A historical subject-didactical genetic analysis of Life Skills education in early childhood

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DECLARATION

I, HANNELIE DU PREEZ (student number 23583487), the undersigned hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature

8 DECEMBER 2015

Date

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DECLARATION

To whom it may concern

I hereby certify that the English language of the following thesis meets the requirements of academic publishing**.** This thesis was linguistically edited and proofread by me, Dr. L. Hoffman.

Title of thesis

A historical subject-didactical genetic analysis of Life Skills education in early childhood

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H. du Preez

Lariza Hoffman

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PREFACE

This inquiry began to take shape in my life with my first realisation that creation, in its full capacity, is orchestrated to produce a perfect symphony[1] to the glory of our almighty Creator. The humble realisation that all creation on earth and beyond is majestically interconnected with one another and, ultimately, with God, for the sole purpose to worship and glorify His name, ignited my curiosity about man, nature and God. The inherent and internal need within me to better understand myself and to make sense of faith, my own lived-experiences, relationships and behaviours of significant others stirred up the need to do a doctorate study. Daily witnessing and experiencing such intense beauty in the world, how more profound and beautiful is God, the creator of heavens and earth!

Throughout my school career and with undergraduate and postgraduate training and development, the knowledge bases of the different science disciplines have fascinated me. I qualified as a teacher in Early Childhood Education with a specific focus on General Science and Special Educational Needs. I completed my first post graduate degree in Educational Psychology with a keen interest in psychometric testing. I continued my studies in Learner Support, Guidance and Counselling, and started to realise how significant, crucial and all-enduring the reciprocal relationships are among humans and their environment, in the quest to understanding their position and their purpose in God. My working experience at an agricultural company confirmed once again the deep desire that has been stirred up in me to better understand this ultimate triad relationship. I pursued a career in teaching knowledge bases of sciences at institutions for both basic and higher education. Lecturing at a university within their faculty of Education Sciences, in the department Early Childhood Development and Education, gave me the opportunity to teach and learn about people and the environment, which has become part of my being in every way. With no coincidence, as I am convinced all happens for a Godly inspired reason, the teaching programmes related to Life Skills and Beginning Knowledge was assigned to me to lecture to emerging teachers. How significant. These two fields of specialisation are embedded within what my body, mind and soul longs for – to begin to understand knowledge that will grow patiently into a skill for life and hereafter.

Given my passion and curiosity for understanding the significance and the extraordinary experiences of all creation, I endeavoured this journey with many struggles. Within this journey, which is only the tip of an enormous iceberg, I have come to face life, nature, myself, and ultimately God. I have lost and loved, but I have gained and grown. I stand in awe of what I have learned and experienced on this journey. This historical research inquiry and my life

[1] Inspiration of the used metaphor is inspired by audio-visual sermon presented by Louie Giglio and distributed by sixstepsrecords® and Sparrow Records® (2014) called Symphony (I lift my hands).

serves as a humble instrument for making a sound that can be orchestrated together with the sounds that heaven, earth and creatures all make as a symphony for our Creator, who is most deserving of all praise.

> The words in Psalms 19:1-4: “1 The heavens proclaim the glory of God. The skies display his craftsmanship. 2 Day after day they continue to speak; night after night they make him known. 3 They speak without a sound or word; their voice is never heard. 4 Yet their message has gone throughout the earth, and their words to all the world” (Bible[2], 2013, p.625).
>
> The words in Psalms 148:1-14: “1 Praise the Lord! Praise the Lord from the heavens! Praise him from the skies! 2 Praise him, all his angels! Praise him, all armies of heaven! 3 Praise him, sun and moon! Praise him, all you twinkling stars! 4 Praise him, skies above! Praise him vapours high above the clouds! 5 Let every created thing give praise to the Lord, for the issued his command, and they came into being. 6 He set them into place forever and ever. His decree will never be revoked. 7 Praise the Lord from earth, you creatures of the ocean depths, 8 fire and hail, snow and clouds, wind and weather that obey him, 9 mountains and hills, fruit trees and all cedars, 10 wild animals and all livestock, small scurrying animals and birds, 11 kings of the earth and all people, rulers and judges of the earth, 12 young men and young women, old men and children 13 Let them all praise the name of the Lord. For his name is very great; his glory towers over the earth and heaven! 14 He has made his people strong, honouring his faithful ones – the people of Israel who are close to him. Praise the Lord!” (Bible[3], 2013, p.699).

[2] Bible. (2013). *The way finding Bible. New Living Translation.* Carol Stream, Ill: Tyndale House Publishers Inc.
[3] Bible. (2013). *The way finding Bible. New Living Translation.* Carol Stream, Ill: Tyndale House Publishers Inc.

ACKNOWLEDGEMENTS

Undertaking this historical research inquiry has changed my life in so many ways and without the invaluable guidance, support and, above all, patience and understanding from the following people, I would not have been able to complete this study. My deepest expression of appreciation and gratitude is not limited to the following mentioned names but also extended to every person, creature, circumstance and event that has crossed my path and helped shaped and (trans)form me into the person who I am today. All praise and honour to God, Son and Holy Spirit for this journey. My life, and this inquiry, is ultimately devoted to the Creator and Knower of all. Above all, I want to dedicate this study and what I have achieved to God Almighty. You have granted me with the character, endurance, time, wisdom, health, capability, and strength to undertake this journey. You brought me to it and ultimately through it.

My thesis is dedicated, in loving memory, to my late fiancé, Malan Smit, who encouraged, comforted, and supported me to pursue this dream of mine to complete such a study and to find true meaning in the triad relationship of God-man-nature. Also, to have had the privilege to share in his precious and innocent sense of humour, to show how proud he was of me, by referring to himself as “future Mister-Doctor Smit”. Also to my late father, Frik du Preez, who voiced his vote of confidence in me and reassured me many times that this journey would be worth it, not just for the product it will produce, but also the person who I will become. You both inspired me to start this journey in 2012, and how I wish you could have accompanied me on the entire journey; your destiny and life journey was different to mine. However difficult it was to continue without your presence, your words, love, support, and confidence in me, the loving memories of you kept me going through those times that I wanted to give up. I miss you both every single day.

It gives me great joy to also dedicate this inquiry to my precious mother and my safe haven, Hannetjie du Preez; my brother in shining armour, Kobus du Preez; my always motivating guardian parent, Louise Veldman; my insightful mother-in-law-to-be, Lelia Weber; and my always encouraging and ever supportive friend, Geoff Odendaal, for making it possible to continue this journey at the midst of great despair and challenges. You always reminded me of my purpose in life and help me (re)focus in those times I wanted to look back and bellow over my situation and circumstances. How blessed can one women be to have three such precious and dynamic mothers as well as a terrific brother and friend in her life.

I want to thank my treasured and valuable colleagues who have become my closest friends, Prof. Carisma Nel, Dr Aninda Adam, Dr Carolien Botha, Dr Julialet Rens, Ms Adri du Toit, Ms Cecile Eloff, Ms Anja Human, Ms Jeannine Keating, and Ms Dedré Victor for your

unconditional support, love, and encouragement, *always*! Also a special word of gratitude to Prof. Ferdinand Potgieter, Prof. Charl Wolhuter, and Dr Pieter Warnich for your guidance and support. Great appreciation to the North-West University, especially Prof. Kobus Mentz and Dr Herman van Vuuren for supporting me through finances, study leave, and attending conferences that enabled and equipped me, in more than one way, to complete this inquiry.

To my language editor Dr Lariza Hoffman. Thank you for dedicating your precious time and energy to linguistically editing and proofreading my thesis and to make sure that it meets the requirements of academic publishing.

I am also extremely grateful for the privilege that was bestowed on me of being selected for the SANPAD/Netherlands Research Capacity Initiative that was presented to a consortium of PhD students selected from the African continent in 2012 and 2013. All the mentors from around the world abetted to equip me with expertise and vital knowledge and skills for succeeding in this Doctoral Study. During this initiative I also met my life-long friends, or the “toight toigers”, as we came to name ourselves during a SANPAD/RCI journey. As friends, and future academic colleagues, they have been my cornerstones during the times of feeling isolated from the world. They were my soundboard and mindfulness that I am not journeying alone, but that together, with their own Doctoral Studies, each of them are right beside me. Thank you Dr Bronwyne Coetzee, Dr Nadia Marais, Ms Tarryn Smith, Mr Marcel van der Watt, and Mr Francois Watson.

To my supporting friends who always kept a watchful eye that I do not neglect my “normal life” and who reminded me to sustain a balanced life and to not miss out on pivotal events; I express my deep indebtedness to you: Ms Daniela Blignaut, Mr Henry Blignaut, Ms Karlien Coetzee, Ms Genie Conradie, Ms Sonet dos Santos, Ms Annelene Edelbacher, Ms Marizaan Esterhuizen, Ms Nadia Esterhyuse, Ms Loraine Geldenhuys, Mr Pieter Greeff, Ms Marisa Greyling, Mr Jacques Heyns, Ms Rouxlani Heyns, Mr Werner Horn, Mr Willem Kleynveld, Ms Esti Kruger, Ms Jane Phawe, Mr Albert Prinsloo, Mr Jacques Prinsloo, Mr Jurgens Schoeman, Ms Andri Schoonen, Mr Christo Smit, Mr Juan Smit, Ms Marike van Eeden, Mr Eben van Zyl, Mr Pieter Vermaak, and Ms Christien Vorster.

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ABSTRACT

The assumption of educationists is that the teaching of Beginning Knowledge, situated in the Life Skills subject within the Foundation Phase curriculum, is not as important as the education of Literacy and Mathematics to learners. However, scholarly work has conveyed that the acquisition and comprehension of Beginning Knowledge concepts and skills, developed through Geography, History, Natural Sciences, and Technology knowledge bases, is essential for cultivating scientific literate citizens for a democratic society and essential knowledge and skills for an ever-changing future.

The purpose of this historical research inquiry was to explicate how the subject Beginning Knowledge has developed historically, by means of critically analysing international and national views on Education, Society and Technology over a period of six hundred and fifteen years. These three accounts were interpreted, by using a hybrid theoretical framework (Cultural-Historical Activity Theory, Ecological Systems Theory, and Media Theory), to explain the complex nature and development of Beginning Knowledge education in the Foundation Phase in South Africa.

The significance of the inquiry is not only in the unique methodological and theoretical framework utilised to investigate the phenomenon, but also the first ever intellectual mapping of this subject within a South African context. It also has the potential for serving as an impetus for future debates and research, especially in South Africa, on the importance of teaching Beginning Knowledge in the Foundation Phase to cater for the necessities of future societies.

This historical research inquiry also announces the compelling truth that Foundation Phase teachers should be trained adequately, with sophisticated knowledge about Beginning Knowledge and how to teach the subject optimally to our future generation of Foundation Phase learners. In the words of Vygotsky in Doyla: “Education must be orientated not towards the yesterday of child development but towards its tomorrow” (2010, p. 10).

Key terms: Beginning Knowledge, Foundation Phase, Life Skills, Hybrid Cultural-Historical Activity Theory, Historical analysis, Sciences Education, South Africa.

OPSOMMING

Die aanname van opvoedkundiges is dat die onderrig-leer van Aanvangskennis, wat aangetref word in die vak Lewensvaardigheid in die Grondslagfase-kurrikulum, nie so belangrik geag word soos die onderrig-leer van Tale en Wiskunde aan leerders nie. Tog deel die literatuur ons mee dat die verwerwing van begrip vir Aanvangskenniskonsepte en -vaardighede, soos aangetref in die kennisbasisse van Geskiedenis, Aardrykskunde, Natuurwetenskappe en Tegnologie, belangrik is vir die ontwikkeling van wetenskaplik-geletterde burgers vir ’n demokratiese samelewing, met kennis en vaardighede wat noodsaaklik is vir ’n deurlopende veranderende toekoms.

Die doel van die historiese navorsingsondersoek was om te verduidelik hoe die vak Aanvangskennis histories oor ’n tydperk van seshonderd-en-vyftien jaar ontwikkel het, deur die kritiese analise van internasionale en nasionale sieninge oor die Opvoedkunde, Samelewing en Tegnologie. Hierdie drie beskouinge is geïnterpreteer deur gebruik te maak van ’n hibridiese teoretiese-raamwerk (Kultureel-Historiese Aktiwiteitsteorie, Ekologiese Sisteemsteorie en Mediateorie) om die komplekse aard en ontwikkeling van dié vak in Vroeë-Kinderopvoeding te verduidelik.

Die waarde van die historiese navorsingsondersoek lê nie net in die unieke metodologiese en teoretiese raamwerk wat aangewend is om die fenomeen te ondersoek nie, maar ook in die feit dat hierdie studie die eerste intellektuele uiteensetting van dié vak in die Suid-Afrikaanse konteks is. Maar des te meer dien dit as ’n potensiële beweegkrag vir toekomstige debatte en navorsingsondersoeke, in die besonder in Suid-Afrika, oor die belangrikheid van die onderrig-leer van Aanvangskennis om voorsiening te maak vir die behoeftes wat toekomstige samelewings mag hê.

Die historiese navorsingsondersoek kondig ook die noodsaaklike waarhede aan dat Grondslagfase-onderwysers doeltreffend opgelei moet word, met gevorderde kennis van Aanvangsleer, en die wyse waarop dit optimaal aan ons toekomstige generasie van Grondslagfase-leerders oorgedra kan word. In die woorde van Lev Vygotsky in Doyla: “Education must be orientated not towards the yesterday of child development but towards its tomorrow” (2010, p. 10).

Sleutelwoorde: Aanvangskennis, Grondslagfase, Hibridiese Kultureel-Historiese Aktiwiteitsteorie, Historiese analise, Lewensvaardighede, Wetenskapsleer, Suid-Afrika.

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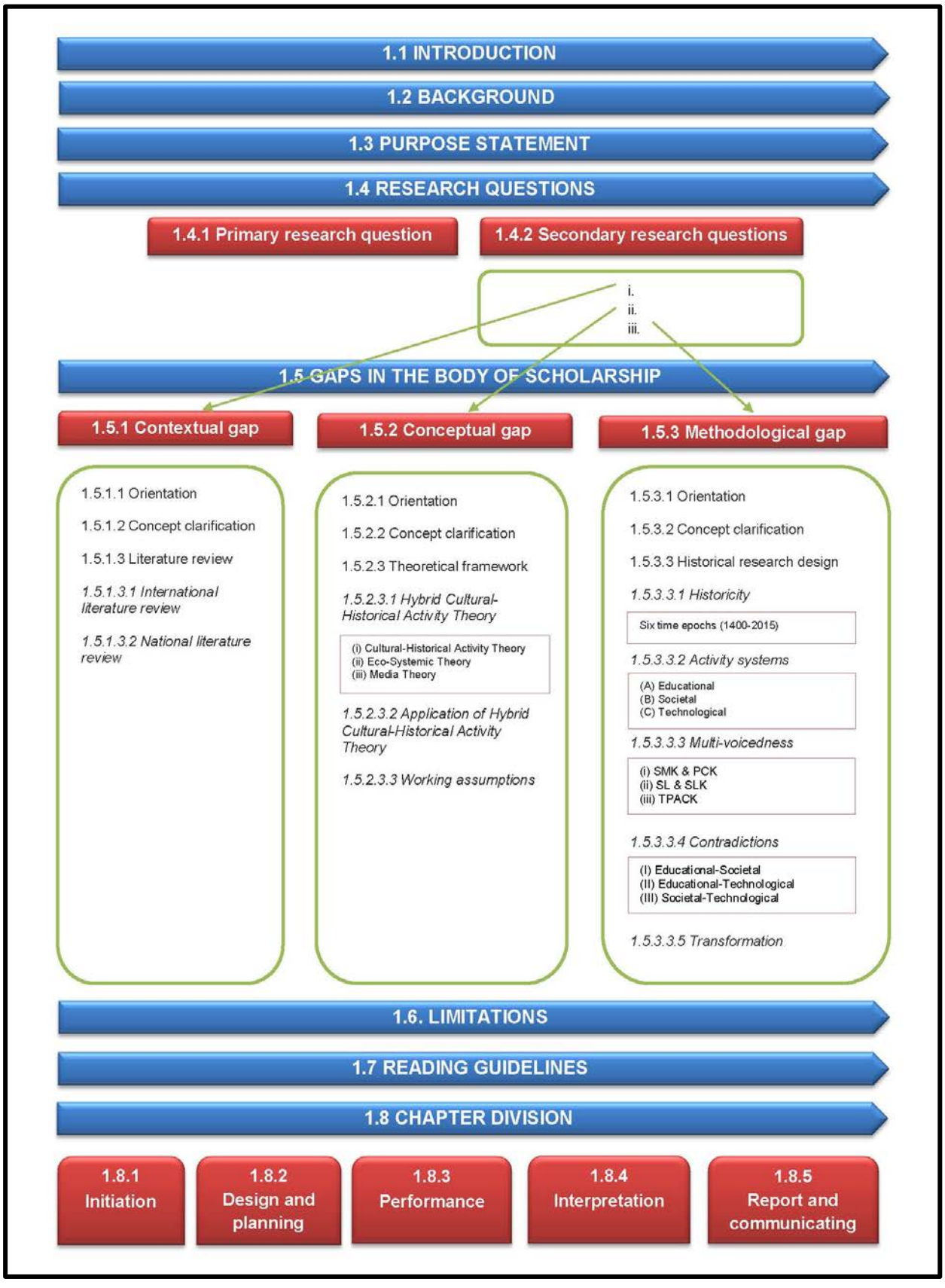
LIST OF ACRONYMS/ABBREVIATIONS

ANA	Annual National Assessment
CAPS	Curriculum and Assessment Policy Statement
CCK	Common Content Knowledge
CHAT	Cultural-Historical Activity Theory
DOBE	Department of Basic Education
DOE	Department of Education
DHET	Department of Higher Education and Training
ECE	Early Childhood Education
GeHiNaTe	Geography, History, Natural Sciences, and Technology
HCK	Horizontal Content Knowledge
HYBRID CHAT	Hybrid Cultural-Historical Activity Theory
KC	Knowledge of Curriculum
KCS	Knowledge of Content and Students
KCT	Knowledge of Content and Teaching
NOS	Nature of Science
PCK	Pedagogical Content Knowledge
RNCS	Revised National Curriculum Statement
SCK	Specialised Content Knowledge
SMK	Subject Matter Knowledge
TPACK	Technological Pedagogical Content Knowledge

CHAPTER 1: INITIATION



1.1 INTRODUCTION

A society desperately needs a historical consciousness – no individual is born with knowledge of the past and therefore an individual has to consciously acquire such knowledge from others like researchers and/or the writing of historians (Booyse, Le Roux, Seroto, & Wolhuter, 2013b; Marwick, 2001). Scholarly work of giants, on whose shoulder we can stand, is of significant value, especially when an intentional effort is made by current researchers to revisit, reinterpret and rethink present realities through historical experiences (Nutbrown & Clough, 2014; Thorburn & Jenkins, 2003). The research done by past extraordinary scholars, such as educationists, scientists, historians, philosophers, sociologists, and psychologists, is still of pivotal importance in current practices even though they are no longer personally present with us to guide us in our thinking, understanding and actions to understand and improve current fields of knowledge (Lascarides & Hinitz, 2000; Nutbrown & Clough, 2014; Verster, Van Heerden, & Van Zyl, 1982a, 1982b). The duty of a historical researcher therefore is to help develop a historical consciousness within society, through saving past voices from being forgotten and generating a full, trustworthy, accurate record of knowledge that is beneficial to current and future generations (Le Roux, 2013a).

Educational historical researchers have an academic and scholarly duty to introduce the history of Education and the historicity of South African education to the teacher community to enhance their teaching in schools (Le Roux, 2013a; Wolhuter, 2013a). Not having a historical knowledge system to fall back on, may result in major “glitches” in knowledge that leaves future generations and societies disconnected and unaware of one another (Asabere-Ameyaw, Sefa Dei, & Raheem, 2012; Le Roux, 2013a; Marwick, 2001; Wolhuter, 2013a). Identifying and considering the importance of historical research inquiries to prevent discontinuities in such knowledge bases, is done by firstly acknowledging the importance of a historical research inquiry and historical mapping. Secondly one then needs to act on this realisation by taking the important step towards reuniting societies and their knowledge bases, which can serve as a stepping stone for the advancement of knowledge bases (Asabere-Ameyaw et al., 2012; Le Roux, 2013a; Wolhuter, 2013a).

Standing at the beginning of the twenty-first century, astonishingly, there have been few debates on the historiographic South African curriculum up to date (Soudien, 2010). This statement implies that the historiography of the curriculum of the Foundation Phase for Life Skills education, which includes Beginning Knowledge education, has also not been investigated extensively. Absence of a systematic review of the historical development of a disciplinary field (Soudien, 2010), thus also implying the Beginning Knowledge curriculum, impoverishes teacher preparation programmes immensely and excludes the curriculum from

benefiting from international developments (Wolhuter, 2013a). A possible reason for the discontinuity and disconnectedness between knowledge societies of the past and the present in South Africa can be partially ascribed to the painful Apartheid regime that South Africans faced (Kallaway, 1984, 1997) and the positing that "Westocentric" or "Eurocentric" knowledge bases are the only knowledge bases worthy of note (Asabere-Ameyaw et al., 2012). A conscious effort made by societies to distance themselves from the excruciatingly discriminating, segregated and inferior education system, could have contributed to some extent to the discontinuity in knowledge systems among diverse racial groups (Asabere-Ameyaw et al., 2012; Kallaway, 1984, 1997). Such historical events of the past cannot be undone; however, they can be reinterpreted, replicated and reviewed, in order to derive new meanings and insights about past knowledge (Nutbrown & Clough, 2014). Acknowledging this painful era in South Africa's history is the first step to revisit, reintroduce and rethink the contributions and mistakes that were made and how it can help shape the future by revisiting and refilling these gaps in the knowledge base (Le Roux, 2013a; Wolhuter, 2013a).

The pursuit of this historical research inquiry by the historical researcher compels the researcher to become a metaphorical time traveller[4], who can travel back and forth between the past, the present and the possible future (Nutbrown & Clough, 2014) to report the diverse dialogues that have taken, are taking, and will take place on the importance of GeHiNaTe education[5] in Early Childhood Education (ECE)[6]. These dialogues are (re)communicated and contextualised within their original historical time period (Nutbrown & Clough, 2014). Their contributing nature is conveyed to current theories and practices to develop a better understanding of how Beginning Knowledge education, embedded in the Life Skills programme, has originated and developed in the Foundation Phase curricula of South Africa. This research inquiry is one of the first national studies, that the researcher know of, relating to the historicity, philosophy, sociology, and science and technology of Life Skills education, with a specific focus on Beginning Knowledge education in the Foundation Phase curricula of South Africa. In other words, research studies on a single aspect, like the history, philosophy, sociology, and/or

[4] The body of scholarship included in this research inquiry predominantly represents the views of those scholars associated with the United States of America and that of Europe. The reason for this selection of work is due to the fact that it is published in English in which the researchers is proficient and competent. Scholarly work published in a language other than English or Afrikaans were therefore not consulted. The focus of this research inquiry was not to generalise data, but rather to introduce the unique South African voice to the body of scholarship.

[5] "GeHiNaTe education" is the acronym used in this inquiry when referring to Beginning Knowledge education in South Africa. The acronym "GeHiNaTe education" is used when referring to international literature, whilst the terms "Environmental Studies" and "Beginning Knowledge" are used respectively in South African curricula before and after the Apartheid years. All of the terminology within this historical research inquiry refers to the formal teaching of subject specific content and skills related to Geography, History, Natural Sciences, and Technology for learners between the ages of five and nine years.

[6] "Early Childhood Education (ECE)" is the synonym term used when referring to Junior Primary Education and Foundation Phase Education in South Africa. The term "Early Childhood Education" is used in international literature whilst the terms "Junior Primary Education" and "Foundation Phase" are used respectively in South African curricula before and after the Apartheid years. All of the terminology within this historical research inquiry refers to the formal teaching of learners between the ages of five and nine years.

science of Beginning Knowledge education, have been conducted; however, a single research inquiry encompassing *all* mentioned aspects has not been conducted, as far as the researcher knows. Without further ado, let the development of a historical consciousness for the Foundation Phase teacher about Beginning Knowledge education in South Africa begin.

1.2 BACKGROUND

The international[7] body of scholarship advocates that the inclusion of GeHiNaTe education in Early Childhood Education is not only interested in the academic prospects of learners acquiring scientific knowledge, skills and values, but also the acquisition of moral and societal awareness, which promotes Scientific Literacy within learners for later citizenship and twenty-first century skills (Hodson, 2008; Roblyer & Doering, 2014; Roth, 2009b). Progressive research focused on the value of teaching GeHiNaTe to the young child because the importance of GeHiNaTe knowledge, skills and values for future vocations, skills and advancements in knowledge bases was recognised (Aikenhead, Orpwood, & Fensham, 2011; Bybee, 1997; Hodson, 2008). However, although these research findings on the inclusion of adept[8] GeHiNaTe education were acknowledged in international curricula, it has not necessarily been welcomed into the intended South African school curricula.

Early Childhood Education, especially in South Africa, was predominantly concerned with teaching learners basic educational skills, like how to read, write and do arithmetic, even though historians and contemporary scholars conveyed that learners can acquire more complex knowledge bases than just these basic educational skills (De Melendez, Beck, & Fletcher, 2000; Fleer & Pramling, 2015; Hodson & Hodson, 1998). Based on such past ideologies that basic educational skills should be the main focus of education in the early years, it might seem foreign at first to also debate the importance of including adept GeHiNaTe education in the early years. However, the justification of the importance of GeHiNaTe education in the early years, by utilising a historical research inquiry approach, might place role-players in an uncomfortable position that presses for a change in contemporary thinking and viewing of Early Childhood Education (Nutbrown & Clough, 2014). Due to the dominant focus on Language and Mathematics education in South Africa, it might be true that a Foundation Phase teacher will not be able to explain surely what Beginning Knowledge entails, what its purpose is, where it has

[7] "International" refers to the body of scholarship outside of the South African context, whilst "national" refers to the body of scholarship inside the South African context.

[8] Reference to "adept" GeHiNaTe knowledge and skills emphasises the need for acquiring scientific concepts and skills by the Foundation Phase learner that fosters habits of mind and promotes scientific thinking and reasoning, and differs from acquiring not mere lay knowledge about the environment. This specific term "adept" is also used in scholarly work of Asabere-Ameyaw, Sefa Dei, and Raheem (2012).

originated from, how it has developed historically or what the future of the subject is. Having an inept understanding of Beginning Knowledge as subject in the Foundation Phase has a ripple effect that surges into the heart of education at all levels. The teacher may find it difficult to make informed decisions when selecting and distinguishing between appropriate philosophical, pedagogic, didactic, subject-content, and assessment strategies of Beginning Knowledge, that will not only affect his/her teaching but also what the Foundation Phase learner will be learning or not learning (Cooper & Sixsmith, 2003; Dever & Falconer, 2008; Shulman, 1986, 1987).

A historical research inquiry of Early Childhood Education and GeHiNaTe education does not implicate a chronological sequence of historical events, but rather emphasises the mediated interactions, multi-voices, contradictions, and transformations that took place within this field at different historical points in time (see Heading 3.3), which contributed to stagnation or progress of this field of specialisation (Engeström, 2001; Wolhuter, 2013a, 2013b). To truly understand the view that national scholars have about the importance of the teaching of Beginning Knowledge in the Foundation Phase, and that international scholars have about GeHiNaTe education in the early years, requires a historical and epistemological investigation to be carried out with pedagogical intent (Guisasola, 2014; Hodson, 1988; Roth, 2009b). With this historical research inquiry it is hoped that a contribution will be made to the historical consciousness of the Foundation Phase teacher community on the importance of Beginning Knowledge education in South Africa (Le Roux, 2013a; Marwick, 2001; Wolhuter, 2013a).

1.3 PURPOSE STATEMENT

The purpose of this historical research inquiry was to discuss how Beginning Knowledge education, located within the subject Life Skills, in the Foundation Phase curriculum in South Africa, has possibly originated and developed historically. There are currently four subject focal areas marginalised under the collective name “Life Skills education” within the Foundation Phase curriculum of South Africa. This historical research inquiry focused exclusively on the Beginning Knowledge education, which included Geography, History, Natural Sciences, and Technology as content areas.

1.4 RESEARCH QUESTIONS

According to Mouton (2001), the conceptualisation of a research question(s) requires thorough consideration before being formulated, as these questions serve the purpose of guiding the

researcher towards a specific research outcome. Mouton (2001) explained that the research question should be feasible and authentic as it is firmly grounded within and justified by the preliminary review of the body of knowledge. Vithal and Jansen (2004) concurred with this statement by indicating that a research question is directly linked to the statement of purpose and demonstrates a conceptual link between the identified keywords. Mouton (2001) emphasised the importance of judiciously considering and identifying the most appropriate research design for the inquiry. The methodological approach should also be reflected in the question(s) (Mouton, 2001). Mouton (2001) also explained that the research questions indicate the process that will be followed for the research inquiry. This notion were further emphasised by Vithal and Jansen (2004) who advised the researcher to consider the sequence and logical connections between the research questions and to formulate each question in such a way that each is self-explanatory and apparent to the reader. Trafford and Leshem (2008) guided the researcher towards attaining a feasible inquiry, by exclaiming how important the theoretical and conceptual frameworks are for the entire research inquiry and that all these entities within the process should be appropriate, coherent and integrated at every level. The research questions are conceptualised as follows, taking into consideration the recommendations from the mentioned scholars:

1.4.1 Primary research question

How did Life Skills education, with specific focus on Beginning Knowledge, develop historically as a subject domain within the Foundation Phase curricula in South Africa?

1.4.2 Secondary research questions

(i) How did the respective activity systems, namely the Educational, Societal and Technological activity systems, contribute to the historical development of Beginning Knowledge, by utilising a vertical analysis? (Contextual gap) (see Headings 1.5.1 and 5.3.1.1.1)

(ii) How did a conglomeration of the Educational, Societal and Technological activity systems contribute to the historical development of Beginning Knowledge, by utilising a horizontal analysis? (Conceptual gap) (see Headings 1.5.2 and 5.3.1.1.2)

(iii) How did a historical research design, as research methodology, contributed to making sense of the development of Beginning Knowledge education? (Methodological gap) (see Headings 1.5.3 and 5.3.1.1.3)

This concludes the brief overview of what this historical research inquiry pertains to. The following discussion will now set forth the justification for this study through identifying three categories of gaps in the body of scholarship which are also represented by the three secondary research questions. These categories are presented as contextual, conceptual and methodological gaps, which embody the body of scholarship, the theoretical framework, and the research design respectively. Each of these gaps is introduced with a unique orientation paragraph, different clarification of concepts and a discussion that sets the stage for further discussions.

1.5 GAPS IN THE BODY OF SCHOLARSHIP

According to Maree and Van der Westhuizen (2009), the most suitable and enthralling justification for a research inquiry is to identify and communicate the gaps, stillnesses, inconsistencies, silences or challenges evident in the body of knowledge. Interpreting Mouton's (2001, pp. 137-142) work concurred with this statement, by stating that when a researcher is conceptualising a research problem, he is in the process of translating a "real-life" problem into an intellectual research problem, which can be investigated.

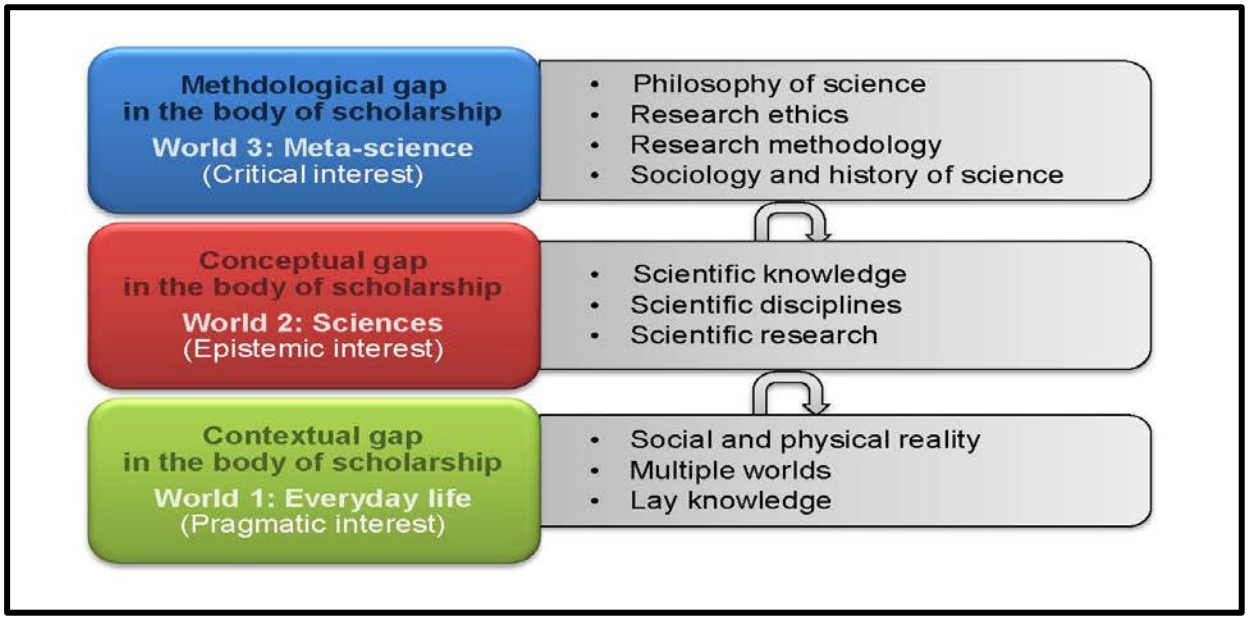


Figure 1.1: Gaps in the body of scholarship as presented through the Three Worlds Framework

(Adapted from Maree & Van der Westhuizen, 2009, p. 8; Mouton, 2001, p. 139)

The process of intellectualising a concrete problem can be explained by referring to Mouton (2001) and Maree and Van der Westhuizen (2009), using the Three Worlds Framework, which concurs with the three categories of gaps in the body of scholarship identified for this research inquiry. The Three Worlds Framework, introduced by Mouton (2001), exemplifies the point that a research inquiry about a phenomenon often requires different levels of inquiry. This framework is brought into perspective with Maree and Van der Westhuizen's (2009) description of categories of gaps that are evident in literature. The contextual weakness (see Heading 1.5.1) in the body of scholarship, identified by Maree and Van der Westhuizen (2009), correlates with the description of World 1 by Mouton (2001). Conceptual silences (see Heading 1.5.2) in literature relate with those of World 2, and methodological gaps (see Heading 1.5.3) in conducting research closely resonate with those of World 3.

By utilising such categories of gaps, the researcher is empowered to demonstrate the understanding that there are different types of gaps in the body of scholarship which require different levels of thinking, reasoning and analyses, and also that there is a strong interplay between these worlds or categories of scientific research and everyday life (Mouton, 2001). Demonstrating an awareness for different worlds of investigation by a researcher, communicates the awareness that a researcher has that there is a perceptible research problem in a physical world, which can also be formulated and communicated on an abstract or intellectual level (Mouton, 2001). Functioning on different levels of reasoning and analyses demonstrates how abstract methodological decisions impact on the way the researcher investigates and addresses perceptible real-life phenomena, and also demonstrates how philosophical and ethical issues can have an impact on how researchers think and act within the real world (Mouton, 2001).

1.5.1 Contextual gap in the body of scholarship

1.5.1.1 Orientation

World 1 of everyday life, also referred to as the "world of pragmatics", enabled the researcher to identify the contextual gap in the body of scholarship (Maree & Van der Westhuizen, 2009; Mouton, 2001). As presented in the figure (see Figure 1.1), individuals in the world of everyday-life interact on a social and physical level, and the knowledge used to address problems that occur at this level, is called "lay knowledge". When a problem occurs at this level, that cannot be resolved with lay knowledge or with information available in everyday life, then further research is required.

In order to understand the present intended curriculum for Beginning Knowledge education in South Africa, the researcher had to access the national body of scholarship on how it originated and developed. By first understanding the past and present view of a subject, it can then be re-examined, rediscovered and renewed for the future. The researcher had to understand what the nature and purpose for Beginning Knowledge education in the Foundation Phase was. This required a thorough understanding of the subjects' historical development and implementation in schools: the philosophical assumptions adopted for education; the pedagogy approach used to teach the Foundation Phase learner; the rationale for including or excluding the subject; the selection of content, language and skills to be educated to the learner; the inclusion and integration of Technology, media and tools in teaching the subject; and the level of training and knowledge that the teacher requires, to name a few examples. The body of scholarship on the historicity of Beginning Knowledge in South Africa is vague, incomplete and extremely difficult to access and interpret. The Beginning Knowledge curricula has not been intellectually mapped out and thus requires more than everyday knowledge to comprehend and communicate.

1.5.1.2 Clarification of concepts

The following table (Table 1-1) is a list of concepts with definitions which are referred to when discussing the contextual gap in the body of scholarship. These definitions communicate the scholarly accepted notions about these concepts in the body of scholarship about Early Childhood Education and GeHiNaTe education. There is rarely one universal definition to describe a concept. But for the purposes of this discussion on the contextual gaps in knowledge, the supplied definition of each corresponds with the researcher's understanding of these concepts and how they are discussed in the literature.

Table 1-1: Clarification of concepts used in the contextual gap of knowledge

Concept	Clarification
Apartheid	Term often used loosely to include all forms of racial segregation. It was coined to refer to the policy adopted by the National Party (NP) in the early 1940s to extend existing segregation, to make it more comprehensive, apply it more rigorously, and broaden its application (Saunders & Southey, 1998, p. 12).
Beginning Knowledge	In the Curriculum and Assessment Policy Statement (CAPS) the subject, Life Skills in Foundation Phase (Grades R-3), has been organised into four study areas, namely Beginning Knowledge, Personal and Social Well-being, Creative Arts and Physical Education. Life Skills has been organised in this manner, in

	order to ensure that the foundational skills, values and concepts of early childhood development and of the subjects offered in Grades 4-12 are taught and developed in Grades R-3 (Department of Education, 2011b, p. 8). The content and concepts of Beginning Knowledge have been drawn from Social Sciences (Geography and History), Natural Sciences and Technology. The key concepts and skills relating to these disciplines are described in the curriculum, at Foundation Phase level (Department of Education, 2011b, p. 8).
Childhood	Early part of the life-course; the institutional arrangements that separate children from adults and the structural space created by these arrangements that is occupied by children (James & James, 2012, p. 14).
Childhood studies	The interdisciplinary study of the early period of the human life-course that is legally recognised and socially (as well as, in part, scientifically) defined as childhood, as distinct from adulthood (James & James, 2012, p. 18).
Citizenship	A status that is given to members of a community who share those rights, responsibilities, duties and adopt those social practices that are intrinsic to belonging to and being a responsible member of that community and who, in return, share in the resources that are distributed within that community (James & James, 2012, p. 27).
Curriculum	Two common ways of understanding the term – curriculum as a plan or description, and curriculum as a practice (Hoadley & Jansen, 2003, p. 4). Although there are different definitions, views and aspects of curriculum, for this inquiry this concept refers to the curriculum plan and not the practice. Curriculum plans… They list content and concepts to be learnt… They organize and sequence learning. They provide ideas about how learners should learn and how teachers should teach (Hoadley & Jansen, 2003, p. 25). According to Reed, Gultig and Adendorff (2012, p. 30) also quoted by Du Preez and Simmonds (2014, p. 4): …a curriculum encapsulates the school subjects and also the minimum knowledge, skills and values that a learner must acquire within this subject, possible guidelines on how this subject and knowledge can be taught in classrooms, and to articulate what are important knowledge, skills and values for learners and society as communicated by curriculum designers and policy makers.
Collection curriculum	Carrim and Keet (2005), Du Preez (2008), and Hoadley and Jansen (2003) described a collection curriculum as characterised as subject areas and contents that are closely linked but taught as separate entities. The boundaries to keep the content apart are strong in structure. This curriculum corresponds with the sets of curriculum practices that are associated with a performance curriculum. The performance curriculum can be associated with the education system during the Apartheid regime.
Early Childhood Education	A comprehensive approach to policies and programmes for children from birth to nine years of age with the active participation of their parents and caregivers. Its purpose is to protect the child's rights to develop his or her full cognitive,

(ECE)	emotional, social, and physical potential (Department of Education, 2001, p. 14).
Environ-mental Studies	Aims to educate people about the natural environment and the interaction of humans, with strong focus on sustainable lifestyles (McCulloch & Crook, 2008, p. 227). In the curriculum of South Africa (Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991) this subject incorporated, amongst others, topics related to Geography, History, Life Sciences, Natural Sciences, and Technology.
Didactics	Didactics can be described as a methodological study of pedagogical sciences. It is concerned with teaching-learning processes in different cultural and cross-cultural settings (McCulloch & Crook, 2008, p. 169).
Foundation Phase	"Foundation Phase" is a South African concept, which refers to the teaching and learning of Literacy/Languages, Numeracy/Mathematics and Life Skills by learners typically aged six to nine years old, in Grade R, 1, 2 and 3. …Foundation Phase, from the beginning of Grade R to the end of Grade 3. Each learning Programme should cover planning for the full period of 3 years (Grades 1-3) or 4 years (Grades R-3) if the school offers a reception year (Clever Books, 2008, p. 7)
Integrated curriculum	Carrim and Keet (2005), Du Preez (2008), and Hoadley and Jansen (2003) described an integrated curriculum as characterised by subject areas and contents which are not as strongly related to one another, but taught holistically. The boundaries to keep the content apart are weakly structured. An integrated curriculum is associated with the curriculum practices of a competency curriculum. The competency curriculum can be associated with the education system after the Apartheid regime.
Life Skills education	The Life Skills subject is central to the holistic development of learners. It is concerned with the social, personal, intellectual, emotional and physical growth of learners, and with the way in which these are integrated (Department of Education (DoE), 2011, p. 8). Life Skills is a cross-cutting subject that should support and strengthen the teaching of the other core Foundation Phase subjects, namely Languages (Home and First Additional) and Mathematics (Department of Education, 2011, p. 8).
Pedagogy	Pedagogy can be defined as the general principle of effective teaching; entailing a complex blend of theoretical understanding, practical skills and competencies. Traditional definitions describe pedagogy as either the science (theory) or the art (practice) of teaching, which makes a difference in the intellectual and social development of students. Various pedagogical models have been based on the structure of knowledge, and how that is deployed through effective teaching strategies in different subject disciplines" (McCulloch & Crook, 2008, p. 429).
Scientific Literacy	There is no consensus about a definition for Scientific Literacy. The term is used in research studies, in discussions and analyses of science education goals, in assessment programs, and in curriculum embodiments such as policies, programs, and teaching resources (Roberts, 2007, p. 1).

	The goal of science education as described by current science education reforms. The components of scientific literacy include being familiar with the natural world, understanding the key concepts and principles of science, being able to employ scientific ways of thinking, recognising the science as a human enterprise, and using scientific knowledge and ways of thinking to make informed decisions (Settlage & Southerland, 2012, p. 28). Refers to the understanding of the basic knowledge concepts, the nature, differences and skills associated with a subject. Furthermore, the interrelationship between the subject and the society/humanity. Preparation of citizen with the knowledge, skills and dispositions to function (for example socially, politically, academically) within the geographical boundaries based on subject matter that promotes citizenship (for example thinking skills, habits of mind, digital technology, service learning and cooperative learning) (Hodson, 2008; McCulloch & Crook, 2008).

1.5.1.3 Literature review

The contribution of knowledge to an existing body of scholarship has a recognisable identity. Such scholarly work usually consists of a typical structure of knowledge, has a rationale and orientation for the research inquiry and a theoretical and conceptual framework (Trafford & Leshem, 2008). A clear methodology of data generation and/or selection strategies are communicated, as well as how data was analysed and interpreted (Trafford & Leshem, 2008). The researcher's tone of voice resembled dedication to critically engage with symbolic text about the research problem and to finally convey his/her understanding and to humbly contribute to the body of knowledge that he/she has studied (Trafford & Leshem, 2008). A corpus of knowledge, belonging to different disciplines, does not exist in isolation; to the contrary, it is important that knowledge systems and cultural tools should be shared and integrated with other fields of knowledge (Trafford & Leshem, 2008). For this reason, this research inquiry tapped into fields of Education, Psychology, Methodology, Philosophy, History, and Anthropology, to name only a few.

Major contributions were made by international scholars to map out the intellectual terrain of Childhood Studies[9] and also give historical and philosophical accounts of the development of Early Childhood Education[10]. Theoretical inquiries from a Vygotskian[11] account increased

[9] (Caruso & Temle-Fawcett, 2007; Dever & Falconer, 2008; File, Mueller, & Wisneski, 2012; James & James, 2012; Jenks, 2002; Krogh & Morehouse, 2014; Leira & Saraceno, 2008; Maynard & Powell, 2014; Meier & Marais, 2007; Morrison, 2004; Nadesan, 2010; Prout, 2005; Qvortrup, 2005; Roopnarine & Johnson, 2009; South African Association for Early Childhood Edcuation (SAAECE), 1980; Swiniarski & Breitborde, 1998; Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2010; Tarlov & Precourt-Debbink, 2008; Wortham, 2006)

[10] (Ariès, 1962; Dever & Falconer, 2008; File et al., 2012; Heywood, 2001; Hinitz, 2013; Holland, 2004; James & Prout, 1997; Jenks, 2002; Lascarides & Hinitz, 2000; Luke, 1989; Nutbrown & Clough, 2014; Pound, 2011; Quisenberry, Eddowes, & Robinson, 1991; Stearns, 2005)

[11] (De Witt, 2009; Doyla, 2007; Edwards, 2009; Gupta, 2006; Hatch, 2007; Holzman, 2009; Kozulin, Gindis, Ageyev, & Miller, 2003; Kozulin, Gindis, Ageyev, & Miller, 2003; Kozulin, 2004; Langford, 2005; Pound, 2011; Roth & Lee,

(Cultural-Historical Activity Theory) and the use of specific methodological approaches[12] to research Early Childhood Education was also more prevalent. In relation to the subject domain itself, a significant amount of studies were conducted on the importance and implementation of GeHiNaTe education,[13] incorporating Geography, History, Natural Sciences, and Technology education, in the early years.

In order to understand the nature of GeHiNaTe education, a search (utilisation of virtual and physical storage facilities where data was kept) on the nature of pure Sciences[14] doctrines was also conducted. This search resulted in ample findings on the historical, philosophical and sociological accounts related to Sciences, inventions and technological devices. As already stated, the hope expressed by society is to cultivate learners who can become Scientific Literate[15] citizens within the society, who will demonstrate diverse twenty-first century[16] skills. Because it is believed that GeHiNaTe education fosters scientific thinking and reasoning for Scientific Literacy, this domain also had to be explored. Finally, South African research studies about Curriculum Studies[17] were also consulted, in search of those studies and scholarly work that relate specifically to the diverse intended curricula utilised in the early years. It is important to note that this historical research inquiry utilised the intended curriculum documents that were accepted by the education system of the day, but the way that the teacher interpreted it and implemented it in the classroom was acknowledged but not analysed in this historical research inquiry. In terms of Curriculum Studies, various efforts were made to research and establish a historiographical account of the curriculum-designing process within the South African context; however, such an account for the Foundation Phase curriculum has not yet been recorded. Based on this discussion, the map for the most dominant research topics conducted in Early Childhood Education, nationally and internationally, can be illustrated as follows in Table 1-2:

2007; Sannino, Daniels, & Gutiérrez, 2009c; Smidt, 2009; Smith, Dockrell, & Tomlinson, 1997; Van der Veer & Valsiner, 1994; Van Oers, Wardekker, Elbers, & Van der Veer, 2008; Virkkunen, 2009; Vygotsky, 1978, 1986, 1997b; Wertsch, 1985)

[12] (Aubrey, David, Godfrey, & Thompson, 2000; Fenstermacher, 1978; Hatch, 2007)

[13] (Brown, 1991; Bybee, 2010; Chaillé & Britain, 2003; Cooper, 2013; Davies, 2010; Davies & Gilbert, 2003; De Melendez, Beck, & Fletcher, 2000; DeBoer, 1991; DeVries, 2005; Fleer & Pramling, 2015; Glauert & Manches, 2012; Haugland & Wright, 1997; Hodson & Reid, 1988; Hodson, 1988; Lind, 2005; Roopnarine & Johnson, 2009; Roth, 2009b; Scoffham, 2013; Seefeldt, Castle, & Falconer, 2014; Siu & Lam, 2005)

[14] (Aicken, 1991; Devlin & Bokulich, 2015; Erduran & Dagher, 2015; Fuller, 2006; Hodson, 1988; Kaku, 2011; Kuhn, 1996; Matthew, 2014a, 2014b; McClennan & Dorn, 1999; Pisano, 2015; Roth, 2009b; Trefil & Hazen, 2007)

[15] (Aikenhead, Orpwood, & Fensham, 2011; Airey & Linder, 2011; Allan & Allan, 2003; Bailey, 1998; Bybee, 1997; Costa & Kallick, 2009; DeBoer, 2000; Eshach, 2006; Green, 2014; Hodson, 2008; Linder et al., 2011; Roberts, 2007, 2011; Roth, 2003; Zeidler, & Kahn, 2014)

[16] (DeVries & Jones, 2009; DeVries, 2005; Dhanarajan, 2002; Fiedler & Väljataga, n.d.; Koehler, Mishra, Kereluik, Shin, & Graham, 2014; Mishra, Koehler, & Henriksen, 2011; Mishra & Koehler, 2006; Nadesan, 2010; Orey, Jones, & Branch, 2013; Roblyer & Doering, 2014; Rückriem, 2003; Siu & Lam, 2005)

[17] (Beckmann, 2011; Behr & McMillan, 1971; Behr, 1988; Booyse, Le Roux, Seroto, & Wolhuter, 2013a; Coetzee, 1958, 1963; Hoadley & Jansen, 2003; Jansen, 1999; Kallaway, 1984, 1997; Le Grange, 2010; Le Roux, 2013a; Pinar, 2013, 2013; Soudien, 2010, 2010; Wolhuter & Karras, 2013)

Table 1-2: Dominant research topics conducted in Early Childhood Education

Pre-Primary, Language and Mathematics education	GeHiNaTe education	Early Childhood Education and Child Psychology
• Subject-Matter Knowledge and Pedagogical Content Knowledge relating to Language and Mathematics education • Early Childhood Education research projects for the promotion of Pre-Primary, Language and Mathematics education • Development of educational and psychological assessment tools. These tools are primarily developed to assess learners' school readiness, and Language and Mathematics abilities, and are implemented to address learning barriers in reading, writing, arithmetic, et cetera • Teacher preparation programs are predominantly focused on developing knowledge and skills within teachers for Pre-Primary, Language and Mathematics education	• Subject-Matter Knowledge and Pedagogical Content Knowledge for GeHiNaTe education, in order to better support learners to acquire basic educational skills • The influence of the environment and nature on knowledge acquisition in the early years • Role of technology, media and educational tools for teaching in Early Childhood Education environments • Acquisition of Science and Scientific Literacy for the 21st century • Acquisition of Technology and Technological Literacy for the 21st century • Acquisition of Social Sciences knowledge bases for citizenship • Development of emotional and moral awareness for Socio-Scientific Issues through GeHiNaTe education	• The pedagogical, historical, didactical, theoretical, philosophical, and psychological views on the development of the young child and how they learn • The holistic development of the young child (cognitive, physical, social, moral, emotional, et cetera) • Policies, acts and regulations on child care, the rights of the young child, and supervision • Societal and familial influences on the development of the young child and how this influence teaching and learning in the early years • Diverse factors influencing the development and implementation of Early Childhood Education curricula, and educational and social policies and procedures • The implementation, adapting and/or development of theories for teaching and learning in the early years • Division in scholarly work about informal education (age 0-5 years) and formal education (6-9 years) • Learner and learning support and inclusive education

As depicted in the table (see Table 1-2), an immense body of scholarship is available on Early Childhood Education, within the disciplines of Pre-Primary, Language and Mathematics education. Less focus has however been dedicated to the importance of Arts, Physical and Music education, especially when learners enter a more formal school programme (Grade 1, 2 and 3). When looking at the table (see Table 1-2) and the diverse topics researched under Pre-Primary education, as well as Language and Mathematics education, these topics seem to have received more attention in comparison with the body of scholarship about GeHiNaTe education in Early Childhood Education, which can be considered a relatively young and less researched field of knowledge.

1.5.1.3.1 International review

Internationally, there has been a prominent focus over decades on how to cultivate scientifically thinking communities across different social contexts (Allan & Allan, 2003; Costa & Kallick, 2009; Green, 2014a; Mishra, Koehler, & Henriksen, 2011). This demand of society to heighten the scientific intellectual levels within citizens, requires the education systems to equip learners from early ages with such habits of minds (Adey, 2003; Bybee, 1997; Eshach, 2006; Kaku, 2011). GeHiNaTe education in Early Childhood Education can better help prepare learners for the demands of socio-economic and political circumstances and help learners advance with the eras of information and digitisation (Adey, 2003; Bybee, 1997; Eshach, 2006; Kaku, 2011). Learners must be made aware of their environment in such a way that raises scientific thinking within them and stimulate the ability to to philosophise and wonder about the world they live in, as well as engage with it, discover it and question it (Fleer & Pramling, 2015; Glauert & Manches, 2012; Hodson, 2008). Scientific thinking should also serve to complement and improve learners' understanding of current science and technological events, devices and processes that occur naturally within their environment (Eshach, 2006). When one considers the fostering habits of scientific thinking, the question arises as to what this entails; Roth (2009b, p. 1) elaborates on this thinking as follows:

> The definitions of science have always been in terms of science content from a scientific perspective and in terms of disembodied forms of knowing. The definitions had little or anything to say about the tremendous experiences and competence everyday people (including students) have especially when they are uninstructed in science; and they had little to say about how science and science education could assist every day, ordinary, and just plain folk in and with the problematic situations that they face in their on-going lives.

With this statement, Roth (2009) did not exclaim that GeHiNaTe education was not important, but rather that the context and feasibility of scientific knowledge and thinking for the lay person or indigenous groups should also be acknowledged. GeHiNaTe education is not only for a select group of people, but for everyone (Hodson, 2008; Roth, 2009b). The development of thinking communities therefore requires an informed and trained understanding of knowledge and engagement with the environment and people. These requirements are fostered by GeHiNaTe education that is represented by content areas associated with Geography, History, Natural Sciences, and Technology (Chaillé & Britain, 2003; Cooper & Sixsmith, 2003; De Melendez et al., 2000; DeVries & Jones, 2009; Eshach, 2006; Fleer & Pramling, 2015; Hodson, 1988; Lind, 2005; Seefeldt, Castle, & Falconer, 2014).

At no point was the importance of Language and Mathematics education dismissed or questioned; in fact, it is the way that these subjects can collaborate to promote and cultivate Scientific Literacy within learners from a young age that was considered (Hodson, 2008). Without Language and Mathematics education, learners will not understand or be able to participate in GeHiNaTe debates, because the acquisition of concepts, language and skills related to GeHiNaTe is dependent on the acquisition of basic educational skills associated with reading, writing and arithmetic (Hodson, 2008). However, acknowledging the importance of these subjects in Foundation Phase curricula does not mean that GeHiNaTe education should give way to these knowledge and skills; rather, what is in fact required, is a healthy balance when teaching all these subjects.

The education of GeHiNaTe enables the learner to experience the world through his/her senses and give meaning to these experiences by means of language and thinking (Eshach, 2006). International scholars dedicated their research efforts towards justifying GeHiNaTe education in the young child, which can be broadly listed under the following themes:

(i) Scientific Literacy, and therefore scientific thinking and reasoning skills, can be developed through GeHiNaTe education.

(ii) The learner in Early Childhood Education is capable of acquiring and comprehending concepts, language and skills associated with GeHiNaTe education.

(iii) Early exposure to GeHiNaTe education initiatives could promote positive attitudes towards acquiring, understanding and applying more sophisticated scientific knowledge, language and skills.

(iv) Early exposure to GeHiNaTe education within an informal approach to education, like pre-school, leads to a better understanding and acquisition of scientific knowledge, language and skills, when introduced to it in a more formal learning environment, like primary grades.

(v) Sciences and Scientific Literacy requires language and cultural tools to be acquired and conveyed and should not be taught separately from Language and Mathematics Education.

(vi) It is in the nature and character of the young child to observe, explore and discover the environment in a curious, spontaneous and playful manner and this demonstrates how important it is for the learner to interact with his environment and even with a knowledgeable adult.

(vii) Developmental theories emphasise that the young child should be educated on understanding his/her own personal, social and emotional well-being. How to relate to others, and the role of emotive factors, are key components which are researched and addressed in GeHiNaTe education.

It seems from the above listed research topics that international scholars' research is undergoing some sort of shift, which acknowledges the potential that the teaching of GeHiNaTe has in Early Childhood Education, to promote citizenship, awareness for Socio-Scientific Issues and Scientific Literacy.

1.5.1.3.2 National literature

The international view on the importance of including substantial education opportunities for GeHiNaTe education in the early years looks surprisingly different to the current intended curricula in South African schools. As stated in the previous discussion, a global appreciation by international scholars confirmed that the education of GeHiNaTe subjects in the early years is crucial as it serves as the frame of reference on which Scientific Literacy, citizenship, awareness for Socio-Scientific Issues, and scientific thinking and reasoning abilities is established for current and future practices (Chaillé & Britain, 2003; De Melendez et al., 2000; DeBoer, 1991; Eshach, 2006; Fleer & Pramling, 2015; Glauert & Manches, 2012; Hodson & Reid, 1988; Ratcliffe & Grace, 2003; Seefeldt et al., 2014).

The intended South Africa curriculum of Beginning Knowledge education in the Foundation Phase does not adequately acknowledge the crucial knowledge bases acquired when learning Beginning Knowledge (Department of Education, 2011). Therefore it can be deduced that the development of Scientific Literacy skills, as well as scientific thinking and reasoning abilities for today and the future, are also possibly downplayed. International literature states that Language, Mathematics and GeHiNaTe education deserves equal status and attention in early childhood; however, South Africa considers Language and Mathematics education as more important than Life Skills Education. The South African reformed competency curriculum does envision a learner who is Scientific Literate, but the Foundation Phase learner is not necessarily explicitly taught this, due to the dominant focus on Language and Mathematics education (Green, 2014; Department of Education, 2011; The Centre for Development and Enterprise, 2015). The following points reflect the current status of Beginning Knowledge education in the Foundation Phase in South Africa that supports the previous statements, leading to the detriment of developing Scientific Literate learners and citizens for a democratic South African society:

(i) Scientific Literacy and scientific thinking and reasoning abilities are acknowledged in the general outcomes of the latest curriculum, but it is not appropriately included in the specific outcomes in the Foundation Phase curriculum (Department of Education, 2011b). These outcomes should be stated within the Beginning Knowledge curriculum but it is not explicitly stated (Department of Education, 2011b).

(ii) The teaching of GeHiNaTe education in the early years is located under the term "Beginning Knowledge" as focus area, which is embedded under the collective name "Life Skills". Life Skills, as subject, is further divided into four foci, namely Beginning Knowledge, Creative Arts, Physical education, and Personal and Social well-being (Department of Education, 2011b). Furthermore, the teaching of Beginning Knowledge, as focus, is then merged with the Personal and Social well-being focus area and taught as one entity (Department of Education, 2011b, p. 14).

(iii) The educational depiction for GeHiNaTe education changes dramatically when the Foundation Phase learner exits this educational band and enters the Intermediate Phase (Grade 4 to 6) educational band (see Heading A.3.2.1.3). The collective name "Life Skills" falls away and Social Sciences, Natural Sciences and Technology are taught as independent subjects (Department of Education, 2011b, p. 6).

(iv) The time allocated for the teaching of Languages, Mathematics and Life Skills in the Foundation Phase is not equally divided. The Foundation Phase learner typically receives 23-25 hours of education, of which less than 10% is designated to teaching Beginning Knowledge concepts and skills (Department of Education, 2011b, p. 6). Beginning Knowledge, as subject that teaches Geography, History, Natural Sciences, and Technology concepts and skills, receives approximately 1% to 2% of the allocated time, which is approximately 15 to 30 minutes per week (Department of Education, 2011b, p. 6).

(v) The Annual National Assessment (ANA), conducted in South African schools, is an effort by government to improve the quality and implementation of the curriculum (Department of Education, 2010). This national measurement aims to report to various educational stakeholders the milestones that have been reached in the provision of quality basic reading, writing and arithmetic education (Department of Education, 2010). The Annual National Assessment (ANA) conducted in South Africa only reports on Mathematics and Language development and progression of the Foundation Phase learner; therefore, it seems as if the importance of Life Skills achievement is not considered (Department of Education, 2010).

(vi) Misconceptions and/or false perceptions, held by teachers, parents and curriculum developers, are reported by researchers, regarding the inclusion of GeHiNaTe education in the early years (Fleer & Pramling, 2015; Hodson & Reid, 1988; Matthew, 2014b). It is believed that the teaching of these knowledge bases in the early years is inappropriate, too difficult and not age-suitable, and should be left for later years of education (Fleer & Pramling, 2015; Hodson & Reid, 1988; Matthew, 2014b). Therefore, the traditional assumption perseveres that basic educational skills associated with reading, writing and arithmetic are more relevant to the young child than GeHiNaTe education.

(vii) The integrated approach, adopted in the Foundation Phase curriculum, misinterprets the true meaning of constructivism as pedagogy (Erduran & Dagher, 2015; Fleer & Pramling, 2015; Department of Education, 2011). The outcomes-based curriculum emphasises that education in the early years should be learner-centred and not teacher-centred (see Heading A.3.2.2.1), with much emphasis on the construction and scaffolding of knowledge by the learner himself. When consulting the defined meaning of constructivism, the opposite is implied, namely that a learner cannot construct knowledge on his/her own and should be guided by a competent adult (Erduran & Dagher, 2015; Fleer & Pramling, 2015).

(viii) South African faces a challenge with regards to the training and development of teachers. An Integrated Strategic Planning Framework for Teacher Education and Development for 2011-2025 was implemented, with the key focus of improving the quality of teacher education and development in order to improve the quality of teachers and teaching (Department of Higher Education and Training, 2011, p. 1). It is recognised that various factors interact to impact on the quality of the education system in South Africa, but teachers' inept subject matter knowledge and pedagogical content knowledge are important contributors to the poor educational outcomes currently witnessed (Department of Higher Education and Training, 2011, p. 4). It is further implied that teachers lack essential knowledge and skills, reflecting back on inadequate pre-service teacher training, which is provided through initial teacher education programmes at higher education institutions in South Africa (The Centre for Development and Enterprise, 2015, p. 1).

From this discussion it becomes clear that the South African view regarding the importance of teaching Beginning Knowledge education in the Foundation Phase, in relation to the view of international academic literature, is conflicting and troublesome, to say the least.

1.5.2 Conceptual gap in the body of scholarship

1.5.2.1 Orientation

The conceptual category as gap in the body of scholarship can be described as an abstract world of scientific knowledge and scientific disciplines. Therefore, to address a contextual knowledge gap, as already discussed, the researcher requires information from the scientific knowledge located within the world of Sciences (Maree & Van der Westhuizen, 2009; Mouton, 2001). A researcher can only revert to this level of analysis and reasoning after identifying a pragmatic problem from everyday life, as presented by World 1.

Due to the incompleteness of South African literature on Beginning Knowledge education, the researcher had to revert to international studies relating to historical studies of GeHiNaTe education in Early Childhood Education to assist in constructing a suitable, thorough, and integrated historical knowledge base from the body of scholarship. Therefore, a great part of the international scholarship on the history and philosophy of Early Childhood Education and GeHiNaTe education was utilised to establish a knowledge base which could be applied and adapted to the South African context. Due to the integration of international and national bodies of scholarship, theory-practice complications were also revealed.

Firstly, international theoretical literature justified that GeHiNaTe education should be intentionally and formally included in Early Childhood Education and not merely as a way to familiarise the learner with the environment (Eshach, 2006; Fleer & Pramling, 2015; Hodson & Hodson, 1998). A strong literature voice advocated that subject-specific concepts, language and skills (see Heading A.3.2.1.1) associated with Geography, History, Natural Sciences, and Technology should be explicitly and purposefully taught to the Foundation Phase learner (Chaillé & Britain, 2003; Cooper, 2013; Lind, 2005; Scoffham, 2013; Seefeldt et al., 2014; Woodhead, Faulkner, & Littleton, 1998). The practical depiction of the Environmental Studies and Beginning Knowledge curricula for the Foundation Phase in South Africa did not really reflect these notions (Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Department of Education, 2002, 2003, 2011; Departement van Onderwys, 1991).

Secondly, a theoretical shift occurred internationally towards adapting Early Childhood curricula to include GeHiNaTe education. The adequate inclusion of GeHiNaTe knowledge bases promotes the possibility to develop learners with Scientific Literacy, awareness for Socio-Scientific Issues, scientific reasoning and thinking skills, and twenty-first century skills. However, as already stated elsewhere, the implied curricula in the Foundation Phase in South Africa does not explicitly meet these requirements as adequately as would be expected.

In order to understand both international and national bodies of scholarship about GeHiNaTe education in Early Childhood Education, the researcher had to be able to discern between many diverse voices and views. The researcher aimed to ensure that this newly constructed and integrated historiography of Beginning Knowledge education in the Foundation Phase in South Africa does not primarily depict an international voice and character (Westocentric/Eurocentric), but also made sure it reflects the South African practices, indigenous/local knowledge systems, and contexts (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012; Booyse et al., 2013b; Le Roux, 2013a, 2013b; Wolhuter & Karras, 2013; Wolhuter, 2013a, 2013b). The researcher came to realise that she ought to be cautious in approaching the international and national bodies of scholarship because merely comparing the past to present realities, without considering the contexts and influencing factors, may be viewed as biased and insensitive (Booyse et al., 2013b; Le Roux, 2013a, 2013b; Wolhuter & Karras, 2013; Wolhuter, 2013a, 2013b).

Scholars suggest that the researcher should rather aim to embrace the opportunity to reintroduce past knowledge bases to the existing frame of reference, in order to develop new insight and perspective (Booyse et al., 2013b; Le Roux, 2013a, 2013b; Wolhuter & Karras, 2013; Wolhuter, 2013a, 2013b). Such a considerate and cautious approach of synthesising or integrating knowledge bases has the potential to bring about systematic change to South African curricula (Booyse et al., 2013b; Le Roux, 2013a, 2013b; Wolhuter & Karras, 2013; Wolhuter, 2013a, 2013b) especially in the hope to better include knowledge bases associated with Beginning Knowledge in the Foundation Phase.

In an attempt to address the conceptual and contextual gaps in the national body of scholarship, as already discussed, the researcher constructed and coined a newly developed theoretical framework. This constructed theoretical framework assisted the researcher in discerning between the diverse contributing voices within the bodies of scholarship. The theoretical framework also aided the researcher in generating an assimilated knowledge base about the historical development of Beginning Knowledge education within South Africa.

1.5.2.2 Clarification of concepts

A list of concepts is tabulated below, with matching definitions in order to clarify the concepts utilised during the discussion of the conceptual gap identified in the body of scholarship. These definitions communicate the scholarly accepted notions about concepts identified in the body of scholarship about Cultural-Historical Activity Theory, Ecosystemic Theory and Media Theory. As mentioned previously, one universal definition to describe a concept is rarely found. However, for the purposes of this discussion on the conceptual gaps in knowledge, the listed concepts

and their definitions resemble the researcher's understanding thereof, as well as how it was discussed in existing literature.

Table 1-3: Clarification of concepts used in the conceptual gap of knowledge

Concept	Clarification
Activity Theory	Activity theory is both a practice-based theory and a historical and future-oriented theory (Sannino, Daniels, & Gutiérrez, 2009b, p. xiv). Activity theory seeks to analyze development within practical social activities.Activities organize our lives. In activities, humans develop their skills, personalities, and consciousness. Through activities, we also transformour social conditions, resolve contradictions, generate new cultural artifacts, and create new forms of life and the self (Sannino, Daniels, & Gutiérrez, 2009c, p. 1).
Culture	Difficult to define but in general it refers to the ways in which groups of people pass on beliefs and values and the products of human work and thought. Vygotsky was interested in how knowledge was both constructed and passed from one generation to another he was deeply concerned with how this was dependant on culture (Smidt, 2009, p. 18). All the socially passed on beliefs and values, arts and tools, thoughts and institutions that are the products of human work and thinking (Smidt, 2009, p. 55).
Cultural-historical	A cultural-historical reading of science education would position science as a form of cultural knowledge that is historically and collectively formed and understood, rather than as something that is located within the individual (Fleer & Pramling, 2015, p. 10).
Cultural tools	Sometimes referred to as psychological tools these are the objects and signs and systems developed by human beings over time and within communities to assist thinking. They include things like language, symbols, music, art and others (Smidt, 2009, p. 18). Cultural tools are not universal and are developed within different cultures. These tools help learners make sense of their worlds. Basic to this perspective is Vygotsky's insight that the inclusion of psychological, or cultural, tools into human functioning fundamentally transforms this functioning. The incorporation of mediational means does not simply facilitate processes that would otherwise have occurred (Wertsch & Tulviste, 1992, pp. 551-552). …the psychological tool alters the entire flow and structure of mental functions. It does this by determining the structure of a new instrumental act, just as a technical tool alters the process of a natural adaptation by determining the form of labor operations… The following can serve as examples of psychological tools and their complex systems: language; various systems for counting; mnemonic techniques; algebraic symbol

	systems; works of art; writing; schemes, diagrams, maps, and mechanical drawings; all sorts of conventional signs; and so on (Vygotsky, 1981, p. 137).
Genetic law of cultural development	Any function in the child's cultural development appears twice, or on two planes. First it appears on the social plane, and then on the psychological plane. First it appears between people as an interpsychological category, and then within the child as an intrapsychological category. This is equally true with regard to voluntary attention, logical memory, the formation of concepts, and the development of volition. ...[I]t goes without saying that internalization transforms the process itself and changes its structure and functions. Social relations or relations among people genetically underlie all higher functions and their relationships (Vygotsky, 1981, p. 163). A second theme in Vygotsky's work that has made it attractive to contemporary Western psychology is his use of a developmental, or genetic, method. His reliance on this method is reflected in the very title of his "general genetic law of cultural development". The fact that the law is formulated in terms of developmental transitions reflects his assumption that the most adequate way to understand human mental functioning is to trace it back through the developmental changes it has undergone (Wertsch & Tulviste, 1992, p. 550).
Mediated	Acts as a facilitator to learning, that moves between the learner and the concepts to be learned (Smidt, 2009, p. 19).
Mediation	…this refers to the use of cultural tools made by people to interpret and explain the world (Smidt, 2009, p. 39). …his analysis of culture is part of his attempt to elaborate the notion of mediation. In his view, a criterial feature of human action is that it is mediated by tools ("technical tools") and signs ("psychological tools"). His primary concern was with the latter (what we are here calling "cultural tools") (Wertsch & Tulviste, 1992, p. 551).
Social	…the word "social" when applied to our subject has great significance. Above all, in the widest sense of the word, it means that everything that is cultural is social. Culture is the product of social life and human social activity. That is why just by raising the question of the cultural development of behavior we are directly introducing the social plane of development (Vygotsky, 1981, p. 164).
Socio-historical	The approach of Vygotsky, which was one which thought it essential to consider the history and the culture from which anything arose (Smidt, 2009, p. 20).
Social interaction	Any function in the child's cultural development appears twice, or on two planes. First it appears on the social plane, and then on the psychological plane. First it appears between people as an interpsychological category, and then within the child as an intrapsychological category ... Social relations or relations among people ... underlie all higher [cognitive] functions and their relationships (Vygotsky, 1978, p. 57). In this interaction [thinking or state of consciousness], individuals are not passive participants waiting for the environment to instigate meaning-making processes for them, but, through their interactions, individuals make meaning

	of the world while they modify and create activities that trigger transformations of artefacts, tools, and people in their environment (Yamagata-Lynch, 2007, p. 16). A learner is not being passively filled with information or knowledge but actively trying to make sense of all experiences and encounters (Smidt, 2009, p. 16).
Systems	The Ecosystemic Theory consists of levels/systems of functioning, according to Donald, Lazarus and Lolwana (2010) and Smidt (2009), namely: microsystems as the immediate environment of the child (roles, relationships, patterns and daily activity); mesosystems as interaction between the environment and the child (set of microsystems outside of the learner); exosystem as environment beyond the immediate (outside the learner's environment but still affected by it); macrosystem as widest environmental set of factors (dominant social and economic structures, culture, politics, wide community); and chronosystem as outside the environment (development and changes over time, worldviews, religious and philosophical beliefs).

1.5.2.3 Theoretical framework

According to Trafford and Leshem (2008), a theoretical framework plays an important role in a research inquiry and serves diverse functions. A theoretical framework enables the researcher to visualise the phenomenon through a theoretical lens and joining it up with a compatible methodological lens (Creswell, 2009; Trafford & Leshem, 2008). A theoretical framework enables the researcher to identify and confirm the gaps in knowledge and assumptions in the body of scholarship. It also enables the researcher to conceptualise and reflect on these aspects and to develop a plan on how to achieve the goals of the research inquiry (Anfara & Mertz, 2006; Trafford & Leshem, 2008). The theoretical framework provides the intellectual premises for the selection of theoretical and methodological processes to conduct the inquiry. The final product is finally conceptualised as a holistic report that is communicated to the wider reading community to which a contribution of knowledge is offered (Anfara & Mertz, 2006; Trafford & Leshem, 2008).

1.5.2.3.1 Hybrid Cultural-Historical Activity Theory

Many different educational theories, paradigms and learning theories for early childhood are present in literature (Aubrey, David, Godfrey, & Thompson, 2000; Gupta, 2006; Hatch, 2007; Pound, 2011; Roopnarine & Johnson, 2009). Due to the contextual and conceptual gap in the body of scholarship, this historical research inquiry required a careful and well-considered decision on which theory/theories should be selected. As motivated already, this research inquiry needed to consider the genetic origination (see "Genetic law of cultural development" in Table 1-3) of the subject as well as the multiple views of both international and national bodies of scholarship from these diverse disciplines in literature. The researcher did not investigate a single concept or field of specialisation but rather diverse concepts and fields of specialisation, and therefore a hybridised theoretical approach was coined and considered. Fleer and Pramling (2015) explained that people and researchers are constantly striving towards constructing knowledge historically and reconstructing knowledge in their daily lives to meet societal needs, to advance knowledge and to innovate cultural tools to help people and researchers make sense of their worlds. The researcher identified three possible contributors (Educational, Societal, and Technological) to the development of Beginning Knowledge education, which collaborated with the three selected theories that were merged as one theoretical framework.

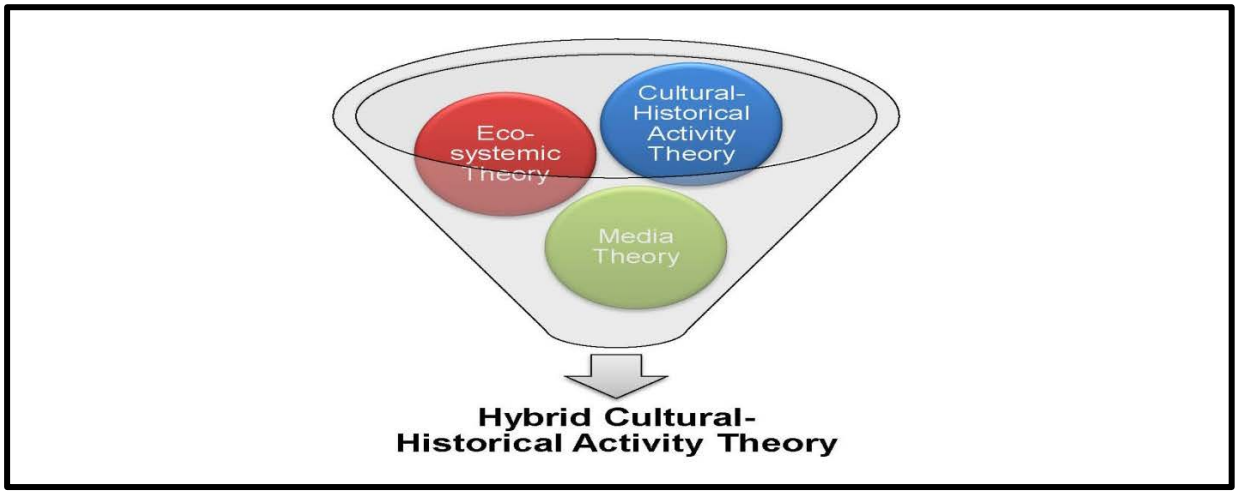


Figure 1.2: Representation of the Hybrid Cultural-Historical Activity Theory

The newly developed and coined Hybrid Cultural-Historical Activity Theory consists of the Cultural-Historical Activity Theory, the Ecosystemic Theory and the Media Theory. This theory enabled the researcher to interpret the bodies of scholarship, pertaining to the education of

Geography, History, Natural Sciences, and Technology in the early years, through the years to be applied to the South African context of learning. The following discussions are dedicated to explaining the key principles of each of the three theories incorporated in the theoretical framework for this research inquiry.

(i) Cultural-Historical Activity Theory (CHAT)

The theory known as the "Cultural Historical Activity Theory" originated during the Revolutionary work of Russian psychologist L.S. Vygotsky and his companions towards the end of the nineteenth and the beginning of the twentieth century. Vygotsky took a keen interest in the works of nineteenth century philosopher, Friedrich Hegel, and sociologist, Karl Marx, which influenced his thinking about context, social learning and culture during the late nineteenth century and early twentieth century (Sannino, Daniels, & Gutiérrez, 2009a; Smidt, 2009). Vygotsky worked closely together with Alexander Luria and Alexei Leont'ev, who both continued Vygotsky's work after his early death in 1934 (Kozulin, Gindis, Ageyev, & Miller, 2003; Smidt, 2009).

Belated Vygotsky's doctrines (1978, 1986, 1987, 1997a, 1997b, 1998, 1999) were only translated and made public during 1960, which left a three-decade void that was never filled (Smidt, 2009). On release and translation of his works, various extended studies have since been conducted by scholars[18] on the value of the Cultural-Historical Activity Theory and how it shapes the research and practice of education in the early years in particular. Before describing this theory, it is important to state that Vygotsky took interest in diverse factors which influence learning. Among others, he did research in the following fields: mediation and cultural tools; culture and context; and much research was conducted on language, concepts and thinking; and especially on understanding how a child learns. He also took an interest in aspects such as understanding the importance of play and the zone of proximal development (Engeström, Miettinen, & Punamäki, 1999; Holzman, 2009; Sannino et al., 2009c; Smidt, 2009). Although all these fields of his theory are important, it is not possible to discuss all his viewpoints regarding these elements in this thesis.

[18] (Daniels, Cole, & Wertsch, 2007; Davydov, 1990, 1999, 2005; Doyla, 2007; Engeström, Miettinen, & Punamäki, 1999; Fleer & Pramling, 2015; Gupta, 2006; Hedegaard & Chaiklin, 2005; Hodson & Hodson, 1998; Holzman, 2009, 2009; Kozulin et al., 2003; Langford, 2005; Roth & Lee, 2007; Roth, 2009a; Sannino et al., 2009c; Smidt, 2009; Van der Veer & Valsiner, 1991, 1994; Van Oers et al., 2008; Wertsch & Tulviste, 1992; Wertsch, 1985)

In principle, the Activity Theory can be demarcated as being the same as the Socio-Cultural and Cultural-Historical Theory, although the emphasis is more focused on the *activity* itself and not so much on the *mediation.* But within all three generations of this theory, the primary principles remained the same (Smidt, 2009). In short, the first generation theory was proposed by Vygotsky, who stated that human experiences of the external world are never directed at the environment itself but rather that their experiences are mediated through artefacts that are used by the individual (Daniels, Cole, & Wertsch, 2007; Smidt, 2009; Wertsch, 1985; Wertsch & Tulviste, 1992). To demonstrate this statement with an example: a child will communicate with an adult, for various reasons, within a given environment, using language, gestures or cultural tools. To take Vygotsky's theory to the next level, this learner is actively controlling this activity by internalising the experience inwardly through language to make sense of his experiences with the adult (Fleer & Pramling, 2015; Holzman, 2009; Smidt, 2009).

The second generation of the Activity Theory arose later, with Leont'ev, who shifted the focus from mediation to activity and to understanding social mediation and collective activity (Holzman, 2009; Kozulin et al., 2003; Smidt, 2009). An individual's awareness of the external world, and the meaning attached to it, is not only influenced by cultural tools, but also by collective activity or shared labour with others towards a common goal (Holzman, 2009; Kozulin et al., 2003; Smidt, 2009). These joint actions are also important to understand an individuals' thinking and comprehension of an experience, as his/her internalised thoughts cannot be detected. When the learner externalises thought through communication or cultural tools, the learner conveys his/her understanding and thoughts to others (Holzman, 2009; Smidt, 2009; Van Oers, Wardekker, Elbers, & Van der Veer, 2008). The dynamics of an individual activity differ from the dynamics of collective activity.

The third generation of the Activity Theory refined the notion described in the previous paragraph, by making it more sensitive towards cultural diversity and history (Cole, 1996; Daniels et al., 2007). The third generation theory is more complex due to acknowledgement of the role of dialogue, multiple perspectives, interactivity systems, and so forth, within the activity system (Engeström et al., 1999; Smidt, 2009; Yamagata-Lynch & Haudenschild, 2009).

The Cultural Historical Activity Theory can be described as a theory that takes interest in cognition, community and situated learning of practice, and is classified as belonging to "cultural psychology" (Daniels et al., 2007). Cultural psychology, a subdivision of psychology, challenges the "common" understanding of human thoughts and understanding, by inviting a socially shared experience or activity within a shared place of location, in a specific time period and context (Engeström et al., 1999). The following quote by Yamagata-Lynch (2007, p. 16) explains this notion as follows:

> In this interaction [thinking or state of consciousness], individuals are not passive participants waiting for the environment to instigate meaning-making processes for them, but, through their interactions, individuals make meaning of the world while they modify and create activities that trigger transformations of artefacts, tools, and people in their environment.

The emphasis on “community”, “collaboration”, the “environment” and “tools and signs” as meaning-making processes over time and context, is of particular importance in the Cultural Historical Activity Theory. Through extensive research by ample scholars on the different generations of Activity Theory, Engeström (1999; 2001) developed five important principles related to the current state of Activity Theory that are crucial for this research inquiry during the analysis process (see Heading 1.5.3.3). The prime unit of analysis, that can be linked in a network to other activity systems, is a collective, artefact-mediated and object-oriented activity system. Activity systems are multi-voiced as they are always communities of multiple points of traditions, views and interests. Historicity is pivotal to activity systems, as they are shaped and transformed over long periods of time; therefore one ought to remember that an activity is always situated within history. Contradictions within activity systems serve as sources of change and development. Therefore transformation and change is possible through activity systems as they move through relatively long cycles of qualitative transformations

(ii) Ecosystemic Theory

The theory called “Ecosystemic Perspective on development of the young child” originated with Urie Bronfenbrenner, during the period after World War II, in an attempt to reconstruct what had been demolished by society (Donald, Lazarus, & Lolwana, 2010; Smidt, 2009). This theory also underwent development through three stages. The first stage is historically known as “the Newtonian Thinkers”, the second the “General Systems Theory”, where cybernetics and constructivism gave it a new dimension, and finally it developed to the stage where it acquired an important ecological spinoff to better understand and explain how individuals’ development is shaped by their social context (Bronfenbrenner, 1979; Donald et al., 2010).

The third stage theory, also known as the Ecosystemic Theory, has levels of interacting systems within the social context which influences child development (Donald et al., 2010), but can also be applied to how an intended curriculum has developed. As with the Cultural Historical Activity Theory, the Ecosystemic Theory is concerned with the role that the complex set of interrelated systems has on development from a social, cultural and ecological point of view (Donald et al., 2010; Smidt, 2009). The Ecosystemic Theory consists of five systems of functioning (see Table

1-3) and is interactive and interdependent on one another. Their relations determine how well the whole system functions (Donald et al., 2010). The Ecosystemic perspective, as the second theory within the Hybrid Cultural-Historical Activity Theory, acknowledges the presence of different systems within a phenomenon, like a curriculum, and how the historical development of a curriculum deploys and how the intended curriculum is interpreted, implemented and acquired.

(iii) Media Theory

The Theory on Media was traditionally based on Postman Media Ecology and McLuhan's Media History. Their traditional thinking, however, was expanded and reconceptualised by different media theorists and media historians, like Giesecke and Rückriem, to what is now known as the "Media Theory" (Fiedler & Väljataga, n.d.; Giesecke, 2005; Rückriem, 2003, 2009; Thorburn & Jenkins, 2003). Rückriem (2003, 2009) rightfully stated that the cultural tool is unavoidable, irreversible, general, and even universal; that it revolutionises the communicable structure, its interacting systems and, ultimately, thinking and knowledge. Rückriem (2003, 2009) claimed that there has been no transformation with larger or more essential significances than the invention of book printing or computer technology. It is therefore important to understand how cultural tools from the past have influenced, changed and contributed to the knowledge that society currently has. Cultural tools, as tooled knowledge, give researchers the opportunity to understand current societal, educational and cultural developments by looking at tools that are evident throughout history.

The Theory on Media is not as traditional as other theories on human development and functioning; however, the Media Theory investigated how knowledge, cultural tools and communication have entered systems and activities, and how such external factors may influence the stability of a system or activity (Giesecke, 2005; Rückriem, 2003, 2009). The Media Theory is even concerned with aspects of human activities, like speech, cognition, thinking, feelings, knowledge, perception, aesthetics, and social rules, because these actions are tools and mediums of reflecting on the world (Fiedler & Väljataga, n.d.; Rückriem, 2003, 2009). Due to the nature of the Media Theory, and being embedded in every part of life, this theory can be fused with both the Cultural-Historical Activity Theory and Ecosystemic Theory (Giesecke, 2005; Rückriem, 2003; Sannino et al., 2009c). The Media Theory influences the generation and transference of knowledge and has an effect on various systems' functioning (Rückriem, 2009, p. 88):

> No matter how we may judge the consequences of this technical development, we cannot but concede that digital technology has entered most things in everyday life, and it increasingly determines the activity of people even if they avoid using it. In more general terms, it has become the basis of an emerging globalization process that is not only economic but cultural, not only universal but irreversible. There is nothing outside it. Reality itself has changed fundamentally.

The Media Theory incorporates the cultural tool that can be described as a physical apparatus, instrument and/or technical equipment, that is physically tangible. The key component of this tool is its capability to the serve as a medium through which semantic systems and thinking and world views are constructed and conveyed, which is a prerequisite for communication (Giesecke, 2005; Rückriem, 2003, 2009). The Media Theory is also concerned with the notion of how knowledge and worldviews are transferred through the ages, by using inventions like paper, pen, the press-machine, the computer and the internet, and the semantic and interactive thinking and communication that are constructed through these inventions (Giesecke, 2005; Rückriem, 2003, 2009). It is thus important to make it clear that the internet and a computer, in this day and age, are only cultural tools, as paper and pen was decades ago. However, it is the revolutionary impact that these tangible tools have on communication and thinking, that is important (Rückriem, 2003, 2009).

> New worldviews emerge, and the position of humans in relation to the world gets reformulated. Each epistemology is the epistemology of a period within the development of media (Rückriem, 2009, p. 96).

Individuals do not only exist and communicate; they consistently adapt, reformulate and regenerate to progress and adapt to current living standards. As individuals evolve, so do knowledge, skills, tools, and values. The Media Theory can therefore help us understand how knowledge was constructed and transferred historically, and reconstructed and reshaped to fit the expectancies of modern life.

1.5.2.3.2 Application of the Hybrid Cultural Historical Activity Theory

According to Trafford and Leshem (2008), a theoretical framework has certain characteristics which will now be utilised to discuss how the Hybrid Cultural Historical Theory can help address the conceptual and contextual gap in knowledge that was already discussed.

(i) A theory identifies and confirms the intellectual foundation for the gaps identified in knowledge (Trafford & Leshem, 2008). During the discussion on the contextual gap, it was motivated that the body of scholarship on the historicity of Beginning Knowledge, located by the researcher, can be described as vague, incomplete and not as systematically examined as would be expected. The Hybrid Cultural Historical Activity Theory enabled the researcher to systematically identify the systems that possibly contributed to the development of Beginning Knowledge curriculum, namely the Educational, Societal and Technological activity systems. The Hybrid Cultural Historical Activity Theory enabled the researcher to historically scrutinise and morph international and national bodies of scholarship into a knowledge base, by means of utilising the three activity systems (see Heading 1.5.3.3).

(ii) A theoretical framework provides the intellectual boundaries according to which a research inquiry can be conducted (Trafford & Leshem, 2008), and these boundaries are discussed as limitations (see Heading 1.6).

(iii) A theoretical framework creates foundations for theoretical frameworks used in data analysis, justifies the claims that research outcomes make and is a contribution to knowledge (Trafford & Leshem, 2008) (Trafford & Leshem, 2008). The Hybrid Cultural Historical Activity Theory enabled the researcher to identify and understand the interrelated relationship between the three activity systems (Educational, Societal and Technological) and how it possibly contributed to the development of Beginning Knowledge education in the Foundation Phase curriculum of South Africa. The identified theoretical framework has a supporting analysis framework, developed by leading scholars, which was utilised in this historical research inquiry (Engeström, 2001; Engeström et al., 1999; Yamagata-Lynch, 2007). This analysis framework enabled the researcher to analyse and interpret the data according to the views of the theories and framework selected for this historical research inquiry (see Heading 1.5.3.3).

(iv) A theoretical framework informs and supports choices throughout the research process, and explains the conceptual framework, the design and conceptual conclusions of a research study (see Heading 5.2) (Trafford & Leshem, 2008). As demonstrated through the identification of the three gaps in the body of scholarship (see Headings 1.5.1, 1.5.2, and 1.5.3), the identified theoretical framework is the metaphorical head and heart for this historical research inquiry.

1.5.2.3.3 Working assumptions

When conducting a historical research inquiry, a researcher has certain expectations or suppositions in mind, which can influence the outcomes positively and/or negatively (Maree & Van der Westhuizen, 2009). Identifying such personal assumptions prior to the study is important in order to keep a focus on the purpose of the research inquiry (Maree & Van der Westhuizen, 2009). With such assumptions it is also important to delineate the scope of the inquiry and prevent distractions or irrelevant discussions (Maree & Van der Westhuizen, 2009). Trafford and Leshem (2008) stated that working assumptions and the scope of the inquiry are interconnected and affiliated with the selected theoretical and conceptual frameworks, and need to be communicated upfront.

The working assumptions identified for this historical research inquiry can be listed as follows:

(i) This research problem necessitated a thorough investigation and could not be explained with lay knowledge, as explained through the contextual gap in knowledge as represented by World 1.

(ii) The contextual, conceptual and methodological gaps identified in the body of scholarship literature served as justification for conducting this inquiry. There might be more gaps present in the body of scholarship, but the researcher will only incorporate the mentioned gaps.

(iii) The nature of the research problem necessitated a delineated focus and the research questions that were formulated served as guiding principle to prevent distractions. The researcher strived only to understand how Beginning Knowledge in the Foundation Phase curriculum has developed in South Africa and did not attempt to answer questions outside this scope of investigation.

(iv) There were diverse theories and paradigms that could be applied to this phenomenon. Because of the complexity of this historical research inquiry, the researcher had to select appropriate theories that could represent the three identified contributors to help shape the historical development of Beginning Knowledge in South Africa. Due to the fact that a curriculum is socially and culturally constructed by humans (Soudien, 2010) at a specific time in history, the Hybrid Cultural-Historical Activity Theory was selected to best explain the development of Beginning Knowledge education through investigating the three activity systems. The Ecosystemic Theory acknowledged the diverse systems that directly and indirectly influence the intended development of the curriculum for Beginning Knowledge education in the Foundation Phase. The Media Theory emphasised and

identified the diverse cultural tools that helped shape the development of the intended curriculum and the transference thereof to learners and future societies. The researcher did not utilise additional paradigms and/or theories other than the three mentioned during this research inquiry.

(v) There are many research strategies available to conduct this historical research inquiry. Given the nature of the theoretical framework and the ultimate purpose for this research inquiry, the researcher chose a qualitative historical research design. This research design enabled the researcher to identify and construct a rich knowledge base of evidences to explain how Beginning Knowledge education in the Foundation Phase in South Africa has developed.

(vi) The findings of this research inquiry can potentially contribute to the existing international and national bodies of scholarship and, in turn, inspire future research endeavours on Beginning Knowledge education in the Foundation Phase in South Africa.

1.5.3 Methodological gap in the body of scholarship

1.5.3.1 Orientation

The methodological category, as gap in the body of scholarship, can be described as the highest level of analysis and reasoning (Maree & Van der Westhuizen, 2009; Mouton, 2001). The reason for this is because researchers use philosophical views, theories, research designs, and paradigms to help make meaning of the phenomenon that was identified in World 1 – in this case the contextual gap in knowledge – and to conduct the study as described in World 2 – in this case the conceptual gap represented by a hybridised theory (Maree & Van der Westhuizen, 2009; Mouton, 2001). This meta-science world has a critical interest in making meaning of the complex realities in everyday life and the scientific research inquiries that have been conducted about this real life problem. By conducting an analysis at this level, the researcher conceptualises the overall research design and the approach to orchestrate the entire research process.

The methodological gap stems from both the contextual and conceptual gaps in the body of scholarship. Due to the vague body of literature on Beginning Knowledge education, it can be concluded that few studies have been conducted on this phenomenon and therefore a qualitative historical research design has also not been utilised before. The Hybrid Cultural-

Historical Activity Theory enabled the researcher to conduct such an inquiry, as this theory embraces the historical research design for historical analysis.

1.5.3.2 Clarification of concepts

It was once again necessary for the researcher to identify and list the concepts utilised in the discussion about the methodological gap in the body of scholarship. These concepts communicate the scholarly accepted notions about a historical research design as research methodology. Once again, no universal definition is available for each of these listed concepts. However, the definitions that are included in Table 1-4 below reflect the understanding that the researcher has developed about these concepts, which is reiterated with the literature identified regarding these concepts.

Table 1-4: Clarification of concepts used in the methodological gap of knowledge

Concept	Clarification
Activity systems as units of analysis	The first principle is that a collective, artifact-mediated and object-oriented activity system, seen in its network relations to other activity systems, is taken as the prime unit of analysis. Goal-directed individual and group actions, as well as automatic operations, are relatively independent but subordinate units of analysis, eventually understandable only when interpreted against the background of entire activity systems. Activity systems realize and reproduce themselves by generating actions and operations (Engeström, 2001, p. 136).
Contra-dictions	..the central role of contradictions as sources of change and development. Contradictions are not the same as problems or conflicts. Contradictions are historically accumulating structural tensions within and between activity systems. The primary contradiction of activities in capitalism is that between the use value and exchange value of commodities. This primary contradiction pervades all elements of our activity systems. Activities are open systems. When an activity system adopts a new element from the outside (for example, a new technology or a new object), it often leads to an aggravated secondary contradiction where some old element (for example, the rules or the division of labor) collides with the new one. Such contradictions generate disturbances and conflicts, but also innovative attempts to change the activity (Engeström, 2001, p. 137).
Historio-graphy	Historiography is the process followed when a historian critically studies, interprets and writes up the findings that emerges from his or her research. The process of historical inquiry includes the investigation, collection and analysis of data, which leads to the interpretation of the past (Le Roux, 2013a, p. 4).

History of education	History of education is the study of the educational provision, policies, ideas, institutions and experiences of past times. It investigates education over time, whether in the recent or the more distant past, to establish patterns of explanation for the kinds of education that have developed, and the relationship between education and the broader society. In particular, it considers the nature of historical continuities, the character and extent of change, the types of context within which education has developed, and the kinds of contestations over education that have arisen between different ideals and groups in society. It seeks to understand the origins of current institutions and of contemporary problems and issues in education (McCulloch & Crook, 2008, p. 295). The intrinsic or primary objective of the study of past education is reconstruction and interpretation, aimed at more complete understanding of education as a whole (Wolhuter, 2013a, p. 1).
Historicity	The third principle is historicity. Activity systems take shape and get transformed over lengthy periods of time. Their problems and potentials can only be understood against their own history. History itself needs to be studied as local history of the activity and its objects, and as history of the theoretical ideas and tools that have shaped the activity. Thus, medical work needs to be analyzed against the history of its local organization and against the more global history of the medical concepts, procedures and tools employed and accumulated in the local activity (Engeström, 2001, p. 136).
Multi-voicedness	The second principle is the multi-voicedness of activity systems. An activity system is always a community of multiple points of view, traditions and interests. The division of labor in an activity creates different positions for the participants, the participants carry their own diverse histories, and the activity system itself carries multiple layers and strands of history engraved in its artifacts, rules and conventions. The multi-voicedness is multiplied in networks of interacting activity systems. It is a source of trouble and a source of innovation, demanding actions of translation and negotiation (Engeström, 2001, p. 136).
Trans-formation	The fifth principle proclaims the possibility of expansive transformations in activity systems. Activity systems move through relatively long cycles of qualitative transformations. As the contradictions of an activity system are aggravated, some individual participants begin to question and deviate from its established norms. In some cases, this escalates into collaborative envisioning and a deliberate collective change effort. An expansive transformation is accomplished when the object and motive of the activity are reconceptualized to embrace a radically wider horizon of possibilities than in the previous mode of the activity (Engeström, 2001, p. 137).

1.5.3.3 Historical research design

A historical research approach is a specialised design to attempt to reconstruct the past, as accurately as possible, in order to help researchers to understand and project current and future events (Maree, 2007). A historical research design, as adopted by a researcher, inclines to be descriptive-driven towards constructing a developmental trajectory of a phenomenon (Maree, 2007), like the development of Beginning Knowledge education in the Foundation Phase in

South Africa. A historical research design enabled the researcher to identify underlying factors, contributors or possible connections that the past have with the present and how these aspects contributed to the investigation (Creswell, 2009; Mouton, 2001; Thies, 2002). A historical research design, in collaboration with the Hybrid Cultural-Historical Activity Theory as theoretical framework, enabled the researcher to explore and describe how Education, Society and Technology have contributed to the development of Beginning Knowledge education in the Foundation Phase in South Africa.

The methodological gap in the body of scholarship will be discussed in great detail in the following chapter as part of the research design. However, in order to motivate why a methodological gap was also identified in the body of scholarship, the researcher will briefly revert to five principles utilised during the conduction of the historical research inquiry. The theoretical and analysis framework enabled the researcher to systematically incorporate the following components when she consulted the bodies of scholarship.

The theoretical and analysis framework implemented through the methodological approach of this research inquiry enabled the researcher to firstly identify six educational periods for this research inquiry, according to which the scholarly work was investigated and presented as a timeline or epochs. This component is called “Historicity” (Engeström, 2001).

Secondly, the researcher was able to identify three contributors that helped shape the development of Beginning Knowledge education in the Foundation Phase in South Africa. This component is called “activity systems” (Engeström, 2001), which is represented by Educational, Societal and Technological as respective activity systems.

Thirdly, the multi-voicedness of each of the mentioned three activity systems (Engeström, 2001) enabled the researcher to identify underlying criteria (vertical analysis) and principles (horizontal analysis) to help her analyse the body of scholarship more specifically. The criteria and principles of each activity system enabled the researcher to communicate the multiple perspectives that international and national bodies of scholarship have about the development of Beginning Knowledge education in the Foundation Phase.

Fourthly, the researcher conglomerated the three activity systems (Educational-Societal, Educational-Technological, and Technological-Societal) to develop tensions, also called “contradictions” (Engeström, 2001), within the constructed and integrated knowledge bases in order to comprehend as to why Beginning Knowledge education in the Foundation Phase in South Africa has advanced or stagnated. These contradictions are identified and communicated in the fourth chapter.

Lastly, the transformations present in the body of scholarship within these activity systems were identified (Engeström, 2001). Where transformations were noted, or not, the researcher made suggestions what the reasons for it could be and what implications it has on the development and future of Beginning Knowledge education in the Foundation Phase in South Africa. In the final chapter the researcher answered the research questions as posed in the beginning of the chapter (see Heading 5.3.1)

1.6 LIMITATIONS

Due to the enormous time frame (1400-2015) and the amount of literature included in this research inquiry, it was important to put perimeters in place to prevent the study from becoming a mile long and only an inch deep. It was of paramount importance to demarcate this research inquiry to ensure a quality outcome that is specific and focused. The following list mentions the boundaries within which this inquiry is conducted:

(i) This research inquiry did not include scholarly work related to any aspects on the education and/or assessment of Language, Mathematics, Physical, Personal and Social well-being, and Creative Arts education in the Foundation Phase.

(ii) Scholarly work and documents for teaching and assessing Geography, History, Natural Sciences, and Technology at Intermediate Phase level was not included in this inquiry. The debate about the transfer of vertical knowledge from one level to the next when learners enter and exit educational bands was discussed where necessary. Thus, the knowledge base for Beginning Knowledge education in the Foundation Phase was not compared to the knowledge basis of GeHiNaTe education for children between the ages of zero to six and learners between the ages of ten and thirteen in the Intermediate Phase.

(iii) Literature and documents on assessment aspects of Beginning Knowledge and Scientific Literacy in learners before and after instruction will not be discussed.

(iv) All literature on non-formal, non-intentional and/or incidental learning of Beginning Knowledge concepts, language and skills outside of the intended curriculum was not considered. It is important to note that brief reference was made to indigenous knowledge systems (non-formal, non-intentional and/or incidental teaching) during the Pre-Colonial time era because schooling was not established yet and therefore such knowledge should be noted and acknowledged.

(v) The intended curricula that were utilised during this historical research inquiry were the performance curriculum for Environmental Studies in Junior Primary and the competency curriculum for Life Skills education in the Foundation Phase. Curricula other than these mentioned and referenced in the bibliography was not consulted.

(vi) The intended curricula to equip the young child with Geography, History, Natural Sciences, and Technology knowledge bases were only formally and intentionally included in schools from 1967 to 2015. However, the historical period prior to this, spanning nearly 567 years, was also of pivotal value to report on. The Educational, Societal and Technological events, that helped shaped the construction of the Beginning Knowledge curriculum, were crucial to also consider.

(vii) The important role of teacher preparation programmes was acknowledged. However, the curricula intended for Higher Education and Training institutions on Beginning Knowledge education to the young child was not investigated and not included in this inquiry.

(viii) Scholarly work published in a language other than English or Afrikaans were therefore not consulted.

(ix) The researcher is aware of the possible sensitivity that readers might experience when utilising terminology such as “Bantu”, “black”, “boere”, “coloured”, “Indian”, “KhoiKhoi”, “natives”, “non-white”, “San”, and “white” due to the political conations associated with these terminology emanating from Pre-Colonial up until the Apartheid eras. However such terminology was utilised within its appropriate historical context for the purpose of clarification.

(x) The researcher primarily refers to Foundation Phase teachers as being female, however the probability of males also occupying this role is not dismissed.

1.7 GUIDELINES ON READING THIS INQUIRY

Seeing that this inquiry was conducted from the theoretical framework embedded within the work of Lev Vygotsky, it was considered suitable to also use his scientific inquiry phases to serve as the names of the chapters of this research inquiry.

A Vygotskian perspective, as defined by scholars, proposes that the most successful way of learning (and, in this case, completing a PhD degree) is to conduct a customised inquiry of a phenomenon in accordance with the customs and principles of the community of research

scholars, under the guidance of a skilled specialist or promoter likely to be concerned with investigating a phenomenon (Hodson & Hodson, 1998, p. 38). This view can be expressed in a similar way by utilising Wells' (1995, p. 233) description of the Vygotskian perspective on learning.

The most effective learning occurs when the PhD student is confronted with a research question and research problem arising from an inquiry to which he/she is dedicated. The PhD student is facilitated to identify and master the relevant cultural resources associated with PhD norms and values in order to construct a justifiable explanation for the identified research problem. Research procedures and knowledge, which were initially co-constructed in interaction with the promoter and other scholars, are then internalised and reconstructed to become a unique personal tool that he/she can use to conduct further research in a creative way, either alone and unaided, or in relationship and collaboration with other scholars.

Therefore, this Vygotskian-inspired theoretical framework can be applied to any type of inquiry, for example literature/media-based or empirical/laboratory-based, as it acknowledges the all-inclusive, adaptable and unique nature of scientific inquiry (Hodson & Hodson, 1998, p. 39). This historical research inquiry was conducted according to the following five phases associated with the Vygotskian scientific inquiry: initiation; design and planning; performance; interpretation; and reporting and communicating (Fleer & Pramling, 2015; Hodson & Hodson, 1998). These five phases was used as the headings of the five chapters for this inquiry.

1.8 CHAPTER DIVISION

The following outline of this inquiry briefly states the central ideas of each chapter under the heading that was obtained from the Vygotskian scientific inquiry phases.

1.8.1 Chapter one – Initiation

This chapter serves the purpose of engendering the focus, importance and significance of the inquiry to the reader. The Initiation chapter, as the first step in the scientific inquiry, helps to introduce the phenomenon under investigation to the reader. The reader is presented with the international and national stances on the importance of including Beginning Knowledge education to the Foundation Phase learner and the stage is set to introduce the silences identified in the literature. The researcher states and justifies the problem, rationale and research questions for this research inquiry. The researcher positions the phenomenon within a

theoretical framework as mean-making framework to conceptualise the keywords, anticipated outcomes, limitations, and working assumptions for this inquiry to the reader.

1.8.2 Chapter two – Design and planning

Chapter two, as the second step in this scientific inquiry, conveys to the reader how the researcher decided to conduct the research inquiry. The researcher justifies her decision for selecting a historical research design as well as other methodological aspects associated with designing and planning a research inquiry and how it concurs with the theoretical and conceptual framework as discussed in Chapter one. This chapter also serves the purpose of explaining in more detail the analysis framework utilised for this inquiry, as mentioned in the theoretical and conceptual framework.

1.8.3 Chapter three – Performance

Step three in the scientific inquiry is the performing act, where the researcher conducts the research inquiry, as described in Chapter one. Within this chapter the gaps are addressed by generating a contextual and conceptual base of knowledge for Beginning Knowledge education in the Foundation Phase in South Africa, by applying the historical research design as methodological strategy. The researcher introduces the three activity systems and the six historical time epochs, as depicted in the theoretical framework through three acts as illustrated below (see Figure 1-3). Therefore the Performance chapter will have an activity system A (Educational activity system), activity system B (Societal activity system) and activity system C (Technological activity system). This chapter demonstrates a vertical interpretation of each of the three activity systems respectively across six time epochs. Each of these acts describes in detail how they have contributed to the development of Beginning Knowledge education in the Foundation Phase curriculum in South Africa from 1400 to 2015.

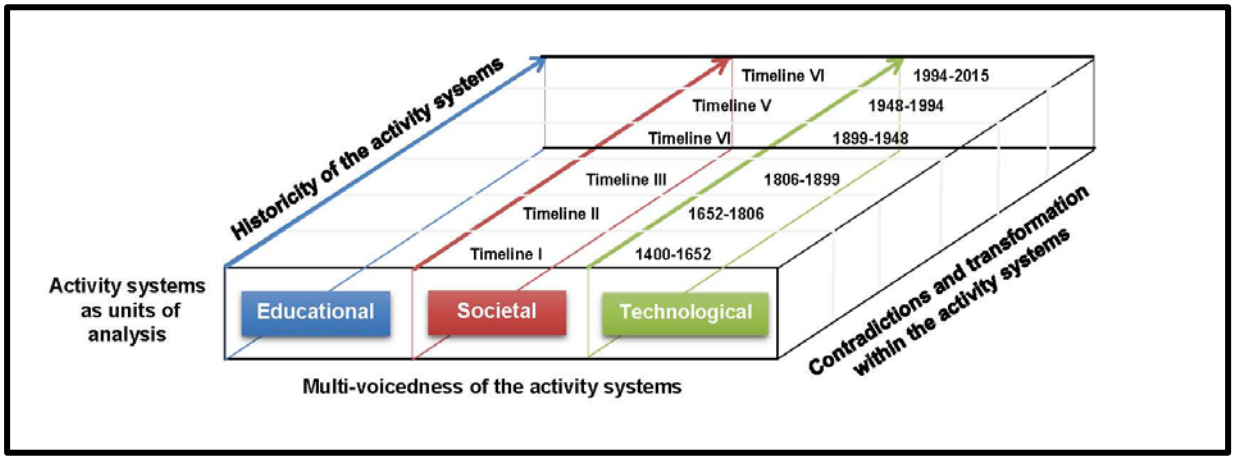


Figure 1.3: Historical analysis of the body of scholarship on a vertical level

1.8.4 Chapter four – Interpretation

The Interpretation chapter, as the fourth step in the scientific inquiry, assists the researcher to present the original vertical historical analysis, descriptions and interpretations, that were communicated in Chapter three, in a horizontal manner. The researcher conglomerates these activity systems (Educational-Societal, Educational-Technological, and Societal-Technological) to communicate the contradictions that occurred in these activity systems from 1400 to 2015. The reason for communicating the findings horizontally, is to depict an in-depth South African view on how Beginning Knowledge education in the Foundation Phase in South Africa has developed.

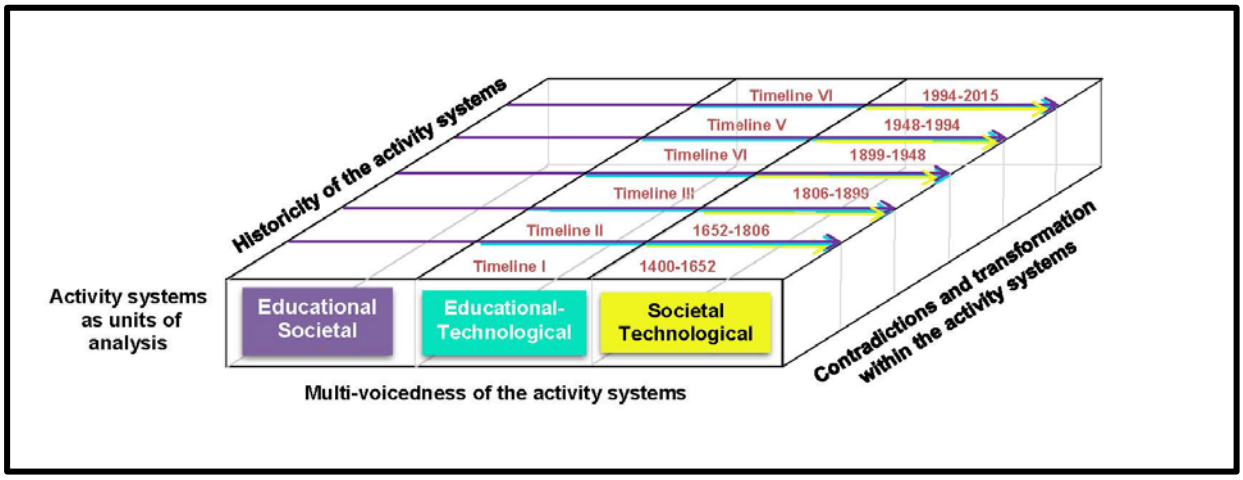
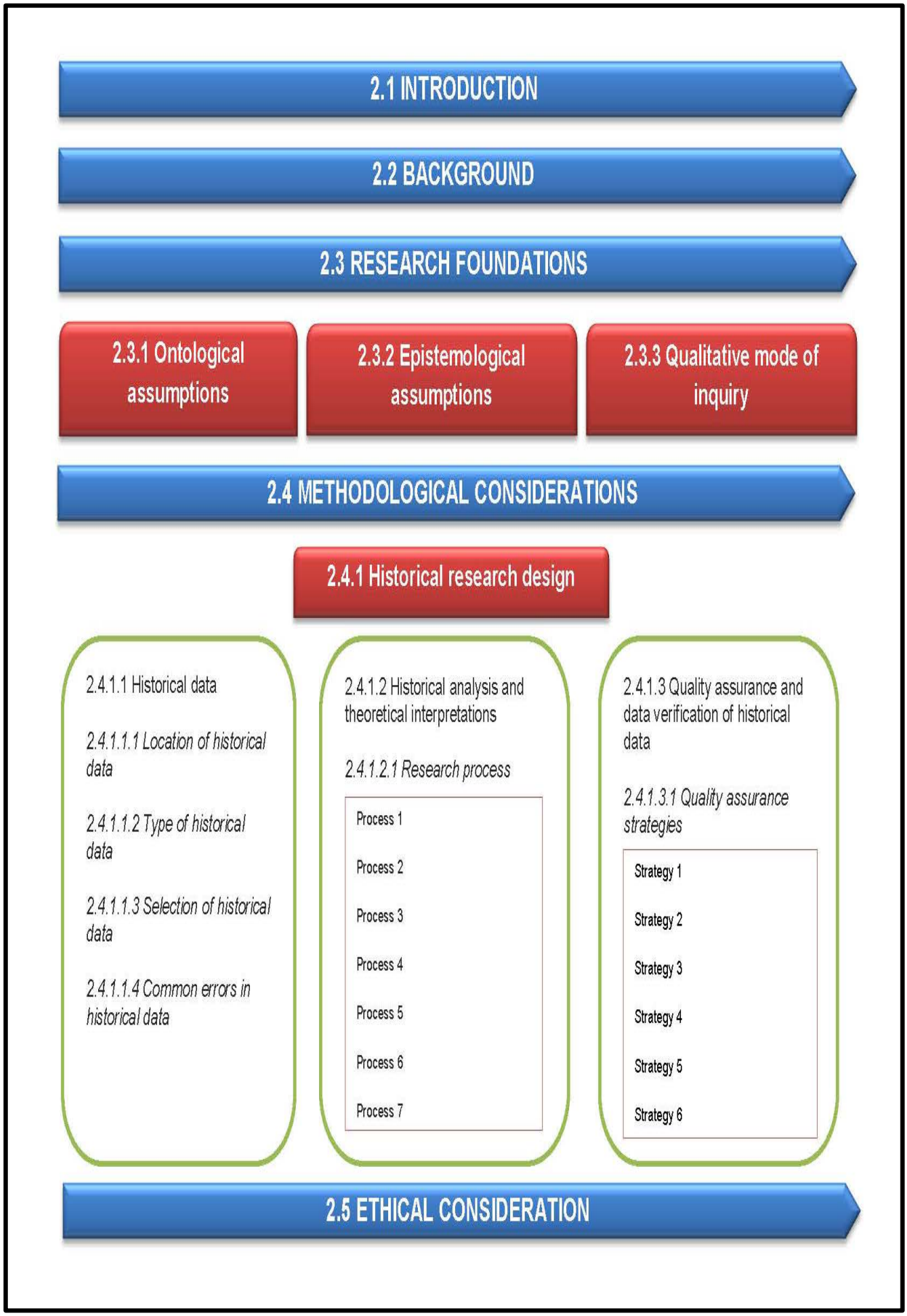


Figure 1.4: Historical analysis of the body of scholarship on a horizontal level

1.8.5 Chapter five – Reporting and communicating

Chapter five, as the last step in the scientific inquiry, concludes the entire inquiry by the researcher and the salient moments of this inquiry are discussed. Appropriate conclusions are drawn, the limitations and anomalies are conveyed and reflected on, and particular reference is made to the anticipated research endeavours. The researcher delineates on the relevance of this inquiry and how it has contributed to the corpus of knowledge.

CHAPTER 2: DESIGN AND PLANNING



2.1 INTRODUCTION

The misconception sometimes held by educational researchers in South Africa, is that a historical research inquiry is not that significant a methodological method, due to reasons such as the following: old mistakes cannot be undone; old theories and/or practices of Apartheid do not have adequate relevance to contemporary times; or even that a historical research inquiry is just the recording of sequential dates of what the researcher considers to be important events (Booyse, Le Roux, Seroto, & Wolhuter, 2013a; Le Roux, 2013a; Soudien, 2010; Wolhuter, 2013a). Such unsupported misconceptions, if not corrected, can be to the detriment of the conception, generation, design, and implementation of local/indigenous knowledge, especially in terms of GeHiNaTe education (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012). International historiographic studies about GeHiNaTe education in Early Childhood Education have been conducted and convey the immense value a study of the history of education or a knowledge base has for the progression of the particular discipline (Ariès, 1962; Bunch & Hellemans, 2004; DeBoer, 1991; Fleer & Pramling, 2015; Frost, 1966; Heywood, 2001; Hinitz, 2013; Horsthemke, Siyakwazi, Walton, & Wolhuter, 2013; Lascarides & Hinitz, 2000; Nutbrown & Clough, 2014).

The conduction of historical research inquiries, outside the bodies of scholarship and debates of contemporary Westocentric/Eurocentric science, should be encouraged and pursued (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012). Scholars have emphasised that, in order to advance in a field of knowledge, a systematic map of the intellectual terrain of that field is required to prevent procrastination or the metaphorical pouring of old wine into new bottles (Hugo, 2010; Soudien, 2010). Progressively, more local scholars have also voiced the importance and relevance of historical research inquiries in the body of knowledge of South African research about Curriculum Studies, especially after the Apartheid era (Beckmann, 2011; Hoadley, 2010; Hugo, 2010; Le Roux, 2013a; Pinar, 2010, 2013; Soudien, 2010; Wolhuter & Karras, 2013).

The purpose of this chapter is to map out the existing body of knowledge about the research studies predominantly conducted in Early Childhood Education and to justify that GeHiNaTe education receives significantly less attention. The significance of this chapter is depicted when the researcher rationalises why a historical research inquiry, as methodology, in collaboration with the newly developed and coined Hybrid Cultural-Historical theory, can help address the silences that are evident in the existing body of research.

2.2 BACKGROUND

The accumulated scholarly knowledge of a disciplinary field resides within a corpus of published work, which researchers draw upon to justify their decision to conduct an inquiry (Trafford & Leshem, 2008). Such a body of knowledge is explicit, domain specific and acknowledged by its respective audiences. When a researcher taps into this source of knowledge, the researcher pledges not only to display an honest character when consulting these scholarly works, but also to adopt a cooperative identity by being committed to the field of knowledge, by contributing to the corpus of knowledge through research (Trafford & Leshem, 2008). A body of knowledge consists of more than just a physical collection of books, text, tools, media, and artefacts (Giesecke, 2005; Rückriem, 2003). The interaction that takes place between the researcher and the external tool of knowledge has the potential to evoke further research and contribution to knowledge. By actively engaging with knowledge, the researcher's thinking, emotions and understanding are stimulated. This results in a possible research inquiry that is externally verbalised as a cultural tool with the purpose to share knowledge with others in order to reach consensus about current thinking or to challenge and adapt it (Giesecke, 2005; Rückriem, 2009; Sannino, Daniels, & Gutiérrez, 2009a). The dialectical relationships between the person, the cultural tool and the outcome of thinking and learning are the basic pillars on which Vygotsky's first generation theory is built (Smidt, 2009). Mediation and activity are vitally important to understand research practices and the quest by individuals to advance knowledge, skills and cultural tools for generations to come (Engeström, Miettinen, & Punamäki, 1999; Kozulin, Gindis, Ageyev, & Miller, 2003; Smidt, 2009; Van der Veer & Valsiner, 1994). The cultural tool of knowledge is therefore imperative to preserve and transfer knowledge, and has the potential to be challenged, adapted and reconceptualised to advance knowledge.

Le Roux (2013b) added to the discussion by stating that individuals are not born with knowledge of the past, but have to acquire it through research, cultural tools and historical writings about the discipline. The importance of being educated on the past events, influences an individual's present and future actions and thinking (Le Roux, 2013a; Wolhuter, 2013). Being knowledgeable about the past enables individuals to relate to others in finding their purpose, to help individuals develop a communal sense of identity, and also to make informed and intelligent decisions about life and to become intelligent citizens (Le Roux, 2013b; Marwick, 2001). Due to the evidence that historical research inquiries have less dominance in current research endeavours, Le Roux (2013c) and Marwick (2001) called on scholars to rethink this methodology's value and to reconstitute traces left by past societies in a quest to replenish the gaps left in knowledge systems. Based on the above-mentioned discussion, it can be deduced that it is crucial that the body of scholarship of a disciplinary field ought to be comprehensive

and thorough. Relevant knowledge systems for this research inquiry will now be further explored.

2.3 RESEARCH FOUNDATIONS

Just as unique and diverse as humans are from one another, it is also true for how researchers think, become aware of, and approach their own identified research problems (Babbie & Mouton, 1998; Creswell, 2009). Thus, a researcher will not think or conduct a research inquiry in exactly the same way as another researcher. Hence, the reason to clarify, upfront, what the researcher's own assumptions were about this historical research inquiry and how it had to be conducted. The researcher had to utilise and critically engage with the international and national bodies of scholarship, as cultural tools, to make sense of how Beginning Knowledge education in the Foundation Phase has developed. Furthermore, for this historical research inquiry to have significance, she had to communicate how the historical research inquiry was conducted and made sense of, in her own unique way. The researcher had to also convey how this entire inquiry process was conducted, to other readers who share a communal interest in this phenomenon. This is why it was important to identify a theoretical framework, as sense-making, tool to help the researcher communicate thinking and understanding of a phenomenon to others.

According to Niewenhuis (2007c), the theoretical frameworks represent the underlying working assumptions or beliefs that a researcher has adopted about fundamental aspects of a reality that is investigated. Theoretical frameworks explain how the researcher views the nature of reality (ontology) and also the dialectical relationship that exists between the researcher and the existing knowledge (epistemology) and which methodologies are most suitable to investigate the phenomenon (Niewenhuis, 2007b; 2007c). As explained to a great extent in the Initiation chapter (see Heading 1.5.2.3), the Hybrid Cultural Historical Activity Theory, together with a historical research inquiry (see Heading 1.5.3.3), best supported the researcher in her endeavour to make sense of how Beginning Knowledge education in the Foundation Phase in South Africa has commenced and developed historically.

Before being able to decide whether this research inquiry would utilise a qualitative, quantitative or multi-method mode of inquiry, Trafford and Leshem (2008) advised that the researcher has to first understand what his/her own personal philosophical assumptions are about the world and to explain which cultural tools the researcher is confident in using to collect and analyse data. As Niewenhuis (2007c) stated, the theoretical framework explains the researcher's thinking about the ontology, epistemology, human nature, and methodology of the phenomenon before

the study is even conducted (see Heading 1.5.2.3). Therefore every aspect, from the identification of the problem up until the conclusive finding, was part of interconnected processes, which were interdependent on each other and on that which the researcher should reflect. The theoretical framework and the methodological considerations became the guiding principle or blue print according to which the researcher conducted the research inquiry (Babbie, 2008; Trafford & Leshem, 2008).

2.3.1 Ontological assumptions

The researcher has presented the need for making sense of the development of Beginning Knowledge education in the Foundation Phase curricula in South Africa and this is the phenomenon under investigation. The ontology of a research inquiry is concerned with understanding what the truth or reality about the phenomenon is and also what the underlying assumptions about reality are (Niewenhuis, 2007b, 2007c).

Firstly, there is an external ontological reality present in a research process (Niewenhuis, 2007b, 2007c) and for this research inquiry, it was represented by different bodies of scholarship over different time periods to help demarcate how Beginning Knowledge education in the Foundation Phase in South Africa has developed historically. The researcher assumed therefore that reality is represented by external typographic cultural tools from different time periods and that there are different views about what Beginning Knowledge is and how it has developed.

Secondly, there was an internal ontological reality present in this research process, which was represented by the connotation individuals attach to reality (Niewenhuis, 2007b, 2007c) and to help the researcher make sense of how different interpretations of Beginning Knowledge education in the Foundation Phase in South Africa contributed to the development of the subject. The researcher identified internal ontological realities through three activity systems, namely the Educational, Societal and Technological activity systems (see Headings 1.5.3.3 and 1.8.3) and the conglomeration thereof: Educational-Societal, Educational-Technological and Societal-Technological activity systems (see Headings 1.5.3.3 and 1.8.4). Both international and national bodies of scholarship were utilised to investigate the development of Beginning Knowledge education and to consolidate a knowledge base for this phenomenon without jeopardising its South African character, as discussed in Chapter one.

The essence of ontological reality is represented by both external contributing factors, like external cultural tools over a historical period, as well as internal contributing factors, such as

the connotations associated with views from Education, Society and Technology about the development of Beginning Knowledge education in the Foundation Phase in South Africa through three activity systems, namely the Educational, Societal and Technological activity systems and the conglomeration thereof: Educational-Societal, Educational-Technological and Societal-Technological activity systems. These realities contributed in their unique way to how Beginning Knowledge education is constructed, and preserved for and transferred to future generations (Niewenhuis, 2007b, 2007c; Rückriem, 2009). The researcher realised that, because knowledge and understanding of reality is not stagnant or permanent, the external and internal ontological realities could have undergone changes as time passed. The Hybrid Cultural Historical Activity Theory, utilised for this research inquiry (see Heading 1.5.2.3), enabled the researcher to be sensitive towards the external and internal ontological realities present in human activity, that is to say, the cultural tools within a social-cultural environment that changes over time (Engeström et al., 1999; Rückriem, 2009; Sannino et al., 2009b).

2.3.2 Epistemological assumptions

Whereas ontological assumptions are concerned with the nature of the reality or truth, Niewenhuis (2007b) emphasised that epistemology is concerned with how a researcher can discover, explain and disclose the truth or reality. It can be deduced that epistemology has an underlying methodological component because it assumes that truth can be discovered and that there is a relationship between the knower and the known (Creswell, 2009; Niewenhuis, 2007b). Based on the ontological nature of this phenomenon and the selection of a theoretical framework to make sense of this phenomenon, the researcher decided to adopt a qualitative mode of inquiry, with a historical research design. By selecting a qualitative mode of inquiry, it is implied that the reality of Beginning Knowledge education can be comprehended by selecting conversations and lived-experiences in textual or typographical format, which can be located within Educational, Societal and Technological bodies of scholarship in different time epochs.

Although the concern may arise whether the findings of this inquiry can be generalised or be objectively known, it is evident that the purpose of this research inquiry was to make sense of the development of Beginning Knowledge education in the Foundation Phase in South Africa. Such a research inquiry in itself is truly a unique cultural-social and historical event that cannot be generalised to other studies. However, this research inquiry can set the groundwork for further studies in Early Childhood Education. The qualitative historical research approach can also be replicated to conduct similar studies for other subjects within the Foundation Phase, for

example conducting how Music Education in the Foundation Phase in South Africa has developed historically, utilising the same procedures and approaches.

2.3.3 Qualitative mode of inquiry

A qualitative research mode of inquiry enabled the researcher to collect and generate descriptive data in respect of a particular phenomenon or reality, with the purpose in mind to demonstrate and develop a deeper understanding of what has been observed or studied (Creswell, 2009; Denzin & Lincoln, 2005; Niewenhuis, 2007b). Qualitative research concentrates on how the reality of the phenomenon is viewed and understood, and how meaning is constructed about the reality that is experienced (Creswell, 2009; Denzin & Lincoln, 2005; Niewenhuis, 2007b). In other words, when referring to a qualitative research design, it emphasises the intention of exploring and understanding the meaning individuals or groups of individuals ascribe to a social phenomenon (Creswell, 2003, 2009).

As with quantitative and multi-method modes of inquiries, qualitative research also favours certain approaches, methods or techniques of data collection or generation, and analytic interpretations, of which historical research inquiries are one, according to Creswell (2003), and Denzin and Lincoln (2005). Based on the discussion on what qualitative research entails, it is important to mention that this mode of inquiry is a well-established field of knowledge and is considered to be a meticulous, reliable and thorough mode of inquiry (Creswell, 2009; Denzin & Lincoln, 2005; Dey, 1993; Grbich, 2013; Niewenhuis, 2007b). It can therefore be deduced that a qualitative approach to a research inquiry is fully fledged and is extensively acknowledged by the body of scholarship as a renowned design; therefore, it needs not be further justified in this section.

Due to the ontological nature of this research inquiry, and the fact that the development of Beginning Knowledge education in the Foundation Phase in South Africa can be investigated through analysing bodies of scholarship of international and national character, it can therefore be deduced that a qualitative mode of inquiry is sufficient with the incorporation of a historical research design. Because the researcher wanted to make sense of how Beginning Knowledge education has developed and how this historical research inquiry could contribute to the body of scholarship, a qualitative research design was selected to best explore such domains and structural processes throughout time (Grbich, 2004, 2013). The qualitative historical research inquiry fulfilled the key requirements of this research inquiry and was therefore utilised.

2.4 METHODOLOGICAL CONSIDERATIONS

Methodological considerations are described as the plan or procedure of a research inquiry, which spans and guides researchers in making choices about aspects such as methods of data selection, collection, generation, and analysis, in order to investigate an identified phenomenon from which broad and general interpretations can be derived (Creswell, 2003, 2009). The decisions that a researcher have made, regarding the selection of a particular research design and the encompassing research processes, are also motivated by the gaps identified in the body of scholarship (see Headings 1.5.1, 1.5.2, and 1.5.3), and the theoretical framework (see Heading 1.5.2.3) identified as a sense-making framework (Creswell, 2009; Maree & Van der Westhuizen, 2009; Mouton, 2001; Trafford & Leshem, 2008). It can therefore be deduced that the justification of consideration of a specific methodology to conduct a research inquiry, is firmly grounded in the following aspects: the nature of the research inquiry (for example problem statement, gaps in knowledge, and research rationale); the researcher's personal preferences and lived-experiences; the theoretical and conceptual framework; the application of the research process (for example data selection, generation, analysis and interpretation); and the reader and body of scholarship to which the research inquiry aims to contribute to (Creswell, 2003, 2009).

2.4.1 Historical research design

Historical research, according to Maree (2007), is a methodical process of selecting, describing, analysing, and interpreting past events founded in constructed information, related to the topic under investigation. Historical research can be described as the attempt to scrutinise historical events or combinations of events; to incorporate the significance of past events with current events; and to arrive at an account of what has happened in the past and how it has contributed to present and future situations (Creswell, 2009; Mouton, 2001; Thies, 2002). As described in the contextual, conceptual and methodological gaps in the body of scholarship (see Headings 1.5.1, 1.5.2, and 1.5.3), this research inquiry aimed to locate factual information about the historical and contextual events, and also to portray thoughtfulness towards appreciating the context within which an event took place or how it developed over time (Maree, 2007).

Conducting a historical research inquiry aids researchers to uncover knowledge or scholarly work that can be described as less familiar to readers due to its historical publication date (Maree, 2007; Mouton, 2001; Thies, 2002). Researchers rarely consult texts older than ten years when conducting a literature review and, by reinterpreting existing historical data, the researcher may attempt to answer questions that current research cannot, due to analysing a

large quantity of texts that are rarely consulted (Maree & Van der Westhuizen, 2009; Vithal & Jansen, 2004). For this historical research inquiry, the researcher consulted a vast amount of existing texts, for which permission was obtained, regardless of its date of publication. The researcher also utilised both primary and secondary sources, and where original texts were in an unknown language, a reliable translation was identified. The researcher made an effort to identify the most renowned or leading scholars within a particular discipline, and by studying their personal publications and the scholars' work the pursue, the researcher was able to identify reliable and suitable bodies of knowledge. Some of these renowned scholars, within different disciplinary fields, were mentioned in the footnotes in the Initiation chapter (see Heading 1.5.1.3)

As with the importance of selecting the most suitable theoretical framework, the choice of research design also has an influence on aspects such as the purpose of the research inquiry, the rationale and contribution of this inquiry to the body of scholarship and how the research inquiry will be conducted, analysed, interpreted, and communicated to the wider community of scholars (Kipling, 2004; McMillan & Schumacher, 2001; Trafford & Leshem, 2008). It can be deduced that a research design involves a series of interconnected processes, within the research inquiry, on which justifiable decisions can be made. Therefore it is important to discuss the implication for selecting a historical research design to make sense of how Beginning Knowledge education in the Foundation Phase in South Africa has developed.

2.4.1.1 Historical data

The construction of a knowledge base, which is also called "data", was an integral element of the evidence-gathering process for this historical research inquiry (Ercikan & Roth, 2006). For this particular historical research inquiry, the evidence-gathering process was aimed at answering the primary research question on how Beginning Knowledge education in the Foundation Phase in South Africa has developed. But in order to answer the primary research question, the secondary research questions were explored (see Heading 1.4.2), and refined, as the researcher progressed through the research process, which is a normal procedure, according to Ercikan and Roth (2006). This section is focused on what establishes data sources, how data is derived from these data sources, and who constitutes participants in research (Ercikan & Roth, 2006).

Within this historical research inquiry, the researcher interpreted data sources as the context, societies, methods, cultural tools, and educational objectives (Ercikan & Roth, 2006) that contributed to the development of Beginning Knowledge education in the Foundation Phase in

South Africa. It was required to explore these data sources, in order for the researcher to make sense that informed decisions were made in this educational research inquiry. The researcher identified gaps in the body of scholarship, as discussed in the Initiation chapter. In order to determine what type of data should be selected for interpretation, the discussion by Mouton on the Three Worlds Framework was utilised (see Heading 1.5). The following excerpt describes what is meant with a research inquiry conducted in World 1:

> An empirical question asks something about World 1; it addresses a real-life problem. To resolve an empirical question, we either have to collect new data about World 1 or we have to analyse existing data. Non-empirical questions are questions about "entities" in World 2, for example questions about the meaning of scientific concepts, questions about trends in scholarship or about the plausibility of a new scientific theory. In this case, we are asking questions that can be resolved without recourse to World 1, but rather an analysis if the body of scientific knowledge in World 2 (Mouton, 2001, p. 59).

Mouton (2001) stated that a research inquiry located in World 1 (see Heading 1.5.1), a contextual limitation, requires participation by human respondents to conduct the study and to implement an intervention to resolve the problem. Mouton (2001) referred to this type of study as an "empirical study". Mouton (2001) continued to explain that when a researcher has identified a research problem in World 2 and 3 (see Headings 1.5.1, 1.5.2, and 1.5.3), then the researcher does not necessitate participation from human respondents to conduct the study or to implement the intervention. Rather, the researcher should employ existing typographic scholarly recognised data that can be re-conceptualised and re-analysed. Based on Mouton's (2001) description, this research inquiry can be described as a non-empirical study and necessitated only existing typographical sources of knowledge to analyse.

Within this historical research inquiry, the aim was not to generalise the findings; rather, the data was utilised to substantiate claims and make inferences about the context, societies, methods, cultural tools, and educational objectives; and these inferences do not go beyond this understanding (Ercikan & Roth, 2006). The historical data enabled the researcher to determine and attempt to make sense of how Beginning Knowledge education have developed, by understanding the different historical contexts, societies, methods, cultural tools, and educational objectives, utilised to include or exclude the subject from the curriculum and why. The relevance or interest emerges, according to Ercikan and Roth (2006), when a dialectical tension or contradiction is identified in patterns. This is the objective of both the Initiation chapter (see Headings 1.3 and 1.8.4) and the Interpretation chapter (see Headings 4.4.1, 4.4.2 and 4.4.3), and is summarised in the Results and Communication chapter (see Headings 5.3.1.1.1, 5.3.1.1.2 and 5.3.1.1.3), with the vertical and horizontal analysis of the databases

constructed and consolidated from the international and national bodies of scholarship. The interpretation of the constructed data required criteria (vertical analysis in the Performance chapter (see Headings A 3.2, B 3.3 and C 3.2) and principles (horizontal analysis in the Interpretation chapter (see Headings 4.4.1, 4.4.2, 4.4.3, and 4.5), and for this historical research inquiry, the hybridised Cultural-Historical Activity Theory was utilised to make sense of how Beginning Knowledge education has developed historically in the Foundation Phase in South Africa.

2.4.1.1.1 Location of historical data

A research site can refer to the physical environment, internet, human, and/or textual resources (Mouton, 2001). It is essential that enough thought should be given to aspects such as accessibility and feasibility of the research site, before conducting a research inquiry (Creswell, 2009; Mouton, 2001). Because historical research is an inquiry of primary and/or secondary, existing textual data, the researcher relied heavily on identifying and obtaining access to existing textual or typographical data in both virtual and physical realms. Considerable time was allocated to the process of scanning, scoping, gathering, and selecting the primary and/or secondary sources in the existing corpus of knowledge, before analysing it (Creswell, 2009; Maree, 2007). The following major storage facilities were visited, contacted or accessed through the internet to gain access to printed, written, and textual data. Name and contact details are available on request, but because the researcher undertook to keep each participant's identity confidential, specific detail is omitted.

Table 2-1: Access points and location of the main type sources of information utilised

Type of information source	Location	Ways of gaining access to sources	Description and function of database
Books Dissertations Documents E-books Files Inventories Journal articles Manuscripts Photos Reports Text books Theses, et cetera.	Library	Library catalogue (NLSA and/or tertiary institutions)	The libraries and museum collections can be visited physically or through the internet as they are established by the state or by the diverse tertiary institutions all over South Africa. These storage facilities (virtual and physical) contain a wealth of information that can be explored through the catalogues or indexes and can then be downloaded or lent through the registered institutions library. These sources include vast amounts of textual data, preserved in different formats (print or digital), places and type of source.
	Online libraries	Bookfind Directories ISI web of knowledge NEXUS NISC SA NRF SACat (Sabinet) Search engines WorldCAT	
	Museums and archives	Inventory catalogue NAAIRS SADA	
Annuals, educational reports, curricula, learner activity books, official educational memoranda, historical documents, records, et cetera.	Library	Library catalogue (DBE, DHET, SATA) Search engines Directories	The Department of Basic Education, the Department of Higher Education and Training, and the South African Teachers' Association have a collection of educational material from Grade R to Grade 12, which also includes adult literacy programmes. This storage facility (physical and virtual) aims to develop, maintain and support a South African school education system for the 21st century.
	Online libraries	ERIC DBE DHET Wilson education	
	Museums	Inventory catalogue	

(Adapted from Mouton, 2001, pp. 29–39, 88)

2.4.1.1.2 Type of historical data

Archival and documentary sources were the dominant type of historical data accessed in this research inquiry. The researcher used computerised and non-computerised means to access textual and numeric sources for information, which were stored on internet bases and in physical buildings. The typographical data accessed (virtually as well as physically) for this historical research inquiry, was described by Mouton (2001) as primary or secondary sources. A primary source is an original, first-hand record, account or artefact that has survived from the

past; whilst a secondary source is an account of the past, created after the event, or created from primary sources (Mouton, 2001). The nature of both data sources can be represented through textual and numeric data in written, printed or electronic format. Examples of types of information located included the following: annual reports, blogs, books, curricula, diaries, dissertations, documents, files, historical documents, internet websites and webpages, inventories, journal articles, learner activity books, letters, manuscripts, memos, minutes, newspapers, official memoranda, periodicals, photos, records, reports, text books, theses, and yearbooks. For this historical research inquiry, the researcher primarily utilised annual reports, books, curricula, dissertations, documents, files, historical documents, internet websites and webpages, inventories, journal articles, learner activity books, manuscripts, official memoranda, photos, records, reports, text books, and theses.

2.4.1.1.3 Selection of historical data

Historical research is a process of discovering and reconstituting existing material (Le Roux, 2013b) and thus, appropriate data must be identified, accessed, selected, and separated from irrelevant data. A preliminary literature review assisted the researcher to determine the current view on the phenomenon (see Heading 5.1.3), whilst a historic investigation determined the nature, breadth and depth of the origin of the phenomenon (Le Roux, 2013b; Marwick, 2001).

The author had to make use of virtual platforms and visit premises of storage facilities to obtain data from disciplinary fields like Early Childhood Education, GeHiNaTe education, Curriculum Studies, and Historical Research. Le Roux (2013b) warned that a research inquiry should not be jeopardised due to ambiguity when terminology is not defined accurately and therefore concepts were clarified by listing tables with concepts and their definitions (see Headings 5.1.2, 5.2.2, and 5.3.2). The researcher determined the key terminology (see Abstract) that was used in both national and international literature, to assure that pivotal information was not overlooked. For example, the international literature refers to Kindergarten and Early Childhood Education, whilst, in South African literature, terms such as Foundation Phase education, Grade R, 1, 2 and 3, Pre-Primary and Primary education or Grade 1/Sub A, Grade 2/Sub B and Grade 3/Standard 1, are all synonyms for the same field of knowledge. The same principle was applied to the concept of GeHiNaTe education or World Orientation, that resembles education of Social Sciences or Geography and History, and Natural Sciences and Technology in international literature, whilst Geography, History, Natural Sciences, and Technology education together are given the collective name of Beginning Knowledge education in the current South African curriculum.

The keywords utilised for this historical research inquiry include the following: Beginning Knowledge; Curriculum; Early Childhood Education; Educational Technology; Environmental education and/or Studies; Foundation Phase; Geography, History; Historical Research; Kindergarten; Life Skills education; Natural Sciences; Pre-Primary education; Primary education; Scientific Literacy; Social Sciences and/or Studies; Syllabi; Technology, Themes and Topics.

Based on the vast amount of data that was available, the researcher had to use informed discretion to use the most suitable terminology, keywords, databases, and indices when searching for sources and therefore, applied the following principles set out by Maree (2007) and Mouton (2001) when selecting sources. The researcher had to:

(i) be attentive to the type of document that she utilised and analysed, by discerning whether it was a primary/secondary source or an official/unofficial document;

(ii) discern whether the text consulted was the original source, or in the case when it was a translated version, that it was accurate and trustworthy;

(iii) take note of the date of publication and location of archived documents;

(iv) realise that, when a particular source was consulted, she should be clear about what the purpose or intent of the document was, whether the evidence was based on empirical research data, in which context it was conducted, and for which reader the text was intended;

(v) limit her search by identifying relevant and well-defined key words when reviewing the body of scholarship; and

(vi) identify renowned scholars within each subject field and incorporate their expertise where possible.

2.4.1.1.4 Common errors in historical data

This historical research inquiry adopted a non-empirical data selection approach by selecting textual data that already existed. Mouton (2001) warned that, when selecting existing data, there is a possibility that there might be common forms of error that the researcher can encounter. Le Roux (2013b) and Mouton (2001) cautioned that data sources can be inaccessible because the data is not computerised or properly catalogued and requires a researcher to work closely with other storage facilities and scholars to locate and replace

documents that could not be accessed. Most curriculum documents during the period of 1968 to 2015, that were identified, were located at one of the mentioned storage facilities. Le Roux (2013b) and Mouton (2001) advised researchers that data sources can be incomplete. Where data cannot be located or replaced, and therefore can be viewed as incomplete, the researcher then has to consult secondary sources within national and international scholarly work. The reason for incomplete data can be due to the possibility that it was not properly documented, because it might have been considered less important, too old, or not as relevant. This was one of the reasons why curricula intended for schools between 1652 and 1967 could not be analysed, since the researcher could not locate these curricula or access it, after various attempts were made to visit storage facilities and to contact emeritus professors to locate these curricula. The researcher decided to discard colonial curricula, based on the fact that Beginning Knowledge education was only formally included in Foundation Phase curricula in South Africa during the time period 1948 to 2015.

Mouton (2001) emphasised that a researcher should justify whether data will be selected from a complete population or only from sample groups of certain domains, as this could limit the data that may have been considered of value. The researcher decided to include both national and international bodies of scholarship relating to the following fields of discipline: Early Childhood Education; Educational Technology; Environmental education and/or Studies; Life Skills education; Scientific Literacy; Natural Sciences; Social Sciences and/or Studies; and Technology. Literature outside this scope of terminology was not selected or analysed. The historical period from which data was utilised, was from 1400 to 2015, and only South African curricula relating to GeHiNaTe education during the period 1948 to 2015, were analysed for understanding how Beginning Knowledge developed in Foundation Phase curricula in South Africa.

Le Roux (2013b) advised researchers to be aware of presentism and to avoid judging or interpreting past occurrences from current opinions or standards (see Headings 1.1 and 1.2). Due to the limited information available about Beginning Knowledge education in the Foundation Phase in South Africa, the researcher had to access international scholarly work to serve as base knowledge where sources were incomplete or absent. The researcher did, however, compare South African literature and curricula for Beginning Knowledge education in the Foundation Phase to international literature and standards available for GeHiNaTe education in the early years. The researcher demonstrated sensitivity and caution when comparing South African curricula to international standards and focused on possible reasons why data was incomplete and what implications it had for the Foundation Phase learner, to whom the subject is taught.

According to Mouton (2001), it is pivotal to state that, in order to conduct a relevant and trustworthy historical research inquiry, a researcher has to access and gather existing data as accurately and in as much detail as possible, before analysing and communicating it to the readers. Mouton (2001) emphasised that a researcher should realise that the results of a research inquiry become a historical record; it can be integrated or consolidated into the body of scholarship and may possibly be used by other scholars. The analysis of secondary data has become a growing field of research and a large extent of existing knowledge bases is grounded on secondary sources (Auerbach & Silverstein, 2003; Creswell, 2003). Therefore the responsibility rests with all researchers to assure that all data included are meticulously documented and recorded.

2.4.1.2 Historical analysis and theoretical interpretations

When conducting a historical research inquiry, a researcher must be set on finding patterns among voluminous details of literature describing a complex phenomenon (Babbie & Mouton, 1998; Mouton, 2001). Researchers conducting a historical study are usually informed by a particular theoretical framework to help them make sense of the phenomenon (Babbie & Mouton, 1998). Historical research acknowledges, therefore, the dialectical relationship between a theoretical framework, the methodology for conducting the inquiry, and the historical facts as presented in the body of scholarship (Babbie & Mouton, 1998; Levy, 2001; Thies, 2002). The process of analysing data can be described as iterative (non-linear), which implies that the process of selection, analysis and interpretation is intertwined and cyclical and not a number of successive steps (Niewenhuis, 2007a; Saldaña, 2009). Because of the strong relationship between the theoretical framework, the methodology and the body of knowledge, the process of analysing data is therefore influenced by it (Babbie & Mouton, 1998; Mouton, 2001).

The selected historical research design, in collaboration with the Hybrid Cultural-Historical Activity Theory, empowered the researcher to make sense of the phenomenon through looking at the activity systems situated in communal and historical contexts (Yamagata-Lynch, 2010). Central to the Hybrid Cultural-Historical Activity Theory, are the interactive activity systems (Educational, Societal and Technological) present in this phenomenon across six historical periods from 1400 to 2015, as discussed in the Initiation chapter. The historical development of Beginning Knowledge in the Foundation Phase has been influenced by a chain of historical events in the different activity systems, which has resulted in conflict and contradictions about the importance of Beginning Knowledge education in the Foundation Phase in South Africa. By

intellectually mapping out the changes and transformations that have occurred in the development of Beginning Knowledge in the Foundation Phase in South Africa, light was shed on the future of this subject. The figure below is a visual representation of the interrelated components of this historical research inquiry.

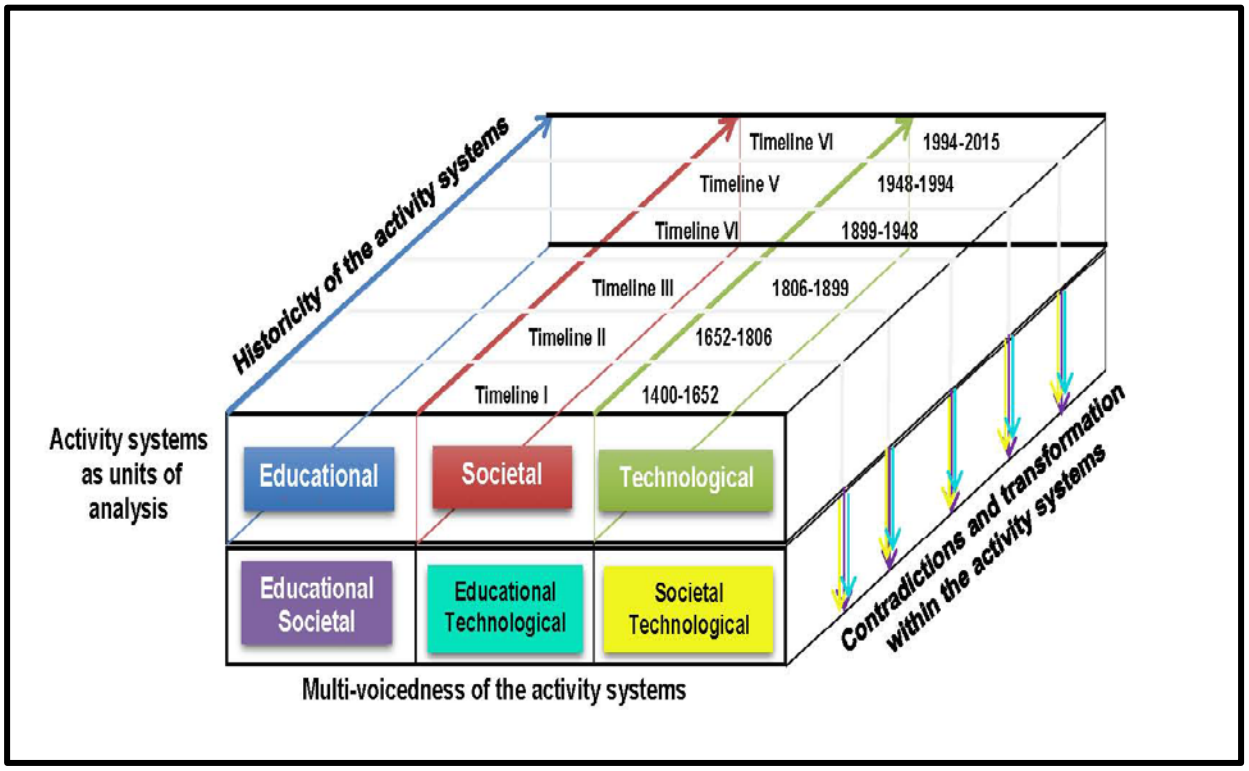


Figure 2.1: Visual representation of the interrelated components of this historical research inquiry

2.4.1.2.1 Research process

In order to make sense of how the researcher conceptualised and analysed the research material, the following processes were used (Auerbach & Silverstein, 2003; Saldaña, 2009):

Process 1: The researcher developed a conceptual map as visual aid, to remind her what the research concern was. The selected theoretical framework, the central research question, and the goals of the research inquiry remained focused. The researcher, together with her promoter, verified the foundation of this historical research inquiry by conducting extensive and diverse literature review checks to determine whether the development of Beginning Knowledge education in the Foundation Phase in South Africa was relevant, actual and authentic (see Headings 1.4, 1.5, 1.5.1.3, and 1.5.2.3).

Process 2: The researcher reviewed scholarly work in search of a suitable theoretical framework that was able to explain the historical development of Beginning Knowledge education in the Foundation Phase in South Africa. After identifying three relevant theories, a new theory was developed, and coined, by hybridising these theories, referred to as the Hybrid Cultural Historical Activity Theory (see Heading 1.5.2.3). Due to the important role that the theoretical framework plays in a research inquiry, and especially a historical research inquiry, the researcher made sure that the ontological, epistemological and methodological perspectives were aligned with the theoretical framework.

Process 3: Based on the body of scholarship, the research problem and the nature of the theoretical framework, the researcher decided that a historical research design was the most suitable methodology for this research inquiry (see Headings 1.5.3.3 and 2.3). Furthermore, such a methodology has not been utilised before in the body of knowledge for Beginning Knowledge education in the Foundation Phase in South Africa and therefore, a methodological contribution to the body of knowledge was also made (see Heading 1.5.3). The researcher reviewed the research questions and methodological considerations to ensure that it was aligned with the theoretical framework and outcome for this investigation.

Process 4: The researcher identified three contributing views, with underlying criteria, that could assist her in making sense of how Beginning Knowledge has developed in the Foundation Phase in South Africa through a vertical analysis (see Headings 1.8.3, A 3.2, B 3.3 and C 3.2). These activity systems are called the Educational, Societal and Technological contributions to the development of the subject and, although they are mentioned distinctively, they are interconnected. These three activity systems are also directly linked with the core principles of the three merged theories (see Heading 1.5.2.3.1).

Process 5: The researcher reviewed scholarly work in search of a suitable time period through which this research inquiry could be investigated (see Headings 1.5.3.3, 2.4.1.2.1 and 3.3). The researcher had to consider the importance of historicity because the development of Beginning Knowledge education in the Foundation Phase in South Africa has taken shape and transformed over a long period of time and each time epoch presents its own history and context. The six time epochs identified for this research inquiry were firstly projected as an international timeline, as developed by international scholars and then brought into perspective with a South African timeline, as developed by local scholars. They are as follows: Pre-Colonial times: Traditional education (1400-1652); Colonial times: Education during Dutch Colonisation in South Africa (1652-1806); Industrial and Progressive era: Education under the British rule (1806-1899); Child Study Movement era: Education in the midst of missionaries, Boer Republics, wars and the end of union (1899-1948); Great Society era: Apartheid education

under National Party rule (1948-1994); and Accountability and Electronic era: Outcomes-based education in a democratic South Africa (1994-2015).

Process 6: Within the implementation of the first five processes, the researcher was able to establish the knowledge bases for this historical research inquiry, as depicted in the Performance chapter (see Headings 1.5.3.3 and 1.8.3), from which she was able to analyse and comprehend how Beginning Knowledge education has developed in the Foundation Phase in South Africa through horizontal analysis (see Headings 1.5.3.3 and 1.8.4). The researcher identified patterns, changes and contradictions, within the body of scholarship of each of the three conglomerated activity systems (Educational-Societal, Educational-Technological and Societal-Technological) over the six time epochs and strived to explain how it contributed to the development of Beginning Knowledge education in the Foundation Phase in South Africa. Such patterns, changes and contradictions should not be seen as issues or problems within the systems or time period, but the historical accumulation and development of views, cultural tools and knowledge on the importance of Beginning Knowledge education in the Foundation Phase in South Africa.

Process 7: The researcher strived to communicate how Beginning Knowledge education in the Foundation Phase in South Africa has developed historically. She then concluded this historical research inquiry, by communicating the findings and recommendations, and depicted how this research inquiry contributed to the body of knowledge (see Headings 1.5.3.3 and 5.4).

2.4.1.3 Quality assurance and data verification of historical data

In order to be taken seriously by the scientific community, and to contribute to the body of scholarship, the researcher must ensure that the manner in which she conducted and explained the research inquiry and the findings, is congruent with, or a true representation of reality (Mouton, 2001; Trafford & Leshem, 2008). The outcome of this research inquiry was to contribute to the body of knowledge in a truthful way (Maree & Van der Westhuizen, 2007, Mouton 2001) by acknowledging and representing findings that reflect the development of Beginning Knowledge education in the Foundation Phase in South Africa through history. The truthful representation of findings can be considered elusive, and, therefore, the researcher aimed to reduce uncertainty, by employing trustworthy and justifiable approaches, whilst conducting the historical research inquiry (Auerbach & Silverstein, 2003; Grbich, 2013). It is, therefore, crucial, in a qualitative research approach, to utilise various strategies or techniques that will assist a researcher to ensure that the interpretations or inferences made from the data

are consistent with the data that has been collected (Maree & Van der Westhuizen, 2009; Merriam, 1998)

2.4.1.3.1 Quality assurance strategies

According to Creswell (2003, 2009), and Denzin and Lincoln (2003, 2005), the following components can assist a researcher to increase trustworthiness and consistency of qualitative data: dependability, transferability, credibility, and conformability. The following discussions focus on Merriam's (1998) suggestions on improving the internal validity of the findings, together with Trafford and Leshem's (2008) internal-literature consistency and internal-theoretical consistency, when selecting, analysing and interpreting existing data, which is also brought into perspective with Creswell's (2009) discussion on qualitative reliability and validity (see Headings 5.2 and 5.3).

Strategy one: Crystallisation refers to using several viewpoints, sources and/or methods to select, analyse and interpret data. The researcher utilised both primary and secondary sources from national and international bodies of knowledge, and vertical and horizontal analysis, during the process of making sense of how Beginning Knowledge education has developed in the Foundation Phase in South Africa. The researcher developed a hybridised theoretical framework that could explain how the three activity systems (respective and conglomerated) contributed to the development of Beginning Knowledge education. The researcher acknowledged the influence that context and time have on the development of Beginning Knowledge education and therefore adopted a historical research design to help make sense of this research problem through analysing six historical periods.

Strategy two: Research bias refers to the clarification of the researcher's assumptions, theoretical orientation and views. The researcher discussed the theoretical framework adopted for this research inquiry and what the underlying working assumptions are and how it influenced the selection, analysis and interpretation of data. The researcher also discussed the ontological and epistemological assumptions that she might have when conducting this study and also communicated the limitations of this research inquiry.

Strategy three: Peer examination, collaborative research, and member checks refer to the researcher's willingness to implore other scholars' opinions on the research inquiry and allowing that data interpretations are verified by other researchers and not by the researcher herself. The researcher scheduled regular meetings with her promoter to communicate, debrief and reflect on the research process and data interpretations. She regularly consulted with experts or

scholars within the field of Early Childhood Education, GeHiNaTe education, History Research and Education, and Research Methodology to verify whether her understanding of texts was correct and whether important scholarly work may have been overlooked. The researcher and promoter co-constructed the three activity systems, the time epochs, and the selection of the body of scholarship with the purpose of reaching consensus of what the theoretical framework will interpret.

Strategy four: Internal empirical consistency and internal criticism refer to the relationship between the research question and factual conclusions. The researcher derived the research questions after the identification of the contextual, conceptual and methodological gaps that were identified in literature and used the research questions, purpose statement and theoretical framework as guiding principles to select, gather and analyse all textual data. The data that was interpreted reflects a true and accurate interpretation of the original and authentic information.

Strategy five: Long-term observation refers to data that is collected over a long period of time. Firstly, the researcher utilised data over a long historical period (1400-2015). Secondly, the researcher spent a great amount of time continuously consulting different works of literature from diverse bodies of scholarship to assure that her current collection of data was up to date, complete and resonated with the specialists in the field. Where data was discovered as incomplete or vague, more research was conducted to locate such data and replace the current collection with more relevant sources or to serve as supplement to the collection, contributing to an authentic and reliable collection of sources.

Strategy six: Internal theoretical consistency refers to the relationship between the research question and interpretive conclusions. By answering the research questions, based on analyses and the interpretation of existing data, the researcher demonstrated higher levels of reasoning and engagement with data and the theoretical framework, than mere descriptions of text.

2.5 ETHICAL CONSIDERATIONS

Due to the nature of this research inquiry, the researcher did not collaborate with participants to generate data; ethical concerns and misconduct were thus reduced. Although the researcher did not necessitate ethical clearance for conducting this research inquiry, she still consulted the literature and documentation to consider ethical practices. The researcher studied the North-West University's policy on conducting a research inquiry, and also scholarly work of Creswell (2003, 2009), Israel and Hay (2006), and Le Roux (2013b), through which the researcher familiarised herself with these aspects and undertook to be considerate of them at all times.

Whilst conducting this research inquiry, the researcher protected the gatekeepers identity (for example librarians, research consultants, archivists) and treated them with the utmost respect at all times. The researcher never violated their rights and assured anonymous participation as gatekeeper (see 2.4.1.1.1 and 2.4.1.1.2).

The researcher conducted truthful and authentic research and guarded against misconduct and indecency, which could reflect negatively on the institution. Any challenges or hindrances that the researcher encountered, she handled in a professional manner and discussed it with her promoter before acting on a situation. Whilst conducting the research inquiry and conveying the results, the researcher was sensitive that it did not lead to stereotyping, marginalisation or disempowerment of the individuals', institutions' or organisations' reputation or character. The researcher did not disturb any of the research sites or locations she visited.

No form of plagiarism was tolerated and all ideas and words were appropriately sourced and acknowledged by the researcher. Data was not falsified or fabricated, and no findings and interpretations were communicated based on data that never existed. The researcher guarded against the misrepresentation, suppression or omission of data, and against reporting selectively or in a biased manner on any data. Finally, the researcher was obliged to store and protect the records of data collection for a specific time duration in a safe and appropriate space, as decided by the ethical committee, appointed by the North-West University.

CHAPTER 3: PERFORMANCE

3.1 INTRODUCTION

The assumption of Life Skills education and, therefore, Beginning Knowledge education in the Foundation Phase, is that this subject should support and strengthen the teaching of the core Foundation Phase subjects, namely Languages and Mathematics (Department of Education, 2011c). After decades of international research within the field of Geography, History, Natural Sciences, and Technology education in the early years, it is still believed by South African curriculum developers that the Foundation Phase learner should dominantly acquire the basic educational skills of reading, writing and arithmetic before acquiring other knowledge bases. This factor, in turn, also influenced teacher preparation programmes for Foundation Phase teacher training, predominantly focusing on these subject areas (Department of Education, 2002, 2003a, 2011c; Department of Higher Education and Training, 2011; Departement van Onderwys, 1991; The Centre for Development and Enterprise, 2015). Such unsupported inferences have, however, been challenged by scholars promoting GeHiNaTe education; the teaching of these knowledge bases is considered more than a compilation of facts and figures, talking about the weather daily, or to look forward to an expedition to the zoo at the end of the school term (De Melendez, Beck, & Fletcher, 2000; Fleer & Pramling, 2015; Haugland & Wright, 1997; Ratcliffe & Grace, 2003). The purpose of this Performance chapter is to understand how Beginning Knowledge education has developed historically. The significance of this chapter is the way the researcher investigated the development of Beginning Knowledge education in the Foundation Phase in South Africa by looking at three activity systems that contributed to its development over six time epochs.

3.2 BACKGROUND

When looking at the scholarly work related to Education(al) Studies or the Foundations of Education, it can be deduced that there are various basic disciplines or fields of study that establishes the niche area of Education (Wolhuter, 2013b). Some of the underlying fields within the discipline of Education, according to Wolhuter (2013b), are Philosophy of Education, History of Education, Sociology of Education, Science and Nature of Education, Psychology of Education, Comparative Education, and International Education, to name a few. In relation to the historical research inquiry about Beginning Knowledge in the early years, it can be deduced that all these mentioned sub-fields, within the discipline of education, are also applicable. With this historical research inquiry, the researcher attempted to access the voluminous corpus of international and national bodies of scientific knowledge, relating to these underlying fields of education, and (re)construct it in a synthesised format that can give a comprehensive overview

of the historical development of Beginning Knowledge education in the Foundation Phase in South Africa, from which deductions can be made and future studies be based on.

In order to understand what the knowledge base of Beginning Knowledge education constitutes of, before explaining how it has developed, the researcher utilised the theoretical framework called the “Hybrid Cultural Historical Activity Theory” (see Heading 1.5.2.3), to identify the main contributors to the transformation of knowledge bases. Each of the three activity systems’ distinctive contribution to the development of Beginning Knowledge is depicted and located across a time period represented by six time epochs.

3.3 IDENTIFICATION OF THE TIME EPOCHS

Due to the fact that a historical research inquiry is not just the mere recording of sequential dates of what are considered important events (Le Roux, 2013b; Wolhuter & Karras, 2013; Wolhuter, 2013b), the researcher had to identify historical periods that communicated an important “group of events” that influenced and transformed education in both international and national bodies of scholarship. It was an even more daunting task to identify two suitable time epochs for this historical research inquiry, as the grouping of events that contributed to the transitions in education for international and national bodies of scholarship, were not the same or synchronised.

The researcher firstly identified international time epochs that represented the most profound events in history that contributed to the transitions in Society and Technology that have transformed Education (Dever & Falconer, 2008; Lascarides & Hinitz, 2000; Verster et al., 1982a, 1982b). Thereafter the researcher identified national time epochs that represented the most significant transitions witnessed in South African education, due to Societal and Technological transformations (Booyse, Le Roux, Seroto, & Wolhuter, 2013; Le Roux, 2013b). After customising these two sets of time epochs with their different grouping of events, the researcher was able to synchronise it into six time epochs. The merged time epochs compliment one another and helped the researcher to give account to the corpus of knowledge by referring to both international and national time epochs during discussions.

Before announcing the time epochs, it is important to note that the researcher acknowledges that there are other groupings of events that could have been considered. Some of these time frames that were identified were located in a) the socio-cultural evolution; b) the gene-culture coevolution; c) archaeological disciplines associated with anthropology; d) the evolution theory; e) the evolution of Cro-Magnon man; f) palaeontology; g) archaeology; and h) the stages

associated with human generation groups typically referred to in studies about Human Resources and Career Psychology. The synthesised and synchronised time epoch that was utilised in this historical research inquiry can be presented as follows:

(i) Pre-Colonial times: Traditional education (1400-1652)

(ii) Colonial times: Education during Dutch Colonisation (1652-1806)

(iii) Industrial and Progressive era: Education under the British rule (1806-1899)

(iv) Child Study Movement era: Education in the midst of missionaries, Boer Republics, wars and the end of union (1899-1948)

(v) Great Society era: Apartheid education under National Party rule (1948-1994)

(vi) Accountability and Electronic era: Outcomes-based education in a democratic South Africa (1994-2015)

3.4 STRUCTURE OF THE PERFORMANCE CHAPTER

In this chapter the development of Beginning Knowledge education in the Foundation Phase in South Africa is comprehensively discussed from a historical point of view. Each of the activity systems that contributed to the development of Beginning Knowledge education is explored and presented as activity system A (see Heading A.3.1), B (see Heading B.3.1) and C (see Heading C.3.1). Each of these respective activity systems that are vertically analysed, is still located in the Performance chapter. The vertical analysis of the three activity systems can be visually presented as follows:

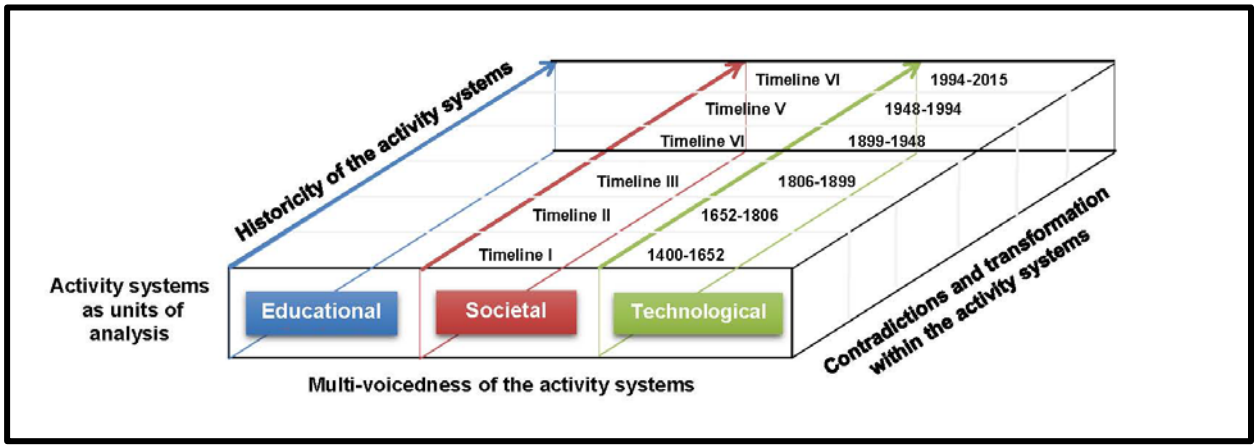


Figure 3.1: Vertical analysis of the body of scholarship utilising three activity systems

A. ACTIVITY SYSTEM A – EDUCATIONAL ACTIVITY SYSTEM

A.3.1 INTRODUCTION

There has been a continuous debate in scholarly work about the structure of knowledge bases that teachers require in order to teach a subject like Beginning Knowledge in the Foundation Phase (Corrigan, Gunstone, & Dillon, 2011). The structure of such a knowledge base can also not be predetermined because, with the passing of time, inevitable changes occur in Education, Society and Technology, which constantly challenge the once accepted knowledge base (Corrigan et al., 2011). One of the most influential factors contributing to changes and transformation within a knowledge system is the intended curriculum developed by government; a change in curriculum thus also requires a change in the knowledge base that a teacher requires to teach the subject (Ball, Thames, & Phelps, 2008; Shulman, 1986, 1987). An example would be the vast development of technology, with the requirement from curricula to include it as a subject; as a result teachers had to develop and acquire a knowledge base about the subject and of teaching the subject to learners.

In this historical research inquiry, South Africa has two categories of curricula that challenged the knowledge bases for teaching Beginning Knowledge education in the Foundation Phase. The first category was described by Carrim and Keet (2005), Du Preez (2008), and Hoadley and Jansen (2003) as a “collection curriculum”, which is characterised as a curriculum with distinct subject areas and contents that are closely linked with one another, but is taught as separate entities (see Heading 1.5.1.2). There are explicit subject boundaries to keep the content separate. The collection curriculum corresponds with the set of curriculum practices that are associated with the performance curriculum. The performance curriculum can be associated with the education system during the Apartheid regime. The second category is described by Carrim and Keet (2005), Du Preez (2008), and Hoadley and Jansen (2003) as an “integrated curriculum”, which is characterised by subject areas and contents which are not as strongly related to one another, but are taught holistically (see Heading 1.5.1.2). There are less explicit boundaries to keep the content separate. The integrated curriculum is associated with the curriculum practices of a competency curriculum and can be associated with the education system in the Post-Apartheid regime.

These two curriculum categories, namely performance and competency curricula, will be utilised when analysing and comparing the South African body of scholarship with that of international literature. Reflecting on such past and present knowledge bases enabled the researcher to constitute what Beginning Knowledge education is and also what signifies a viable knowledge base for professional Foundation Phase teachers (Corrigan et al., 2011). Thus, the historical analysis of how education has contributed to the knowledge bases and development of

Beginning Knowledge education was reported, which was also one of the research outcomes of this historical research inquiry (see Heading 1.4.2).

A.3.2 CATEGORIES OF KNOWLEDGE REQUIRED BY THE TEACHER TO TEACH GeHiNaTe IN EARLY CHILDHOOD EDUCATION

One of the most influential scholars on the development and transformation in knowledge bases that teachers ought to have about a subject and the teaching thereof, was Lee S. Shulman. Shulman followed in the footsteps of many imminent scholars,[19] whose original works dated back to the beginning of the twentieth century; they were Dewey (1904), Scheffler (1965), Green (1971), Fenstermacher (1978), Smith (1980), and Schwab (1983), amongst others. It was the scholarly work of Schulman (1986, 1987) that laid the foundations for further research on the knowledge bases for teaching, that inspired the work of Ball, Thames, and Phelps (2008) within the field of Mathematics education. Ball, Thames and Phelps (2008) and Corrigan, Gunstone and Dillon (2011) were of the opinion that Shulman's knowledge bases can be applied to the context of teaching other subjects like History, Geography, Natural Sciences and Technology as well. The works of Ball, Thames and Phelps (2008) were utilised for this historical research inquiry because they did extended research on developing knowledge bases for Mathematics education and their work can be applied to that of GeHiNaTe education. The following figure represents the two distinct groups of research on what a teacher should know about knowledge and teaching, which will be discussed thereafter.

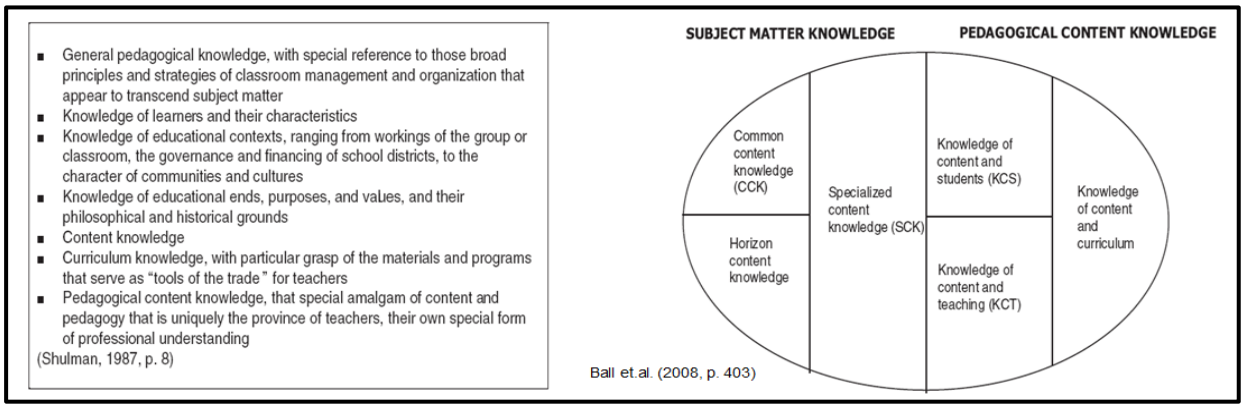


Figure 3.2: Shulman's major categories of teacher knowledge and the Ball, Thames and Phelps categories of Mathematical knowledge for teaching

(Adapted from Shulman (1987, p. 8) and Ball, Thames and Phelps (2008, pp. 391 & 403))

[19] These references are made available in the bibliography (Dewey, 1904; Fenstermacher, 1978; Green, 1971; Scheffler, 1965; Schwab, 1983; Smith, 1980)

Shulman (1987, p. 8), indicated on the left side of the above figure (see Figure 3.2) identified seven major typologies of professional knowledge. These typologies underlie what the teacher ought to understand about knowledge and teaching in order to teach learners the content. These seven typologies were categorised as Content Knowledge (incorporating four of the seven typologies), and Pedagogical Content Knowledge (incorporating three of the seven typologies). Shulman (1987, p. 7) referred to the Pedagogical Content Knowledge category as the missing paradigm in research about teachers' knowledge of content, the curriculum (both lateral and vertical), and pedagogy. Ball, Thames and Phelps (2008) represent the same overall picture of that of Shulman's original work, as indicated on the right side of the figure (see Figure 3.2). Their interpretation of Schulman's work is displayed as an oval shape, which is divided into two halves, namely Subject Matter Knowledge and Pedagogical Content Knowledge, each with their underlying typologies as set out by Shulman. Because the work of Ball et al. (2008) was based on Shulman's work and they had coined categories of Mathematical knowledge for teaching these, the same terminology was used as criteria to investigate and convey how Beginning Knowledge education in the Foundation Phase in South Africa has developed historically. The interchange between Subject-Matter Knowledge and Pedagogical Content Knowledge and teaching is an essential component for Ball et al. (2008) and is also embedded in the Hybrid Cultural-Historical Activity Theory that forms the theoretical framework for this historical research inquiry.

A.3.2.1 Subject Matter Knowledge relating to GeHiNaTe in Early Childhood Education

Substantial development has occurred during the past six decades regarding Subject Matter Knowledge required to teach GeHiNaTe in the early years (Brown, 1991; Chaillé & Britain, 2003; De Melendez et al., 2000; Eshach, 2006; Fleer & Pramling, 2015; Glauert & Manches, 2012; Lind, 2005; Seefeldt, Castle, & Falconer, 2014). Researchers and scholars conducted extensive research in order to successfully identify concepts, language and skills for the young child, as associated with the subject areas of Social Sciences, Natural Sciences and Technology. The acquisition of Beginning Knowledge concepts, language and skills helps learners to make sense of their world, to establish relationship with people, and foster habits of mind that promote Scientific Literacy competencies (Bybee, 1997; Fleer & Pramling, 2015; Hodson, 2008; Seefeldt et al., 2014). Subject Matter Knowledge (SMK), according to Ball et al. (2008, p. 408), incorporates three typologies that a teacher requires for teaching Beginning Knowledge in the Foundation Phase, namely Common Content Knowledge (CCK), Horizon Content Knowledge (HCK), and Specialised Content Knowledge (SCK).

A.3.2.1.1 Common Content Knowledge of GeHiNaTe education

Common Content Knowledge refers to the teacher's adept knowledge base of concepts, language and skills, related to Beginning Knowledge, that is taught to learners in the Foundation Phase (Ball et al., 2008; Shulman, 1987). Firstly, the Foundation Phase teacher has to have knowledge of what the underlying concepts of Geography, History, Natural Sciences, and Technology are.

Secondly, the Foundation Phase teacher also needs to have knowledge of how to use language to communicate understanding and help learners acquire Beginning Knowledge concepts and skills. In terms of language, the teacher must demonstrate understanding and sensitivity of the complex language issues in South Africa. The Foundation Phase learner's Home Language and even First Additional Language may differ from the Language of Learning and Teaching presented in school, which creates the risk that a learner may not understand or acquire Beginning Knowledge. An example of such a language situation is when a Foundation Phase learner's Home Language is Setswana and his First Additional Language is isiZulu, but neither of these languages is accommodated at school and he/she is required to learn in the Language of Learning and Teaching, which could most probably be English or Afrikaans. As can be deduced, language directly influences the acquisition of Beginning Knowledge concepts and skills.

Thirdly, the Foundation Phase teacher also needs to have knowledge of the relevance of Geography, History, Natural Sciences, and Technology concepts and how it can be applied to the environment or to a learning activity by the learner, using specific skills. An example would be for a learner to be able to measure the temperature, using a thermostat, at home and within the classroom. In short, the acquisition of concepts, language and skills by a learner, necessitates guidance from a more knowledgeable teacher. The reason for this is that Beginning Knowledge concepts, language and skills are not an inherent part of the learner's consciousness, but rather requires deliberate attempts to acquire it through social and cultural inventions in which the learner grew up (Fleer & Pramling, 2015; Vygotsky, 1987). Vygotsky's contribution to the issue of learning is of importance here because he explained how everyday and scientific concepts are acquired, which is crucial for the learning of Beginning Knowledge.

A.3.2.1.1.1 Concepts (everyday and scientific), language and skills associated with GeHiNaTe education

Vygotsky (1978) made reference to two categories of concepts, namely everyday concepts and scientific concepts. Vygtosky (1978) argued that the acquisition of these concepts is pivotal for the formation of higher thinking and understanding. Daniels (2005) and Virkunnen (2009) explained that scientific concepts are formed on the basis of systematic, organized and hierarchical thinking, whilst the distinct everyday concept is formed in a particular context that does not require a logical system of thinking. The development of everyday concepts may arise earlier than, later than or simultaneously with scientific concepts. Thus regardless of when an everyday concept is developed, it is central for developing a scientific concept, not an alternative (Vygotsky, 1987). Everyday concepts also need to become abstract and not remain concrete (Fleer & Pramling, 2015; Vygotsky, 1987). It is of fundamental importance that both these concepts are acquired, because everyday concepts bring the surrounded richness and detailed patterns of meaning of everyday thinking into perspective with the systematic and organized structure of scientific concepts (Daniels, 2005; Virkkunen, 2009). Merging everyday concepts with scientific concepts produces adept understanding and the application thereof in diverse contexts (Daniels, 2005; Virkkunen, 2009). Unlike everyday concepts, scientific concepts can be transferred to different contexts (Fleer & Pramling, 2015; Vygotsky, 1987). The development of a scientific concept captures the complexity of the movement between the everyday concept and the scientific concept, and, over time, the young learner begins to think and act using scientific concepts (Fleer & Pramling, 2015; Vygotsky, 1978).

As Lektorsky (2009) explicated, language was a central theme in the works of Vygotsky. Language and exploration of vocabulary for everyday concepts do not hinder the acquisition of scientific concepts; rather, it provides the basis or foundation for acquiring it (Vygotsky, 1987). Without naming the conscious experiences by the learners and attaching meaning to it or explaining it, it cannot be abstracted and transferred to another context (Fleer & Pramling, 2015; Vygotsky, 1987). The development of scientific concepts begins firstly with the verbal definition of the everyday concept in its concrete form, before it is abstracted and applied to other contexts (Fleer & Pramling, 2015; Vygotsky, 1987). Communication between the Foundation Phase learner and the Foundation Phase teacher therefore plays a pivotal role in the acquisition of everyday and scientific concepts and it is crucial that the learner is motivated to use language, preferably his Home Language, to acquire both types of concepts (see Heading B.3.3.2.1).

Eshach (2006) explained that Beginning Knowledge skills refer to the physical act of a learner when involved in an experimental design and when the learner evaluates the evidence.

According to Eshach (2006), the teaching of Beginning Knowledge as subject, requires knowledge of the concepts (knowing that) and knowledge of how to apply these concepts (knowing how). Eshach's (2006, p. 2) description of such skills includes, but is not limited to, asking questions, choosing and applying appropriate statistical tools to analyse data, designing controlled experiments, formulating theories or models, hypothesizing, interpreting data, measuring, observing, recording data, representing data by means of tables, graphs, diagrams, et cetera, and using appropriate apparatus, to name a few. From this it becomes clear that the formation of a scientific concept is not a mere collection of associative connections learned with the aid of memory; neither is it an automatic mental habit. Rather, the formation of a scientific concept is a complex and true act of thinking and doing, that cannot be mastered through mere memorization (Vygotsky, 1987).

It is therefore crucial for a Foundation Phase teacher to understand which everyday concepts the learner has acquired through a lived-experience at home or school, for example, and how to guide the learner to acquire an organised and abstract scientific understanding of this lived-experience. Therefore, the teacher must be knowledgeable on all the Beginning Knowledge concepts, language and skills, as intended by the curriculum. An example of demonstrating Common Content Knowledge by the Foundation Phase teacher is when the teacher understands that a learner's rich and detailed description of the playground equipment during his/her playground experience, was an everyday experience (everyday concept) and that the learner has not yet acquired the scientific concept "force" which will enable him/her to systematically organize this pleasant experience through hierarchical thinking and understanding, and transfer it to other similar experiences (Fleer & Pramling, 2015). This learner has developed an intuitive and alternative view of understanding force, which cannot be memorised or mastered through associations, but through language, skills and the teacher guiding the learner to develop a complex, structured and true act of thinking abstractly about the scientific concept "force" at a higher level of consciousness (Fleer & Pramling, 2015).

A.3.2.1.1.2 Historical analysis

The Foundation Phase teacher's knowledge base needs to encompass Common Content Knowledge of Beginning Knowledge. Through historically analysing bodies of international scholarship, the researcher was enabled to identify which concepts, language and skills are associated with GeHiNaTe education in the early years of which a teacher should have adept knowledge. The determination of a knowledge base for teaching GeHiNaTe in the early years aided the researcher to compare South African curricula and determine if the concepts,

language and skills are on par with that of international work. The following four analysis processes were conducted:

a) Identification of concepts, language and skills in international literature

b) Comparison of international concepts and skills with the South African performance curriculum

c) Comparison of international concepts and skills with the South African competency curriculum

d) Comparing the concepts and skills of the performance curriculum with those of the competency curriculum

The international and national scholarly work, related to basic concepts and skills intended for Early Childhood Education, was identified for Geography, History, Natural Sciences, and Technology. These concepts and skills have been accepted by scholars as appropriate for a Foundation Phase learner to acquire, in order to relate and make sense of his/her immediate environment, make informed choices and also serve as foundation on which further concepts, language and skills can be built on.

a) Identification of concepts, language and skills in international literature

The table below depicts two categories of information. The first one is the basic concepts to be learned and the second is the basic educational skills to be acquired by learners between the ages of five and nine years, within the associated fields of Social Sciences, Natural Sciences and Technology.

Table 3-1: Basic concepts and skills identified in the international body of scholarship

	Social Sciences	Natural Sciences	Technology
Concepts	• Cause-effect • Change • Communicate • Constancy • Contribute • Culture • Distance • Direction • Disease • Diversity • Position • Population • Place • Resources • Rituals • Rocks • Safety • Scale • Seasons • Sequence • Similarity • Space • Systems • Time • Transport • Weather	• Absorb • Attract • Biotic and abiotic • Biodiversity • Chemical change • Change • Colour • Continuity • Direction • Earth and space objects, properties and changes • Electricity / circuits • Erosion • Evaporation • Force • Heat • Length • Light • Liquid / solid / gas • Life cycles • Magnetism • Matter and materials • Motion • Pitch • Reaction • Reflect • Refract • Repel • Resources / objects • Sequence • Shape • Size • Sound • Speed • Patterns • Position • Processes • Proportion • Temperature • Time • Volume • Vibration • Weather • Weight	• Change • Compression • Constraints • Costs • Control • Force • Inventions • Materials • Process • Problem • Quantity • Resources • Safety • Science • Shape • Solution • Space • Stability • Structure • System • Tension • Technology • Time • Tools
Skills	• Communicate • Compare • Classify • Describe • Graph • Inquire • Measure • Map • Predict • Problem-solve	• Cause-effect • Communicate • Collect • Compare • Classify • Describe • Evidence • Fair test • Graph • Hypothesise • Inquire • Infer • Investigate • Measure • Observe • One to one correspond • Order • Predict • Problem-solve	• Communi-cate • Collect • Compare • Combine • Convert • Construct • Decision-making • Describe • Design • Extract • Infer • Inquire • Observe • One to one correspond • Problem-solving • Recycle

(Sources utilised: Bybee, 1997; De Melendez et al., 2000; Lind, 2005; National Council for Social Studies (NCSS), 2010b; National Sciences Resources Centre (NSRC), 1996; Next Generation Science Standards (NGSS), 2013; Seefeldt et al., 2014)

b) Comparison of international concepts and skills with the South African performance curriculum

The South African curriculum plan intended during the Apartheid regime, within the time epoch of 1948 to 1994, was called the “performance curriculum” for the Junior Primary learner (Grade 1/Sub A, Grade 2/Sub B, and Standard 1) and the subject Environmental Studies. This content was organised in the performance curriculum by means of topics to describe the domains of Geography, History, Life Sciences, Natural Sciences, and Health. There were therefore no explicit lists of concepts and skills present within this curriculum. Only those topics associated with History, Geography, Natural Sciences, and Technology were analysed to determine the possible underlying concepts and skills to be acquired by the Foundation Phase learner.

Table 3-2: Basic concepts and skills within the South African performance curriculum for Grade 1 to 3 from 1948 to 1994

	Social Sciences	Natural Sciences	Technology
Concepts	• Cause-effect • Change • Communicate • Constancy • Culture • Direction • Distance • Position • Rituals • Rocks • Safety • Seasons • Sequence • Space • Time • Transport • Weather	• Biotic and abiotic • Direction • Erosion • Evaporation • Force • Heat • Length • Light • Life cycles • Magnetism • Matter and materials • Motion • Resources • Sequence • Speed • Processes • Temperature • Time • Volume • Weight	Not specified as subject
Language	Afrikaans and English are the two official languages of South Africa which are acknowledged in the curriculum; the learner has the right to receive instruction in one of these two languages where reasonably practical. The Language for Learning and Teaching was therefore either English or Afrikaans, and native languages were not accommodated. Afrikaans or English was introduced as a Home Language or First Additional Language for all learners as of from Grade 1. A bilingual curriculum for Environmental Studies was available.		
Skills	• Communicate • Collect • Compare • Classify • Evaluate • Infer • Observe • Order • Predict • Problem-solving • Record	• Communicate • Collect • Compare • Classify • Evaluate • Graph • Infer • Observe • Order • Predict • Problem-solving • Record	Not specified as subject

(Sources utilised: Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991; Steyn, Steyn, De Waal, & Wolhuter, 2011)

The above table (see Table 3-2) depicts three categories of information: basic concepts, the use of language, and basic educational skills to be acquired by learners between ages five and nine within the associated fields of Social Sciences and Natural Sciences. When comparing the concepts and skills to be acquired by the Foundation Phase learner, during the period from 1948 to 1994 (see Table 3-2), with the concepts and skills identified by international work (see Table 3-1), it does seem to overlap or correlate. For example, the international body of scholarship identified approximately twenty-five concepts and twelve skills for the teaching of Social Sciences and the performance curriculum has presented approximately seventeen concepts and thirteen skills, of which some are excluded, like “resources” and “population”. Approximately fifty-two Natural Sciences concepts and nineteen skills were identified in the international body of scholarship, whilst of the derived concepts and skills in the topics of the performance curriculum of South Africa, less than half of these concepts and skills were included. Some of the excluded concepts are “absorb”, “vibration” and “refraction”, to name a few; skills excluded are “describe”, “evidence” and “measure”. For the education of Technology, international scholarly work identified approximately twenty-four concepts and seventeen skills and within the South African competency curriculum this particular subject was not dealt with at all.

c) Comparison of international concepts and skills with the South African competency curriculum

The South African plan intended during the Post-Apartheid regime, in the time epoch of 1994 to 2015, was called the “Life Skills curriculum for the Foundation Phase learner (Grade R to 3)”. This content was organised in the competency curriculum by means of topics to describe the domains of Social Sciences, Life Sciences, Natural Sciences, Technology, Arts and Culture, Physical Sciences, Music, Economic Sciences, and Social and Personal well-being. Only topics associated with Social Sciences, Natural Sciences and Technology were analysed regarding underlying concepts and skills to determine the underlying concepts and skills to be acquired by the Foundation Phase learner.

Table 3-3: Basic concepts and skills within the South African competency curriculum for Grade R to 3 from 1994 to 2015

	Social Sciences	Natural Sciences	Technology
Concepts	• Adapt • Cause-effect • Change • Conserve • Distance • Direction • Place • Position • Sequence • Space • Time	• Biotic and abiotic • Chemical change • Direction • Earth and space objects, properties and changes • Electricity • Erosion • Evaporate • Force • Heat • Length • Light • Life cycles • Magnetism • Matter and materials • Motion • Organism • Resources • Sequence • Speed • Processes • Temperature • Time • Volume Weight	• Control • Compress • Process • Shape • Structure • System • Tension
Language	All official languages of South Africa are acknowledged in the curriculum and the learner has the right to receive instruction in the language of choice, where reasonably practical. Schools therefore have to provide more than one Language for Learning and Teaching. English is introduced as either a Home Language or First Additional Language for all learners as of from Grade 1. Multilingual curricula for Life Skills are available for every official language in South Africa		
Skills	• Analyse • Communicate • Enquire • Infer • Observe • Order • Organise • Predicting • Problem-solve • Record • Synthesise	• Classify • Communicate • Compare • Experiment • Measure • Observe	• Communicate • Design • Evaluate • Investigate • Make

(Sources utilised: Department of Education, 2002, 2010, 2011c; Steyn et al., 2011)

The above table also depicts three categories of information: basic concepts, the use of language and basic educational skills to be acquired by learners between ages five and nine within the associated fields of Social Sciences, Natural Sciences, and Technology. When comparing the concepts and skills to be acquired by the Foundation Phase learner during the period from 1995 to 2015 (see Table 3-3), with the concepts and skills identified by international work (see Table 3-1), it also seems to overlap and correlate. For example, the international body of scholarship identified approximately twenty-five concepts and twelve skills for Social Sciences education, which correlates with the approximately eleven concepts and twelve skills identified in the topics within the competency curriculum. Approximately fifty-two Natural

Sciences concepts and nineteen skills were identified in international literature, whilst the topics in the competency curriculum revealed approximately twenty-nine concepts and six skills. Thus, the concepts and skills identified are less for the South African curriculum; some of the concepts and skills excluded are “sound”, “refract”, “predict” and “hypothesise”, to name a few. For Technology education, approximately twenty-four concepts and seventeen skills were identified in international literature, whilst approximately seven concepts and five skills were identified in the topics of the competency curriculum. Again, there is a gap between the concepts and skills to be acquired, as represented by the international knowledge base in comparison with the South African curriculum.

d) Comparing the concepts and skills of the performance curriculum with those of the competency curriculum

Comparing the lists of concepts and skills to be acquired by the learner of the performance curriculum (see Table 3-2), with the list of the intended competency curriculum (see Table 3-3), it becomes evident that the teaching of Social Sciences concepts has remained more or less the same, whilst the Natural Sciences concepts, within the competency curriculum, have increased, but the skills have decreased in comparison with the performance curriculum. Technology concepts and skills were only taught in the competency curriculum and cannot be compared. In terms of language usage for teaching the performance curriculum, the teacher needed to be fluent in both English and Afrikaans and had to introduce learners to concepts and skills in both languages, whilst the competency curriculum acknowledges all the official languages of South Africa and Foundation Phase teachers should be fluent in English and a minimum of one other language.

Based on these comparisons made between the bodies of scholarship about GeHiNaTe concepts and skills included in Early Childhood Education, it can be deduced that teachers’ Common Content Knowledge for teaching the subject Environmental Studies and Life Skills in South Africa is not as encompassing and comprehensive in comparison with this content on international level. Some of the reasons that could possibly explain why there are differences between the international and the national lists of concepts and skills and teachers’ knowledge bases can probably be because of the emphasis still placed on equipping learners with basic educational needs, associated with reading, writing and arithmetic skills in the early years, and using Environmental Studies (1948-1994) and Beginning Knowledge (1994-2015) to introduce and familiarise learners with their immediate environment. It is also interesting to note that in both South African curricula, the Social Sciences concepts and skills correlated more with

international work than Natural Sciences and Technology, which could possibly indicate that preparing learners to be socially adaptable and develop citizenship, is more of a focus point than Scientific and Technology Literacy. Another aspect to consider is that South Africa's teaching preparation programmes have also undergone changes (see Heading 4.5.5.4), as training associated with the performance curriculum was a diploma course, whilst teacher preparation programmes associated with the competency curriculum required a degree programme (Coetzee, 1963; Steyn et al., 2011).

In conclusion, although the concepts and skills to be taught might be less in the South African curriculum, the teacher still requires adept Common Content Knowledge to guide learners from everyday conceptualisation of their experiences to abstract scientific understanding, using appropriate language and skills. Furthermore, the teacher requires adept Common Content Knowledge to identify the underlying concepts and skills within curricula that utilise topics instead of explicitly listing the concepts and skills to be acquired by the learner. The concepts and skills which are included in these curricula, necessitate from teachers to foster Scientific Literacy skills for citizenship within the learner and to prepare him/her with knowledge of Social Sciences, Natural Sciences and Technology to succeed in society and on the next educational level of teaching and learning.

A.3.2.1.2 Specialised Content Knowledge of GeHiNaTe education

Specialised Content Knowledge refers to having knowledge of GeHiNaTe as subject, that is beyond what is expected of any well-educated person; this knowledge excludes having knowledge of the learner or of teaching and is therefore exclusively focused on the subject (Ball et al., 2008). In other words, Specialised Content Knowledge implies that the Foundation Phase teacher need to have specialised knowledge of Geography, History, Natural Sciences, and Technology, which is more sophisticated and complex than what is implied by the Foundation Phase curriculum that is taught to the Foundation Phase learner (Ball et al., 2008). Specialised Content Knowledge would therefore refer to the ability and knowledge of what is needed to teach Beginning Knowledge in the early years and being able to analyse and interpret the topics included in the curriculum and identify underlying concepts, language and skills that a Foundation Phase learner has to acquire.

A.3.2.1.2.1 Utilisation of topics to organise content within the Early Childhood Education curriculum

The utilisation of topics to organise content instead of teaching explicit concepts and skills in the Early Childhood Education curriculum, are not uncommon for an integrated curriculum approach. Scholars are of the opinion that topics are more appropriate for teaching in the early years because the learner can better associate with topics from their real life or immediate environment than with abstract concepts (Spady & Schlebusch, 1999). The utilisation of topics to organise content in the curriculum makes the learning experience more context-orientated and less content-orientated and creates the opportunity for learners to better transfer and apply context-knowledge to educational and real-life environments (Spady & Schlebusch, 1999). An example of such a context-orientated topic in the curriculum would be “organisms and habitats”, which focuses on teaching learners the characteristics of organisms and their habitats and where they can be located (Lind, 2005; National Sciences Resources Centre (NSRC), 1996). The topic “organisms and habitats”, which is included in the curriculum, clearly communicates the context of what is to be learned, but still does not explicitly communicate the content to be taught. In other words, the specific Beginning Knowledge concepts, language and skills to be acquired (content-orientated) are not obvious, and teachers will have to investigate which content is associated with the broad and general topic (context-orientated) before instruction.

In order to interpret a curriculum which organises its content according to topics, the Foundation Phase teacher, with Specialised Content Knowledge of Beginning Knowledge, will have to perform the following actions before instruction. Firstly, he/she will have to identify which concepts, language and skills could be taught under the topic “organisms and habitats”. For example, concepts such as “systems”, “change”, and “constancy” are present in the topic and the skills to be applied to acquire these concepts, are “measurement”, “order” and “organisation”. Secondly, the Foundation Phase teacher ought to determine where the topic “organisms and habitats” is predominantly located in the curriculum. An example question would be, is this topic related to Geography, History, Natural Sciences or Technology, or is it located across all or only some of these subjects? Thirdly, the Foundation Phase teacher must have knowledge of what each learner’s prior knowledge is about the topic, before teaching it to them. Another question would be, have the learners interacted with their natural environment when playing outdoors, or have learners looked under leaf litters, sheets of tin, stones, and logs and discovered all kinds of insects (Fleer & Pramling, 2015)? If the Foundation Phase teacher has established that all learners have experienced “organisms and habitats” within their everyday life, he/she can draw on such experiences in an academic lesson. For instance, because the learners have experienced “organisms and habitats”, the teacher can introduce the concepts “systems” or “ecosystem” based on their experiences. Because the learners can relate to the

topic “organisms and habitats”, the teacher has the opportunity to guide the learners to consciously realise that they are a part of a natural ecosystem and introduce specific scientific concepts and skills to them (Fleer & Pramling, 2015). It is therefore required from the teacher to build theoretical knowledge into the lesson by drawing on experiences which can contribute to learners’ understanding of these concepts and find ways in which the learner can relate to the ecosystem (Fleer & Pramling, 2015).

The example of the organisms and their environment elucidates that the teacher should have sophisticated knowledge of Beginning Knowledge to teach learners the concepts and skills that are present in a topic or an experience of a learner, according to Fleer and Pramling (2015, p. 105). The teacher with Specialised Content Knowledge realises that, before introducing content to the learner, through the topic, he/she needs to determine what the core Beginning Knowledge concepts and skills might be, that are to be acquired by the learner. The teacher is therefore aware of the notion that concepts are the basis for building theoretical knowledge and dialectical thinking (Fleer & Pramling, 2015).

When engaging the learner with a concept and skill, the teacher will consider both particular (for example, ant), and the general (species classification) principles, as the teacher realises that relational knowledge is also important (Fleer & Pramling, 2015). The teacher will know how to support the learner by recreating their learning as models through a basic ecosystem, where habitat, structure of the insect, and food are all related (Fleer & Pramling, 2015). The teacher therefore needs to look for relations from the learners’ point of view, by considering what the learner would find, the habitat in which the learner would find it, and the food sources available for the insect to survive (Fleer & Pramling, 2015). By guiding learners through the concrete representation, they have the opportunity to consider how the abstract knowledge (for example, species classification) was formed in the first place (observing form, function, food source, and habitat of a particular insect). This elementary ecosystem therefore serves as a theoretical model that helps learners to make sense of their world and not experience these discoveries as disconnected, but rather learn how to explore their environment through a more systematic conceptual approach (Fleer & Pramling, 2015).

A.3.2.1.2.2 Historical analysis

The Foundation Phase teacher’s knowledge base needs to encompass Specialised Content Knowledge of the topics utilised in the curriculum and determine which are based on Beginning Knowledge concepts, language and skills. Through historically analysing bodies of international scholarship, the researcher was enabled to identify which topics are associated with GeHiNaTe

education in the early years, of which a teacher should have adept knowledge. The determination of topics associated with teaching GeHiNaTe in the early years, aided the researcher to compare South African curricula and determine if the topics are on par with those of international work. The following four analysis processes were conducted:

a) Identification of GeHiNaTe topics in international literature

b) Comparison of international topics with the South African performance curriculum

c) Comparison of international topics with the South African competency curriculum

d) Comparing the topics of the performance curriculum with those of the competency curriculum

The international and national scholarly work, related to topics associated with Geography, History, Natural Sciences, and Technology education, was consulted. These topics have been accepted by scholars as appropriate for a Foundation Phase learner to acquire, as they present their immediate environment and their experiences, and make it more likely for them to relate to and transfer knowledge from one real life experience to the next. It is expected from a Foundation Phase teacher to identify the underlying concepts, language and skills associated with GeHiNaTe, within these topics, which are then taught to the learner.

a) Identification of GeHiNaTe topics in international literature

The table below depicts one category of information about topics used to teach underlying concepts, language and skills to the learners between ages five and nine, within the associated fields of Social Sciences, Natural Sciences and Technology.

Table 3-4: Basic topics for Early Childhood Education within the international body of scholarship

Social Sciences	Natural Sciences	Technology
Understanding and performance of activities related to: • Civic ideals and practices • Culture • Global connection • Individual development and identity • Individuals, groups, and institutions • People, places, and environment • Power, authority, and governance • Production, distribution, and consumption • Science, Technology and society • Time, continuity, and change	Understanding and performance of activities related to: • Earth, earth's systems, human activity and Space Science • Energy • History and the nature of Science • Life Sciences, heredity and ecosystems • Motion and stability • Physical Science • Science and Technology • Science in Personal and Social Perspective • Scientific inquiry	Understanding and performance of activities related to: • Nature and operation of technology systems • Science and Technology • Structures and processes

(Sources utilised: (Bybee, 1997; De Melendez et al., 2000; Lind, 2005; National Council for Social Studies (NCSS), 2003, 2010a; National Sciences Resources Centre (NSRC), 1996; Next Generation Science Standards (NGSS), 2013; Roblyer & Doering, 2014; Seefeldt et al., 2014)

b) Comparison of international topics with the South African performance curriculum

The South African curriculum plan intended during the Apartheid regime, within the time epoch of 1948 to 1994, was called the "performance curriculum" for the Junior Primary learner (Grade 1/Sub A, Grade 2/Sub B, and Standard 1) and the subject Environmental Studies. As explained before, the content that was organised in the performance curriculum, utilised topics to describe the domains of Geography, History, Life Sciences, Natural Sciences and Health. There were no explicit lists of concepts and skills present within this curriculum; only the topics associated with History, Geography, and Natural Sciences.

Table 3-5: Basic topics within the South African performance curriculum for Grade 1 to 3 from 1948 to 1994

Social Sciences	Natural Sciences	Technology
Understanding and performance of activities related to: • Civics and rules • Clothing • Community • Festival days • Heritage • Landmarks and names of places • Relationships with self and others • Residence of animals and people • The school, district and other places • Transport	Understanding and performance of activities related to: • Earth and space • Fauna and Flora • Food • Habitat • Matter and material • Pets and insects • Plants • Seasons • Weather	Not specified as subject

(Sources utilised: Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991)

The above table also depicts one category of information about topics which were used to teach learners between the ages of five and nine about Social Sciences and Natural Sciences. When comparing the topics (see Table 3-5) included in the performance curriculum during 1948 to 1994, with the topics identified by international work (see Table 3-4), much overlapping can be observed. For example, the international body of scholarship identified ten topics for Social Sciences that depict the importance of social relationships, vocation and civics on different levels, and these notions are also depicted in the ten topics identified within the South African performance curriculum. However, the performance curriculum is not as much focused on vocation and technology, probably because this subject was not included in the curriculum.

The nine topics identified by the international body of scholarship for Natural Sciences are quite specific in what kind of knowledge base the learner ought to acquire; this includes aspects such as specific content and skills, socio-scientific issues, the role of technology, and the history and nature of Science, to name a few. The topics in the South African performance curriculum is not nearly as structured and comprehensive. The performance curriculum only refers to typical topics that are present in a learner's environment and not making them aware of the nature and purpose of Natural Science. For Technology education, three topics were identified in international literature, and the South African competency curriculum did not include this subject.

c) Comparison of international topics with the South African competency curriculum

The South African plan intended during the Post-Apartheid regime, in the time epoch of 1994-2015, was called the Life Skills curriculum for the Foundation Phase learner (Grade R to 3). As mentioned before, the content that was organised by means of topics in the competency curriculum, was aimed to describe the domains of Social Sciences, Life Sciences, Natural Sciences, Technology, Arts and Culture, Physical Sciences, Music, Economic Sciences, and Social and Personal well-being. Only those topics associated with Social Sciences, Natural Sciences and Technology were identified that ought to be acquired by the Foundation Phase learner.

Table 3-6: Basic topics within the South African competency curriculum for Grade R to 3 from 1994 to 2015

Social Sciences	Natural Sciences	Technology
Understanding and performance of activities related to: • Communication • Diverse people and places • Festival days and religious days • People and Places • People and resources • People and the environment • Rights and responsibilities • Safety and environmental issues • Weather and Seasons	Understanding and performance of activities related to: • Energy and change • Life and living • Matter and materials • Planet earth and beyond	Understanding and performance of activities related to: • Materials and products • Structures • Processes

(Sources utilised: Department of Education, 2002, 2010, 2011c)

This table also depicts one category of information about topics used to teach Social Sciences, Natural Sciences and Technology to learners between ages five and nine. When comparing the listed topics (see Table 3-6) included in the competency curriculum from 1994 to 2015, with the topics identified by international work (see Table 3-4); it also overlaps or correlates significantly. As mentioned before, the international body of scholarship identified ten topics for Social Sciences and these topics correlate with the nine topics identified within the South African competency curriculum. Also mentioned before, the importance of vocation and technology could receive more attention. The nine internationally identified topics for Natural Science, as

already discussed, is specific, structured and organised, with a specific purpose in mind. The four topics in the South African competency curriculum are also structured and specific, and is focused on the acquisition of content and skills, although other aspects, such as Technology and Science, the history and nature of Science, and the quest for Scientific Literacy, to name a few, are not as clearly communicated. The three topics for Technology within the international body of scholarship correlate with those included in the competency curriculum.

d) Comparing the topics of the performance curriculum with those of the competency curriculum

When comparing the lists of topics included in the performance curriculum (see Table 3-5) with those of the competency curriculum (see Table 3-6), it becomes evident that the topics related to Social Sciences have not changed much, although the topics associated with Natural Sciences and Technology are more inclusive in the competency curriculum, as opposed to the performance curriculum.

Based on these comparisons about topics included in Early Childhood Education, it can be explicated that to interpret and identify the underlying concepts and skills associated with Beginning Knowledge content, in both the performance and competency approaches adopted for the South African curricula, requires expert and insightful Foundation Phase teachers with specialised knowledge of Beginning Knowledge.

The diverse topics that the South African curricula include, are not as logically structured and comprehensive as those presented by the international body of scholarship and could be better conceptualised. It can be deduced that a teacher's Specialised Content Knowledge for teaching Social Sciences, Natural Sciences and Technology in the competency curriculum, needs to be more comprehensive than that of teachers of the performance curriculum. A possible reason could be because the development of the competency curriculum welcomed input from international scholars and curriculum developers to generate a curriculum fit for a democratic society, which addresses previous discriminations (Coetzee, 1963; Pinar, 2010; Spady & Schlebusch, 1999; Steyn et al., 2011). Also, the notion of the teacher preparation programmes is different for both curricula, as discussed elsewhere. It can be deduced that a teacher's Specialised Content Knowledge for teaching the subject Environmental and Beginning Knowledge is not comprehensive, in comparison with a teacher's Common Content Knowledge on international level.

A.3.2.1.3 Horizon Content Knowledge of GeHiNaTe education

Horizon Content Knowledge refers to the understanding of how the knowledge base of Beginning Knowledge links to other subjects, to help transfer acquired knowledge bases laterally within the educational band and vertically to other educational bands (Ball et al., 2008; Shulman, 1987). In other words, the teacher teaching GeHiNaTe will have to firstly determine how Beginning Knowledge links laterally with other Foundation Phase subjects, like Language and Mathematics, to name a few. Secondly, the teacher teaching GeHiNaTe will also have to determine how Beginning Knowledge integrates vertically with Social Sciences, Natural Sciences and Technology in the Intermediate Phase.

A. 3.2.1.3.1 Horizontal and vertical integration of Beginning Knowledge in curricula

Bernstein (1999) conducted an in-depth study on the need for knowledge bases to be transferred horizontally and also vertically within a community through communication or through text, like a curriculum. Horizontal knowledge embraces the notion that a learner will acquire knowledge from different subjects within the curriculum, that are not necessarily related, but because its content is structured with the use of topics, the content becomes more common and familiar to them, due to the integrated nature of the curriculum (Bernstein, 1999; Spady & Schlebusch, 1999). Horizontal knowledge is therefore context-orientated and focused on using real-life environments through topics to make a stronger link between Foundation Phase subjects, which maximises the opportunity for the learner to encounter knowledge and skills within diverse environments, educationally and socially (Bernstein, 1999; Spady & Schlebusch, 1999). To give a curriculum example, the Foundation Phase learner is introduced to the knowledge bases of Language, Mathematics and Life Skills over a period of four years (Grade R to 3), which becomes the foundation on which more complex knowledge is based (Bernstein, 1999; Krogh & Morehouse, 2014). It might also explain the reason why the terms “Foundation” is used in the Foundation Phase and “Beginning” in Beginning Knowledge, as these terms set the premises for acquiring more complex and specialised knowledge bases as the learner progresses.

Within Foundation Phase education, as horizontal knowledge base in the South African curriculum, the learner will acquire knowledge associated with Languages, Mathematics and Life Skills, which is presented in an integrated manner, with sub-divided and multi-layered foci and described as more tacit or implicit (Bernstein, 1999). The primary subjects within Horizontal knowledge bases, which are Languages, Mathematics and Life Skills, do not have equal importance (Bernstein, 1999). To demonstrate why this level of education is important in the

early years, scholars have explained that a Foundation Phase learner is able to alter between situations represented by reality and those of imagination, which is of utmost importance to also alter their thinking about Beginning Knowledge concepts and skills, and integration with other subjects (Fleer & Pramling, 2015). An example would be by integrating Beginning Knowledge concepts and skills to be acquired, with other subjects like Language, Drama, and Personal and Social well-being as other foci in the Life Skills curriculum. Because there is a dialectical relation between fantasy and concrete situations and, therefore, the integration of subject domains, like Languages with Life Skills, for example, it is important to understand how Beginning Knowledge concepts and skills can be conceptualised as an imaginative act by the Foundation Phase learner (Fleer & Pramling, 2015).

The following example (Fleer & Pramling, 2015, p. 46) serves to illustrate how a teacher with Horizon Content Knowledge will guide learners to understand how knowledge of Beginning Knowledge can be transferred to other experiences in their daily programme and how this knowledge is important for when they exit the Foundation Phase and enter Intermediate Phase education. The curriculum suggests that a Foundation Phase learner should be able to tell and re-tell the story of Goldilocks and the three bears, which is further extended into an activity using available props for role-playing the story. The teacher also introduces the imagination table to the learners, which has diverse bowls, bears, beds, and so forth, which the learners can use during role-play. Even a technological, cultural tool to take a picture with, was given to the learners to capture pictures of their play of Goldilocks and the three bears. This activity was integrated with Natural Sciences outcomes, where learners were given the opportunity to cook and eat porridge. This activity was also integrated with Technology outcomes, where learners had to design and build a machine to help the bears to cool down their porridge. This cooling-down machine is considered an important device, because if the bears had this machine initially, they would not have needed to leave the house and Goldilocks would not have entered their house without permission.

Fundamental to the communal imaginary situation that the learners produced, a series of collective investigations is required. In this example, the Foundation Phase teacher has to demonstrate creative and sound Horizon Content Knowledge in order to integrate and fuse different content areas, that will guide learners to develop scientific thinking and understanding and transfer these understanding to other content areas (Fleer & Pramling, 2015).

Within Intermediate Phase education, as vertical knowledge base in the South Africa curriculum, the learner will build forth on already established horizontal knowledge bases acquired in the Foundation Phase, before proceeding to Grade 4 or the Intermediate phase. Within Intermediate Phase education, as vertical knowledge base, the learner will extend their

knowledge of Beginning Knowledge, with subjects focused on the explicit content, like Natural Sciences, Technology and Social Sciences. These subjects are presented in a coherent, explicit, systematic structure, and because progression and complexity are important, it is hierarchically organised (Bernstein, 1999). Because these subjects are content-specific and no longer integrate the knowledge base, they require teachers and learners to use specialised content, language and skills to incorporate or consolidate new learning with prior learning (Bernstein, 1999). The primary subjects, within vertical knowledge bases, have increased (from three to seven) and the importance of each of the subjects within the curriculum, is more equally spread (Bernstein, 1999).

To give an example of how knowledge bases change from horizontal to vertical, the activity of mapping in Geography can be used. The Foundation Phase learner has been progressively introduced to Geography concepts (change, distance, direction, place, et cetera) and skills (describe, graph, map, identify, compare, et cetera) under topics such as location, place, movement, regions, direction, human-environment interaction, to name a few, over the four-year period (De Melendez et al., 2000). It was expected of the learner to learn how to read and produce a map by progressively exposing them to the stages of mapping, for example the topological phase and the semi-abstract mapping phase (De Melendez et al., 2000). Teaching mapping concepts and skills was previously incorporated with learning areas like Language, Mathematics, Art, and Physical Education in the Foundation Phase to make the acquisition of such knowledge more familiar, common and interesting to the young learner (De Melendez et al., 2000). When the learner enters the Intermediate Phase, the subject, Social Sciences, is introduced as a discipline on its own and it will be expected of the learner to identify, select and scrutinise information about Geographical content in order to produce abstract maps using information from textual, numeric and visual data sources (Department of Education, 2011b, p. 14). In this example, the Foundation Phase teacher has to demonstrate both horizontal and vertical knowledge as premises of Horizon Content Knowledge, in order to establish a knowledge base that not only will guide learners to develop scientific thinking, but also apply its understanding to build on it and consolidate more complex knowledge and thinking.

A. 3.2.1.3.2 Historical analysis

The knowledge base of the Foundation Phase teacher needs to encompass Horizon Content Knowledge of the concepts and skills utilised in the Beginning Knowledge curriculum in the Foundation Phase and determine how they progress in difficulty in the Intermediate Phase. Through historically analysing bodies of international scholarship, the researcher was enabled

to identify when the subject was first included in the early years, as this subject was not always considered important for Early Childhood Education. The determination of the inclusion of the subject internationally, aided the researcher to compare when South African curricula also included the subject. The following four analysis processes were conducted:

a) Identification of horizontal and vertical knowledge integration associated with GeHiNaTe in international literature

b) Identification of horizontal knowledge integration of GeHiNaTe in the South African performance curriculum

c) Identification of horizontal knowledge integration of GeHiNaTe in the South African competency curriculum

d) Identification of vertical knowledge integration of GeHiNaTe in the South African competency curriculum

The international and national scholarly work, related to teaching Geography, History, Natural Sciences, and Technology, horizontally and vertically, was consulted. The inclusion and formal instruction of the GeHiNaTe in the early years have been accepted by scholars and it is expected from a Foundation Phase teacher to equip learners with a sound knowledge base of GeHiNaTe, which can be built upon when entering the next level of education.

a) Identification of horizontal and vertical knowledge integration associated with GeHiNaTe in international literature

The tables below each depicts two categories of information; the first one is the formal inclusion of GeHiNaTe education in the early years (horizontal) and later years (vertical) from international literature. The second category is the approach adopted to the teaching of GeHiNaTe education in the early years. These categories will be discussed accordingly.

Table 3-7: Inclusion of GeHiNaTe education in schools between 1400 and 1899

	Pre-Colonial times (1400-1652)	**Colonial times** (1652-1806)	**Industrial** and **Progressive era** (1806-1899)
Horizontal subjects	Religion, reading, writing and arithmetic		
Vertical subjects	Religion, Classical languages, **History, Geography,** Law, Medicine, and **Physics**	Religion, Anatomy, Classical Languages, **Chemistry, Economic**s, **Geology,** Moral education, **Physics,** and **Physiology**	Religion, Anatomy, Classical Languages, **Chemistry, Economics, Geology,** Moral education, **Physics,** and **Physiology**
Curriculum approach	The utilisation of nature and the physical environment is acknowledged in the early years		

(Sources utilised: DeBoer, 1991; Le Roux, 2013a; Seroto, 2013; Verster et al., 1982a, 1982b)

From this table it can be deduced that the teaching of GeHiNaTe education in the early years, from 1400 to 1899, was absent from the curriculum. Only older learners were introduced to concepts related to Geography, History, Natural Sciences and Technology when they progressed to more advanced education. The approach of incorporating nature within education was acknowledged in the period from 1400 to 1899. It can be assumed that the utilisation of nature and the physical environment has always been important and considered a way to introduce the learner to the environment. However, the focus of teaching remained with basic educational skills like reading, writing and arithmetic. In other words, the importance of nature was acknowledged as a curriculum approach to teaching in the early years, but the content associated with nature was not included.

Table 3-8: Inclusion of GeHiNaTe education in schools between 1899 and 2015

	Child Study Movement(1899-1948)	**Great Society era** (1948-1994)	**Accountability and Electronic era** (1994-2015)
Horizontal subjects	Religion, reading, writing and arithmetic, **Nature Study**, and **Social Sciences**	Religion, reading, writing and arithmetic, **Nature Study**, and **Social Sciences**	Computer Sciences, **Economical Sciences**, Languages, **Life Sciences**, Mathematics, **Natural Sciences, Social Sciences**, **Technology** and Media
Vertical subjects	Religion, Art, **Civics**, Moral education, Music, **Natural Sciences, Nature study, Social Sciences**, and Physical education	Religion, Art, **Civics**, Moral education, Music, **Natural Sciences, Nature study, Social Sciences**, and Physical education	Computer Sciences, **Economical Sciences**, Languages, Life Sciences, Mathematics, **Natural Sciences, Social Sciences**, **Technology** and Media
Curriculum approach	The utilisation of nature is acknowledged in the early years and the subject is also formally educated to the learner in the early years through integrated curriculum		

(Sources utilised: DeBoer, 1991; Department of Education, 2002, 2003, 2011c; Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Le Roux, 2013a; Seroto, 2013; Verster et al., 1982a, 1982b)

From this table it can be deduced that the teaching of GeHiNaTe education in the early years, from 1899 to 2015, was present in the curriculum. Younger and older learners were introduced to concepts related to Geography, History, Natural Sciences and Technology. The importance of incorporating nature, when teaching, was strengthened with the formal inclusion of the subject in the curriculum. It is important to note that the notion of acquiring basic educational skills (reading, writing and arithmetic), still received primary attention in the early years and the other subjects only secondary attention.

b) Identification of horizontal knowledge integration of GeHiNaTe in the South African performance curriculum

The South African curriculum plan, intended during the Apartheid regime, within the time epoch of 1948 to 1994, was called the “performance curriculum” for the Junior Primary learner (Grade 1/Sub A, Grade 2/Sub B, and Standard 1) and the subject, Environmental Studies. This subject

was not present in the South African curriculum before, although it is important to also indicate how knowledge bases, related to domains of Geography, History, Life Sciences, Natural Sciences, and Technology, could have been acquired incidentally or informally.

Table 3-9: Inclusion of GeHiNaTe education in schools between 1400 and 1994

	Traditional education (1400-1652)	**Education during Dutch colonisation** (1652- 1806)	**Education under British rule** (1806-1899)	**Education in the midst of missionaries, Boer Republics, wars, and end of the union** (1899-1948)	**National Party rule and Apartheid education in South Africa** (1948-1994)
Horizontal subjects	Indigenous knowledge	Religion, reading, writing and arithmetic	Religion, reading, writing and arithmetic	Reading, reading, writing and arithmetic, Art, Music, **Nature Study**, and Physical education	Reading, reading, writing and arithmetic, Art, Music, **Nature Study**, and Physical education
Vertical subjects	Indigenous knowledge	Religion, **Astronomy**, **Geography,** Languages, **Nature Study,** and Mathematics,	Religion, **Astronomy**, **Geography,** Languages, **Nature Study,** and Mathematics,	Religion, Art and crafts, **Environmental Studies**, Languages, Mathematics, Music, **Natural Sciences**, Physical education, and **Social Sciences**	Religion, Art and crafts, **Environmental Studies**, Languages, Mathematics, Music, **Natural Sciences**, Physical education, and **Social Sciences**

(Sources utilised: Booyse et al., 2013; Coetzee, 1958, 1963; Du Raan, 1978; Giliomee & Mbenga, 2007; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991; Seroto, 2013)

Due to the absence of textual curricula for traditional education during the 1400-1652 time epoch in South Africa, it is difficult to explicate which knowledge systems were transferred to the young child. Given the daily activities of the KhoiKhoi, the San and other Bantu-speaking people to survive and sustain their communities, it can be deduced that these learners were introduced

to concepts relating to Beginning Knowledge before they were exposed to formal curricula (Le Roux, 2013b; Seroto, 2013). Education, during the Dutch Colonisation of South Africa, 1652-1806, resembled the beginning of South Africa's formal education system, focusing on basic educational skills like reading, writing and arithmetic, but it is assumed that the importance of including the environment within teaching, was acknowledged (Coetzee, 1958, 1963; Le Roux, 2013b; Seroto, 2013). Between 1652 and 1899, the inclusion of Geography, History, Natural Sciences, and Technology did not feature as part of a formal curriculum; however, knowledge and skills associated with these subjects could have been transferred as part of indigenous knowledge systems to learners by communities and cultural activities (Coetzee, 1958, 1963; Le Roux, 2013b; Seroto, 2013). Under British rule, 1806-1899, there was a strong international involvement recognised to help establish education systems in South Africa, which could clarify how the approach of utilising nature and the physical environment, when teaching, could have been adopted in the curriculum (Coetzee, 1963; Le Roux, 2013a, 2013b).

The education system, from 1899 to 1948, underwent changes. The development and implementation of the curriculum by foreign authorities and teachers introduced Nature Study curricula to the young learner in a formal manner, which most likely included content that could be associated with Geography, History and General Sciences (Coetzee, 1963; Le Roux, 2013a, 2013b). The learner in the early years was taught how to read, write and do arithmetic, but the importance of the environment and nature was acknowledged (Coetzee, 1963; Le Roux, 2013a, 2013b). The organisation of knowledge in the curricula for the young child was to include Language and Mathematic proficiency; topics from Geography, History and Natural Sciences were to be used for context (Booyse, 2013a; Coetzee, 1963; Verster et al., 1982a, 1982b).

c) Identification of horizontal knowledge integration of GeHiNaTe in the South African competency curriculum

The South African plan intended during the Post-Apartheid regime, in the time epoch of 1994-2015, was called the Life Skills curriculum for the Foundation Phase learner (Grade R to 3). As mentioned before, Life Skills within the competency curriculum, include Social Sciences, Life Sciences, Natural Sciences, Technology, Arts and Culture, Physical Sciences, Music, Economic Sciences, and Social and Personal well-being.

Table 3-10: Inclusion of GeHiNaTe education in schools between 1994 and 2015

	A new education policy in a new South Africa (1994-2015)
Horizontal subjects	Languages, Mathematics and Life Skills
Vertical subjects	Languages, Mathematics, Computer Sciences, **Economical Sciences, Life Sciences**, **Natural Sciences, Social Sciences**, and **Technology** and Media

(Sources utilised: Booyse et al., 2013; Giliomee & Mbenga, 2007; Department of Education, 2002, 2003a, 2011a, 2011b, 2011c)

Towards the end of the twentieth century, it was expected from the Foundation Phase teacher to teach knowledge of Life Skills as part of the intended curricula. The name has changed from "Environmental Studies" to "Life Skills", which included diverse foci, explicitly including Social Sciences, Natural Sciences and Technology for the first time. Early Childhood Education, up until this time, primarily focused on Language and Mathematics education, which was horizontally integrated with Life Skills education, which has a less explicit structure, as discussed in the section about horizontal education. Life Skills education served the purpose of making the Foundation Phase learner aware of the relationships between the environment and people, through elementary knowledge bases about Beginning Knowledge (Coetzee, 1963; DeBoer, 1991; Verster et al., 1982a, 1982b).

d) Identification of vertical knowledge integration of GeHiNaTe in the South African competency curriculum

In order to deduce what type of Horizon Content Knowledge a Foundation Phase teacher requires to teach Beginning Knowledge, the researcher has tabulated the content associated with Beginning Knowledge education in the Foundation Phase (Department of Education, 2011c), with that of Social Sciences Department of Education, 2011b) and Natural Sciences and Technology (Department of Education, 2011a) in the Intermediate Phase.

Table 3-11: Vertical knowledge integration of GeHiNaTe in the South African competency curricula for the Foundation Phase and the Intermediate Phase

Beginning Knowledge education as part of the Life Skills subject in the Foundation Phase

Content summary of Beginning Knowledge

Grade R	Grade 1	Grade 2	Grade 3
Days of the week Different people and environments Festival days and special days Food categories and uses Categories of animals Homes Shapes in the environment Transport Weather and seasons	Different people and environments Food categories and uses Healthy habits Picture maps Religious and special days The sky at night Types and purposes of animals Types and purposes plants Weather and seasons	Different people and environments and why each is important Four elements Healthy living Life at night Religious and special days Road safety South Africa Sustainment of life Transport Types of animals and their habitat Types of communication Weather patterns and season changes	Different people and environments and why each is important Environmental dangers, sustainment and endangerment Further differentiation of types and purposes of animals and insects Life cycles Products and processes Religious and special days Right and responsibilities Self safety and public safety Space

Social Sciences education and Natural Sciences and Technology education in Intermediate Phase

Content summary of History:

Grade 4	Grade 5	Grade 6
Local history Learning from leaders Transport through	Hunter-gatherers and herders in Southern Africa The first farmers in Southern Africa	An African kingdom long ago in Southern Africa: Mapungubwe Explorers from Europe find Southern Africa

time Communication through time	An ancient African society: Egypt A heritage trail through the provinces of South Africa	Democracy and citizenship in South Africa Medicine through time

Content summary of Geography

Grade 4	Grade 5	Grade 6
Places where people live (settlements) Map skills Food and farming in South Africa Water in South Africa	Map skills (focus: Africa) Physical features of South Africa Weather, climate and vegetation of South Africa Minerals and mining in South Africa	Map skills (focus: world) Trade (focus: South Africa and world) Climate and vegetation around the world Population – why people live where they do (focus: South Africa and world)

Content summary of Science

Grade 4	Grade 5	Grade 6
Life and Living: Living and non-living things, Structure of plants and animals, what plants need to grow and habitats of animals Matter and Materials: Materials around us and solid materials Energy and Change: Energy and Energy transfer, Energy around us and Energy and sound Planet Earth and beyond: Planet Earth, the Sun, the Earth and the Sun, and the Moon	Life and Living: Plants and animals on Earth, Animal skeletons, Food chains and Life cycles Matter and Materials: Metals and non-metals and uses of metals Energy and Change: Stored energy in fuels, Energy and electricity and Energy and movement Planet Earth and beyond Planet Earth Surface of the Earth Sedimentary rocks and fossils	Life and Living: Photosynthesis, Nutrients in food, Nutrition, Ecosystems and Food, webs Matter and Materials: Solids, liquids and gases, Mixtures Solutions as special mixtures, Dissolving mixtures and water, and resources Energy and Change: Electric circuits, Electrical conductors and insulators and Mains electricity Planet Earth and beyond The Solar System, Movements of the Earth and planets, and the movement of the Moon

Content summary of Technology

Grade 4	Grade 5	Grade 6
Structures: Structures for animal shelters, Strengthening materials, and strong frame structures Systems and control: Movement energy in a system and Rocket systems	Structures: Skeletons as structures Processing: Processing materials and processed materials Systems and control: Systems for moving things	Processing: Food Processing, and processes to purify water Systems and control: Systems to solve problems, Systems for looking into space Systems to explore the moon andMars

(Sources utilised: Department of Education, 2011a, p. 17, 2011b, p. 14, 2011c)

This is a summary of how knowledge bases of Beginning Knowledge in the South African competency curriculum were organised for the Foundation Phase curriculum (horizontally) and for the Intermediate Phase curriculum (vertically): The Foundation Phase curriculum has one subject, namely Life Skills, where knowledge bases are subdivided into four criteria of which Beginning Knowledge is one (Department of Education, 2011c). Beginning Knowledge infuses Social Sciences, Natural Sciences and Technology, as one focus area with multi-layered topics, that progresses from the familiar to the abstract, over a four-year period; the description of content is less explicit due to its integrated nature and utilisation of topics. It also seems as if Technology content is only introduced to the learner for the first time in Grade 3 through the topic “processes”. Natural Sciences have four overarching categories, which include “Life and Living”, “Matter and Materials”, “Energy and Change”, and also “Planet Earth and Beyond”, according to the curriculum specification or overview (Department of Education, 2011c). The topics that are utilised in the Beginning Knowledge curriculum, that is related to the teaching of Natural Sciences, however do not use these four categories mentioned (Department of Education, 2011c).

The knowledge bases of Beginning Knowledge in the Intermediate Phase curriculum (vertically) change drastically. When comparing the separate curricula of History, Geography, Science and Technology education for the Intermediate Phase, the subjects are more coherent and systematic in structure, the content is explicitly communicated, the topics or categories of content for Science and Technology are repeated, and therefore it is hierarchically organised in a manner that requires specialised concepts, language and skills. There is therefore some

resemblance of the knowledge bases of the Foundation Phase curriculum and those of the Intermediate Phase curriculum, but it is not clear whether teachers in the Foundation Phase will be able to teach all the required concepts and skills, appropriately, given the integrated nature and the fact that reading, writing and arithmetic still receive preference in the Foundation Phase curriculum.

Based on this discussion of the bodies of scholarship about the horizontal and vertical integration of Social Sciences, Natural Sciences and Technology at the Foundation Phase and the Intermediate Phase levels of education, it can be explicated that to interpret these intended curricula is challenging. Firstly, the Foundation Phase teacher has to identify the underlying concepts and skills within the topics that are intended in the Beginning Knowledge curriculum. Secondly, the teacher needs to have knowledge of where to locate this subject in the Life Skills programme, because it has been absorbed and merged with other content areas. And thirdly, the teacher needs to have an adept knowledge of how to adequately prepare the Foundation Phase learner to be successful in the Intermediate Phase, when the structure and nature of these, once integrated subjects, transform to that of separate academic subjects. The current intended South African curricula require expert and insightful Foundation Phase teachers, with adept Horizon Content Knowledge (Department of Education, 2002, 2011a, 2011b).

From these discussions it can be deduced that the formal and purposeful inclusion of Social Sciences, Natural Sciences and Technology education, in the Foundation Phase curricula in South Africa, has only been evident these past five decades. The organisation of knowledge in the curricula is not as clear as to be expected and the shift from a performance curriculum to a competency curriculum resulted in subject names being discarded and content removed from a subject structure and merged into integrated focus areas. The Foundation Phase teacher requires a proficient Knowledge of Content and Curriculum, and of the Beginning Knowledge concepts and skills to interpret the curriculum and select diverse materials to teach Beginning Knowledge to the Foundation Phase learner.

A.3.2.2 Pedagogical Content Knowledge related to GeHiNaTe in Early Childhood Education

As with Subject-Matter Knowledge, substantial development has occurred during the past six decades regarding Pedagogical Content Knowledge and the equipping of teachers with knowledge on how to effectively teach Beginning Knowledge concepts, language and skills to the Foundation Phase learner. Pedagogical Content Knowledge acknowledges the importance of having knowledge of multiple pedagogies, didactics, curricula, the learner, and content areas,

and to use these knowledge bases to interpret the intended Beginning Knowledge curriculum in a unique and subjective manner (Abell, Park-Rogers, Hanuscin, Lee, & Gagnon, 2009). Pedagogical Content Knowledge is concerned with creating the conditions for teaching Beginning Knowledge to a Foundation Phase learner, by acknowledging the importance of having knowledge of the curriculum, the learner, and teaching (Ball et al., 2008; Fleer & Pramling, 2015). Thus, a Cultural-Historical approach to viewing Pedagogical Content Knowledge acknowledges the relations between the Foundation Phase learner/teacher and the concepts/contexts as a dialectical process, where the learner is shaped by, but also shapes the social and material conditions for Beginning Knowledge learning (Fleer & Pramling, 2015). Pedagogical Content Knowledge (PCK), according to the model (see Figure 3-2), incorporates three knowledge typologies that a teacher ought to have in order to teach Beginning Knowledge. These are Knowledge of Curriculum (KC), Knowledge of Content and Students (KCS), and Knowledge of Content and Teaching (KCT) (Abell et al., 2009; Ball et al., 2008).

A.3.2.2.1 Knowledge of Curriculum

Knowledge of Curriculum signifies that a teacher has to demonstrate adept Subject Matter Knowledge (with its three typologies), in order to interpret and utilise diverse curricula and teaching material (Ball et al., 2008). Examples of such diverse curricula would be the performance curriculum and competency curriculum in South Africa, which are two very different approaches to organising and teaching knowledge to the young child. In order to interpret and make sense of an intended curriculum, the teacher requires knowledge and understanding of both, because the curriculum in South Africa has undergone regular changes, that, either embrace one of the two approaches or merge them in one approach. Thus, the teacher ought to demonstrate Knowledge of the Curriculum by having knowledge of both categories of curriculum approaches and understand what the purpose of such a curriculum is and how the organisation of knowledge and the teaching thereof might differ.

A.3.2.2.1.1 Integrated curriculum approach in early childhood

It is not uncommon for an Early Childhood Curriculum to adopt an integrated approach. As explained by Bernstein (1999), the horizontal knowledge bases are typically associated with Early Childhood Education and therefore knowledge is organised in such a manner that is more familiar to the learner, by utilising topics. The reason for organising knowledge in this manner is because the young learner is typically described as curious, inquisitive, playful, and creative,

and the use of topics and integrating subjects will more likely engage him/her with learning (Krogh & Morehouse, 2014; Krogh & Slentz, 2001). Because the world through which learners learn and with which they daily engage, is not divided into subjects or segments such as Geography, History, Natural Sciences, and Technology, it is argued that the curriculum should also present a more integrated or holistic structure (Krogh & Morehouse, 2014; Krogh & Slentz, 2001).

As discussed elsewhere, Carrim and Keet (2005), Du Preez (2008), and Hoadley and Jansen (2003) described an integrated curriculum as characterised by learning areas of content, which are not as strongly related to one another, but are still organised in a holistic manner. It is important to briefly state that the relevance of each subject area associated with the Early Childhood Education curriculum should never be questioned, and utilising and integrating the diverse subjects provide the learner with rich and rewarding learning experiences (Krogh & Morehouse, 2014; Krogh & Slentz, 2001).

In order to explicate the relevance of each subject, Krogh and Morehouse (2014) defended the purpose of each. For example, Language education is essential for communication, learning and involvement within the society (Krogh & Morehouse, 2014). Mathematics is important to help learners make sense of everyday experiences around them and to discover and explore (Krogh & Morehouse, 2014). Natural Sciences have an intense influence on society's ability to progress with the advancement of knowledge and cultural tools and to explain the experiences learners have of the world (Krogh & Morehouse, 2014). Social Sciences teach learners how to adopt, understand, and participate in societal activities and how to make decisions about the present and future by learning about the past and current events (Krogh & Morehouse, 2014). The study of Art, Music, Movement and Drama in the early years, also a way of communication, heightens the learners' enjoyment, and appreciation for the aesthetic and arts in diverse forms (Krogh & Morehouse, 2014). These subjects are crucial for the physical development of the body (fine and gross motor skills) and teach the body to function as a unit (sensory integration), which promotes learning and functioning within the world (Krogh & Morehouse, 2014). Thus, each subject contributes to the holistic development of the learner and integrating these subjects, as opposed to isolating them, makes it easier for learners to acquire appreciation for and knowledge bases of these distinct subjects in a natural and interesting manner (Krogh & Morehouse, 2014; Krogh & Slentz, 2001).

A.3.2.2.1.2 Curriculum approaches in South Africa

It has been explicated that two different approaches were adopted in the South African curriculum during the distinct periods of Apartheid and Post-Apartheid. Bernstein (1999) explained his ideas about the curriculum and what the underlying uses of each model was. The following table (see Table 3-12) serves the purpose of illustrating how the two categories of curricula could have impacted the learner and the teacher due to the diverse underlying pedagogical ideologies associated with each approach.

Table 3-12: Dominant curriculum approaches for South African curricula

	Performance-based approach (Transmission-performance or collection curriculum)	**Competency-based approach** (Acquisition-competence, outcomes-based or integrated curriculum)
Learner	• Has little control over the selection, sequence and pace of learning • Assumption that not all learners can learn at all levels; as learning proceeds vertically, some learners are excluded	• Has control over the selection, sequence and pace of learning • Assumption that all learners can learn, but will do so in different ways, at different levels and paces
Teacher	• Direct teaching role; transmits knowledge according to defined pedagogical rules • Control is positional	• Indirect role as facilitator of learning • Control is personally negotiated
Pedagogy	• Teacher- and subject-centred • Clearly demarcated subject areas • Little link between formal school knowledge and everyday knowledge • Content is described as abstract and theoretical • Collection of facts and concepts	• Learner-centred • Integrated learning areas • Strong links to learner experience and everyday knowledge • Content is described as concrete and practical • Collection of broad and specific objectives
Learning site	• Clearly marked learning sites • Content is organised in subjects	• Anywhere • Content is morphed into other areas

(Adapted from Hoadley and Jansen, 2003, p. 124)

The above table depicts two categories of information about the structuring of knowledge, which influences the learner, the teacher, the pedagogy, and the learning site quite extensively. For example, in the performance curriculum, the pedagogy was associated with a teacher; the content took the centre role in a teaching activity and less focus was on the learner, to whom it was being taught. The performance curriculum did use topics, but the subjects were still

presented as silos with clearly demarcated borders – for example, what was learned in Language or Arts, was not brought into relation with Geography or Mathematics. The competency curriculum required a total opposite pedagogy for teaching as demonstrated in the table.

South Africa shifted from the performance approach to the competency approach after the democratic election (Hoadley & Jansen, 2003; Spady & Schlebusch, 1999). However, two decades later, the latest intended Curriculum and Assessment Policy Statement (CAPS) has combined these two approaches, due to critique by scholars about the oversimplification of the curriculum that resulted in shallow, weak and conceptually insignificant knowledge bases (Hoadley, 2010; Hugo, 2010; Le Grange, 2013). The complete removal of an explicit hierarchical structure for acquiring more complex concepts and skills at a lateral and vertical level, can result in the disintegration of knowledge entirely (Hugo, 2010). The too drastic shift away from strong disciplinary boundaries in the form of subject clusters, to a horizontal integration of traditional curriculum subjects, and the removal of subject-specific content, can be to the detriment of education (Hugo, 2010; Hoadley, 2010).

Both performance and competency curricula have their strengths and weaknesses, and should be used together, rather than distinctly. It is acknowledged that an integrated curriculum emphasises categorical topics within the Foundation Phase curriculum, in order to integrate and transfer concepts and skills across Language, Mathematics and Life Skills domains and that this is to the young child's advantage (Hugo, 2010). But over-emphasising this approach can cause lack in coherence, sequence and relevancy of concepts and skills, and the educational content might become too diffused and unclear if the teacher is not an expert on the curriculum and content; as a result, the organised knowledge structure is threatened (Hugo, 2010).

A.3.2.2.1.3 Historical analysis

The Foundation Phase teacher's knowledge base needs to encompass Knowledge of Curriculum and its different approaches. Through historically analysing bodies of international scholarship, the researcher was enabled to identify which curriculum approaches were included first in the early years, which aided the researcher to identify the shifts in the curriculum approaches in the South African education system. The following two analysis processes were conducted:

a) Identification of the integrated curriculum approach for early childhood in international literature

b) Shift from the performance curriculum to the competency curriculum in South Africa

The international and national scholarly work, related to collection curriculum and integrated curriculum, was consulted. The adoption of an integrated curriculum approach to teaching GeHiNaTe in the early years was accepted by scholars and it is expected of a Foundation Phase teacher to utilise both approaches to equip learners with a sound knowledge base of GeHiNaTe, required for future education.

a) Identification of the integrated curriculum approach for early childhood in international literature

In South Africa, the two most significant curriculum categories adopted in education were the performance curriculum, also called “collection curriculum”, during the years of Apartheid and the competency curriculum, also called “integrated curriculum”, in the post-Apartheid years (see Table 3-13).

Table 3-13: General overview of curriculum approaches in the Foundation Phase curricula of South Africa

Pre-Colonial times: Traditional education (1400-1652)	**Colonial times: Education during Dutch Colonisation** (1652-1806)	**Industrial and Progressive: Education under the British rule** (1806-1899)
No curriculum or education of Beginning Knowledge as part of formal curriculum	Formal basic curriculum which does not incorporate Beginning Knowledge in the Foundation Phase	Formal basic curriculum which does not incorporate Beginning Knowledge in the Foundation Phase
Child Study Movement: Education in the midst of missionaries, Boer Republics, wars and the end of union (1899-1948)	**Great Society era: Apartheid education during National Party ruling** (1948-1994)	**Accountability and Electronic era: Outcomes-based education in a democratic South Africa** (1994-2015)
Formal collection curriculum which incorporates the subjects Geography and Nature Study in the Foundation Phase	Formal collection curriculum which incorporates the subject Environmental Studies in the Foundation Phase	Formal integrated curriculum which incorporates the subject area Life Skills curricula in the Foundation Phase

According to this intellectual map of intended curriculum, as depicted by this table (see Table 3-13) and international scholarly work, the dominant design to organise Early Childhood Education knowledge was that of a collection curriculum approach, which was later replaced with an integrative curriculum approach (Krogh & Morehouse, 2014; Krogh & Slentz, 2001).

During the Industrial era, 1806-1899, the curriculum was structured according to the need to prepare learners for the workforce, thus to teach them the basic educational skills to read, write and do arithmetic (Dever & Falconer, 2008; Krogh & Morehouse, 2014; Wortham, 2006). This notion on basic education in a structured way was soon challenged by Dewey and the rise of laboratory schools during the Progressive era, 1806-1899, which promoted the ideals of establishing and sustaining a democratic society and also to reform education by introducing an integrated curriculum, that was more related to real life (Dever & Falconer, 2008; Krogh & Morehouse, 2014).

During the Child Study Movement, 1899-1948, education became more progressive and the integrated curriculum approach for Early Childhood Education was adopted by more schools, due to the focus on the young child's social and psychological needs and teaching that should address their holistic functioning (Dever & Falconer, 2008; Krogh & Morehouse, 2014).

During the Great Society era, 1949-1994, after World War II, there was a counter movement against such an integrated curriculum approach, because it was argued that specifically defined subjects, especially in secondary schools, were required to better equip society with knowledge and skills needed for the workforce; advancements of scientific and technological discoveries and advancement of an integrated curriculum approach was not as efficient (Dever & Falconer, 2008; Krogh & Morehouse, 2014). Within this time, it was decided that Mathematics and GeHiNaTe could not be taught in an integrated manner and that teaching them should be focused on subject specific knowledge (Krogh & Morehouse, 2014). It was soon realised, within this same era, that the young child did not benefit from a collection curriculum approach to organisation of content in a curriculum and hence the split of a horizontal level (integrated curriculum) and a vertical level (collection curriculum) to teach these two distinct groups of learners (Dever & Falconer, 2008; Krogh & Morehouse, 2014).

Throughout the Great Society and Accountability eras, 1994-2015, curricula in the early years were integrated in nature, with topics, and the main focus remained to acquire sound Literacy and Mathematical concepts and skills (Dever & Falconer, 2008; Krogh & Morehouse, 2014).

b) Shift from the performance curriculum to the competency curriculum in South Africa

In South Africa, this shift in curriculum approaches, as discussed according to the international body of scholarship, can be confirmed with the shifts witnessed in the national body of scholarship. During the Apartheid education under National Party ruling, 1948-1994, the curriculum for the young learner was described as a performance curriculum approach, in which the subject Environmental Studies was taught to the young child, but still utilising topics to organise knowledge (Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991). The acquisition of Language and Mathematics concepts and skills was brought into context with real life, through unifying topics associated with Environmental Studies, Arts, Drama, Physical Education, to name a few other subjects (Booyse, 2013b; Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991).

When South Africa was declared a democratic society, 1994-2015, the curriculum approach changed from a performance to a competency curriculum approach, which affected the structure and organisation of knowledge in the curriculum in totality (Hoadley & Jansen, 2003; Hoadley, 2010; Department of Education, 2002, 2003a, 2011c). The major shift was witnessed in the organisation of knowledge, as content that was previously compartmentalised into subject units, was now represented through integrated learning areas (Department of Education, 2002, 2003a, 2011c; Spady & Schlebusch, 1999). The Foundation Phase curriculum was divided into three programmes, namely Languages/Literacy, Mathematics/Numeracy, and Life Skills; the latter programme incorporated the subject Beginning Knowledge. The understanding and purpose of Life Skills were demarcated as follows :

> …is aimed at guiding and preparing learners for life and its possibilities, including equipping learners for meaningful and successful living in a rapidly changing and transforming society. Through Life Skills learners are exposed to a range of knowledge, skills and values that strengthen their physical, social, personal, emotional and cognitive development; creative and aesthetic skills and knowledge through engaging in dance, music, drama and visual art activities; knowledge of personal health and safety; understanding of the relationship between people and the environment; awareness of social relationships, technological processes and elementary Science (Department of Education, 2011c, p. 8)

The competency curriculum approach (outcomes-based education) removed the subject Environment Studies, among others, from the curriculum and replaced it with Life Skills education. All topics and content related to Geography and History were merged and renamed as “Social Sciences”. Topics and content related to General Sciences were merged and renamed as “Natural Sciences”, and Technology was, for the first time, officially introduced into

the curriculum (Department of Education, 2002, 2003a, 2003b, 2011c). Life Skills, as school subject, had six focus areas, three of which were Social Sciences, Natural Sciences and Technology (Department of Education, 2002).

For the first time in the history of the Foundation Phase curriculum, Natural Sciences, Social Sciences and Technology were clearly demarcated and given discipline names in the National Curriculum Statement, otherwise known as “Curriculum 2005” (Department of Education, 2002). Each of these areas having its own place in the Life Skills curriculum, resulted in the first ever explicit teaching of the associated Beginning Knowledge concepts, language and skills to the Foundation Phase learner (Department of Education, 2002). However, the newly introduced competency curriculum experienced various problems and was soon replaced with the Revised National Curriculum Statement (Department of Education, 2003a; Steyn et al., 2011). Amongst various reasons, teachers did not have adequate knowledge of how to interpret or implement the curriculum and material, how to assess learning, and how to attain the desired competencies due to deficiencies in the basic structure of the knowledge base (Department of Education, 2003a; Steyn et al., 2011). Within the next decade, the competency curriculum was revised and adjusted to address these concerns accordingly (Hugo, 2010; Steyn et al., 2011; Wolhuter, 2013c). One of the subjects that underwent drastic changes, was the Life Skills curriculum in the Revised National Curriculum Statement (Department of Education, 2003a). The foci of six subject domains, within Curriculum 2005, were merged, renamed and reorganised into four focus areas, namely Health promotion, Social development, Personal development, and Physical development and movement (Department of Education, 2003a). The explicit demarcation of the areas of Social Sciences, Natural Sciences and Technology was once again removed and replaced with implicit and integrated topics; thus, explicit concepts and skills related to Geography, History, Natural Sciences and Technology once again became ambiguous in the curriculum and teaching materials (Department of Education, 2002a).

With the announcement of the latest curriculum of South Africa, namely the Curriculum and Assessment Policy Statement (Department of Education, 2011c), an effort was made to provide clearer specification of the subject matter to be educated to learners within a specific time period, and less reliance on teachers to design and develop outcomes that they found suitable (Department of Education, 2003a; Steyn et al., 2011). Within the Life Skills programme, the previous four focus areas were replaced with four new focus areas, of which Beginning Knowledge is considered the subject domain for teaching Geography, History, Natural Sciences, and Technology concepts, skills and language to learners in Grade R to Grade 3.

From these discussions it can be deduced that the formal and purposeful inclusion of Social Sciences, Natural Sciences and Technology education in Foundation Phase curricula in South

Africa has only been evident the past five decades (1968-2015). The organisation of knowledge in the curricula is not as clear as expected and the shift from a performance curriculum to a competency curriculum resulted in subject names being discarded and content being removed from a subject structure and merged into integrated focus areas. The Foundation Phase teacher requires a proficient Knowledge of Content, Knowledge of the Curriculum, and of the Beginning Knowledge concepts and skills to interpret the curriculum and select diverse materials to teach Beginning Knowledge to the Foundation Phase learner.

Based on this discussion, the teacher not only requires adept Subject Matter Knowledge of Beginning Knowledge, but also Knowledge of Curriculum, in order to locate the subject within the curriculum and other educational material, that he/she will be able to educate the Foundation Phase learner. The teacher must understand that the subject Beginning Knowledge has undergone a few name changes in the South African curricula and that it is not as easily located as one would assume.

A. 3.2.2.2 Knowledge of GeHiNaTe Content and the Foundation Phase learner

This second typology within the Pedagogical Content Knowledge category requires teachers to have an adept knowledge of both content and the learners to whom Beginning Knowledge is taught (Ball et al., 2008). Without knowledge of the Foundation Phase learner and Beginning Knowledge content, the teacher will not be able to attain the educational outcomes as set for the developmental profile and characteristics of the learner (Ball et al., 2008; Seefeldt et al., 2014). Although learners are unique, there is a set of universal characteristics which incorporate the likenesses and differences of the typical Foundation Phase learner and also a set of Beginning Knowledge concepts and skills that the learner has to acquire (Seefeldt et al., 2014).

In order to develop a better understanding of the unique profile and characteristics of a Foundation Phase learner, different philosophical views were consulted to understand how the young child develops and acquires knowledge (Dever & Falconer, 2008; Gupta, 2006; James & Prout, 1997; Pound, 2011; Roopnarine & Johnson, 2009). The Foundation Phase teacher should have knowledge of such philosophical views in order to understand the Foundation Phase learner, who is acquiring GeHiNaTe knowledge. Thus, Knowledge of Content and the Foundation Phase Learner requires both a philosophical and practical consideration and the implementation thereof (Hoadley & Jansen, 2002).

A. 3.2.2.2.1 The GeHiNaTe framework as philosophical view

Citizenship is a matter of social concern and the preparation of learners to fulfil this role is directly connected to the education of GeHiNaTe. Researchers are therefore of the opinion that curricula should be developed and designed in such a way that the Foundation Phase teacher can guide Foundation Phase learners to become Scientific Literate, through acquiring knowledge of GeHiNaTe (Bruguière, Tiberghien, & Clément, 2014; Stengers, 2014). The acquisition of GeHiNaTe education aims to shape the Foundation Phase learner to become a responsible citizen, Scientific Literate, sensitive towards the environment and to sustain development (Fensham, 2011; Ratcliffe & Grace, 2003). Due to the nature of the young learner being curious, inquisitive and naturally intrigued with their physical environment, the acquisition of GeHiNaTe knowledge bases can be incorporated with the curriculum spontaneously. Citizenship, Environmental Education, Scientific Literacy, Socio-Scientific Issues, and Sustainable Development each contributes towards fostering and providing the Foundation Phase learner with the knowledge base of Beginning Knowledge concepts, language and skills, in order to participate and contribute to societal activities and the social environment in a thoughtful, informed, considerate and conscious manner (Ratcliffe & Grace, 2003). Thus, it becomes clear that education for citizenship has its knowledge base situated in GeHiNaTe education and its philosophical view of Socio-Scientific or Cultural-Historical frameworks.

A scholar whose work has contributed significantly to understanding how the young child acquires knowledge, is Lev Vygtosky. Vygotsky's notion on the acquisition of knowledge and skills by the young child embraces the social context of cognitive development with particular emphasis on the role of language in the development of higher cognitive functions and understanding (Hodson & Hodson, 1998; Holzman, 2009; Kozulin, Gindis, Ageyev, & Miller, 2003). Vygotsky considers the learner's interaction with the external, physical world, the immediate social world, and the inner mental world, and how these interactions on all planes take place and contribute to learning (Hodson & Hodon, 1998). The diverse philosophical views adopted within the family of Socio-Scientific and Cultural-Historical frameworks, place great value on exploring the contexts and social situations in which everyday concepts are experienced by learners on a daily basis. These views also help learners make sense of these experiences through language and abstract reasoning and comprehension, with the purpose to acquire scientific understanding of such an everyday experience (Davydov, 1990; Fleer & Pramling, 2015; Holzman, 2009; Vygotsky, 1978).

In order for a Foundation Phase learner to acquire GeHiNaTe concepts, language and skills, requires subject-specific activities and participation by both the learner and the more knowledgeable adult to guide the learner in acquiring such knowledge base in the quest to

become a Scientific Literate citizen (Driver, Asoko, Leach, Mortimer, & Scott, 1994; Hodson & Hodson, 1998; Ratcliffe & Grace, 2003). The mere social situation in which learners interact with peers and the environment was never considered the source of knowledge, nor what meaning the learner attaches to the world as constructivist and socio-constructivist philosophical views proclaim (Hodson & Hodson, 1998). It rather was the dialectical relationship between teacher, learner, cultural tools, and the social situation that leads to changes in behaviour (Hodson & Hodson, 1998).

The danger of misinterpreting a philosophical view has far-reaching consequences. An extreme example is detected within the competency approach (see Heading A.3.2.2.1), which draws on the constructivist philosophical view, which has been misinterpreted. The competency curriculum approach firstly assumes that the mere daily experiences of the environment by the young learner will ensure abstract understanding and sophisticated language to explain these experiences. Secondly, the assumption is that the Foundation Phase learner is capable to construct knowledge by himself/herself and also consolidate it with previous learning (Department of Education, 2002, 2003a, 2011c). Such assumptions can be challenged by the theory of Vygotsky, as his philosophical view emphasises the deliberate and formalised development of a conscious and concrete realisation of thought and action about everyday experiences, that have the potential to be abstracted and generalised to scientific concepts (Fleer & Pramling, 2015; Holzman, 2009; Vygotsky, 1978, 1987).

Furthermore, GeHiNaTe curricula for citizenship should be carefully designed and developed, and Scientific Literacy and scientific thinking and reasoning cannot be acquired by mere real-life experiences (Bruguière et al., 2014; Stengers, 2014). The learning of GeHiNaTe content by the young child is therefore a deliberate and guided act to acquire and comprehend everyday concepts through language and thought, which lay the foundations for scientific thinking and scientific concepts, which in turn lay the foundations for everyday conceptual thinking (Fleer & Pramling, 2015; Holzman, 2009; Vygotsky, 1978, 1987). What is central to this philosophical view, is that a learner has the ability to acquire everyday and scientific concepts and is therefore not predominantly dependant on age, maturity, or specific capabilities. Whether we refer to the development of spontaneous everyday concepts, or scientific ones, we are dealing with the development of a unified process of concept formation and not assuming a learner has to be a certain age to acquire such concepts and skills (Erduran & Dagher, 2015; Fleer & Pramling, 2015).

A. 3.2.2.2.2 Historical analysis

The Foundation Phase teacher's knowledge base needs to encompass Knowledge of Content and the Foundation Phase Learner, which encompasses knowledge of Beginning Knowledge concepts, language and skills, and also philosophical views about child development. Through historically analysing bodies of international scholarship, the researcher was enabled to identify how philosophical views about how children learn GeHiNaTe knowledge have evolved. The determination of these philosophical views associated with teaching GeHiNaTe in the early years aided the researcher to compare South African curricula and determine if the theory for acquiring GeHiNaTe resembles the views of international work. The following two analysis processes were conducted:

a) Identification of philosophical views for GeHiNaTe education in international literature

b) Comparing the international philosophical views with those of the performance curriculum and the competency curriculum in South Africa

The international and national scholarly work, related to philosophical views associated with Geography, History, Natural Sciences, and Technology education, was consulted. These philosophical views on how Foundation Phase learners acquire GeHiNaTe knowledge, and relate to and makes sense of their world, have been accepted by scholars . It is expected of a Foundation Phase teacher to have knowledge of these philosophical views associated with the acquisition of a GeHiNaTe knowledge base.

a) Identification of philosophical views for GeHiNaTe education in international literature

The following table depicts one category of information about the different philosophical views about child development and education over historical periods.

Table 3-14: Philosophical view about the education of GeHiNaTe in the early years from 1652 to 1948

Colonial times: Education during Dutch Colonisation (1652-1806)	**Industrial and Progressive: Education under the British rule** (1806-1899)	**Child Study Movement: Education in the midst of missionaries, Boer Republics, wars and the end of union** (1899-1948)
Philosophical view of JeanJacques Rousseau about GeHiNaTe education to the young child	Philosophical views of Johann Heinrich Pestalozzi, Johann Friedrich Herbert, and Herbert Spencer about GeHiNaTe education to the young child	Philosophical view of Individualist, Social-Interactionist, and Cultural-historicist about GeHiNaTe education to young child

As depicted in the table (see Table 3-14) these three time epochs represent the eras when Beginning Knowledge was not formally incorporated as a subject in the curriculum for the young child. During the Colonial times, 1652-1806, an increased awareness was raised by philosophical movements, especially those of the Realists and Naturalists, about the knowledge of nature and that a learner should acquire such knowledge (Engelbrecht & Lubbe, 1987; Verster et al., 1982a, 1982b). The importance of creating experiences of reality through nature and the learners' immediate environment was strongly recommended when teaching the young child (Engelbrecht & Lubbe, 1987; Verster et al., 1982a; 1982b). Jean-Jacques Rousseau's proposition of Knowledge of Content and of the Learner was to reinstate the value of nature studies, implying that a Foundation Phase learner has a natural, inborn capability to acquire knowledge through studying nature, as opposed to formal, authoritarian and religious methods (DeBoer, 1991; Verster et al., 1982a, 1982b).

The Industrial and Progressive era, 1806-1899, were renowned for philosophical orientation towards psychology and developing knowledge about the learner by thinkers like Johann Heinrich Pestalozzi, Johann Friedrich Herbert and Friedrich Froebel. Their view on Knowledge of Content for the Learner, is embedded in the environment and the young child who can acquire such knowledge (Engelbrecht & Lubbe, 1987; Verster et al., 1982a; 1982b). All of these scholars emphasised the pivotal responsibility a teacher has to teach knowledge to the learner, which reiterates the debate that teachers should have Knowledge of Content and Learners. Pestalozzi is of the opinion that a teacher should demonstrate Knowledge of Content by selecting objects or cultural tools that symbolise the knowledge to be learned (DeBoer, 1991; Verster et al., 1982a, 1982b). Herbert was also of the opinion that teachers should have

Knowledge of Content, especially scientific concepts, which should be presented sequentially to the learner to promote understanding and can, therefore, not be merely discovered (DeBoer, 1991). Spencer relied less on the presence of a teacher to help learners learn and, therefore, teachers' Knowledge of Content and the Foundation Phase Learner was not a major concern (DeBoer, 1991). It was the work of Spencer, especially on Science education for older children, that emphasised the exploration and discovery of concepts on their own and the drawing of their own inferences within minimum instruction, as they are able to master concepts and skills with minimum help from others, and maximum involvement with the environment and material (DeBoer, 1991). The latter orientation required teachers to approach learners differently and guide them to more self-directed and individualistic learning, as opposed to the view of guidance and social interaction with the environment.

The Child Study Movement time period, 1899-1948, that was primarily dedicated to developing Knowledge of the Foundation Phase Learner and the teaching of GeHiNaTe education, like Natural Sciences or Nature Studies, was considered a point of departure to gain learners' attention for a lesson and introduce them to their world (DeBoer, 1991; Dever & Falconer, 2008; Lascarides & Hinitz, 2000).

As mentioned within this discussion, a division between what content to teach to what age child, was evident in this time epoch. There were three views about Knowledge of Content and the Foundation Phase Learner. Firstly, the traditional pedagogy or individualistic paradigm, as mentioned by Spencer, emphasised Knowledge of Content and put less focus on the Foundation Phase Learner, because it was seen as not the teachers' responsibility, but rather that scientific concepts and skills should be independently acquired by the learner through self-discovery (DeBoer, 1991; Fleer & Pramling, 2015). The second was the contemporary pedagogy or Social-Interactionist paradigm, that was concerned with adept Knowledge of the Foundation Phase Learner. In this paradigm less focus was put on Content, because a child can only master certain content and this should be presented in a manner that closely resembles their immediate environment. The third was the GeHiNaTe pedagogy or Cultural-Historical paradigm, that struck a balance between the two previously mentioned paradigms, as Knowledge of both the Content and the Foundation Phase Learner was investigated. The Cultural-historical paradigm acknowledges the dialectical relationship between the nature of the content and the learner, the environment, the teacher and the social interactions between learners (DeBoer, 1991; Fleer & Pramling, 2015). The Cultural-Historical paradigm diverges from the Individualist and Social-Interactionist paradigms, in the sense that age or a specific type of thinking, as central criterion for acquiring concepts and skills, is not the prerequisite for learning, but rather focuses on understanding the conceptual development of the Foundation Phase learner (DeBoer, 1991; Fleer & Pramling, 2015).

Table 3-15: Philosophical view about the education of GeHiNaTe in the early years from 1948 to 2015

Great Society era: Apartheid education during National Party ruling (1948-1994)	**Accountability and Electronic era: Outcomes-based education in a democratic South Africa** (1994-2015)
Philosophical view of Jean Piaget, Jerome Bruner, Joseph Novak, and South African syllabi about GeHiNaTe education to the young child	Philosophical view of Marilyn Fleer, Niklas Pramling, Haim Eshach, and South African syllabi about GeHiNaTe education to the young child

These two remaining time epochs, as represented by the table (see Table 3-15), are the eras when Beginning Knowledge was formally incorporated as a subject in the curriculum for the young child. Both these eras represent a period where diverse philosophical views about Knowledge of Content and Knowledge of the Foundation Phase Learner were researched, that significantly impacted the organisation of knowledge in the curriculum (Erduran & Dagher, 2015; Hodson & Hodson, 1998; Pisano, 2015; Vosniadou, 2008). In terms of the inclusion of GeHiNaTe education in the early years, diverse views were communicated in scholarly work of the Great Society era, 1948-1994, and the Accountability and Electronic era, 1994-2015. In the first era, 1948-1994, Constructivism, Anti-Rationalism and Postmodernism views on the inclusion of GeHiNaTe education to contextualise basic reading, writing, and arithmetic skills in the early years, undermined the view of the Natural-Science movement on sophisticated GeHiNaTe concepts, language and skills in the early years (Erduran & Dagher, 2015; Hodson & Hodson, 1998; Pisano, 2015; Vosniadou, 2008). The Constructivists considered Beginning Knowledge as merely a social construct and that a pure discipline, like GeHiNaTe, for the young learner, will not advance knowledge, reality or reason because such subjects do not represent knowledge, reality or reason (Erduran & Dagher, 2015; Vosniadou, 2008). Constructivism was informed by Piaget's own theory of child development and most Foundation Phase curricula are based on a Constructivist pedagogy (Cooper & Sixsmith, 2003; File, Mueller, & Wisneski, 2012; Fleer & Pramling, 2015; Hoadley & Jansen, 2003).

The acquisition of Beginning Knowledge concepts and skills, according to Piaget, occurs within the Foundation Phase learner at a certain age when the learner accepts the concept as true, reinforces and consolidates these concepts, and becomes the first answer or automatic response when asked about the concept (Fleer & Pramling, 2015). Burner, a follower of Piaget's work, influenced the education of Beginning Knowledge in the Foundation Phase, with his notion that learners acquire concepts and skills at certain ages in a concrete manner, which is

presented in abstract forms in later years of school (DeBoer, 1991). Learners have to acquire concepts and skills through concrete presentation, scaffolding and integration of subject matter and therefore seeing concepts as interrelated and easier to transfer across contexts (DeBoer, 1991). Novak's influence on acquiring GeHiNaTe in the early years, resonates with the Constructivist paradigm that a learner acquires concepts and skills from the teacher, who presents these concepts in an interconnected and integrated manner (DeBoer, 1991).

The movement in favour of Knowledge of the Foundation Phase Learner, called the "child-centred approaches", subverted the movement of Knowledge of Content as subject-centred approach. Thus, it is believed that Foundation Phase learners are not mature enough to acquire specific GeHiNaTe concepts and skills (DeBoer, 1991). The commencement of the Accountability and Electronic era, 1994-2015, increasingly acknowledged the importance of proper Sciences Education in the early years, internationally, by adopting GeHiNaTe or Cultural-Historical theoretical frameworks. Diverse scholars, like Marilyn Fleer, Niklas Pramling, Haim Eshach, John Settlage, and Sherry Southerland, to name a few, have dedicated their research endeavours to bring the pendulum between Knowledge of the Foundation Phase Learner, as opposed to Knowledge of Content, back into balance, and stating that both are important to assure the acquisition of a sound knowledge base and fostering the notion of Scientific Literacy within the child.

b) Comparing the international philosophical views with those of the performance curriculum and the competency curriculum in South Africa

During the first three decades of Early Child education, it can be deduced that Knowledge of the Foundation Phase Learner received much more attention by scholars and the intended curricula, and less attention was dedicated to what the learner is supposed to learn, let alone the acquisition of GeHiNaTe content by the young child. It can be deduced that there was a split between the knowledge that the teacher required about the content and about the learner. Comparing the South African curricula with the international trends about what a learner is able to learn, communicated that there was still a clear assumption that the acquisition of Language and Mathematics was still considered more important than Life Skills education and all the content bases that were associated with it. Hoadley (2010) explained that, in South Africa, the curricula of the eras of Apartheid, 1948-1994, and Post-Apartheid, 1994-2015, were influenced by global movements and adopted more progressive curricula, hence the competency curricula. The implication for South Africa, from a historical point of view, in terms of the Foundation Phase curricula, is that Knowledge of Content and the Foundation Phase Learner are

predominantly located in Constructivist philosophical views, that foster learning through integrated curricula with the organisation of knowledge around topics, that foster scaffold thinking and co-construction of knowledge (Cooper & Sixsmith, 2003; File et al., 2012; Fleer & Pramling, 2015; Hoadley & Jansen, 2003). It is therefore still believed that Beginning Knowledge is best taught through a Constructivist philosophical view. Thus, teachers require adept Knowledge of Content and the Foundation Phase Learner, but the focus on which content is taught is not equal for all subjects, as Beginning Knowledge concepts, language and skills are not considered a priority in relation to Literacy and Mathematics (Coetzee, 1963; Hugo, 2010; Department of Education, 2002, 2003a, 2011c).

The constructivist philosophical view is described as the “knower discourse” and the age of the learner predetermines what content is considered suitable. The acquisition of knowledge has a specific constructivist learning process of scaffolding and discovery (Fleer & Pramling, 2015; Hoadley, 2010). In both curricula, the view of learning certain Beginning Knowledge concepts and skills was dependent of the age of the learner, their level of thinking and reasoning, and how to integrate social experiences with learning (Hoadley, 2010; Le Grange, 2010; Van der Stoep & Louw, 1987).

In conclusion it can be deduced that the Knowledge of Content and the Foundation Phase Learner is not equally viewed. Because of the historical view that the acquisition of content relies on the age and thinking abilities of the learner, it influenced the shift in the Foundation Phase to teachers requiring more Knowledge of Content of basic educational skills relating to reading, writing and arithmetic, and less knowledge of other subjects. Although international scholarly work is moving towards an equal position of Knowledge of Content and the Foundation Phase Learner, for acquiring sophisticated Beginning Knowledge concepts and skills for citizenship and Scientific Literacy, the South African curriculum still tends to focus more on what the learner cannot acquire, based on age and thinking abilities.

A. 3.2.2.3 Knowledge of GeHiNaTe Content and Teaching in the Foundation Phase

This typology within the Pedagogical Content category refers to those broad adopted teaching methods that a teacher utilises to teach Beginning Knowledge content to Foundation Phase learners (Ball et al., 2008). It is thus expected of teachers to have an adept Subject Matter Knowledge of Beginning Knowledge, as well as having knowledge of how to teach it to a Foundation Phase learner. Pedagogical ideologies also influence teaching and therefore this typology is concerned with didactics being the methodological application of the pedagogical theory (McCulloch & Crook, 2008).

The scholar whose work has contributed significantly to understanding how the young child acquires knowledge and, therefore, how it should be taught, is Lev Vygtosky. Vygotsky developed a didactical approach for guiding a Foundation Phase learner to move from everyday concepts to understanding scientific concepts. According to Hodson and Hodson's (1998), interpretation of Vygotsky's theory of teaching, learning and remediation (Zone of Proximal Development), Vygotsky drew on methods inspired by play, creativity, and inquiry that are in accordance with the norms, views and values adopted by the communities of both Early Childhood Education, as well as GeHiNaTe as subject. The Foundation Phase teacher requires Knowledge of Content and Teaching that will pose a problem to the learners, which will interest them to inquire and solve through utilising cultural tools (Hodson & Hodson, 1998). The teacher guides the learner to internalise the Beginning Knowledge concepts, language and skills that he/she has co-constructed with peers and to apply this newly acquired knowledge to solve problems creatively on his/her own or with others (Hodson & Hodson, 1998).

According to Erduran and Daghner (2015), the Foundation Phase teacher ought to provide the learner with ample opportunities for play, to become curious and inquisitive, and to experience assorted scientific procedures and cultural tools that produce diverse types of evidence for what has been learned. Regular engagement with Beginning Knowledge concepts, skills and language lead to more comprehensible explanations and understanding thereof. The maturation of the learner's higher mental functions occurs in a cooperative process between the teacher's assistance and the learners' participation (Fleer & Pramling, 2015).

Hodson and Hodson (1998, pp. 35-36) explicated the Vygotskian-inspired didactical strategy to introduce new knowledge to Foundation Phase learners and consolidate with their existing knowledge. This holistic and also flexible didactical strategy of scientific inquiry comprises of the following aspects: Initiation (generating interest, commitment and finding a focus for activity); Design and Planning (selection of concepts, skills and language to be acquired); Performance (drawing on existing and new concepts, skills and language to engage in activity); Interpretation (acquiring and consolidating new concepts, skills and language with existing); and Reporting and Communicating (sharing experience through diverse communication styles).

Hodson and Hodson (1998) advised that the sequence of this didactical approach, when introduced to Foundation Phase learners in an educational lesson, does not mean they have to follow it linearly and on their own; rather, the learners can repeat the phases more than once, in collaboration with the teacher and other learners. If the aim is that learners become independent and self-directed, then the scientific inquiry process can be conducted by themselves. It is emphasised that learners should be actively involved, in order to refine their skills by regularly participating in this didactical approach and becoming used to utilising

language and cultural tools as medium for explanations, negotiations, coordination and management (Hodson & Hodson, 1998). Once again, this teachers' Knowledge of Content and of Teaching is of pivotal importance and the teacher should be able to switch between the roles of supporter to facilitator of enculturation (Hodson & Hodson, 1998).

Based on this discussion, it is important to just restate that Foundation Phase learners cannot move from everyday thinking to scientific thinking on their own. Therefore GeHiNaTe concepts, language and skills cannot be self-discovered or self-constructed by Foundation Phase learners, as some worldviews portray; they should rather be guided to deeper understanding and abstract thinking (Fleer & Pramling, 2015; Hodson & Hodson, 1998; Settlage & Southerland, 2012). Within the Socio-Scientific and Cultural-Historical Framework, as pedagogical and didactical approach, the researcher looked at play, curiosity and inquiry as teaching methods for GeHiNaTe Education.

A. 3.2.2.3.1The GeHiNaTe framework using play, curiosity and inquiry for teaching

Krogh and Morehouse (2014) rightfully observed that the young child is naturally curious about their world and would also naturally inquire interest through a playful manner. Fleer and Pramling (2015) and Tu (2006) further elaborated on the nature of a child, by stating that their first encounter with GeHiNaTe concepts, language and skills is when they come to realise that they can discover the world, which evokes a natural curiosity and scientific inquisitive spirit through play and discovery. Although any environment therefore has the potential for GeHiNaTe discoveries, it is important that a teacher needs to plan and organise such an experience to ensure the acquisition of concepts, language and skills, and not rely on incidental learning (Fleer & Pramling, 2015; Tu, 2006).

Play, as method of teaching, is described by Glauert and Manches (2012) and Smidt (2009) as an activity that is centred, planned and focused on the child because the child has the ability to choose play as a way to engage with the world; in doing so, the child attaches meaning to what is experienced. Although there are different types and stages of play, in order for it to become a method for teaching, the key role of the Foundation Phase teacher should be to acknowledge the importance of organising a play environment by contributing interesting cultural tools and then utilising play as mediation to help learners think about ideas and experiences, whilst doing an activity that comes natural to them (Glauert & Manches, 2012; Smidt, 2009). Such an activity should always be directed with a specific goal in mind, in order for a Foundation Phase teacher to guide the scaffolding learning process through different activities (Glauert & Manches, 2012).

Creativity, as a method of teaching, is to provide the learner with the opportunity to think differently or in a new way about a situation that has already been experienced in real life through play (Smidt, 2009). In other words, by utilising creativity as teaching method, learners are enabled to express their thinking in diverse ways, by having a different explanation for the same evidence (Glauert & Manches, 2012; Settlage & Southerland, 2012). The creativity process cannot be predetermined or controlled by the teacher, as the learner's own personal bias influences his/her creativity (Glauert & Manches, 2012; Settlage & Southerland, 2012). It has been communicated and agreed upon by scholars that the subjects Social Sciences, Natural Sciences and Technology benefit from creativity, as it can serve as a crucial impetus for discoveries devising alternative solutions (Fleer & Pramling, 2015; Glauert & Manches, 2012; Settlage & Southerland, 2012).

Inquiry, as a method of teaching, acknowledges that facts or evidence are not the only way of learning, but rather gives the opportunity to the learner to deliberately diagnose problems, or to critique an experiment that was conducted, or to come up with an alternative solution, or even to plan an investigation or expedition (Glauert & Manches, 2012; Settlage & Southerland, 2012). By incorporating inquiry in teaching, the purpose of learning content as opposed to merely inquiring a process or skill is served; it therefore gives learning a dynamic character and enables the teacher to create an environment for creative and logical thinking and reasoning (Glauert & Manches, 2012).

Drawing upon Vygotsky's work to help explain learning of concepts, language and skills, it is also necessary to reflect on his notion on play, curiosity and inquiry. Creativity and imagination serve as the internal platform through which a learner can create, alter or visualise an experience (Fleer & Pramling, 2015). In other words, a learner's act of creativity and/or imagination demonstrated through play, says something about his/her reasoning and understanding of GeHiNaTe content (Fleer & Pramling, 2015). As Vygotsky (2004, p. 11) stated in the works of Fleer and Pramling (2015, p. 42):

> Everyone knows what an enormous role imitation plays in children's play. A child's play very often is just an echo of what he saw and heard adults do; nevertheless, these elements of this previous experience are never merely reproduced in play in exactly the way they occurred in reality. A child's play is not simply a reproduction of what he [sic] has experienced, but a creative reworking of the impressions he has acquired.

Thus, through play and creativity, the learner is acting out previous inquiries and experiences. When a Foundation Phase learner is given ample opportunities to use his/her curiosity within a play situation to raise inquiries, the learner can develop in-depth knowledge of Socio-scientific

concepts and skills, and transfer and integrate it with other knowledge bases (Krogh & Morehouse, 2014). Therefore, the teaching of GeHiNaTe benefits from a child's natural ability to be curios and playful, which is the backbone of inquiry (Krogh & Morehouse, 2014).

A. 3.2.2.3.2 The lesson plan to teach GeHiNaTe education in the early years

It is expected of a teacher to plan daily learning experiences, as well as long-term outcomes for the Foundation Phase learner, according to the intended curriculum (Seefeldt et al., 2014). Lesson plans are therefore the short-term outcomes that the teacher want to reach on a daily basis, as prescribed by the curriculum (Seefeldt et al., 2014). The planning of lessons assists the teacher to consider aspects such as content, pedagogy, methods, resources, assessment, and special educational needs, to name a few (Seefeldt et al., 2014). Although there are diverse types and formats of lesson plans, the universal aspects presented in such a lesson plan can be tabulated as follows:

Table 3-16: Standard phases included in a lesson plan

Phase	Description
Preparation	• Identification of concepts, language and skills to be taught, as prescribed by curriculum • Develop or refresh own knowledge of these concepts, language and skills before teaching • Translation of concepts and skills in the Language of Learning and Teaching and to be sensitive to learners with a different home language • Verifying facts regarding concepts and skills to ensure accuracy of knowledge • Assess learners' prior knowledge as foundation to build upon • Locating resources for the presentation of the lesson, which can be used by the leaners
Objectives	• Stating the lesson's major purpose as prescribed by curriculum and refine it to make it more specific • Stating upfront what will be taught, how it will be taught and which recourses and procedures can be utilised to teach the objective
Procedure	• Typical structure of a lesson plan, using an introduction, middle and closing or summary • Specific description of learning activity is required • Teaching methods utilised needs to be described and whether it is based in a specific approach like Inquire-Based or Problem-based, to name a few • The utilisation of the scientific processes for conducting a research inquiry
Assessment	• The learner's behaviour ought to be compared with the original objectives; then can be determined whether learning has taken place

	• Diverse formats and strategies of assessment are available to measure, with accuracy, whether the learner has truly acquired the concepts, language and skills, or he/she requires additional teaching

(Adapted from Seefeldt et al., 2014, pp. 41-46)

A. 3.2.2.3.3 Historical analysis

The Foundation Phase teacher's knowledge base needs to encompass Knowledge of Content and Teaching, which requires knowledge of GeHiNaTe concepts, language and skills and also didactical approaches to teach it to the young child. Through historically analysing bodies of international scholarship, the researcher was enabled to identify how didactical approaches on how to teach children GeHiNaTe knowledge, have evolved. The determination of these didactical approaches associated with teaching GeHiNaTe in the early years, aided the researcher to compare didactical approaches, such as the lesson plan, with the South African curricula. Then it could be determined if the didactical approaches for teaching GeHiNaTe resembles the views of international work. The following two analysis processes were conducted:

a) Identification of didactical approaches in international literature

b) Comparing the international lesson plan for teaching GeHiNaTe in the early years with that of the performance curriculum and the competency curriculum in South Africa

The international and national scholarly work, related to didactical approaches associated with Geography, History, Natural Sciences, and Technology education, was consulted. These didactical approaches were accepted by scholars on how to teach the Foundation Phase learner GeHiNaTe concepts, language and skills. It is expected of a Foundation Phase teacher to have knowledge of these didactical views associated with the acquisition of a GeHiNaTe knowledge base.

a) Identification of didactical approaches in international literature

The tables below depicts one category of information about the different didactical approaches utilised to teach GeHiNaTe to the young child over historical periods.

Table 3-17: Didactical approach about GeHiNaTe education in 1806 to 1948

Industrial and Progressive era: Education under the British rule (1806-1899)	**Child Study Movement era: Education in the midst of missionaries, Boer Republics, wars and the end of union** (1899-1948)
Discovery, Heuristic, Play, Verification and Inquiry methods to teaching the young child	Play and Inquiry methods to teaching the young child

Based on the interpretation of this table (see Table 3-17) it can be deduced that, although GeHiNaTe was not formally introduced as subject in the curriculum for the young child, the importance of play and inquiry was advocated by scholars like Friedrich, Froebel and Montessori (Krogh & Morehouse, 2014). Play and inquiry contributed to learning of their (learners') physical environment (Krogh & Morehouse, 2014). Pestalozzi, Herbart and Spencer's contributions to teaching methods for GeHiNaTe in the Industrial and Progressive era, 1806-1899, were mostly concerned with the development of an understanding on how learners acquire knowledge through discovery/heuristic approaches, as opposed to dogmatically memorising or only playfully experiencing such knowledge (DeBoer, 1991; Engelbrecht & Lubbe, 1987; Verster et al., 1982a, 1982b). Thus, the teacher should have Knowledge of Content and Teaching to gradually guide learners to understanding and not merely expecting them to acquire knowledge on their own.

The importance of a heuristic approach was to help learners move from concrete to abstract reasoning and understanding; later on learners were encouraged to ensure self-development and independence (DeBoer, 1991; Engelbrecht & Lubbe, 1987; Verster et al., 1982a, 1982b). Some of the teaching methods implemented within a discovery and heuristic approach were observation, inquiry, play, sense impression, experiments, reasoning and inferring (DeBoer, 1991; Engelbrecht & Lubbe, 1987; Verster et al., 1982a, 1982b). Herbart also developed a didactical strategy when teaching concepts and skills, in order to help learners expand their conceptual understanding as they follow these linear steps: preparation, presentation, association, generalisation, and application (DeBoer, 1991; Engelbrecht & Lubbe, 1987; Verster et al., 1982a, 1982b).

The early twentieth century brought about a Child Study Movement, 1899-1948, that, according to Krogh and Morehouse (2014), redefined the activity of play as teaching method and acknowledged its didactical power to be utilised in the formal Early Childhood Education.

Classrooms were redesigned to incorporate space for learning and materials were developed to promote dramatic play (Krogh & Morehouse, 2014).

Table 3-18: Didactical approach to GeHiNaTe education in 1949 to 2015

Great Society era: Apartheid education during National Party ruling (1948-1994)	**Accountability and Electronic era: Outcomes-based education in a democratic South Africa** (1994-2015)
Play, creativity and scientific methods to teaching GeHiNaTe to the young child	Human activity, Affection/Motivation, and Values methods to teaching GeHiNaTe to the young child

These two remaining time epochs (see Table 3-18) represent the eras when GeHiNaTe was formally incorporated as a subject in the curriculum for the young child. The Great Society era, 1948-1994, emphasised methods like creativity, play and inquiry for the Foundation Phase, as these methods can be easily incorporated in the curriculum because learners have a natural tendency to play, inquire and be creative (Glauert & Manches, 2012). Therefore, play and creativity were utilised as appropriate methods to help learners voice their ideas about strange or unusual concepts and skills, and give them the opportunity to make sense thereof through play, communication and collaboration with an informed teacher (Glauert & Manches, 2012). Scholars found that the combination of methods of play and creativity, with the scientific inquiry phases, helped learners acquire concepts and skills successfully as these phases give structure to activities like defining the problem, constructing the hypotheses, experimenting, compiling results, and drawing conclusions (DeBoer, 1991).

During the Accountability and Electronic era, 1994-2015, scholars declared the importance of including affective factors (attitudes, values, beliefs, opinions, interests, and motivation) with methods of play, curiosity and inquiry, when teaching Beginning Knowledge, giving it an affective spin to help learners to personalise learning and therefore not only rely on cognitive factors (DeBoer, 1991; Glauert & Manches, 2012). Senses and emotions have a strong influence on learning and memory. Within this era, 1994-2015, the didactical approaches were introduced to GeHiNaTe education, which automatically incorporated play, curiosity and inquiry. Humanistic education, as a didactical approach, evoked emotional responses, motivation, creativity, and active participation in projects. Activities were incorporated in teaching strategies, in order to involve learners with the content and to guide them in communicating their own ideas

and understanding what they have experienced and learnt (DeBoer, 1991; Fleer & Pramling, 2015). The use of Values, as didactical method to acquire GeHiNaTe concepts and skills, was driven to awaken learners' awareness of moral and ethical dilemmas, and responsible inquiry within their environment. This also gave them an opportunity to creatively discuss these issues, come forth with alternative solutions and develop an overall appreciation for how concepts and skills associated with GeHiNaTe can help them solve problems (DeBoer, 1991).

b) Comparing the international lesson plan for teaching GeHiNaTe in the early years with that of the performance curriculum and the competency curriculum in South Africa

Before concluding this discussion, it is important to briefly compare the South African curricula against the notions of what a standard lesson plan would look like according to the international body of scholarship (see Table 3-16). In South African schools, during the National Party rule and Apartheid education, 1948-1994, a specific didactical lesson plan was implemented for the performance curriculum approach in schools on how subjects were taught to learners (De Vries, 1978; Van der Stoep & Louw, 1987).

The teacher had to incorporate the unified concepts, as communicated through topics, from the performance curriculum and apply it according to a seven-phase, prescribed lesson procedure. According to Landman, Roos and Mentz (1979) there were three goals identified within a lesson plan presented to learners. The first phase in a lesson plan was for the teacher to pre-determine three goals: the broader societal goal, that would guide a learner to maturity; the lesson goal, which was concerned with content and skills; and the learning goal, bringing about change in the behaviour of the learner. The second phase represented the actualisation of learners' prior knowledge and the determination of what the learner was aware of (observation method), the recall of prior knowledge (memory and drill work), and the reliving of prior knowledge (dialogue method). This phase of the lesson plan allowed for more active engagement and participation of the learner (Landman, Roos, & Mentz, 1979). The third phase required the teacher to formulate the problem or goal for the lesson, which awakened the realisation in the learner that he/she needed to learn from this lesson, if he/she wanted to solve the problem. In this phase teachers required learners to become intrinsically motivated and responsible for their own learning by engaging with the knowledge and the teacher (Landman et al., 1979). The fourth and fifth phases were the exposition of new knowledge, where core facts were identified and relationships between concepts and contexts were drawn. The knowledge was acquired by the learner through individual and social activities, in accordance with the learner's own ability and tempo (Landman et al., 1979). The sixth phase was the functionality phase, that referred to the

act of practicing, integrating and consolidating knowledge into existing knowledge and transferring it to their real-life knowledge and experiences of the world (Landman et al., 1979). Such a lesson cycle was then completed with an evaluation phase, with tests, orientation, differentiation in assignments, and the execution of the assignment by each and every learner (Landman et al., 1979).

In South African schools, during the Post-Apartheid regime and the adoption of a new education policy for a democratic South Africa, 1994-2015, the education systems reflected the interests of emancipating those individuals who were previously discriminated against and placed in a disadvantaged position, by adjusting the education system (Hoadley, 2010; Hugo, 2010). The vision of the competency curriculum approach was to equip learners with critical thinking and problem-solving skills, and free them from teacher-centred teachings, which over-emphasised rote learning and acquiring content knowledge (Hoadley & Jansen, 2003; Reed, Gultig, & Adendorff, 2012).

As with the performance curriculum, the competency curriculum also required a specific way of planning a lesson according to a prescribed procedure. There were less systematic phases included in this lesson plan, although four phases were present. The first phase also included the identification of goals by the teacher on a general, educational and personal level, in order for the acquisition of knowledge, skills, and values that brought about change in the learners' behaviour and prepared them for future citizenship (Department of Education, 2002, 2003a, 2003b, 2011c). The strategies utilised for teaching and assessment were decided by the teacher and what was associated as most fitting for the particular learning area and the learner (Department of Education, 2002, 2003a, 2003b, 2011c).

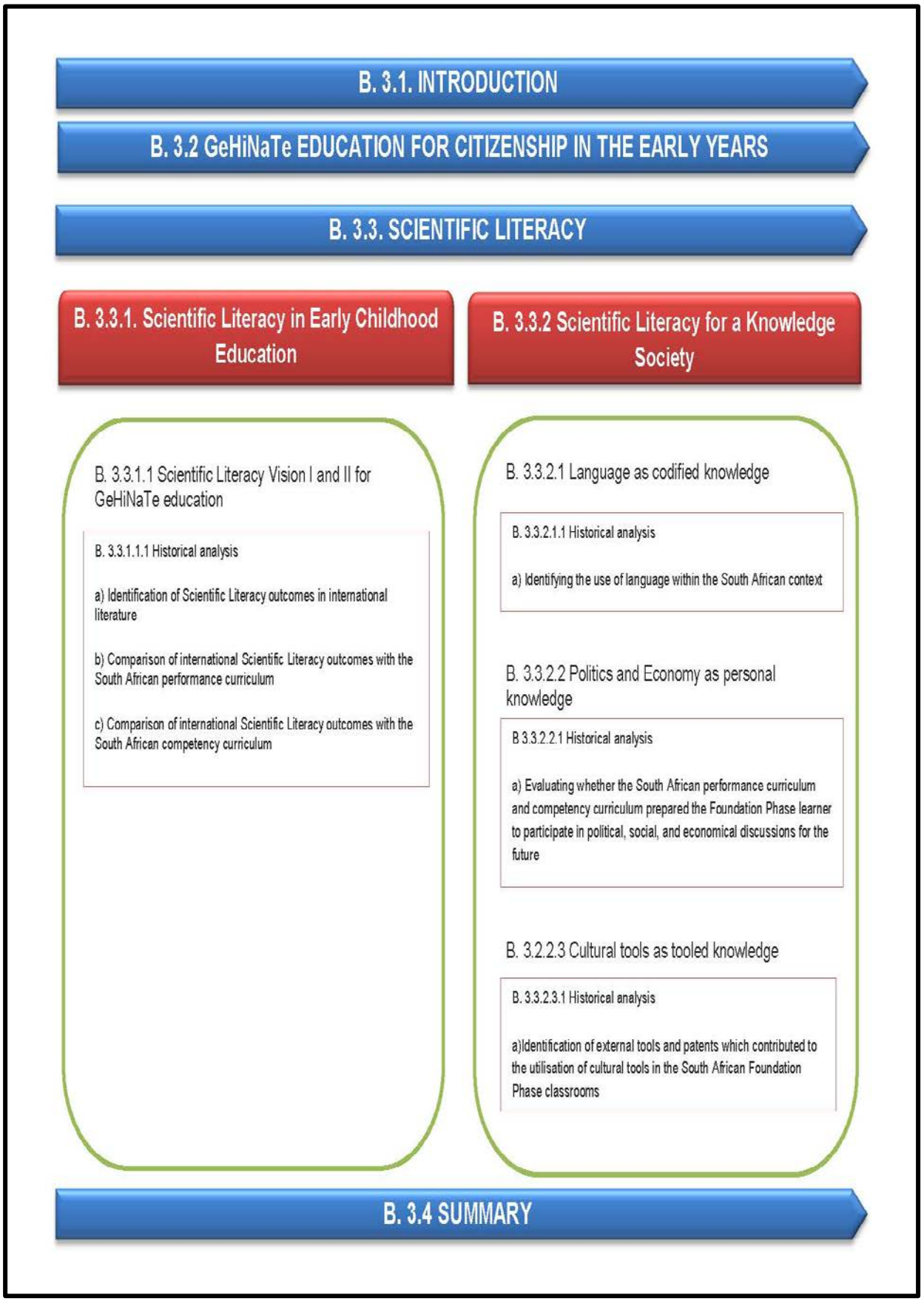
The underlying principles for outcomes-based education, which influenced the lesson development, were as follows (Spady & Schlebusch, 1999): In the first phase of a lesson, the teacher had to gain clarity of focus on the outcome that was significant to the learner and how it was linked to his/her prior knowledge and current situation in society and life. Phase two required from teachers to design the lesson plan backwards, by starting with the outcome in mind (Spady & Schlebusch, 1999), determining the outcome and concepts, skills, and values required to reach the outcome. The third phase related to having high expectancies of the learner to achieve the goals and knowledge, which would motivate the learner to strive for success (Spady & Schlebusch, 1999). The fourth phase refered to expanded opportunities developed by the teacher to help all learners reach the outcomes, by incorporating strategies associated with repetition, alternative didactical methods, and using diverse resources (Spady & Schlebusch, 1999).

In conclusion, it can be deduced that, in terms of Knowledge about Content and Teaching, teachers require expert knowledge and understanding of guiding learners to move away from everyday concepts to scientific concepts through applying diverse didactical approaches and the scientific inquiry process. South African teachers are also facing challenges as to how to interpret the curricula from two different didactical approaches, as not one of them is flawless and both these curricula's strengths and weaknesses should be integrated and acknowledged. With reference to the comparison of the lesson plans, the South African recommended approach does incorporate the basic phases required for lesson plans, as stipulated by the body of scholarship. It is of concern that both intended curricula use a recommended structure for planning a lesson in the Foundation Phase; however, this is a generic procedure and how such lesson plans might differ from teaching Languages, to Mathematics, to Life Skills, is not made explicit. This is then also true for not communicating explicitly how the lesson format would look for teaching Beginning Knowledge from a play, curiosity or inquiry approach.

A.3.3 SUMMARY

The Educational activity system helped to map out the knowledge bases that teachers require in order to teach a subject like GeHiNaTe in the Foundation Phase, by utilising both international and national bodies of scholarship. Through historically analysing the two categories of knowledge bases, each with their underlying typologies, the researcher indicated how knowledge bases changed and progressed through the years and that a teacher has to continuously update his/her own understanding of all the encompassing domains discussed in the Educational activity system. The Educational activity system investigated the Subject-Matter Knowledge category of knowledge required by the teacher, as well as the Pedagogical Content Knowledge category. Both these categories clearly depict that a Foundation Phase teacher requires an adept knowledge of the content, the curriculum, teaching approaches, philosophical views, and of the learner, in order to teach GeHiNaTe education in the early years, and in order for learners to become Scientific Literate, responsible citizens, capable of meeting the demands that life in the twenty-first century necessitates. The subject GeHiNaTe is therefore an important knowledge base to be acquired by the young child and to be taught with sophistication by the Foundation Phase teacher.

B. ACTIVITY SYSTEM B – SOCIETAL ACTIVITY SYSTEM



B.3.1 INTRODUCTION

Scholars have debated on the importance of including the history of education in the structure of knowledge bases of teachers. Having an understanding and awareness of how the history of education helped shaped knowledge bases by the teacher, enables him/her to help shape learners' understanding of, and adding value to a national heritage of knowledge bases, promote citizenship, and prepare learners for participation in society (Wolhuter, 2013a). History of a knowledge base contributes personal value to human development on a cognitive, interpersonal, civic, and moral level, according to Wolhuter (2013a). The learner develops a civic identity through learning about the history of knowledge bases, which fosters a sentiment of loyalty and respect towards society within the learner, and shapes and directs the moral development of the learner (Wolhuter, 2013a). Having developed a value for the history of knowledge bases and becoming a citizen, helps the learner to better utilise and apply acquired knowledge when making decisions and taking actions within social situations. Therefore, the teacher has a responsibility to help prepare learners for the future, by acknowledging how important past events were. With the vast development of technology and the changes in knowledge bases, society requires citizens that are Scientific Literate and, therefore, requires teachers with adept knowledge to unlock curricula and teaching activities to learners, to foster and equip learners for the citizenship in the twenty-first century.

B.3.2 GeHiNaTe EDUCATION FOR CITIZENSHIP IN THE EARLY YEARS

The way in which learners think and value GeHiNaTe, as a shared knowledge base which is nurtured by society, is not automatically embedded in the mind of a young learner; instead, thinking and valuing GeHiNaTe is transmitted from one generation to the next through cultural tools, media and medium (Giesecke, 2005; Rückriem, 2003, 2009; Settlage & Southerland, 2012). Foundation Phase learners, who are still novices to the field of GeHiNaTe, should be taught about this knowledge base by the society in which they are raised, in order to later become active and contributing members of society (Bybee, 2010; Hodson, 2008; Settlage & Southerland, 2012).

GeHiNaTe is an educational, social and cultural experience, and to participate in current and future societal activities, the learner has to acquire Scientific Literacy, which is embedded in GeHiNaTe education. One of the most influential movements on the development and transformation of GeHiNaTe knowledge bases, that learners ought to acquire to participate in life and society, is that of Scientific Literacy. The works of Roberts (2007, 2011), especially, is utilised for this historical research inquiry. Understanding how important a society considers

Scientific Literacy to be, also discloses how important GeHiNaTe education is considered in schools and at which educational level it is considered suitable to teach GeHiNaTe and Scientific Literacy.

B.3.3 SCIENTIFIC LITERACY

The end of World War II has taken global societies into an age dominated by GeHiNaTe and Technology, and in order to sustain thinking and values associated with GeHiNaTe and Technology, an economic progress requiring higher levels of education was therefore necessitated (Bybee, 1997). Based on the latter social event and the drive towards GeHiNaTe and Technology knowledge and skills, DeBoer (1991, 2000) noted that GeHiNaTe was included in the intended school curriculum during the nineteenth century (see Table 3-8) as advocated by scientists[20] like Spencer (1864), Faraday (1867), Tyndall (1867), Eliot (1898), and Huxley (1899). The inclusion of GeHiNaTe education in schools also served as an impetus for researchers[21] to understand what the link is between these subjects and citizenship.

Scientific Literacy, as the link between GeHiNaTe education and citizenship, most likely began with Conant (1947) and was further elaborated by the renowned works of Hurd (1958). Hurd's vision and understanding of Scientific Literacy is two-fold; firstly, it is described as acquiring the knowledge bases of GeHiNaTe, and secondly, as the application of GeHiNaTe knowledge to social experiences (Bybee, 1997, 2010; DeBoer, 1991, 2000). According to DeBoer (1991, 2000), GeHiNaTe had obtained a central role in society to such an extent that economic, political, and personal decisions were not made without considering the involvement of GeHiNaTe and Technology (Bybee, 1997, 2010; DeBoer, 1991, 2000). As mentioned before, and restating this notion of Hurd, there is a clear connection between both the knowledge and the application of GeHiNaTe, and those of citizenship and, ultimately, Scientific Literacy (Bybee, 1997; DeBoer, 2000; Hurd, 1958).

The work of Hurd has served as basis for further research regarding Scientific Literacy. The strive towards determining what Scientific Literacy encompasses was demonstrated by scholars and associations such as the Pella (1967), Agin (1974), Showalter (1974), Shen (1974), the National Science Teachers Associations and Science Technology Society (1982), Miller (1983), Murnane and Raizen (1988), the American Association for the Advancement of Science (1989), and the National Science Teachers Associations (1994). A clear notion was inspired by Shen

[20] These references are made available in the bibliography (Eliot, 1989; Faraday, 1867; Huxly, 1899; Spencer, 1864; Tyndall, 1867)

[21] These references are made available in the bibliography (Conant, 1947; Hurd, 1958)

(1975) to develop a framework for Scientific Literacy, which was followed by the drive by Shamos (1995) and Bybee (1997) to assess Scientific Literacy by determining types and levels of Scientific Literacy in learners at different levels of education. Millar (1996) and Ryder (2001) started investigating how Scientific Literacy and GeHiNaTe education could be introduced to all people, so that no-one would be excluded from developing such skills and knowledge.

Table 3-19: Historical presentation of Scientific Literacy characteristics as component of Sciences education

<table>
<tr><th colspan="4">Great Society era
(1948-1994)</th></tr>
<tr><td>Hurd and Gallagher
Socio-historical development of Science
Social and cultural relationships of Science
Social responsibility of Science</td><td>Pella
Interrelationship between Science and society
Ethics of Science
Nature of Science
Conceptual knowledge
Science and Technology
Science in the humanities</td><td>Science Technology Society
Scientific and technological process and inquiry skills
Scientific and technological knowledge
Skills and knowledge of Science and Technology in personal and social decisions
Attitudes, values and appreciation of Science and Technology
Interactions among Science Technology Society via context of Science-related societal issues</td><td>American Association for the Advancement of Science
The nature of Science
The nature of Mathematics
The nature of Technology
The physical setting
The living environment
The human organism
Human society
The designed world
The mathematical world
Historical perspectives
Common themes
Habits of mind</td></tr>
<tr><td colspan="2">Agin
Science and society
Ethics of Science
Nature of Science
Knowledge of the concepts of Science
Science and Technology
Science and the humanities</td><td>Showalter
Nature of Science
Concepts in Science
Process of Science
Values of Science
Science and society
Interest in society
Skills associated with Science</td><td>Shen
Practical Science literacy
Civic Science literacy
Cultural Science literacy</td></tr>
<tr><th colspan="4">Accountability and Electronic era
(1994-2015)</th></tr>
<tr><td>Shamos
Cultural Scientific Literacy
Functional Scientific Literacy</td><td>Bybee
Nominal Literacy
Functional Literacy
Conceptual and procedural Literacy
Multi-dimensional Literacy</td><td>Miller
Scientific Literacy for:
Economic group
Utility group</td><td>Ryder
Functional Scientific Literacy for:
Subject matter knowledge
Collect, evaluate and interpret data
Modelling in Science</td></tr>
</table>

• True Scientific Literacy		• Democratic group • Cultural/social group	• Uncertainty in Science • Communication in public domain

(Adapted from De Boer, 1991; Bybee, 1997, p. 53-59, 64; 76-80; Linder et al., 2014, Hodson, 2008); Roberts, 2007, 2011)

The above table (see Table 3-19) depicts two time eras of information; the first is the era of the six dominant scholars who researched Scientific Literacy between 1948 and 1994. Each of them developed categories or characteristics that described Scientific Literacy. The second time epoch of the development of Scientific Literacy was between 1994 and 2015, with four dominant scholars continuing the research endeavour to define and characterise Scientific Literacy. In terms of how this table (see Table 3-19) describes the notions that scholars have about Scientific Literacy, there is an alternative way to looking at it, as represented by the works of Roberts (2007, 2011). Roberts (2007, 2011) considered Scientific Literacy in a more encompassing way than giving a mere definition or description thereof. Roberts (2007, 2011) described the conversations about Scientific Literacy in the body of scholarship as driven by intellectual and political tension. Roberts (2007, 2011) explained that, with the inclusion of GeHiNaTe education in the intended school curriculum, he observed the two intellectually and politically conflicting stresses playing out. Theses stresses were concerned with whether curricula should formally or informally emphasise knowledge of GeHiNaTe as subject matter or if curricula should formally or informally emphasise knowledge of Science for the application thereof in life situations. Roberts (2007, 2011) then developed a two-folded model for understanding Scientific Literacy. There are thus two flipsides of knowledge to the same Scientific Literacy coin – the one side focuses on curricula's emphasises on knowledge of GeHiNaTe as subject matter (Vision I) and the other side is curricula's emphasises on knowledge of GeHiNaTe for the application thereof in Science-situations (Vision II).

Scientific Literacy incorporates two typologies that a Foundation Phase teacher requires in order to guide learners to become Scientific Literate citizens through GeHiNaTe education in the Foundation Phase, namely Scientific Literacy curriculum (Vision I and II) and Scientific Literacy for a Knowledge Society. Each will now be historically analysed and discussed.

B.3.3.1 Scientific Literacy in Early Childhood Education

Scientific Literacy, according to Roberts (2007, 2011), is an aspiration held by society which is fostered and reached by an education system that values GeHiNaTe education and the explicit

teaching thereof. Therefore, the GeHiNaTe teacher plays a pivotal role to help cultivate citizenship in learners through GeHiNaTe education and therefore he/she requires adept knowledge of how to guide learners to become Scientific Literate. The two visions identified by Roberts (2007; 2011) are designed as frameworks to help evaluate whether school curricula are fostering learners to become Scientific Literate and equipping learners with knowledge and skills to meet the demands and actively participate in society.

B.3.3.1.1 Scientific Literacy Vision I and II for GeHiNaTe education

Roberts (2007, 2011) described that Vision I gives meaning to Scientific Literacy by enabling a researcher to look inward into the compilation of the knowledge base of Beginning Knowledge and analyse its conventional uses of concepts, language, skills, products, and processes. Roberts (2007, 2011) described that Vision II gives meaning to Scientific Literacy by enabling a researcher to look outward from the situation into the GeHiNaTe knowledge base. In other words, Vision I is the acquisition of the knowledge base of GeHiNaTe, but, with Vision II, the learner is enabled to apply an acquired GeHiNaTe knowledge base to any Science-related situation. Both visions are concerned with Scientific Literacy; the first with the knowledge base and the second with the application of the knowledge base. Vision I is the precursor for Vision II, and together these two visions foster Scientific Literacy. Vision I and II, according to Roberts (2007; 2011), are therefore the roadmap that can be used to help learners become Scientific Literate and these visions ought to be present and catered for in the intended GeHiNaTe curricula's foci and outcomes. As Foundation Phase learners will not naturally become Scientific Literate, they need to be intentionally guided towards it.

B.3.3.1.1.1 Historical analysis

The Foundation Phase teacher's knowledge base needs to encompass Subject-Matter Knowledge and Pedagogical Content Knowledge of GeHiNaTe education in the early years in order to guide learners to becoming Scientific Literate. The historical researcher utilised Roberts's two visions of Scientific Literacy by identifying suitable and distinctive outcomes that is compliant with the notion of both Vision I and Vision II of what Scientific Literacy is. The determination of these Scientific Literacy outcomes for teaching GeHiNaTe in the early years, aided the researcher to compare South African curricula and determine if Scientific Literacy outcomes are present in these curricula. The following three analysis processes were conducted:

a) Identification of Scientific Literacy outcomes in international literature

b) Comparison of international Scientific Literacy outcomes with the South African performance curriculum

c) Comparison of international Scientific Literacy outcomes with the South African competency curriculum

Within the consulted research studies and scholarly work, basic outcomes for Scientific Literacy were identified. These Scientific Literacy outcomes were accepted by scholars as appropriate outcomes for the Beginning Knowledge curriculum intended for the Foundation Phase learner. The American Association for the Advancement of Science (1989) launched a project to teach GeHiNaTe to all learners by 2061, which can be used as a flagship for developing criteria for measuring Vision I. The Nuffield Foundation and the Association for Science Education (1998) launched the project, Beyond 2000, to teach GeHiNaTe to all learners in order to better prepare learners for the twenty-first century. This project's notion about the application of the GeHiNaTe knowledge base was used as a flagship for developing criteria for measuring Vision II. These Scientific Literacy outcomes have been accepted by scholars on how Foundation Phase learners acquire GeHiNaTe knowledge and apply it to their world. It is expected of a Foundation Phase teacher to have knowledge of these Scientific Literacy outcomes associated with the acquisition and application of the GeHiNaTe knowledge base.

a) Identification of Scientific Literacy outcomes in international literature

The table below (see Table 3-20) depicts two categories of information: the Scientific Literacy outcomes for Vision I, as developed by the American Association for the Advancement of Science, to measure whether intended curricula foster Scientific Literacy through the GeHiNaTe subjects. The second category, the Scientific Literacy outcomes for Vision II, was developed by the Nuffield Foundation and the Association for Science Education, to measure whether intended curricula foster Scientific Literacy through the application of GeHiNaTe subjects.

Table 3-20: Basic Scientific Literacy outcomes identified for Vision I and II in the international body of scholarship

Scientific Literacy outcomes as determined by the American Association for the Advancement of Science	Nuffield Foundation and the Association for Science Education
Vision I	**Vision II**
The scientifically literate person is one who: • is aware that Science, Mathematics and Technology are independent enterprises with strengths and limitations; • understands key concepts and principles of Science; • is familiar with the natural world and recognises both its diversity and unity; and • uses scientific knowledge and scientific ways of thinking for individual and social purposes.	We would expect a scientifically literate person to be able to: • appreciate and understand the impact of Science and Technology on everyday life; • read and understand the essential points of media reports about matters that involve Science; • reflect critically on the information included in and omitted from reports; • take informed personal decisions about things that involves Science, such as health, diet and use of energy resources; and • take part confidently in discussions with others about issues involving Science.

(Sources utilised: American Association for the Advancement of Science, 1989, p. 4; Nuffield Foundation and the Association for Science Education (NFAS), 1998; Roberts, 2007, p. 14)

b) Comparison of international Scientific Literacy outcomes with the South African performance curriculum

The South African curriculum plan intended during the Apartheid regime within the time epoch of 1948 to 1994, was called the “performance curriculum” for the Junior Primary learner (Grade 1/Sub A, Grade 2/Sub B, and Standard 1) and the subject, Environmental Studies. As explained before, the content that was organised in the performance curriculum utilised topics to describe the domains of Geography, History, Life Sciences, Natural Sciences, and Health. There were no explicit lists of concepts and skills present within this curriculum, only the topics associated with History, Geography and Natural Sciences. It is important to note that the South African performance curriculum did not have specific Scientific Literacy outcomes formulated. The researcher had to identify these outcomes within each of the curricula in order to be able to compare it.

Table 3-21: Basic Scientific Literacy outcomes identified for Vision I and II in the performance curriculum of South Africa from 1948 to 1994

Great Society era (1948-1994)	
Vision I	**Vision II**
The purpose of learning Environment Studies is to equip the learner with: • the awareness that Environment Studies, Language, Mathematics and Arts and Music are interconnected; • the understanding that there are key concepts and principles related to environmental studies; and • the knowledge of the natural and ecological world and the ability to recognise the importance of change, adaptability, connectedness, difference and similarities.	The purpose of learning Environment Studies is to equip the learner with: • the ability to participate verbally and through writing in conversation about Environment Studies topics within the school context and outside school context; • the awareness of becoming independent and being responsible for own development, by guidance of teacher, in relation to health, safety, civics, nature, et cetera; and • the awareness that the learner has a role and responsibility towards the environment and society.

(Sources utilised: Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991; Roberts, 2007)

The outcomes identified in the South African curriculum, to be acquired by the Foundation Phase learner during the period from 1948 to 1994, were categorised according to the two categories of Scientific Literacy outcomes, as determined by international scholarly work. When comparing the South African outcomes (see Table 3-21) with the Scientific Literacy outcomes by international work (see Table 3-20), the South African outcomes do correlate to some extent with the international Scientific Literacy outcomes for both visions. For example, the international body of scholarship identified four Vision I outcomes and five Vision II outcomes for fostering Scientific Literacy, and the performance curriculum presented three Vision I outcomes and three Vision II outcomes. The performance curriculum did not place as much emphasis on acknowledging the importance of acquiring and utilising scientific knowledge and scientific ways of thinking for individual and social purposes. Not paying much attention to the importance of such knowledge and skills, also implicated that the application thereof was also not considered. The international Scientific Literacy outcomes emphasised the involvement of the learner with society, technology and decision-making, and how it affects their lives and the consequences for such choices.

The competency curriculum was primarily focused on the social development of the learner, the active participation as a social responsible citizen and fostering a sensitivity in learners towards the environment. A possible reason for the predominant “social” focus might be because the content in the performance curriculum focused more on developing Social Sciences knowledge and skills within the learner and less on Natural Sciences. The fact that Technology education was not part of the curriculum, reinstates the notion that scientific and technological knowledge and thinking was not valued as much. It can be deduced that the intended performance curriculum did not foster Scientific Literacy within the Foundation Phase learner, as would be expected.

c) Comparison of international Scientific Literacy outcomes with the South African competency curriculum

The South African plan intended during the Post-Apartheid regime in the time epoch of 1994 to 2015, was called the “Life Skills curriculum” for the Foundation Phase learner (Grade R to 3). As mentioned before, the content that was organised by means of topics in the competency curriculum, was aimed to describe the domains of Social Sciences, Life Sciences, Natural Sciences, Technology, Arts and Culture, Physical Sciences, Music, Economic Sciences, and Social and Personal well-being. Only those topics associated with Social Sciences, Natural Sciences and Technology, that ought to be acquired by the Foundation Phase learner, were identified. As with the previous observation, it is important to note that the South African competency curricula did not have specific Scientific Literacy outcomes formulated. The researcher had to identify these outcomes within each of the curricula in order to be able to compare it.

Table 3-22: Basic Scientific Literacy outcomes identified for Vision I and II in the competency curriculum of South Africa from 1994 to 2015

Accountability and Electronic era (1994-2015)	
Vision I	**Vision II**
The purpose of learning Life Skills is to equip the learner: • to acquire and apply knowledge, skills, values and understanding of the relationships with and among people and the environment; • with the awareness and understanding of concepts and processes of elementary Science, Technology and social relationships; • to be guided and prepared for life and the possibilities it holds; • with knowledge of safety, personal health and environmental issues; and • to develop the ability to promote their own physical, social, personal, emotional and cognitive development.	The purpose of learning Life Skills is to equip the learner: • to acquire and apply knowledge, skills, and values that are relevant for their own lives in local contexts and being sensitive to international obligations; • to acquire and apply knowledge, skills, and values to reach their full potential and participate in a democratic society; • to communicate successfully in various modes (verbal, symbolic, et cetera); • to demonstrate knowledge, skills, and values of the importance of systems and context and recognising that problem-solving does not exist in isolation; • to effectively apply Science and Technology and to demonstrate responsibility towards the health of others and the environment; • to gather, evaluate, arrange and critically scrutinise information; and • to identify and resolve problems by using critical and creative thinking.

(Sources utilised: Department of Education, 2002, 2003a, 2011c; Roberts, 2007)

The outcomes identified in the South African curriculum to be acquired by the Foundation Phase learner, during the period from 1994 to 2015, were categorised according to the two categories of Scientific Literacy outcomes, as determined by international scholarly work. When comparing the South African outcomes (see Table 3-22) with the Scientific Literacy outcomes by international work (see Table 3-20), the South African outcomes correlate significantly with those of the international Scientific Literacy outcomes for both visions. For example, the international body of scholarship identified four Vision I outcomes and five Vision II outcomes for fostering Scientific Literacy, and the competency curriculum presented five Vision I outcomes and seven Vision II outcomes. The competency curricula acknowledged the importance of integrating Beginning Knowledge with other subjects and to develop skills to apply knowledge across diverse societal and environmental contexts. More recognition was also given to the importance of acquiring knowledge, skills and values relating to Technology and vocational

preparation for the twenty-first century. A possible reason for the improvement in these aspects, is because Natural Sciences received more attention and Technology education was included for the first time. Furthermore, it also might be because international scholars were invited to help develop a progressive curriculum for a new democratic South Africa. It can be deduced that the intended competency curriculum did foster Scientific Literacy within the Foundation Phase learner to a greater extent, but can still be improved and made more explicit in the curriculum outcomes.

Based on these discussions, there are some concerns relating to how well learners are guided to become Scientific Literate in South Africa. The researcher had to identify the Scientific Literacy outcomes for both South African curricula herself, which in itself communicates concern regarding why Scientific Literacy is not explicitly addressed as an outcome in the curriculum. The fact that there are no explicit outcomes or aspiration to guide learners to become Scientific Literate, has far-reaching consequences. Adopting an integrated curriculum to help learners develop better associations with content domains and real-life situations, should not be to the detriment of GeHiNaTe education and Scientific Literacy. Both Scientific Literacy outcomes, as identified for Vision I and II, do correlate with the outcomes of the performance and competency curricula, but more attention should be given to designing these outcomes to purposefully guide learners in becoming Scientific Literate and ensuring that the knowledge bases of Social Sciences, Natural Sciences and Technology encompass the necessary concepts and skills and, furthermore, applying it in real-life situations. Therefore equal attention should be given to Vision I and Vision II requirements. It therefore requires an expert and insightful Foundation Phase teacher to teach the knowledge base of Beginning Knowledge to learners and to also guide them to apply such knowledge within society. The knowledge base, application thereof and outcomes to foster Science Literacy can be better considered, communicated and included in the curricula, as the importance for developing a Scientific Literate society is obvious. The necessity for cultivating a Knowledge Society will now be discussed.

B.3.3.2 Scientific Literacy for a Knowledge Society

As discussed before, the role of Beginning Knowledge education is to prepare learners for the world and also for the world of work (Aikenhead, Orpwood, & Fensham, 2011). Technology serves as an important impetus for the vast changes that can be witnessed in the world and in in employment, which affects the economy, language and cultural tools drastically (Aikenhead et al., 2011). The acquisition of new knowledge for a Knowledge-base economy and a Knowledge Society requires that educational curricula are adapted to meet the ideologies of society (Aikenhead et al., 2011; Linder et al., 2011). There are three sources of knowledge

required for a Knowledge Society, namely codified knowledge, personal knowledge, and tool knowledge, which are all forms of applying knowledge bases of GeHiNaTe to the world. It is important to discuss these three forms of knowledge for a Knowledge Society because education systems have to cultivate learners who can communicate (through language) what they know about Beginning Knowledge and also know how to apply their knowledge through tools (cultural tools) in order to become individuals who can participate (through politics and economy) as Scientific Literate workers within society (Aikenhead et al., 2011; Linder et al., 2011).

B.3.3.2.1 Language as Codified Knowledge

Codified knowledge is concerned with the meaning that learners attach to acquired knowledge and experiences of the environment and how such meanings are shared by society through a communicable system like language (Aikenhead et al., 2011; Linder et al., 2011; Smidt, 2009). The transfer of knowledge, skills, experiences, and so forth, requires language, and therefore this communicable system is important to understand in this historical inquiry (Smidt, 2009). In order for a Foundation Phase learner to understand what he/she is being taught about Beginning Knowledge, the learner must understand the code, or, in this case, the language, in which he/she is instructed, to which he/she then attaches semiotic and/or symbolic meaning (Aikenhead et al., 2011; Linder et al., 2011). Language, as a cultural tool, encompasses aspects such as speaking, reading, writing, thinking, and comprehension (Smidt, 2009). Language is also a key communicable system for developing a Knowledge Society (Aikenhead et al., 2011; Hodson, 2008; Linder et al., 2011).

To understand how a young child uses language to learn, Hodson and Hodson (1998) utilised the works of Vygotsky. Hodson and Hodson (1998) explained the crucial role language plays in the development of the young learner's thinking, learning and higher cognitive functions within a social context. Language is central to communicate what the individual is thinking and learning about Beginning Knowledge and how he/she applies it to a social situation. The ability to label, name or communicate about Beginning Knowledge concepts and skills, makes the learner attentively aware of the interconnectedness between his/her surroundings, the people and the knowledge the learner is acquiring through instruction, that is taking place through different forms of language (Fleer & Pramling, 2015; Hodson & Hodson, 1998). Language is therefore used to describe everyday experiences and scientific thinking, and develop the foundations for conceptual and procedural thinking (Fleer & Pramling, 2015; Hodson & Hodson, 1998). Because the Foundation Phase learner will not merely acquire Beginning Knowledge concepts, language and skills, just because he/she can describe the experience, the role of teachers and

society become crucially important to intentionally introduce them to Beginning Knowledge through language (Fleer & Pramling, 2015; Hodson & Hodson, 1998).

The complexity of language as codifier of knowledge was discussed (see Heading A. 3.2.1.1). It is also important to convey that the acquisition of Beginning Knowledge concepts, language and skills and the application thereof, is complicated even further if the learner's Home Language, especially, and First Additional Language differ from the Language of Learning and Teaching in the school (Airey & Linder, 2011; Hugo, 2010). Language is divided in one primary dialogue, with many secondary dialogues. The primary dialogue is the language we learn from birth, through oral dialogues, and through interaction and engagement with significant others in our family unit and society (Airey & Linder, 2011). Therefore, a secondary dialogue is described as more specialised in use, as the acquisition of this language occurs outside the immediate family unit, and oral means and text are used to acquire it (Airey & Linder, 2011). The acquisition of primary dialogue, therefore, precedes the acquisition of secondary dialogue (Airey & Linder, 2011).

Scientific Literacy, in this sense, means that an individual must be able to acquire and use specialised language or scientific concepts of GeHiNaTe, which he/she can apply to diverse environments in society (Airey & Linder, 2011). It therefore becomes clear that Beginning Knowledge concepts and skills require specialised language and vocabulary and, more importantly, a primary dialogue or Home Language that has sophisticated vocabulary to accurately describe these Beginning Knowledge concepts and skills (Airey & Linder, 2011; Hodson, 2008). Having to use an underdeveloped Home Language or primary dialogue for acquiring GeHiNaTe, places more stress on both the teacher and learner to help acquire these scientific concepts and skills, in order to become Scientific Literate as expected by society (Airey & Linder, 2011; Hodson, 2008).

In South Africa there is cause for concern whether all the indigenous languages have evolved as sufficiently as English and Afrikaans did, because the majority of learners in South Africa do not have English or Afrikaans as their primary dialogue. If their Home Language lacks the sufficient vocabulary to acquire Beginning Knowledge concepts and skills, the acquisition of a GeHiNaTe knowledge base and Scientific Literacy is threatened. Historically, the issue regarding the use, development and survival of communities' Home Language or primary dialogue, served as an impetus for many battles and wars in South Africa. A short historical account serves to emphasise the point of how important language is for a society's identity and the protection of knowledge (Airey & Linder, 2011; Hodson, 2008). These historical accounts also give insight into how much loss in Societal Knowledge has occurred in South Africa due to the forced marginalisation of native or indigenous groups of people to that of the minority groups, due to diversity in language use (Airey & Linder, 2011; Hodson, 2008). Although much

political and economic factors are evident in these discussions, as it is difficult to separate these two, it is important to investigate the transformation that languages underwent in South Africa in the midst of political and economic circumstances.

B.3.3.2.1.1 Historical analysis

The Foundation Phase teacher needs to recognise the historically weakened use and status of the different indigenous languages and how the implementation of the Constitutional law helped to elevate the status of these languages and give learners the opportunity to receive education in their mother tongue (Steyn et al., 2011; Wolhuter, 2013c). The following analysis process was conducted to determine how the languages in South Africa have transformed historically:

a) Identifying the use of language within the South African context

The table below depicts how the use and progress of language have undergone transformation historically in South Africa over six time epochs. Within these time epochs, certain political and economic factors contributed to these transformations; these are elaborated on hereafter. The researcher systematically mapped and determined how the transformation of language contributed to the development of adequate language systems for teaching Beginning Knowledge in the Foundation Phase in South Africa and how it influenced Scientific Literacy for a Knowledge Society.

Table 3-23: Transformation that languages have undergone in South Africa from 1400 to 2015

Pre-Colonial times: Traditional education (1400-1652)	**Colonial times: Education during Dutch Colonisation** (1652-1806)	**Industrial and Progressive eras: Education under the British rule** (1806-1899)
Indigenous languages of community groups KhoiKhoi, the San and other Bantu-speaking people	Immigrants, slaves and refugees from all over the world are colonised in South Africa	Urbanisation and Anglicisation of the Colony and the Great Trek to interior parts of the country

Child Study Movement era: Education in the midst of missionaries, Boer Republics, wars and the end of union (1899-1948)	**Great Society era: Apartheid education during National Party ruling** (1948-1994)	**Accountability and Electronic era: Outcomes-based education in a democratic South Africa** (1994-2015)
War and the establishment of a sovereign state for the Afrikaner community	Segregated nations based on language and race	Eleven official languages and the Languages of Learning and Teaching

(Sources utilised: Booyse et al., 2013; Coetzee, 1963; Elphick & Shell, 1989; Giliomee & Mbenga, 2007; Muller, 1981; Van Jaarsveld, 1984)

During the Colonial time period, 1652-1806, various immigrants, slaves and refugees were imported to South Africa, which established a new society from three continents, namely Europe, Asia and Africa (Giliomee & Mbenga, 2007; Pretorius, 2012). The newly assimilated society faced difficulties in communication, because of the miscellaneous quantity of languages present in the Cape region, like creolised Portuguese, Dutch, the indigenous languages, English, and French (Le Roux, 2013a; Welsh, 1998).

The Dutch Eastern India Company became aware of the linguistic problem and dreaded a possible decrease in productivity and work efficiency, which led to the requirement that all slaves and immigrant labourers had to adopt Dutch as communal language (Giliomee & Mbenga, 2007; Le Roux, 2013a; Pretorius, 2012). Adopting Dutch as communal language, by the slaves, refugees and immigrants, resulted in further amalgamation of some already merged groups because not only did they have to acquire the languages, but also the communal identity, traditional cultures, customs, knowledge bases, and religious orientations associated with Dutch, which lead to the subsiding of some of the groups' homogenous character (Le Roux, 2013a; Welsh, 1998). Although the assimilation of groups had taken place during this time, which led to a larger heterogeneous community, there were still homogenous indigenous communities in existence, who had migrated to the interior parts of the land to prevent losing their demographic identity and cultural knowledge base (Giliomee & Mbenga, 2007; Le Roux, 2013a; Pretorius, 2012).

During the Industrial and Progressive era, 1806-1899 epoch, the urbanisation and Anglicisation of the Colony under British rule led to the need within the Afrikaner and indigenous groups, as well as some Dutch communities, to reconstruct themselves as homogenous groups, away from the assimilated heterogeneous society (De Kock, 1971; Giliomee & Mbenga, 2007). The urge to move away from the British rule and a foreign colony, in order to preserve knowledge, cultural

identity and, above all, their language, was so drastic that this movement gave rise to the internationally renowned event called “the Great Trek” by some Dutch, indigenous and conformed Afrikaans-speaking people (Giliomee & Mbenga, 2007; Pretorius, 2012; Welsh, 1998).

The Child Study Movement era, 1899-1948, represents a time of war, political movements, the annexation and attaining of land, and the development and establishment of Afrikaans as another official language, other than English (De Kock, 1971; Giliomee & Mbenga, 2007). South Africa witnessed its first war due to a need for power and authority by minority groups opposed to the British rule, because of the continuing acts of discrimination that were witnessed in segregated education, unequal vocational income, possession of land and political participation based on race, language and social status (De Kock, 1971; Giliomee & Mbenga, 2007). The war was lost against the British government. The move of social and racial groups represented by the Boer community, away from Anglican customs, religious traditions, foreign knowledge systems, and language use, towards an independent Afrikaans-orientated authority, was documented (De Kock, 1971; Giliomee & Mbenga, 2007; Le Roux, 2013a). Churches and political parties associated with the Afrikaans culture and social groups set the groundwork for segregation acts to become independent from British influences, as well as indigenous and slave communities, by focusing on becoming a sovereign state and by declaring Afrikaans as an official language (De Kock, 1971; Giliomee & Mbenga, 2007; Le Roux, 2013a).

Nationalism, during the Great Society era, 1948-1994, introduced segregated ideologies in order to give the diverse racial groups the opportunity to develop their own cultural identity without sacrificing any traditions, indigenous knowledge systems, religious views, or language (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973, 1984). The description of equal but separate development of white and non-white nations was not experienced or perceived the same way as it was intended by the rulers; South Africa had experienced a period called ”Apartheid”, that had tremendous consequences on the social identity and knowledge bases and language development of the society (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973, 1984). The issue of race and language was also a contributing factor in terms of the development and advancement of social identities and knowledge bases and other customs and ideologies associated with a communal society sharing a communal language. Afrikaans-speaking communities perceived themselves as different and unique, in relation to English-speaking and indigenous groups. Although the indigenous groups had strong heritage bonds with their culture, they still assimilated, with less opposition, with Afrikaans and/or English dominant social groups (Asabere-Ameyaw, Sefa Dei, & Raheem, 2012; Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973, 1984). Because language was also associated with race, non-white groups were obliged to be educated in their own indigenous tongue to assure

segregated and unique education (Coetzee, 1963; Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973, 1984).

Learning in one's own indigenous language in South Africa had both positive and negative associations; positive because children learn best in their mother tongue, but negative because this led to more isolation and segregation in knowledge acquisition and transference (Coetzee, 1963; Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973, 1984). Segregation emphasised the participation of white supremacy groups, to prevent non-whites from progressing in the western culture and economy (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973, 1984).

During the Accountability and Electronic era, 1994-2015, South Africa's language situation underwent severe changes with the announcement of a democratic society and legislation to address discrimination and social misconduct (Giliomee & Mbenga, 2007; Pretorius, 2012). The government acknowledged and included the importance of all eleven official languages in South Africa, where indigenous languages are nine of them and English and Afrikaans, as European languages, are the remaining two (Brits, 2012; Wolhuter, 2013c). Most Coloured communities adopted Afrikaans as mother tongue, whilst Indian communities adopted English because their own indigenous language descended from India and was not recognised as an official language. Black communities adopted both Afrikaans and English (Brits, 2012; Giliomee & Mbenga, 2007; Wolhuter, 2013c). Recognising the historical diminished use and status of indigenous languages, the newly elected government and inaugurated Constitution were focused on elevating and advancing these languages (Wolhuter, 2013c). Afrikaans and English have always been recognised as the two official languages of South Africa and therefore these languages progressed, but not the other indigenous languages. This is because English was considered an international language for trading and communication and Afrikaans was politically driven; thus these two languages were used for teaching and learning (Brits, 2012; Wolhuter, 2013c).

South Africa experienced tension on political, social, educational, and economic level. Hugo (2010) stressed his concern that, in South Africa and internationally, high status and dominance are associated with English, as communication language, over other languages, which causes fundamental issues for acquiring knowledge and applying it to scientific situations. The attempt to replace the learners' mother tongue too soon with the Language of Learning and Teaching, leads to severe losses in terms of learning and cultural heritage (Airey & Linder, 2011; Hugo, 2010). Reiterating the fact that mother tongue education is of pivotal importance, it is also a matter for future research studies to assure that the Beginning Knowledge concepts and skills identified and determined by international scholarly work (see page 75-76), should firstly be

translated correctly (truly reflects the correct meaning of the concept and experience) and then be included in the curriculum.

Because there is a link between language and the acquisition of GeHiNaTe for Scientific Literacy, according to Airey and Linder (2011), children who are taught in an Additional Language or secondary dialogue, might be at risk; firstly, because they need to acquire complex knowledge systems in a language less familiar and natural to them; and secondly, because their primary language might not have developed enough to incorporate the specialised language terminology associated with Beginning Knowledge. A secondary dialogue utilised for Language of Learning and Teaching can be to the detriment of acquiring adept Beginning Knowledge concepts and skills, which influences the applicability of such knowledge to society and therefore threatens the possibility of building a Scientific Literate society.

B.3.3.2.2 Politics and Economy as personal knowledge

Personal Knowledge, as a knowledge source required by society, can be described as an aspect of Scientific Literacy because it requires from the learner to connect with the wider society through participating in political, social and economic activities and processes (Aikenhead et al., 2011; Linder et al., 2011). In other words, the rationale for implementing Scientific Literacy is an overt goal communicated by educators, scientists and politicians to equip citizens and members of society with sound knowledge of GeHiNaTe knowledge bases and the application thereof in scientific situations, as this will enable learners to participate fully in making key decisions about their lives and socio-scientific issues (Hodson, 1988; Roberts, 2011). James and James (2012, p. 27) explained that citizenship in this context refers to:

> [a] status that is given to members of a community who share those rights, responsibilities, duties and adopt those social practices that are intrinsic to belonging to and being a responsible member of that community and who, in return, share in the resources that are distributed within that community.

In light of this quotation, it becomes clear that children, regardless of their age, should be considered as already part of society (James & James, 2012). Even though learners do not have political voting rights and access to resources, James and James (2012) emphasised the fact that they should still be considered as part of the majority adult group. Equipping them with an adept GeHiNaTe education and a curriculum that fosters Scientific Literacy, is a good start to view them as part of society. In international scholarly work it has become an important notion to help *all* learners acquire critical Scientific Literacy skills, regardless of their educational level,

ethnicity, gender, language preference, race, religion, sexual orientation, and socio-economic status (Hodson, 2008, 2014; Linder et al., 2011). Furthermore, the economic circumstances necessitate that *all* learners from *all* societies acquire critical Scientific Literacy in order to be actively part of the vocational world, which is increasingly becoming dominated by Science and Technology (Aikenhead et al., 2011; Bybee, 2010; Hodson, 2008).

This notion about the participation of the young child in societal activities is also supported by Erduran and Dagher (2015). They stated that the Foundation Phase learner ought to understand how learning of Beginning Knowledge is related to state politics on an internal and external level, as this will help them understand why becoming Scientific Literate is important without compromising the value and rationality thereof. Erduran and Dagher (2015) was convinced that learners need to develop an informed understanding of the relationship between Science, Technology, Economy, and Society, in order to encourage them to become Scientific Literate. Scientific Literacy, that emphasises superior education of GeHiNaTe for all learners, is therefore becoming a matter of political and constitutional rights (Aikenhead et al., 2011; Hodson, 2014). Knowledge of GeHiNaTe will enable learners to have more success in pursuing and entering employment opportunities within GeHiNaTe; demonstrating better capabilities to respond to new devices and technologies; adapting and coping with daily and technology-dominated demands; understanding and evaluating Science-related problems and phenomena; and taking informed decisions concerning their own well-being and that of others (Aikenhead et al., 2011; Hodson, 2014). The acquisition of Scientific Literacy through GeHiNaTe education empowers learners to take part in the processes related to a democratic society and becoming employable and equipped with twenty-first century skills (Wolhuter, 2013c).

Scientific Literate learners are considered beneficial to the state and society, as their knowledge of GeHiNaTe and the habits of mind that this subject fosters, will promote and sustain the economic situation, develop Scientific Literacy within learners and promote political fairness of the country (Aikenhead et al., 2011; Hodson, 2014). Scientific Literate learners will more likely further their studies in Engineering, Sciences, Technology, and Medicine, which will increase Science-based research and the development of inventions and advancement in knowledge (Aikenhead et al., 2011; Hodson, 2014). It therefore becomes clear that the value of the education of GeHiNaTe in schools has received global attention; meeting these ideologies set by politicians, scientists, economists, and educators, to develop a Scientific Literate society, requires curricula that will not exclude anyone from developing these skills and knowledge regardless of each learner's unique and complex educational profile.

Early introduction to GeHiNaTe should help prepare learners, not only for the world of work, but for futuristic advancements as well (Aikenhead et al., 2011; Bybee, 2010; Hodson, 2008). The demands from the wider society to develop Scientific Literate learners, through GeHiNaTe

education, has become a requirement, whilst opting out or excluding Foundation Phase curricula from the movement, is a diminishing factor (Aikenhead et al., 2011; Bybee, 2010; Hodson, 2008).

B.3.3.2.2.1 Historical analysis

Foundation Phase teachers need to recognise how important it is to develop learners to become Scientific Literate. The following analysis process was conducted to determine whether the South African curricula foster and promote participation in societal, economic, and political activities and processes in the Foundation Phase classroom.

a) Evaluating whether the South African performance curriculum and competency curriculum prepared the Foundation Phase learner to participate in political, social, and economical discussions for the future

The table below depicts how South African curricula historically utilised political, social and economical discussions to prepare learners for citizenship. The researcher had to identify such discussions, as they were not explicitly communicated within the Foundation Phase curricula.

Table 3-24: South African curricula preparing the Foundation Phase learner for citizenship discussions

Performance curriculum (1948-1994)	Competency curriculum (1994-2015)
The purpose of learning Environmental Studies is to equip the learner: • to acquire and apply knowledge, skills and values to promote social adaptability and inclusivity; • to be guided and prepared for life and the possibilities it holds and to fit in and adapt to their immediate environment; and • to develop the ability to promote their own physical, social, personal, emotional and cognitive development.	The National Curriculum Statement Grades R to 12 serves the purposes of: • preparing all learners with the knowledge, skills and values necessary for self-fulfilment, and significant participation in society as citizens of a free and democratic country; • expediting the transition of learners from education institutions to the workplace by providing employers with an adequate profile of a learner's capabilities; and • empowering all learners with the knowledge, values and skills to take part in the processes associated with a democratic society.

(Sources utilised: Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Department of Education, 2002, 2003a, 2011c; Departement van Onderwys, 1991; Wolhuter, 2013c)

The performance curriculum introduced during the Great Society era, 1948-1994, did acknowledge the importance of learners to become socially and emotionally mature through Environmental Studies education, to partake in society. However, the aspects regarding political and economic participation are not as clearly communicated, probably because the view was more focused on emotional and social development of the young child, as opposed to already starting to prepare them for political and economic engagement. Some of the topics utilised in the performance curriculum do incorporate discussion about future vocational positions and cultural and civic discussions (Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b). The competency curriculum introduced during the Electronic and Accountability era, 1994-2015, communicates clearly that the learner should be able to partake in social, political and economic processes and activities. The topics utilised in the competency curriculum do incorporate discussion about future vocational positions, economic principles, and cultural and civic discussions (Republic of South Africa, 2002, 2003, 2011c). Based on these discussions, there are some concerns relating to how well learners are guided to become active and participating citizens within the South African society in the Foundation Phase. Because the researcher had to identify these political, societal and economic activities for both South African curricula herself, it indicates that these aspirations are not communicated as explicitly as would be expected.

According to Le Grange's (2013) interpretation of the White Paper on Education and Training (2006), curricula during the Apartheid's regime created and reproduced occupational and social class distinctions. Such distinctions were evident in the performance curriculum and in the choices of careers closely related to ethnic structure of economic opportunity and power (Christie & Collins, 1982; Le Grange, 2010; Department of Education, 2006). The shift to a competency curriculum was also an effort to create equality and uniformity between education and workplace learning, as there is a strong link between education, labour and social participation (Booyse, 2013b; Le Grange, 2010; Linder et al., 2011). The curricula of South Africa were and are still influenced by the larger social, political and economic milieu and, through Scientific Literacy, the current education system will continually utilise Scientific Literacy as agent for social, economic and political change. Aspirations, clearly influenced by society, as communicated in the National Curriculum Statement (2011c, p. 4), state that the purpose of education is to serve the purposes of:

> equipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country; providing access to higher education; facilitating the transition of learners from education institutions to the workplace; and providing employers with a sufficient profile of a learner's competences.

The idealisation of developing a Scientific Literate and Knowledge Society, as part of one's constitutional right, implying GeHiNaTe education in schools for all learners, was not always valued (Hodson, 2008, 2014). There was a time, globally and in South Africa during the Apartheid regime, when some members of society lacked critical Scientific Literacy and were excluded and disempowered from participating optimally in civic, economic and social activities, due to political reasons (Hodson, 2008, 2014; Hugo, 2010).

According to Hodson (2008) and Hodson and Reid (1988), and historically, the education of GeHiNaTe content, language and skills was only reserved for the politically-influenced elite groups, while curricula associated with preparing learners for life (also ironically referred to as "Life Skills"), were introduced to all children of the lower social status order. The following quotation by Hodson (2008, p. 2), demonstrates the underlying socio-economic-political rationale within historical times, in only equipping some children with scientific literacy and scientific reasoning skills and why it is of the utmost importance to address it:

> If the knowledge, skills and attitudes embodied in the notion of scientific literacy are important, as I claim, they are important for everyone. Use of the term "universal critical scientific literacy" carries with it a commitment to a much more rigorous, analytical, sceptical, open-minded and reflective approach to science education than many schools provide and signals my advocacy of a much more politicized and issues-based science education, a central goal of which is to equip students with the capacity and commitment to take appropriate, responsible and effective action on matters of social, economic, environmental and moral-ethical concern

Acknowledging the importance of outcomes to prepare learners to better participate in society, implies indirectly that Beginning Knowledge education is considered important, and more attention can be given to assuring that Scientific Literacy, through Beginning Knowledge education, is developed as early as in the Foundation Phase.

B.3.3.2.3 Cultural tools as tooled knowledge

Tooled knowledge is communicated in many ways, but this type of knowledge has a specific function within its cultural society and although it involves language as a cultural tool, it is not the same as codified knowledge (Aikenhead et al., 2011; Linder et al., 2011). Tooled knowledge is usually presented through scientific revolutions and technological inventions and is described as hard and soft tooled knowledge (Aikenhead et al., 2011; Linder et al., 2011). Hard tooled knowledge refers to a physical instrument (for example artefacts, instruments, tools, and media), while soft tooled knowledge is non-physical instruments (for example signs, and

symbols). Both types of tools are utilised to advance and transfer knowledge (Aikenhead et al., 2011; Linder et al., 2011).

Communication through cultural tools is the way society interacts, creates and presents knowledge, which is important to be preserved and transferred to the next generation (Aikenhead et al., 2011; Rückriem, 2009; Settlage & Southerland, 2012). Communication, as mentioned before, is a social and cultural construct, which requires a complex interaction between the communicators, the information to be transferred, and the presence of a cultural tool (Aikenhead et al., 2011; Rückriem, 2009; Settlage & Southerland, 2012). For Vygotsky, it was important to utilise cultural tools to bring about cognitive (psychological) changes. This can be substantiated with the following quote (Vygotsky, 1997, pp. 61-62):

> The tool serves for conveying man's activity to the object of his activity, it is directed outward, it must result in one change or another in the object, it is the means for man's external activity directed toward subjugating nature. The sign changes nothing in the object of the psychological operation, it is a means of psychological action on behavior, one's own or another's, a means of internal activity directed toward mastering man himself; the sign is directed inward. These activities are so different that even the nature of the devices used cannot be one and the same in both cases.

In light of the above quotation, the transference and advancement of knowledge occur between two entities, for example from one person to the next, from one computer system to the next (Aikenhead et al., 2011; Linder et al., 2011) or from a research study about Beginning Knowledge education to the intended curriculum, through the teacher, to the Foundation Phase learner, to the society of work and citizenship.

B.3.3.2.3.1 Historical analysis

The transformation noticed in cultural tools, which influenced and changed thinking and knowledge, was described by McLuhan's Media History as the influence of the tribal age, the literate age, the print age, and the electronic age (Fuller, 2005; McLuhan, 1962). Each of these technologies inspired transitions within the cultural tool itself (oral, written, printed, electronic), and brought about diverse ways of thinking and understanding within the individual because the cultural tool requires different sensory inputs and challenges the individual's way of thinking and comprehending (Giesecke, 2005; Rückriem, 2003, 2009). Rückriem (2003, 2009) claimed that there has been no transformation with larger or more essential significances than the invention of book printing or computer technology. Foundation Phase teachers need to recognise the use and status of these cultural tools and how cultural tools help to elevate the learning experience

of a learner and then utilise such tools to meet learners' diverse learning preferences. The following analysis process was conducted to determine how international external tools (devices and patents) have contributed to the external tools utilised in the South African classrooms.

a) Identification of external tools and patents which contributed to the utilisation of cultural tools in the South African Foundation Phase classrooms

The following table depicts two categories of information: the external tools (devices and patents), invented by international scholars; and how this has contributed to the transition in thinking, which influenced the external tools used in schools to teach. These cultural tools also portray how thinking has advanced and the means developed by society to transfer or preserve their knowledge bases. Only the Beginning Knowledge curricula, as communicators, were investigated, together with the physical resources utilised to implement the intended curriculum.

Table 3-25: Cultural tools available in society and utilised in school classrooms between 1400 and 1652

Pre-Colonial times: Traditional education (1400-1652)			
External tools (devices and patents)			**External tools used in Beginning Knowledge education**
• 1438: Wooden blocks used for printing by Koster • 1442: Johannes Gutenberg established the printing press	• 1455: Gutenberg printed the first book, a Latin Bible, using moveable type • 1474: William Caxton printed the first book in English	• 1476: William Caxton established a printing press • 1499: Johannes Trithermius's book on cryptography	• Arts, crafts, pottery and cutlery • Proverbs, oral tradition, oral culture and oral lore (messages) • Rituals, trances and dances, as social events • Shores, herding, farming, and cooking

(Sources utilised: Aicken, 1991; Behr & McMillan, 1971; Booyse et al., 2013; Bunch & Hellemans, 2004; Coetzee, 1963; Goddard, 2009; Kaku, 2011; Luke, 1989; Muller, 1981; Welsh, 1998)

There was one medium transition present before the Pre-Colonial time period (tribal era) and two medium transitions present during the Pre-Colonial time period (literary and print ages),

according to Fuller (2005) and McLuhan (1962). During the tribal age, the cultural tools utilised to convey, present and preserve knowledge dominantly, relied on the sensory inputs associated with the auditory, kinaesthetic and verbal senses (Fuller, 2005; McLuhan, 1962). During the Pre-Colonial time epoch, cultural tools and communication were still much dependent on interactions and the auditory sense input; however, when the phonetic alphabet was developed, the cultural tools adopted symbols and visual representations of knowledge, which necessitated a stronger visual sensory input than before (Fuller, 2005; McLuhan, 1962). The printing press served as an important transitional period, as knowledge was presented, stored and distributed through books, requiring people to become literate in order to read the knowledge, as opposed to only acquiring it through auditory mediums (Giesecke, 2005). The typographical medium necessitated that the thinking of great scholars from the previous and current eras' work was captured in a textual form to be presented, stored or disseminated (Giesecke, 2005).

In terms of how these transitions in cultural tools affected traditional education in South Africa during Pre-Colonial times, it can be deduced that the tribal age was the most prominent means for generating and transferring knowledge. Members of these indigenous groups used external tools, associated with cultural customs, to transfer knowledge. Although, internationally, communities were using texts and books to transfer knowledge, these external tools were not yet introduced to South Africa, because they did not know the phonetic alphabet associated with the literacy age (Giliomee & Mbenga, 2007; Seroto, 2013; Welsh, 1998)

Table 3-26: Cultural tools available in society and utilised in the school classroom in 1652 to 1806

Colonial times: Education during Dutch Colonisation (1652-1806)			
External tools (devices and patents)			**External tools used in Beginning Knowledge education**
• 1600: William Gilbert published his works about magnetism • 1605: Francis Bacon published the advancement of learning • 1637: Descartes published his philosophy on truth in and through	• 1687: Newton published Principia • 1690: Locke published works on human understanding • 1704: Newton published Opticks • 1719: Le Blon invented four-colour-printing • 1729: Chinese	• 1770: Joseph Priestley invented the pencil eraser • 1781: Kant published doctrine on reason • 1795: First lead pencil invented by Nicolas Conte • 1796: Lithographic printing press developed	• Curriculum and teaching material • Music, dance and instruments • Place of gathering with basic furniture • Stationery and workbooks • Teachers imported from the Netherlands • Text books (Bible, nonspiritual; grammars and pictorial books, alphabet

science • 1665: The Royal Society's first peer-reviewed scientific journal published	encyclopaedia • 1753: Charles Morrison invented the telegraph	• First book published; first printed book in English, using movable parts	letters; Early Dutch Primers or ABC books; English Hornbook; Lord's prayer, the twelve articles of faith and the Ten Commandments)

(Sources utilised: Aicken, 1991; Behr & McMillan, 1971; Booyse et al., 2013; Bunch & Hellemans, 2004; Coetzee, 1963; Goddard, 2009; Kaku, 2011; Luke, 1989; Muller, 1981; Welsh, 1998)

The Colonial era was also primarily influenced by the printing press. The body of knowledge was grounded in external typographical cultural tools that were visually, symbolically and publicly circulated as a means to demonstrate internal thinking of scholars' knowledge and understanding of Sciences (Giesecke, 2005). The printing press was the most prominent means of duplicating and distributing knowledge before the invention of the telegraph, which progressed the way of communication to a new level, as distance was no longer a restriction (Giesecke, 2005; McLuhan, 1962). The Knowledge of Society during the Dutch Colonisation in South Africa, was an important time period, as immigrants and settlers from abroad helped society to develop from the tribal age to the age of literacy and printing (Horsthemke, 2004; Semali & Kincheloe, 1999; Seroto, 2013). Through the establishment of schools and the introduction of formal education, learners were taught the basic educational skills of reading, writing and arithmetic, primarily from Scripture and some other cultural tools common to the literacy and printing age (Behr, 1988; Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a). The formal teaching of knowledge associated with Geography, History, Natural Sciences, and Technology was not evident in this era.

Table 3-27: Cultural tools available in society and utilised in the school classroom from 1806 to 1899

Industrial and Progressive era: Education under the British rule (1806-1899)			
External tools (devices and patents)			**External tools used in Beginning Knowledge education**
• 1800: Charles Stanhope invented the iron printing	• 1838: Morse invented the electronic telegraph	• 1884: Ottmar Mergenthaler invented the linotype	• Assessment material • Classrooms, basic teaching equipment,

press • 1807: Paper-making machine invented by Henry and Sealy Fourdrinier • 1811: Wollasto invented the camera lucida • 1821: First reflector of messages over distance, called the heliograph, by Karl Gauss • 1822: Typesetting machine by William Church • 1829: The Braille alphabet was invented • 1832: Stereoscope by Charles Wheatstone • 1833: Charles Baggage developed the first computer • 1837: Noritz von Jacobi invented an electrotyping device	• 1858: Transatlantic telegraph cable by Charles Bright • 1859: Darwin published the Origin of Species • 1863: Huxley published Evidence of Man's Place in Nature • 1865: William Bullock invented the web-fed rotary printing press • 1869: Mendeleev published the Period table of chemical elements • 1876: Bell patented the telephone • 1876: Melvil Dewey developed the classification system for cataloguing library books • 1877: Phonograph invented by Alva Edison and Charles Cros	machine • 1885: The metal-type or monotype machine invented by Tolbert Lanston • 1889: First automatic telephone exchange • 1889: Motion-picture camera invented by William Friese-Greene • 1890: Punch-card reader for recording census results invented by Herman Hollerith • 1893: Auguste and Louis Lumiere's motion-picture camera • 1895: Karl Klic's photogravure printing press • 1895: Marconi established the wireless telegraph	furniture and school buildings • Curriculum and teaching material • Music, debates, concerts, dance and instruments • Public library and museum • Stationery and work books • Teacher resources and materials within classroom • Teachers attend local teaching training institutions • Text books (Bible, nonspiritual; story and pictorial books, alphabet letters)

(Sources utilised: Aicken, 1991; Behr & McMillan, 1971; Booyse et al., 2013; Bunch & Hellemans, 2004; Coetzee, 1963; Goddard, 2009; Kaku, 2011; Luke, 1989; Muller, 1981; Welsh, 1998)

Due to the influence the printing press had in contributing to the distribution of knowledge through text (see Table 3-27), strict rules, standards and criteria for textual publications were developed by scholars, to which all members of society had to adhere if they wished to distribute knowledge through text, according to Giesecke (2005). Such a standard was developed to guarantee cultural communication, that was considered suitable and valuable with the use of a standard language (Giesecke, 2005). The Morse code, Braille alphabet, telegraph, telephonic call, and heliograph took communication to the next level, as it was no longer bound to a cultural tool like printing on paper; text could now be converted into a new language and even travel over distance (Fuller, 2005; Giesecke, 2005; McLuhan, 1962). This was the beginning of the electronic age, although it had not reached its full capacity, as compared to what we came to know currently (Fuller, 2005; Giesecke, 2005; McLuhan, 1962).

Education under the British rule portrayed more or less the same picture as within the time under the Dutch rule, although the basic literacy of more learners increased because of

compulsory schooling. Their knowledge bases also expanded because diverse texts and cultural tools were utilised to teach content (Behr, 1988; Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a). The inclusion of nature and the environment in formal education was noted, which also indicated that learners were exposed to cultural tools associated with Geography, History, Natural Sciences, and Technology education.

Table 3-28: Cultural tools available in society and utilised in the school classroom from 1899 to 1948

Child Study Movement era: Education in the midst of missionaries, Boer Republics, wars and the end of union (1899-1948)			
External tools (devices and patents)			**External tools used in Beginning Knowledge education**
• 1900: Planck published his "quantum theory" • 1901: Marconi made first transatlantic radio transmission • 1905: Albert Einstein published his special theory of relativity • 1906: Fesserden developed the amplitude modulation (AM) for radio transmissions • 1908: Dayton Miller recorded sound photographically • 1909: SOS signal for distress introduced to radio	• 1913: Sigmund Freud's "Interpretation of dreams" • 1914: John Hammer invented a radio remote-control system • 1917: Sigmund Freud's "Introduction to Psychoanaly-sis" • 1922: First part-talking motion picture by Lee de Forest • 1923: Mechanical scanning television system by John Baird • 1923: Paper copier device invented by a company called Ormig	• 1930: Enrico Caruso's first gramophone recording • 1937: Xerography dry photocopying process by Chester Charlson • 1938: First ballpoint pen by Laslo Biro • 1940: The first official network television broadcast by NBC • 1947: Polaroid introduced instant camera • 1948 Peter Goldmark invented the long-playing phonograph record	• Assessment material • Audio-visual materials and resources and film festivals • Broadcast and recording equipment • Classrooms, teaching equipment, furniture and school buildings • Community projects and vegetable gardens • Cultural activities and festivals • Curriculum and teaching material • Expeditions outside classroom • General Science clubs • Music, debates, concerts, dance and instruments • Public libraries and museums • School libraries, archives and departmental libraries • School papers and brochures • Stationery and work books • Teacher resources and materials within classroom • Teachers attended local teaching training institutions • Text books (Bible, nonspiritual; story and pictorial books, alphabet letters) • Visual overhead projector for teaching

(Sources utilised: Aicken, 1991; Behr & McMillan, 1971; Booyse et al., 2013; Bunch & Hellemans, 2004; Coetzee, 1963; Goddard, 2009; Kaku, 2011; Luke, 1989; Muller, 1981; Welsh, 1998)

As demonstrated in the above table (see Table 3-28), the Child Study Movement era continued to advance in cultural tools and more of these external tools were aimed at incorporating all the senses when communicating. An example of such a device is the television, which creates an audio-visual picture of communication and transference of knowledge. Education, in the midst of missionaries, Boer Republics, wars and the end of union, became more established and accessible to learners. Furthermore, by looking at the external tools utilised in schools (see Table 3-28), teachers were empowered and advised to use technological cultural tools, such as radio devices, sound reinforcement apparatus, photocopying machines, scientific apparatus and the library, to assist teaching and help learners acquire knowledge of different subjects and become competent in Educational Technology as well (Behr, 1988; Booyse, 2013a; Coetzee, 1963; Giliomee & Mbenga, 2007; Welsh, 1998). During these times, the importance of becoming proficient in and adaptable to the use of technological devices in education, was emphasised. The government also realised that skills and knowledge on how to use Educational Technology, were to be implemented in schools to ensure social and communicative progression in society (Coetzee, 1958, 1963).

Table 3-29: Cultural tools available in society and utilised in the school classroom in 1948 to 1994

Great Society era: Apartheid education during National Party ruling (1948-1994)			
External tools (devices and patents)			**External tools used in Beginning Knowledge education**
• 1952: Floppy disk drive by Yoshiro Nakamatsu • 1952: Fred Walter presented the Cinerama widescreen system for movies • 1956: FORTRAN computer language for programming • 1957: Portable typewriter • 1959: Karl Popper published the	• 1967: Memory for computers invented • 1968: Douglas Engelbart developed the computer mouse • 1970: PASCAL computer language for programming • 1971: Dot matrix printer is invented • 1971: Ted Hoff introduced the single-chip microprocessor • 1974: Laser printer for	• 1976: VHS as video cassette launched by Matsushita • 1979: Ericsson marketed first cellular phone • 1981: 32 bit silicon chip for computers • 1981: MS DOS operation system by Microsoft • 1984: Windows launched • 1985: Adobe introduced PostScript as page-description for	• Assessment material • Audio-visual materials and resources and film festivals • Audio-cassette players, concerts, dance and instruments • Broadcast and recording equipment • Classrooms, designated corners for learning, furniture and school buildings • Colouring books, stationery, art resources and work books • Community projects and vegetable gardens • Cultural activities and festivals • Curriculum and teaching material • Educational equipment and toys • Expeditions outside classroom • Fantasy resources which include type writers and telephones • General Science clubs and laboratories in schools

Logic of Science • 1960: Audio cassette tapes • 1960: Felt-tip or Pentel pens • 1960: Mini-computer with monitor and keyboard • 1962: Thomas Kuhn published the Structure of Scientific Revolutions • 1964: BASIC computer language for programming	computers, which was followed by inkjet printers • 1975: Bill Gates found Microsoft Corporation • 1975: First personal computer available to the public • 1976: Steven Jobs and Stephen Wozaniak found computer company Apple	computer language • 1985: C++ computer language for programming • 1987: Digital Audio Tape system launched	• Observation table with equipment for observing • Outdoor equipment to promote gross-motor development • Public libraries and museums • School libraries, archives and departmental libraries • School papers and brochures • Specialised equipment for special educational needs • Teacher resources and materials within classroom • Teachers attended local teaching training institutions • Text books (Bible, nonspiritual; story and pictorial books, alphabet letters) • Visual overhead projector for teaching

(Sources utilised: Aicken, 1991; Behr & McMillan, 1971; Booyse et al., 2013; Bunch & Hellemans, 2004; Coetzee, 1963; Goddard, 2009; Kaku, 2011; Luke, 1989; Muller, 1981; Welsh, 1998)

The introduction of the computer, the internet and electronic devices that stimulate all senses when interacting with knowledge, are some of the external tools that allow individuals to communicate across borders, without a delayed reaction, like books or letters would have, as depicted in this table (see Table 3-29). The National Party rule and Apartheid education in South Africa were also embracing the cultural tools available; for example, the television, as cultural tool, changed the face of communication and the transference of information and knowledge in society drastically (Booyse, 2013b; Coetzee, 1963; Giliomee & Mbenga, 2007; Welsh, 1998). A new spin-off on the reception of information through senses was provided, as learners' auditory and visual skills were now exposed to different inputs and no longer only dependant on memorisation and imagination (Coetzee, 1963; Grovè & Hauptfleisch, 1985; Grovè, 1982). The implementation of a telephone and the computer brought about new concepts of being connected with people who are distances apart, or being able to communicate with a complete stranger by dialling a number or entering a virtual address into the device (Lektorsky, 2009; Siu & Lam, 2005). The introduction of these cultural tools to learners also required a new form of social and emotional behaviour and opened up a new field of research (Frost, 1966; Lascarides & Hinitz, 2000; McClennan & Dorn, 1999).

Table 3-30: Cultural tools available in society and utilised in the school classroom in 1994 to 2015

Accountability and Electronic era: Outcomes-based education in a democratic South Africa (1994-2015)	
External tools (devices and patents)	**External tools used in Beginning Knowledge education**
• 1997: CDs replaced cassettes and DVDs replaced VHS format • 1990: Berners-Lee began to devise the world wide web • 1990: Photo CD disc was launched • 1995: JAVA computer language for programming • 2000: Rise of cell phone use and cellular technology • 2001: Instant message services • 2001: International Space Station launched by Dennis Tito • 2002: Satellite radio was launched • 2002: TV standard changed to digital • 2005: Google Library Book Project, digitization of books; digitization of National Archives films • 2005: Youtube was launched • 2005: Google Video Pilot Project • 2007 Apple's iPHONE and touchscreen were introduced • 2008: Apple launched its iPAD	• Assessment material • Audio-visual materials and resources in 2D, 3D and 4D • DVDs, television set, digital video recording camera resources and film festivals • CD players, concerts, dance and instruments • Digital broadcast and recording equipment • Classrooms, designated corners for learning, furniture and school buildings • Colouring books, stationery, art resources and work books • Community projects and vegetable gardens • Computers, cell phones, tablets and other technological devices • Cultural activities and festivals • Curriculum and teaching material • Digitalised equipment • Electronic books and activities • Educational equipment and toys • Expeditions outside classroom • Fantasy resources which includes computers, cell phones and other technology devices • Games, on-line and virtual games • General Science clubs, laboratories in schools, and sophisticated equipment • Observation table with equipment for observing • Outdoor equipment and virtual computerised devices to promote gross-motor development • Robotic equipment for teaching • Public libraries and museums • School libraries, archives and departmental libraries • On-line school papers and websites • Specialised equipment for special educational needs • Teacher resources and materials within classroom • Teachers qualified with teaching degree at local or international teaching training institutions • Text books and e-books • Virtual tours on the internet to other places • Visual projector and interactive whiteboards for teaching

(Sources utilised: Aicken, 1991; Behr & McMillan, 1971; Booyse et al., 2013; Bunch & Hellemans, 2004; Coetzee, 1963; Goddard, 2009; Kaku, 2011; Luke, 1989; Muller, 1981; Welsh, 1998)

The Accountability and Electronic era, which society has become accustomed to, demonstrated the coevolution practices of generating knowledge and disseminating knowledge globally

(Giesecke, 2005). A crucial skill that learners and members of the society need to acquire, is the knowledge of Sciences, that they have made their own, in order to discern which knowledge should be transferred and which should be demolished, because all distributed knowledge is not necessarily correct and truthful (Giesecke, 2005).

In terms of a new education policy in a new South Africa, the equipping of its entire society with the literacy to use the available cultural tools or to progress with globalisation, has not yet been accomplished (Pretorius, 2012; Steyn et al., 2011; Wolhuter, 2013c). The curriculum cannot efficiently provide scientific and technological literacy to equip society with these advances, because access to these devices and virtual worlds are too expensive for state-subsidised schools (Steyn et al., 2011; Wolhuter, 2013c). Technology cultural tools cannot remedy education problems, or replace teachers, or be mistaken for the illusion that older technologies are not useful (Roblyer & Doering, 2014). However, advances in technological cultural tools will expect from teachers, policy makers, the government, and other role players to adapt and find solutions to include learners in the twenty-first century culture and not be segregated due to socio-political-economic reasons (Steyn et al., 2011; Wolhuter, 2013c).

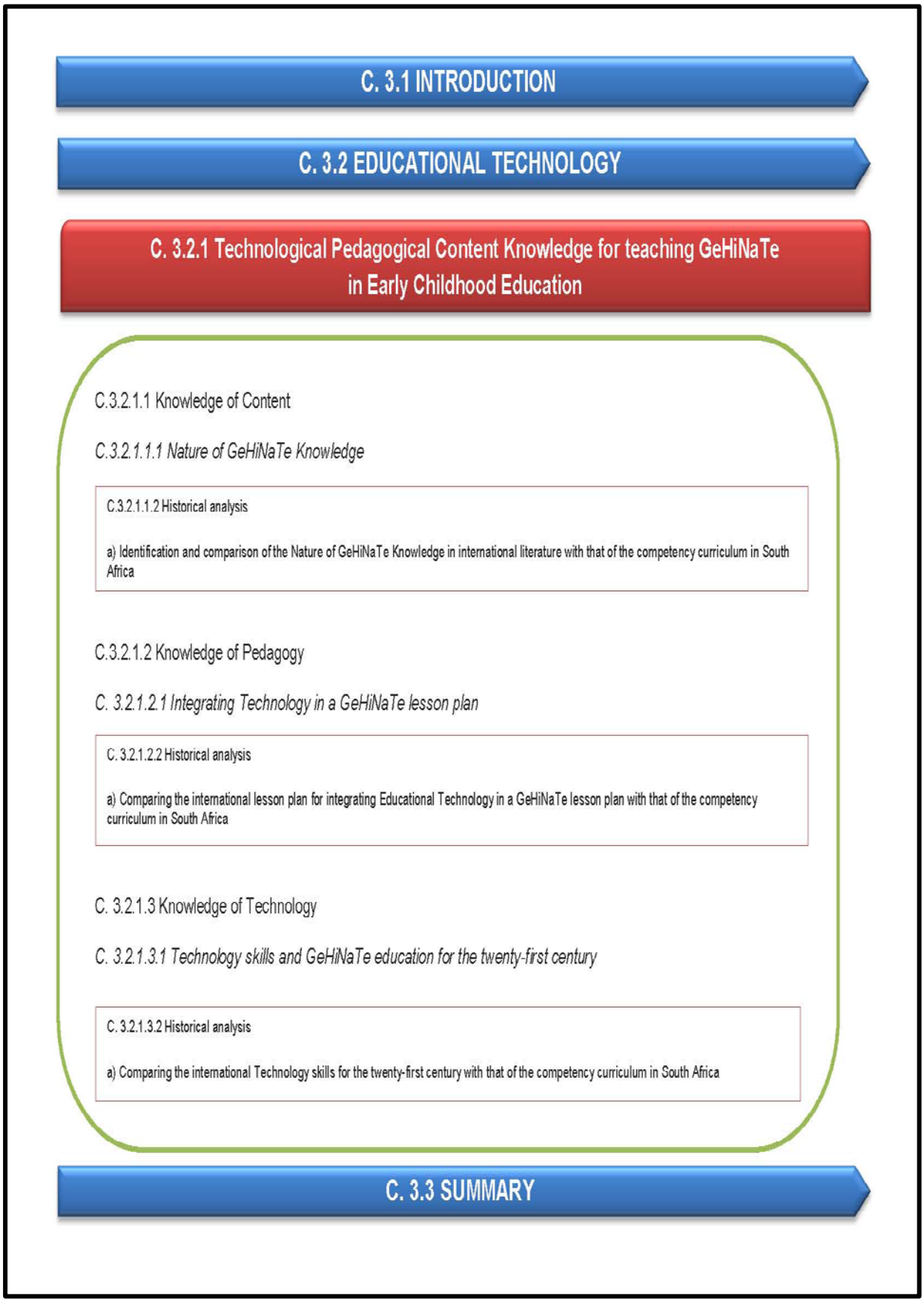
Giesecke (2005) warned that the curriculum designers do not fully comprehend what the influence of electronic cultural tools is on education, because teaching is still portrayed and depicted through the same lenses and pedagogy that were developed by the culture of the printing press and books. Knowledge and learning through electronic tools have their own identity, and knowledge and learning through books have their own identity and should not be mistaken as the same thing (Giesecke, 2005; Rückriem, 2009). A shift in thinking about teaching and knowledge should be a witness to break free from the old mould of repetition and replication and thinking that a single medium, like either books or the internet, is considered the desired medium (Giesecke, 2005; Rückriem, 2009). The balance between the two, as a blended or, more appropriately, “multi-media” approach, should be considered (Giesecke, 2005; Rückriem, 2009)

B.3.4 SUMMARY

The Societal activity system enabled the researcher to map out the knowledge bases that teachers require in order to teach a subject like GeHiNaTe for citizenship in the Foundation Phase, by utilising both international and national bodies of scholarship. Through historically analysing the Scientific Literacy, with its underlying typologies, the researcher indicated how societal requirements contributed to the changes and progress in knowledge bases through the years and that a teacher has a responsibility to develop learners for citizenship through

GeHiNaTe education. The Societal activity system investigated the two visions of Scientific Literacy and which knowledge bases are required by the teacher to guide learners, as well as the three types of knowledge, that contribute to Knowledge Society. Both these categories clearly depict that a Foundation Phase teacher requires an adept knowledge of GeHiNaTe education and the purpose of this subject, as well as how to guide learners in becoming Scientific Literate and responsible citizens, who are able to participate in political, economic and societal activities and embrace twenty-first century living. The subject, GeHiNaTe, is therefore an important knowledge base to be acquired by the young child for future citizenship and to be taught with superiority by the Foundation Phase teacher.

C. ACTIVITY SYSTEM C – TECHNOLOGICAL ACTIVITY SYSTEM



C.3.1 INTRODUCTION

A teacher's knowledge base to teach a subject like GeHiNaTe in the Foundation Phase is pivotal, as motivated in the previous activity systems. This is due to the fact that adept knowledge of this subject will enable the teacher to guide learners to acquire GeHiNaTe concepts, language and skills, and promote Scientific Literacy and future citizenship. As mentioned before, the structure of a teacher's knowledge base for teaching GeHiNaTe is dynamic because such a knowledge base undergoes changes as time passes and advances in Education, Society and Technology occur (Corrigan et al., 2011). One of the most significant factors contributing to changes and transformation within knowledge bases is the advancement in Technology and futuristic research. Findings of these research studies project the knowledge and skills necessary to meet the demands of the twenty-first century. Therefore, teachers have to also develop and acquire an adept knowledge base about Educational Technology in order to teach GeHiNaTe to the young child and prepare them for the demands that society and the future hold for them.

C.3.2 EDUCATIONAL TECHNOLOGY

The use of Technology has the ability to revolutionize a subject, like GeHiNaTe education, at the most basic level (Koehler, Mishra, Kereluik, Shin, & Graham, 2014). Research investigations on the role of Technology in teaching is not a new phenomenon, as one would expect. To the contrary, the disciplinary field of Technology for education is as old as education itself, and modern tools and the latest techniques are merely some of the latest advancements in this field, according to Roblyer and Doering (2014) and Roberts, Leung and Lins (2013). Although Technology is concerned with the use of processes and tools to address an educational need (Roblyer & Doering, 2014), the primary focus is to transform learning through embracing Technology for education and Technology's ability to become an integral and interacting part of teaching (Koehler, Mishra, Kereluik, Shin, & Graham, 2014).

Before continuing the discussion of the importance of Technology in education, it is vital to state that Educational Technology should not be mistaken for Technology education, as the latter refers to the subject, which has been included in this historical research inquiry as one of the content areas in GeHiNaTe education. Educational Technology, in this context, refers to the cultural tools that act as expansions of the teacher's knowledge base through teaching. However, Educational Technology is not limited to only machines, physical material and soft/hardware, but also embraces pedagogical and didactical techniques and methods to promote learning and bring about change in human behaviour and thinking (Orey, Jones, &

Branch, 2013). Media, within this context, is considered the delivery systems of cultural tools for educational communications (Orey et al., 2013).

The use of Educational Technology to teach GeHiNaTe requires from the Foundation Phase teacher to have an adept Knowledge of Content (subject matter to be taught), Pedagogy (process and practices of teaching and learning approaches), and of Technology (common place and advanced tools); by having this, the teacher understands that there are close interactions between these three knowledge bases and that all three are present when teaching (Koehler et al., 2014; Mishra & Koehler, 2006; Roblyer & Doering, 2014). These three knowledge bases are of importance to help the teacher to attain learning outcomes, to situate learning activities, to negotiate and facilitate the construction of knowledge through diverse learning approaches, to support assessment and record learning, to support the acquisition of skills, and to embrace diversity in learning preferences (Orey et al., 2013). It is therefore pivotal that teachers not only use Technology when teaching, but, more importantly, that they understand the potential that Educational Technology has to support and transform learning acquisition by the young child (Koehler et al., 2014; Mishra & Koehler, 2006; Roblyer & Doering, 2014).

Electronic Educational Technology has made its first appearance in scholarly work and in the social world during the mid-twentieth century, when technologist Charters (1948) and Fin (1963), used radio and audio-visual technological devices for communication and instruction (Roblyer & Doering, 2014; Saettler, 1990). It was then realised that Educational Technology enabled individuals to use such devices, as both a tool and process, to address an educational need (Roblyer & Doering, 2014). The realisation that tools and processes can be combined within a theoretical framework served as impetus for future research on the role of Technology in education (Mishra & Koehler, 2006).

Firstly, the use of Technology in education was viewed through four perspectives in the 1980s to better explain what Technological Education encompasses (Roblyer & Doering, 2014). The professional organisations[22] involved in describing these four perspectives were the Association for Education Communication and Technology, the International Technology and Engineering Educators Association, and the International Society for Technology in Education. These research endeavours viewed Educational Technology as being the following: a media and audio-visual communication system; an instructional system and instructional design; a system for vocational training; and also a computer system (Roblyer & Doering, 2014). From these four

[22] These references are made available in the bibliography (International Society for Technology in Education (ISTE), 2008; International Technology and Engineering Educators Association (ITEEA), 2010).

perspectives the preliminary, strong focus on tools and processes for teaching can be established. Although these perspectives could not yet explain how Technology can transform teaching and learning, researchers started exploring theoretical frameworks where Technology could be applied to education (Koehler et al., 2014; Mishra & Koehler, 2006; Roblyer & Doering, 2014). A quest to find ways on how Technology can be integrated with teaching resulted in researchers identifying and utilising the framework of Shulman; this framework concedes that teaching is a highly complex practice using malleable and integrated knowledge bases (Koehler et al., 2014; Mishra & Koehler, 2006; Mishra, Koehler, & Henriksen, 2011). The latter scholars identified a theoretical framework suitable for Education Technology, which was further extended to utilise trans-disciplinary thinking and also incorporated Habits of Mind to transform learning (Mishra et al., 2011).

The Technological Pedagogical Content Knowledge (TPACK) framework helped curriculum designers to conceptualise coherent learning environments by being able to utilise it as a framework to identify the pedagogical ideology, didactical approaches, and content and structure of these knowledge bases in a coherent manner (Mishra & Koehler, 2006).

C.3.2.1 Technological Pedagogical Content Knowledge for teaching GeHiNaTe in Early Childhood Education

As with the Educational activity system, the work of Lee S. Shulman is once again considered the most influential on the development and transformation in knowledge bases that teachers ought to have about a subject and the teaching thereof by integrating Technology. Shulman followed in the footsteps of many imminent scholars and he laid the foundation for further research on the knowledge bases for teaching (Shulman, 1986, 1987). Hughes (2000) extended Shulman's notion by introducing Technology as another knowledge base that a teacher ought to acquire when teaching (Roblyer & Doering, 2014). The incorporation of Technology as knowledge base gave rise to the disciplinary domain of Educational Technology for teaching, which inspired scholars to continue to research this discipline (DeVries & Jones, 2009; Haynes & Cho, 2013; Koehler et al., 2014; Mishra et al., 2011; Orey et al., 2013; Roblyer & Doering, 2014; Saettler, 1990).

The works of these scholars were utilised for this research inquiry, as presented through the Technological activity system. It not only utilises Shulman's framework for teacher knowledge, but these scholarly works also acknowledge the important contribution Technology makes in transforming learning and teaching in the twenty-first century. Mishra and Koehler's (2014; 2011; 2006) and Roblyer and Doering's (2014) works are based on Shulman's work and they

have coined the category “Technological Pedagogical Content Knowledge” for teaching. Therefore the same terminology was used as criteria to investigate and convey how Technology has contributed to the development of Beginning Knowledge education in the Foundation Phase in South Africa.

Technological Pedagogical Content Knowledge is described as a developing knowledge base that teachers ought to acquire (Koehler et al., 2014; Mishra et al., 2011; Mishra & Koehler, 2006; Roblyer & Doering, 2014). This framework acknowledges the importance and complexity of Knowledge of Content, Pedagogy and Knowledge of Technology for learning and how Technology can transform education (Mishra & Koehler, 2006). A Cultural-Historical approach to understanding Technological Pedagogical Content Knowledge framework acknowledges the dynamic relations between the presentation of GeHiNaTe content through Technology, the selection of pedagogical techniques appropriate for teaching GeHiNaTe by using Technology, and knowledge of Technology available to support the learning thereof within the Foundation Phase (Mishra & Koehler, 2006).

C.3.2.1.1 Knowledge of Content

Knowledge of Content refers to the subject-matter knowledge, like GeHiNaTe, that a teacher is teaching (Koehler et al., 2014; Mishra et al., 2011; Mishra & Koehler, 2006). Because technological tools change at a rapid pace and Technology has become integrated in all aspects of life, teachers ought to also realise and rise to the occasion to continuously develop with the field, upgrading their professional knowledge of GeHiNaTe education in the early years and understanding that knowledge is not permanent or stagnant. In other words, it is expected from teachers to continually strive to revise their own understanding and comprehension of content associated with GeHiNaTe education, as knowledge bases undergo frequent changes and advancement (Roblyer & Doering, 2014).

Technology has a far-reaching influence on the advancement of knowledge bases, especially in terms of the discovery of new concepts and skills that are necessary for citizenship, Scientific Literacy, and scientific thinking in the twenty-first century, according to Mishra et al. (2011). Within this historical research inquiry, a historical trajectory of how Beginning Knowledge education has developed, by utilising the Educational activity system, was depicted and the Technological activity system discussion enabled the researcher to continue this trajectory into the future. In other words, knowledge bases undergo constant change and transformation and therefore it was crucial to also look at which future knowledge bases teachers will require to teach GeHiNaTe in the early years in the twenty-first century. A discussion on futuristic

knowledge bases, pertaining to the content of GeHiNaTe education, will be depicted by firstly deploying scholarly work on the Nature of Science[23] (NOS).

C.3.2.1.1.1 Nature of GeHiNaTe Knowledge

The Nature of GeHiNaTe Knowledge has been one of the educational goals of GeHiNaTe education for many decades, but the explicit characteristic of it has caused much controversy among scholars (Aicken, 1991; Erduran & Dagher, 2015; Lederman, Abd-El-Khalick, Bell, & Schwartz, 2002). Such controversy included inquiries about what the Nature of GeHiNaTe Knowledge is, if there is more than one notion that should be accepted and why, and if the Nature of GeHiNaTe Knowledge that has been intended for the curriculum and has been taught to learners differ for early childhood, as compared to other grades (Erduran & Dagher, 2015; Lederman et al., 2002). The first reason for establishing what the Nature of GeHiNaTe Knowledge is, is because it influences how the teacher will interpret and implement the curriculum for GeHiNaTe (Lederman et al., 2002). Secondly, it inhibits teachers from developing misconceptions or false beliefs about the subject (Lederman et al., 2002). Some of the common misconceptions teachers have about GeHiNaTe education, due to a poor understanding of the Nature of GeHiNaTe Knowledge, is quoted from Loving's (1997, p. 443) work as presented by Hodson (2014, p. 997):

> (a) Science is taught totally ignoring what it took to get to the explanations we are learning – often with lectures, reading text, and memorizing for a test. In other words, it is taught free of history, free of philosophy, and in its final form. (b) Science is taught as having one method that all scientists follow step-by-step. (c) Science is taught as if explanations are the truth – with little equivocation. (d) Laboratory experiences are designed as recipes with one right answer. Finally, (e) scientists are portrayed as somehow free from human foibles, humor, or any interests other than their work.

A teacher's understanding and comprehension of the Nature of GeHiNaTe Knowledge preceded the development of specialised and adept Knowledge of the Content and Pedagogy. To effectively integrate Educational Technology in teaching, knowledge of the Nature of GeHiNaTe Knowledge, that encompasses all aspects of GeHiNaTe education, is required:

> Curriculum reform efforts have concentrated on the teaching of science as a goal not only for the education of scientists but also for the general public. The key premise of these efforts is that in industrialized and democratic societies, as part

[23] Nature of GeHiNaTe Knowledge is the synonym terminology used when referring to the Nature of Science or the Nature of Scientific Knowledge. The abbreviation for this concept in literature is NOS.

> of active citizenship, the public needs to be better equipped with scientific reasoning skills for informed decision-making about numerous issues ranging from climate change to genetic cloning. A particular aspect of the move for "scientific literacy for all" is the inclusion of themes such as NOS and the understanding of science in its socio-cultural context (Erduran & Dagher, 2015, p. 10).

There is no universal definition, according to Lederman et al. (2002), due to the fact that the Nature of GeHiNaTe is complex, creative, dynamic, empirical, fairly the product of human inference, imaginative, multifaceted, socially and culturally embedded, tentative, and theory-laden. However, for this historical research inquiry, the Nature of GeHiNaTe Knowledge is described as encompassing the following aspects, as derived from the contributions of the American Association for the Advancement of Science (1989), Fleer and Pramling (2015), Erduran and Dagner (2015), Hodson (2014), and Lederman et al. (2000). The Nature of GeHiNaTe Knowledge can be described according to three principles with underlying aspects:

(i) The world view underlying the Nature of GeHiNaTe Knowledge: Due to the complex social, cultural and historical influences that contribute to the acquisition of GeHiNaTe concepts, language and skills by the young child, the world views embedded in GeHiNaTe and Cultural-Historical theories are adopted. When acquiring Geography, History, Natural Sciences, and Technology knowledge bases, the teacher and learner are aware that acquired concepts, language and skills of the world can be discovered and comprehended, but do not provide the answer to all questions about the world. GeHiNaTe does attempt to give a plausible and trustworthy explanation for evidence, which makes it durable, but not permanent, because all knowledge bases are subjected to change as knowledge, societies and Technology progresses.

(ii) The method underlying the Nature of GeHiNaTe Knowledge: Based on the underlying world view adopted for a GeHiNaTe knowledge base, the method of inquiry embraces the scientific inquiry, and both teachers and learners ought to have knowledge of the characteristics and phases associated with this method, namely initiation, planning and development, performance, interpretation, and reporting and communication. Conducting this scientific inquiry through commonplace or advanced Educational Technology by the young child is crucial for learning. This should incorporate or utilise play, creativity and inquiry in order to gain their interest, to welcome them to the activity from their point of departure and development, and to facilitate their unique way of thinking, experiencing and making sense of the world. The conduction of a scientific inquiry by teachers and

learners requires the following: a familiarity with the accepted and specialised language vocabulary of GeHiNaTe for communicating evidence; the adherence to ethical principles when conducting an inquiry; the ability to appreciate and have respect for fellow scientists' social and intellectual contributions to the inquiry; and functioning as an individual and/or as part of a cooperative group. The evidence that the scientific inquiry generates should be considered and communicated with great care, and teachers and learners should consider how the evidence impacts on the social context or wider environment and any decisions based on it.

(iii) The initiatives underlying the Nature of GeHiNaTe Knowledge: GeHiNaTe education is one of the key ingredients necessary to become Scientific Literate and it is essential that the teacher helps the learner acquire knowledge of the concepts, language and skills associated with GeHiNaTe. Teachers and learners ought to understand that GeHiNaTe knowledge bases are interrelated with other fields of knowledge and require a blend of logic from diverse fields, like that of History, Geography, Natural Sciences, Technology, Languages, Mathematics, Arts, Psychology, Humanities, and Societies, to name a few. The teacher and learner should understand that GeHiNaTe knowledge should be acquired and applied to real-life as well as virtual situations. Becoming Scientific Literate will enable the learner to contribute to society, become employable, address socio-scientific issues effectively, progress with knowledge, and be prepared for the future.

C.3.2.1.1.2 Historical analysis

The Foundation Phase teacher's knowledge base needs to encompass an adept understanding of what the Nature of GeHiNaTe Knowledge pertains to. Through historically analysing bodies of international scholarship, the researcher was enabled to identify what the Nature of GeHiNaTe Knowledge was and compare it with the competency curriculum of the South African curriculum to determine whether the South African view of the Nature of GeHiNaTe Knowledge is on par with that of international work. The following analysis process was conducted.

a) Identification and comparison of the Nature of GeHiNaTe Knowledge in international literature with that of the competency curriculum in South Africa

The international and national scholarly work, related to the Nature of GeHiNaTe Knowledge for teaching these subjects in the early years, was consulted. The following depiction of the Nature of GeHiNaTe Knowledge for Early Childhood Education was accepted by scholars as an appropriate representation of what GeHiNaTe education in the Foundation Phase entails.

a) Identification and comparison of the Nature of GeHiNaTe Knowledge in international literature with that of the competency curriculum in South Africa

The table below summarises two categories of information; the first is the Nature of GeHiNaTe Knowledge according to the international body of scholarship, which was discussed in the section before, and the second is the Nature of Beginning Knowledge as portrayed by the competency curriculum in South Africa. There was no explicit conceptualisation of the Nature of Beginning Knowledge within the competency curriculum of South Africa and the researcher had to derive such information by analysing the content included in the curriculum associated with History, Geography, Natural Sciences, and Technology.

Table 3-31: Nature of GeHiNaTe Knowledge identified in international literature and compared with the competency Nature of Beginning Knowledge in the curriculum of South Africa in 2011 to 2015

Accountability and Electronic era: A new education policy in a new South Africa (1994-2015)	
Nature of GeHiNaTe Knowledge as represented by international scholarly work	**Nature of Beginning Knowledge as represented by the competency curriculum of South Africa**
(i) World view	
• Knowledge is theory-laden and adopts a GeHiNaTe and Cultural-Historical theoretical framework • Knowledge is discoverable and comprehendible, socially and culturally embedded, tentative, and theory-laden, a product of human inference, and multifaceted with more than one answer	• Holistic development of learners through an integrated curriculum approach • Knowledge attained through becoming aware of social relationships, technological processes and elementary Science
(ii) Method	
• Scientific inquiry process used to investigate: initiation, planning and development, performance, interpretation, and reporting and communication. • Utilises play, creativity and inquiry techniques • Requires specialised language vocabulary for communicating, conducting inquiry ethically, respect for fellow peers, function as an individual and/or as part of a cooperative group, responsible communication of findings	• Perceptual skills; perception means using the senses to acquire information about the surroundings, environment or situation • Structured activities that are often guided by the teacher, with individual learners, in small groups or as a whole class, depending on the nature of the lesson • All Foundation Phase learners should not be stuck in chairs behind desks all morning; they rather need comfortable spaces with blankets and cushions and workspaces with chairs and tables in which they can play, work and move around freely

(iii) Initiatives	
GeHiNaTe knowledge bases are interrelated with other fields of knowledge • GeHiNaTe knowledge should be acquired and applied to real-life and virtual situations • Developing Scientific Literacy in all learners through GeHiNaTe education for citizenship	• Beginning Knowledge and Personal and Social well-being are integrated in the topics to support and strengthen the teaching of the other core subjects – Languages and Mathematics • Preparing learners for life and its possibilities, including equipping learners for meaningful and successful living in a rapidly changing and transforming society

(Sources utilised: American Association for the Advancement of Science, 1989; Erduran & Dagher, 2015; Fleer & Pramling, 2015; Hodson, 2014; Lederman et al., 2002; Department of Education, 2011c, p. 8)

According to the depicted table (see Table 3-31), the Nature of Beginning Knowledge, as implied by the South African curriculum, 2011-2015, differs significantly from the Nature of GeHiNaTe Knowledge, as determined by international scholars. The international literature categorised the Nature of GeHiNaTe Knowledge into categories of world view, method and initiatives, which were further specified with descriptions. The South African curriculum for Beginning Knowledge education does not have an explicit explanation of what the Nature of Beginning Knowledge pertains to and the researcher had to locate statements in the curriculum that match the international depiction in order to compare it.

There is a significant difference between these two views of the subject on every level. Firstly, the South African curriculum has not identified a particular pedagogy and explicit didactical method to teach Beginning Knowledge and relies therefore on the integrated curriculum approach to provide structure and justification of how content should be structured and taught (Department of Education, 2011a). Secondly, international scholars acknowledge that all subjects should be integrated to make sure learners transfer knowledge bases across disciplines, whilst the South African curriculum still views Beginning Knowledge as a subject to support Language and Mathematics education (Department of Education, 2011a). Thirdly, there is also no clear vision communicated as to what Beginning Knowledge prepares the learner for and how this curriculum aims to attain it (Department of Education, 2011a). It can be deduced that the Nature of Beginning Knowledge, taught in the Foundation Phase in South Africa, is unclear and lacks structure and purpose. The Foundation Phase teacher is therefore at risk of developing misconceptions or false beliefs about what the purpose of the subject is, which could also negatively influence his/her implementation of this curriculum and hamper the guidance of learners to become Scientific Literate citizens in the twenty-first century.

C.3.2.1.2 Knowledge of Pedagogy

Knowledge of Pedagogy refers to the teacher's adept knowledge about the processes and instructional practices of teaching and learning, and incorporates the outcomes and purposes for an educational activity and how to attain these objectives (Koehler et al., 2014; Mishra et al., 2011; Mishra & Koehler, 2006). Knowledge of pedagogy, demonstrated by the teacher also acknowledges aspects such as how a learner acquires concepts and skills associated with GeHiNaTe and what the learner's learning preferences is (Mishra et al., 2011). As expressed in the introduction, Technology, especially in the form of computer software, has a far-reaching influence on the approaches adopted to teach learners (Mishra et al., 2011).

C. 3.2.1.2.1 Integrating Technology in a GeHiNaTe lesson plan

Teaching, in the electronic and information era, necessitates a synthesis of both Educational Technology and Traditional Pedagogy (Haynes & Cho, 2013). Scholars supporting the Technological Pedagogical Content Knowledge framework, agree that a teaching activity still requires the underlying pedagogical ideologies as represented by a learning theory and that no Educational Technology can replace the teacher as designer (DeVries & Jones, 2009; Mishra & Koehler, 2006; Roblyer & Doering, 2014). A teacher is of pivotal importance to plan a complex lesson for diverse learners, keeping in mind their different educational environments, knowledge bases and learning preferences (DeVries & Jones, 2009; Mishra & Koehler, 2006; Roblyer & Doering, 2014). However, the purpose of commonplace and advanced Educational Technology is to serve as an extension of the teacher's knowledge base and enrich his/her teaching ability with diverse tools (Orey et al., 2013; Roberts, Leung, & Lins, 2013). Tools such as these have an extremely important function in a learning activity and have been a part of education for many decades. This reinstates the notion that a Foundation Phase teacher ought to understand that Educational Technology can be characterised according to its purpose, its qualities and also its uses (Orey et al., 2013; Roberts et al., 2013).

In relation to the latter statement, Roblyer and Doering (2014) explained that Educational Technology is the combination of processes and tools to attain an educational outcome that has been identified. Before discussing how Technology can be utilised in a GeHiNaTe lesson plan, it is important to firstly discuss the types of Educational Technology software and hardware that are available at the teacher's disposal. The types of Educational Technology software available are: tools utilised for instructional purposes (tutorials, drill-and-practice programmes, simulations, et cetera); tools utilised for productivity purposes (word processing, email programmes, et cetera); and tools utilised for administrative purposes (student records, et

cetera). All these tools assist the teacher to teach, manage and record the entire teaching process (Roblyer & Doering, 2014). The six types of Educational Technology hardware that is available to the teacher are: microcomputer (tablets, notebooks, et cetera), handheld technologies (cell phones, smart pens, et cetera), display technologies (projectors, big screens, et cetera), imaging technologies (photos, videos, et cetera), peripherals (keyboard, mouse, et cetera), and external storage devices (flash drives, internet post box, et cetera). It becomes clear that Education Technology provides the opportunity to experience GeHiNaTe education, that encompasses traditional and advanced tools in the curricula (Roberts et al., 2013). The advancement in Technology creates a teaching experience for a learner on a personal and communal level, which in turn fosters connectivity with, easier access to, and a more hands-on exploration of GeHiNaTe knowledge bases (Roberts et al., 2013).

In terms of planning a lesson for GeHiNaTe, by integrating Technology, scholars suggest that a teacher utilises the Technological Pedagogical Content Knowledge framework to guide him/her in the process of conceptualisation. This framework focuses on aspects such as the following: the educational outcome; how to attain his/her objective; how to select and arrange tools to teach GeHiNaTe; how to carefully consider didactical approaches to teach the concepts and skills; and how to constantly monitor and adapt the activity to include all learners and accommodate their personal learning preferences (Gueudet, Bueno-Ravel, & Poisard, 2014). In an attempt to understand how to obtain synergy between the Knowledge systems of Content, Pedagogy and Technology, when teaching GeHiNaTe education in the early childhood, Roblyer and Doering (2014, p. 58) explained how a constructivist learning theory can lead to Inquiry-based teaching by integrating Educational Technology. There are three aspects that a teacher has to consider before being able to conceptualise a lesson plan that integrates Educational Technology.

The first aspect the teacher has to consider before planning the lesson, is which learning theory is most suitable for teaching GeHiNaTe. Thus, adopting a Cultural-Historical world view for teaching GeHiNaTe, presumes that a learner acquires knowledge through guidance of a more informed adult, in order to move from everyday concepts to acquiring abstract scientific concepts (Roblyer & Doering, 2014). Great value is placed on exploring the contexts and social situations in which everyday concepts are experienced by learners on a daily basis and to help them make sense of these experiences through language and abstract reasoning and comprehension with the purpose to acquire scientific understanding of such an everyday experience (Davydov, 1990; Fleer & Pramling, 2015; Holzman, 2009; Vygotsky, 1978).

The second aspect that the teacher has to consider before planning the lesson, is to consider which teaching approaches should be utilised and how it could be tailored to incorporate each learner's individual needs. The teacher has to consider the learner's social-cultural context, the

available cultural tools, the content to be acquired and what knowledge base the learner has already developed (Roblyer & Doering, 2014).

The third aspect that the teacher has to consider before planning the lesson, is how Educational Technology that incorporates the learning theory and didactical approach will be integrated in the lesson. The teacher must be able to know how to access Educational Technology ethically/legally, effectively and competently, and assess the applicability of the Educational Technology critically and knowledgeably (Partnership for 21st century skills, 2009; Roblyer & Doering, 2014). It is therefore pivotal for the teacher to be able to analyse Educational Technology before exposing it to the learner, namely: a) the teacher must understand how, why, and what the Educational Technology is constructed for; b) the teacher must interpret how the learner might interpret the Educational Technology by taking aspects such as values, culture-historical experiences, gender, believes, race, language, and so forth into consideration; and c) the teacher must be able to utilise Educational Technology that is most suitable, appropriate and sensitive to multi-cultural and inclusive classrooms (Partnership for 21st century skills, 2009; Roblyer & Doering, 2014).

After considering these three implications, the teacher can conceptualise the GeHiNaTe lesson plan and be assured that Educational Technology tools are utilised in a meaningful, successful and efficient manner (Roblyer & Doering, 2014). These three implications proceed the actual lesson plan. The lesson plan then utilises the Technological Pedagogical Content Knowledge framework to ensure that the complex knowledge bases of the teacher about Content, Pedagogy and Technology are present in the lesson (Roblyer & Doering, 2014).

The first phase of the lesson plan requires from the teacher to analyse the learning and teaching needs, by following these steps: in the first step, the teacher has to determine whether the technology-based method will be of advantage to the learning outcome; and in the second step, the teacher has to assess what his/her Knowledge of Content, Pedagogy and Technology (TPACK) is and whether he/she has selected the most suitable learning theory, didactical approach and technological tool to teach the identified concepts, language and skills.

The second phase requires from the teacher to plan how Educational Technology will be integrated in the lesson by firstly deciding what the educational objectives are that he/she will have to attain and how to assess these objectives. In the second step the teacher designs the lesson and uses strategies on how commonplace and advanced tools can be integrated in the lesson. The last step requires from the teacher to plan and prepare the environment where teaching will take place, to assure that all tools can be utilised in the environment.

The third and final phase is described as the post-instruction analysis and revision of the lesson by the teacher. Firstly, the teacher has to assess whether the integration strategies have worked well for this particular lesson and reflect on how it can be improved; then the teacher revises these identified problems and make changes according to these findings.

C.3.2.1.2.2 Historical analysis

The Foundation Phase teacher's knowledge base needs to encompass how Educational Technology is integrated in a GeHiNaTe lesson plan. Through historically analysing bodies of international scholarship, the researcher was enabled to identify how Technology can be integrated into a lesson plan and compare it to the lesson plan of the competency curriculum of South African to determine whether the South African lesson plan is on par with that of international work. The following analysis process was conducted.

a) Comparing the international lesson plan for integrating Educational Technology in a GeHiNaTe lesson plan with that of the competency curriculum in South Africa

The international and national scholarly work, related to integrating Educational Technology in a GeHiNaTe lesson plan in the early years, was consulted. The process followed to integrate Educational Technology in a GeHiNaTe lesson plan was accepted by scholars as appropriate for GeHiNaTe education in the Foundation Phase.

a) Comparing the international lesson plan for integrating Educational Technology in a GeHiNaTe lesson plan with that of the competency curriculum in South Africa

The table below summarises two categories of information; the first is the lesson plan for integrating Educational Technology in a GeHiNaTe lesson according to the international body of scholarship, which was discussed in the previous section; the second is the lesson plan as portrayed by the competency curriculum in South Africa. There was no explicit structure or lesson plan in the curriculum on how a GeHiNaTe lesson should be planned for the Foundation Phase learner, nor how Educational Technology would be integrated. The researcher had to derive such information by analysing the content included in the curriculum associated with History, Geography, Natural Sciences, and Technology.

Table 3-32: Technology integrated in a GeHiNaTe lesson in international literature and compared with the teaching plan of Beginning Knowledge in the curriculum of South Africa in 2011 to 2015

Accountability and Electronic era: A new education policy in a new South Africa (1994-2015)	
Technology Integrated Model and the TPACK principle from the international body of scholarship	**Teaching of Beginning Knowledge in the Foundation Phase competency curriculum of South Africa**
First Phase: Analysis of learning and teaching needs: Step 1: The teacher has to determine whether the technology-based method will be of advantage. Step 2: The teacher then has to assess what his/her Knowledge of Content, Pedagogy and Technology is (TPACK) and whether he/she has selected the most suitable learning theory, didactical approach and technological tool to teach the concepts, language and skills. **Second Phase: Planning for integration:** Step 1: The teacher has to decide what the educational objectives are that he/she will have to attain and how to assess these objectives. Step 2: The teacher designs the lesson and uses strategies on how commonplace and advanced tools can be integrated. Step 3: The teacher now plans and prepares the environment where teaching will take place to assure that all tools can be utilised in the environment. **Third Phase: Post-instruction analysis and revision:** Step 1: The teacher has to assess whether the integration strategies has worked well and how it can be improved. Step 2: The teacher brings about the revisions and makes changes according to these findings.	**First Phase: Selection of focus** The teacher should plan how this lesson integrates with general outcomes and how this lesson conceptually links to previous and future learning activities. Details and sequencing of the teaching, learning and assessment activities are included, as well as any particular teaching approach and method to be used. Special and important notes regarding the needs of the learners in the class for whom the teacher is preparing the learning activity should be stated. **Second phase: Design and plan** Teachers has to design the lesson plan backwards by starting with the outcome in mind, determining the outcome and concepts, skills, and values required to reach the outcome. The context and/or core knowledge and concepts selections for the lesson are also stated. The assessment tasks to be used in the lesson and resources needed for the lessons, as well as the opportunities for integration of other subjects should be stated. **Third phase: Expectancies** The teacher has to develop high expectancies of the learner to achieve the goals and knowledge which will motivate the learner to strive for success. **Fourth phase: Expanded opportunities:** Expanded opportunities are developed by the teacher to help all learners reach the outcomes by incorporating strategies associated with repetition, alternative didactical methods, and using diverse resource.

(Sources utilised: Mishra et al., 2011; Department of Education, 2002, 2003a, 2003b, 2011c; Roblyer & Doering, 2014; Spady & Schlebusch, 1999).

The above table depicts (see Table 3-32) how Educational Technology can be integrated in a lesson plan for GeHiNaTe education. After comparing the lesson plan that utilises Technology, as conveyed by international scholars, with the lesson plan of Beginning Knowledge education, as implied by the South African curriculum, 2011-2015, it can be stated that these two lesson plans differs significantly. The international literature identified three phases with seven steps to assure that Educational Technology is integrated into the GeHiNaTe lesson plan, whilst the South African curriculum for Beginning Knowledge education does not have an explicit lesson plan format or explanation of how Educational Technology should be integrated in the Beginning Knowledge lesson (see Heading A. 3.2.2.3.2).

There is a significant difference between the two approaches in implementing a lesson on every level, as described above. Firstly, the South African curriculum does not prescribe or recommend a particular pedagogy, explicit didactical method, or Educational Technology to teach Beginning Knowledge (Department of Education, 2011a; Roblyer & Doering, 2014). Secondly, international scholars value Technological Pedagogical Content Knowledge as key factor when planning a lesson and integrating Educational Technology, whilst the South African curriculum does not make reference to utilising such knowledge bases when planning a Beginning Knowledge lesson in the early years (Department of Education, 2011a; Roblyer & Doering, 2014). Thirdly, the structure and sequence from each perspective differs significantly and it can be deduced that the South African curriculum does not consider the incorporation of Educational Technology as important and central to the learning experience, as the international scholarly work does (Department of Education, 2011a; Roblyer & Doering, 2014).

C.3.2.1.3 Knowledge of Technology

In order for Technology to possibly have a transformative influence on GeHiNaTe education, scholars suggest that teachers ought to develop Knowledge of Technology (Koehler et al., 2014; Mishra et al., 2011). Knowledge of Technology pertains to both traditional and innovative technologies which can be utilised when teaching a GeHiNaTe activity (Koehler et al., 2014; Mishra et al., 2011). Knowledge of Technology enables teachers to understand Information Technology and how to apply it to a teaching activity, and consider the possibility to transform a learning experience of a learner by incorporating tools to meet the learning disposition of the learner (Koehler et al., 2014; Mishra et al., 2011). Thus, the teacher's developing adept Knowledge of Technology is pivotal in order to successfully integrate Technology in education, which can help attain the goal for transformative learning and Scientific Literacy (Mishra et al., 2011).

C.3.2.1.3.1 Technology skills and GeHiNaTe education for the twenty-first century

The scholarly work of Kaku (1997, 2011) predicted what type of knowledge future societies would require, by drawing a trajectory from past and present revolutions across diverse disciplinary fields of Science and also Technology. These predictions have a direct influence on the Technology skills and knowledge bases required for the future, that can be developed through GeHiNaTe education. A major contributing factor, according to Kaku (1997, 2011), to help envisage the future, is based on a sophisticated understanding and the identification and analysis patterns of knowledge that contributed to fundamental laws and paradigms of disciplines across time.

Scholars from the Kuhnian world view (Devlin & Bokulich, 2015; Kuhn, 1996) concurred with this notion of Kaku that knowledge is not merely accumulated over time, or a wild speculation of facts. Rather, it is believed that knowledge bases have a historical pattern for prediction, that can be presented by a trajectory. Thus, reasoned estimations are systematically guided through patterns that ultimately lead to revolutions. However, to be able to analyse such historical patterns requires sophisticated knowledge of GeHiNaTe and of Technological devices. It is therefore crucial that future generations should also be equipped with sophisticated knowledge of GeHiNaTe, to also analyse patterns in knowledge bases to make predictions in the future.

The physicist, Kaku, conducted a thorough study of historical revolutions, the works of futurists Jules Verne and Leonardo da Vinci, and also scheduled intensive discussions with current pioneers across multi- and trans-disciplines to develop an understanding of knowledge and Technology for the future. Kaku (1997, 2011) based his theory and prediction of the future on four fundamental forces in nature, that drives the entire universe: Firstly, Sir Isaac Newton's force of gravity (mechanics on how objects are moved through forces); secondly, Edison, Faraday, and Maxwell, explaining the electromagnetic force (electricity and magnetism); and thirdly and fourthly, Albert Einstein's two nuclear forces (weak and strong forces, and the splitting of the atom). Kaku (1997, 2011) stated that an understanding of gravity, as described through Einstein's theory of general relativity, and the other three forces, as described through the quantum theory, allows scientists to decipher the subatomic realm which inspired scientific and technological inventions like the laser, the digital revolution, and the transistor, that were the impetus behind modern society. Kaku (1997, 2011) was furthermore of the opinion that quantum theory informed the understanding of DNA molecule and the biotechnological revolution, which was inspired by technological inventions like the computer and Information Technology, due to the fact that DNA sequencing is processed by computers, machines, and robots (Kaku, 1997, 2011). The following table incorporates some of the visions that Kaku predicted for the future:

Table 3-33: Kaku's visions on the revolution of Science in the twenty-first century

The future (2015-2100)
• Technology and computer revolution (internet glasses and internet contact lenses, driverless cars; four-wall screens; flexible electronic paper; virtual worlds; universal translators; holographs and 3D; mind reading; photographing a dream; tri-corders and portable brain scans; telekinesis; diverse robots with different functions; brain modelling and assembling and disbanding; avatars; cyber cash; et cetera) • Bimolecular revolution (genomic medicine; stem cells; cloning; gene therapy; coexisting with cancer; reversing age; caloric restriction; biological clock; immortality; resurrecting extinct and creating new life forms; unravelling the AIDS gnome; et cetera) • Quantum revolution (Nano technology; walking through walls; moving individual atoms; mems and Nano particles; Nano machines in our bodies; DNA chips; Carbon Nano tubes; atomic transistors; quantum computers; shape shifting; replicators; genetic engineering; et cetera) • Energy revolution (solar and hydrogen economy; wind power; sun power; nuclear fission; nuclear proliferation; global warming; greenhouse gas; visit to Iceland; launching pollutants into the atmosphere and space; algae blooms; fusion power; fusion and the laser and magnetic fields; magnetism; maglev trains and cars; energy from the sky and stars; space travel; extra-solar planets; landing on asteroids; permanent moon base; visiting planets and space tourism; space elevator; star ships; nuclear rocket; ramjet fusion; anti-matter rockets; Nano ships; et cetera) • Wealth revolution (winner-loser jobs; the matrix; mass production and customisation; commodity to intellectual capitalism; digital divide; et cetera) • Humanity revolution (ranking of civilisations; terrorism and dictatorships; search for extra-terrestrial intelligence; search for wisdom; planetary civilisations; et cetera)

(Adapted from Kaku, 1997, 2011)

In relation to these visions of Kaku, as depicted in the table (see Table 3-33) it becomes clear that transformative learning and trans-disciplinary learning are vital and learners will need to develop, not only adept knowledge of diverse disciplinary fields, but also habits of mind or thinking skills to creatively transfer knowledge to these fields (Mishra et al., 2011). Education for the future is heading towards the notion that a learner ought to be active, collaborative, adaptive, intrinsically motivated, progressive, self-directed, and focused on attaining outcomes (Haynes & Cho, 2013). The way in which curriculum designers have historically organised disciplinary content knowledge, will be challenged in the near future (Mishra et al., 2011). It is predicted that future vocations will draw upon knowledge bases from multi-disciplines (education-psychology) to cross-disciplines (bio-mechanics or product-phycology), according to Mishra et al. (2011) and Kaku (1997, 2011). The future of learning will necessitate learners to

creatively transfer knowledge and skills across knowledge disciplines, and transformative and trans-disciplinary learning are inevitable (Mishra et al., 2011; Mishra & Koehler, 2006).

Pereira, Baranauskas and Da Silva (2013) assert that it is increasingly more expected from teachers and learners to also embrace Technology within the educational environment. Individuals no longer just use Technology, but it has become part of their lives. In other words a learner's interaction with people, through Technology, has also changed, because aspects such as behaviour, cognitive ability, emotional and social skills, and human values are present when operating Technology (Pereira et al., 2013).

Because Technology has become part of a learner's life, it is pivotal for teachers to realise, when they utilise Educational Technology, that they should not neglect the personal impact (for example values, motivation, emotion or affect) that the tool will have on learners. Teachers should not be misled by thinking such tools are merely a way to attain the educational outcome or a task that they are busy with; instead, teachers should embrace the opportunity to also develop personal skills (Pereira et al., 2013). Technology suffused the lives of learners. They are daily confronted with an abundance of information and able to adapt to the continuous change in Technology tools (Partnership for 21st century skills, 2009). Furthermore, learners are expected to collaborate with people on virtual, as well as on real-life platforms. In order to socialise effectively (and carefully) on both platforms, requires a range of skills to be able to critically reflect, discern and think about information, media and Technology (Partnership for 21st century skills, 2009). It is important for a teacher to prepare the learner for Technology and the responsible use thereof. Teachers need to be Information literate, media literate, and Information, Communications and Technology (ICT) literate (Partnership for 21st century skills, 2009; Roblyer & Doering, 2014).

C.3.2.1.3.2 Historical analysis

The Foundation Phase teacher's knowledge base needs to encompass how Technology is progressing and necessitating from learners to develop twenty-first century skills in order to cope with these mentioned demands (see Table 3-33) Through analysing historical bodies of international scholarship, the researcher was enabled to identify what the twenty-first century skills are and compare it with the competency curriculum of the South African curriculum, to determine whether the national view of the twenty-first century skills is on par with that of international work. The following analysis process was conducted:

a) Comparing the international Technology skills for the twenty-first century with that of the competency curriculum in South Africa

The international and national bodies of scholarly work, related to twenty-first century skills developed through GeHiNaTe education, was consulted. Scholarly works of Bybee (2010) and the National Research Council (2007, 2008) also compiled skills and knowledge bases, which they predict learners would require for the twenty-first century. They therefore called upon scholars and curriculum developers to do the following: firstly, re-evaluate whether the current concepts, language and skills included in curricula, are sufficient to guide future scientific investigations; secondly, to identify the diverse dimensions of thinking, functioning, and habits of mind, that are considered necessary for future endeavours; thirdly, to revisit and possibly revise models for alternative ways of thinking and philosophising about GeHiNaTe and Technology; and fourthly, to reconsider the development of skills for futuristic communication and transference of knowledge. It becomes clear that the importance of preparation for the future in order to progress and advance with time and knowledge, should be fostered sooner rather than later. The following twenty-first century skills, developed through GeHiNaTe education, were accepted by scholars as appropriate for GeHiNaTe education in the Foundation Phase:

a) Comparing the international Technology skills for the twenty-first century with that of the competency curriculum in South Africa

The table below summarises two categories of information: the first is the twenty-first century skills according to the international body of scholarship, which were discussed in the previous section; and the second is the twenty-first century skills, as portrayed by the competency curriculum in South Africa. It is important to note that the current South African curriculum does not have specific twenty-first century skills formulated in the Life Skills curriculum or within Beginning Knowledge outcomes. The researcher had to identify these skills within the broad curriculum statement for Grade R to 12 learners, in order to be able to compare it with those identified in the international body of scholarship.

Table 3-34: Twenty-first century skills identified in international literature and compared with the competency curriculum of South Africa in 2011 to 2015

Essential Features of 21st-Century Skills	Curriculum and Assessment Policy Statement (CAPS), Grade R to 3, Life Skills
Adaptability, creativity and self-development	
The learner should be able to cope with changing conditions by: • using appropriate tools and equipment to observe, identify, gather, analyse, and interpret data; • conducting scientific and technological investigations independently; and • working individually and in groups on GeHiNaTe activities. For example: Work on investigations in the laboratory and outdoors	• Organise and manage themselves and their activities responsibly and effectively • Collect, analyse, organise, and critically evaluate information
Complex communications skills, social skills and collaboration	
The learner should be able to communicate GeHiNaTe explanation by: • conducting scientific and technological investigations with the help of the teacher and together with peers; • communicating own understanding and alternative understanding of others of the scientific and technological procedures and results; • using other knowledge bases, such as Language, Mathematics and Technological tools, to improve investigations and communications; • processing and interpreting both verbal and nonverbal information; and • negotiating an outcome if peers have alternative understandings of investigation. For example: Work with group members to prepare a report	• Work effectively as individuals and with others as members of a team • Communicate effectively using visual, symbolic and/or language skills in various modes • Use Science and Technology effectively and critically showing responsibility towards the environment and the health of others
Critical thinking and problem-solving	
The learner should be able to apply acquired GeHiNaTe knowledge to questions and problems by: • drawing from different GeHiNaTe knowledge sources and demonstrating the ability to link, integrate and identify patterns in information; • reflecting on the suitability of the solution to the problem; and • providing alternative and creative solutions to the problem. For example: Propose several possible solutions and strategies to attain the solutions	• Identify and solve problems and make decisions using critical and creative thinking

Systems thinking	
The learner should be able to apply systems thinking across the subjects included in the curriculum by: • understanding the concept "systems"; and • understanding how changes in one part of the system affect the other parts of the system and thus understanding the holistic view of a situation. For example: Describe components of a system based on a system under investigation	• Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation

(Adapted from sources: Bybee, 2010, pp. 134–137; National Sciences Resources Centre (NSRC), 1996; Department of Education, 2011c, p. 5; Roblyer & Doering, 2014, pp. 31–32)

According to the depicted table (see Table 3-34), the type of learner that the South African curriculum envisages, during the period from 2011 to 2015, does correlate significantly with the twenty-first century skills identified by international scholars.

The international literature identified a combination of cognitive abilities, social skills, personal motivation, conceptual knowledge, and problem-solving competencies, which was categorised with specific outcomes to attain these goals (Bybee, 2010, pp. 134-137; National Sciences Resources Centre, 1996, Roblyer & Doering, 2014, pp. 31-32). The South African curriculum (2011, p. 5) listed seven outcomes, which the researcher organised into the categories, as identified by international scholars. Although the twenty-first century skills of learners, as presented by international literature, do correlate with the national literature, it is of great concern that these twenty-first century skills are not listed as part of the specific outcomes of the Foundation Phase curriculum. Furthermore, these twenty-first century skills are not applied to the Beginning Knowledge curriculum in order for teachers to attain these outcomes within an education activity for the young child. Rather, these crucial twenty-first century skills, identified in the South African curriculum, are merely listed as "general aims" and "principles" for the entire curriculum from Grade R to 12.

The assumption is therefore that, because it is considered a general outcome, every teacher should strive towards attaining, but it is not explicitly communicated (Department of Education, 2011b, p. 4-5). For example, within the category of critical thinking and problem-solving (as a twenty-first century skill), the general description of this skill is that a learner should be able to reflect on the appropriateness of his/her answer or solution to a question and/or problem; and the explicit outcome within the GeHiNaTe curricula in the early years should be that the learner can link evidence and information from an investigation, with knowledge from textbooks, the

web, or other sources, and propose creative and different solutions to the question or answer (Bybee, 2010, p. 136). The “general” goal, in the case of the South African outcomes, is therefore made explicit at the specific subject level.

These above-mentioned twenty-first century skills of international scholarly work do correlate with the general outcomes of the South African curriculum, but are not explicitly and intentionally applied and attained within the Beginning Knowledge focus in the Life Skills curriculum for the Foundation Phase. The risky supposition, that is made by curriculum developers, is that they assume that a general outcome, like twenty-first century skills, will be specifically attained within the lesson plan of the Foundation Phase teacher teaching Beginning Knowledge. In order for a teacher to include twenty-first century skills in a Beginning Knowledge teaching activity, it ought to be referred to in the intended Life Skills for the Foundation Phase learners’ curriculum.

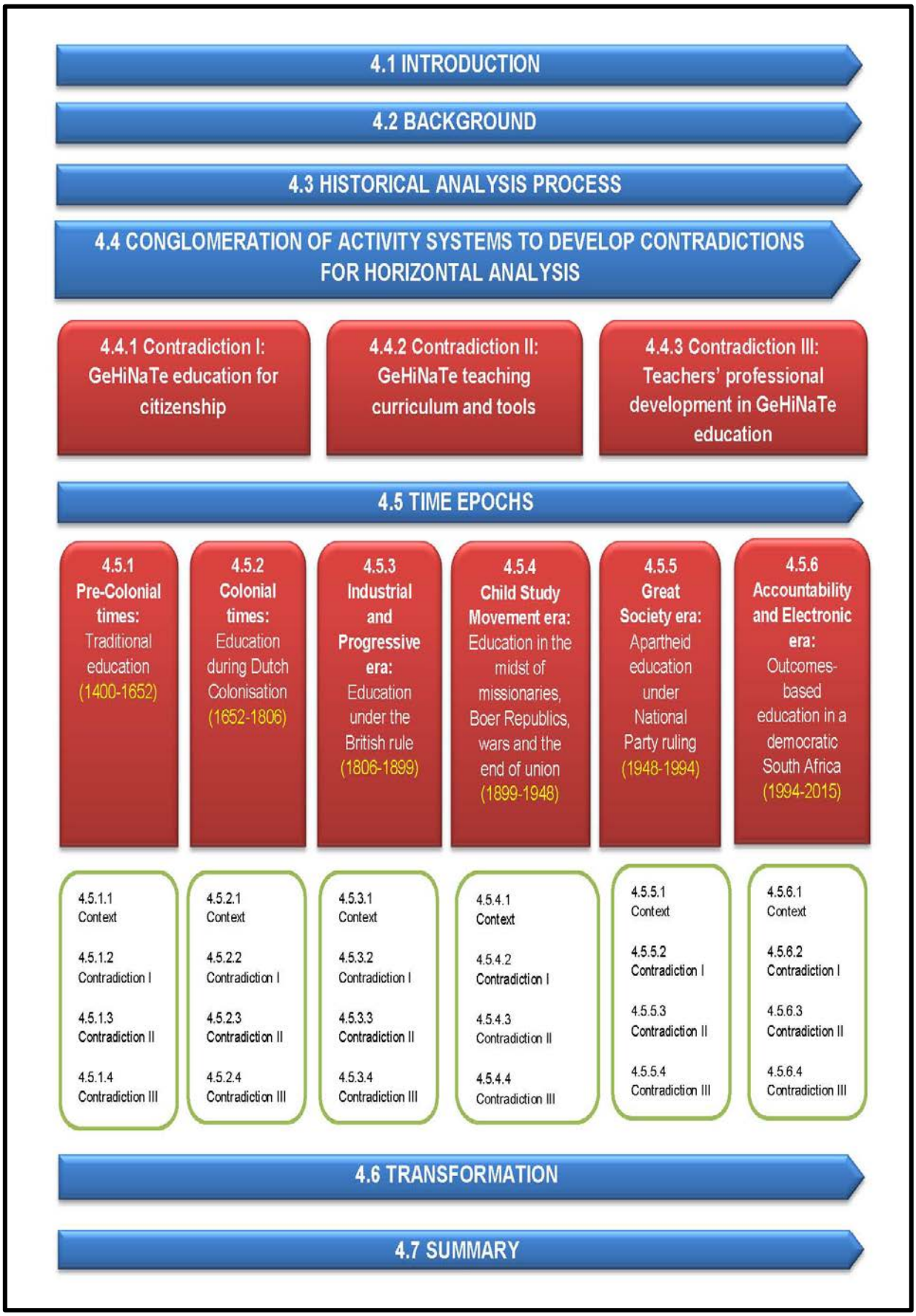
This discussion exemplified the notion that the rapid development that is witnessed in GeHiNaTe and Technology in present times necessitates a new manner of learning for the twenty-first century (Mishra et al., 2011). The transformation in Technology is influencing current knowledge bases and current practices and outcomes of South African schooling in the Foundation Phase and should also be reinvestigated and reconsidered to assure that learners are optimally and explicitly prepared for the future (Mishra et al., 2011).

C.3.3 SUMMARY

The Technological activity system enabled the researcher to map out the knowledge bases that teachers require in order to integrate Educational Technology, when teaching a subject like GeHiNaTe, which also help develop twenty-first century skills in the Foundation Phase learner. Through analysing a historical Technological Pedagogical Content Knowledge framework with its underlying typologies, the researcher indicated how Technology contributed to the changes and progress in knowledge bases and predicted what is to be expected in the future. The Technological activity system investigated the Technological Pedagogical Content Knowledge framework and the Content, Pedagogy and Technology knowledge bases that are required by the teacher to guide learners to adapt to the twenty-first century. The utilisation of Educational Technology enables the teacher and learner to acquire knowledge, skills, and values for learning, and for applying these in their society in a different way than in traditional approaches. It is therefore crucial to expose and equip learners with knowledge of the GeHiNaTe knowledge base and also with an understanding of how to interpret information, communications and Technology through utilising it in education and preparing them for a future which is information-rich, knowledge-dependent, and global (Pereira et al., 2013).

GeHiNaTe education and the fostering of Scientific Literacy knowledge and skills will hopefully foster the eagerness in learners and teachers to renew their knowledge bases and to remain lifelong learners, as such dynamism in the world will require from everyone to progress with advancements (Pereira et al., 2013).

CHAPTER 4: INTERPRETATION



4.1 INTRODUCTION

The assumption, for decades, was that the young learner should only be educated to become literate on basic skills of reading, writing and arithmetic. However, these notions were challenged by scholarly work, holding out that the teaching of GeHiNaTe in the early years is pivotal for the learner's holistic development, for knowledge advancement, and for future citizenship and employability (Aikenhead, Orpwood, & Fensham, 2011; Bybee, 2010; Eshach, 2006; Fleer & Pramling, 2015; Ratcliffe & Grace, 2003). The purpose of this chapter is to further analyse the Educational, Societal and Technological activity systems, that were analysed vertically according to pre-selected criteria (see pages 68, 127, and 160), in order to depict how each activity system has contributed to the development of Beginning Knowledge education in the Foundation Phase in South Africa respectively over the six historical periods. The significance of this chapter is that the researcher will now horizontally cross-evaluate the data according to pre-selected principles presented in each of the three conglomerated activity systems over the same six historical periods. The researcher identified the most plausible contradictions between these conglomerated systems and the transformations that contributed to the development of Beginning Knowledge education in South Africa. This chapter communicates the final analysis process which enabled the researcher to interpret the data and assist in answering the research questions in the last chapter, in order to possibly address some of the evident gaps in the existing body of research, as presented in Chapter one.

4.2 BACKGROUND

As depicted in the previous chapters (see pages 5 and 12), the importance of learning GeHiNaTe in the early years was affirmed by research, especially in that of the past three decades (Brown, 1991; Chaillé & Britain, 2003; DeBoer, 1991; Fleer & Pramling, 2015; Glauert & Manches, 2012; Seefeldt, Castle, & Falconer, 2014). The construction of GeHiNaTe as a body of knowledge to be acquired by the young learner is influenced historically by Society, Education and Technology and continually reconstructed to meet the needs of humans (Fleer & Pramling, 2015). The construction, reconstruction, and transference of GeHiNaTe knowledge bases require cultural tools and educational context. It also requires a communal valued notion about the importance and role of GeHiNaTe education in order to justify why it should be acquired by the young child and how the acquisition thereof can be applied to everyday life and the future (Fleer & Pramling, 2015).

The Hybridised Cultural-Historical Activity Theory (see page 25), utilised for this historical research inquiry, enabled the researcher to develop an understanding of how Beginning

Knowledge education in the Foundation Phase in South Africa has developed by identifying and analysing the three respective activity systems across the six time epochs. In this chapter the researcher draws on the vertically analysed and newly constructed and integrated knowledge bases associated with Education, Society and Technology, which enabled her to analyse it horizontally and map out the historical development and contribution the three conglomerated activity systems have had on Beginning Knowledge education in South Africa. With both the vertical and historical analysis, and with the empirical national and international bodies of scholarship relevant to GeHiNaTe education in the early years, it is possible to understand how the subject genetically originated (see page 21), developed and will keep on evolving to develop scientific thinking, reasoning and Scientific Literacy in the young leaner.

4.3 HISTORICAL ANALYSIS PROCESS

The utilised historical research approach, as a methodological design (see pages 33 and 42), enabled the researcher to vertically reconstruct the past and present, and project the future of the subject, as accurately as possible, through deploying knowledge bases through the three activity systems. The researcher identified underlying criteria for each activity system, which enabled her to analyse the data to develop an understanding of how the knowledge bases for Beginning Knowledge education have developed. These historical and intellectual mappings of Beginning Knowledge education is of pivotal importance to cultivate an understanding for the connection and the trajectory between the past, the present, and the future knowledge bases (Creswell, 2009; Mouton, 2001; Thies, 2002).

As discussed previously (see pages 34 and 42), the researcher utilised the following five principles to analyse the constructed and integrated knowledge bases in both the Performance and the Interpretation chapters, as represented by the works of Engeström (2001) and explained in the Initiation chapter. During the vertical analysis, the researcher utilised the historicity component (six time periods), the three activity systems (Educational, Societal and Technological), and how, over a historical period, these three activity systems introduced a multi-voiced account (Engeström, 2001). This multi-voiced account conveyed international knowledge bases about GeHiNaTe education in the early years, which were brought into relation with the South African curriculum and relevant national literature. This analysis process, as introduced by Engeström (2001), was further utilised with the re-analyses of the constructed and integrated knowledge bases in the Performance chapter, but now takes a horizontal point of view. The essential tensions that exist within and between these three activity systems have been historically accumulated, and, because an activity system is open for influences internally and externally, change can be introduced to the activity system and the inherent knowledge

bases (Engeström, 2001). Such contradictions within the activity systems produce instabilities and conflicts, which lead to revolutions and innovative attempts to bring about change to knowledge bases and understanding of the world and people (Engeström, 2001). Through using these five principles for analysis, the researcher was able to mature into understanding how Beginning Knowledge education in the Foundation Phase in South Africa has developed. The transformations that contributed to the change in the respective activity systems were emphasised. The researcher made suggestions what the reasons for that could be and what implication it has on the development and future of Beginning Knowledge education in the Foundation Phase in South Africa. The following image depicts the process visually.

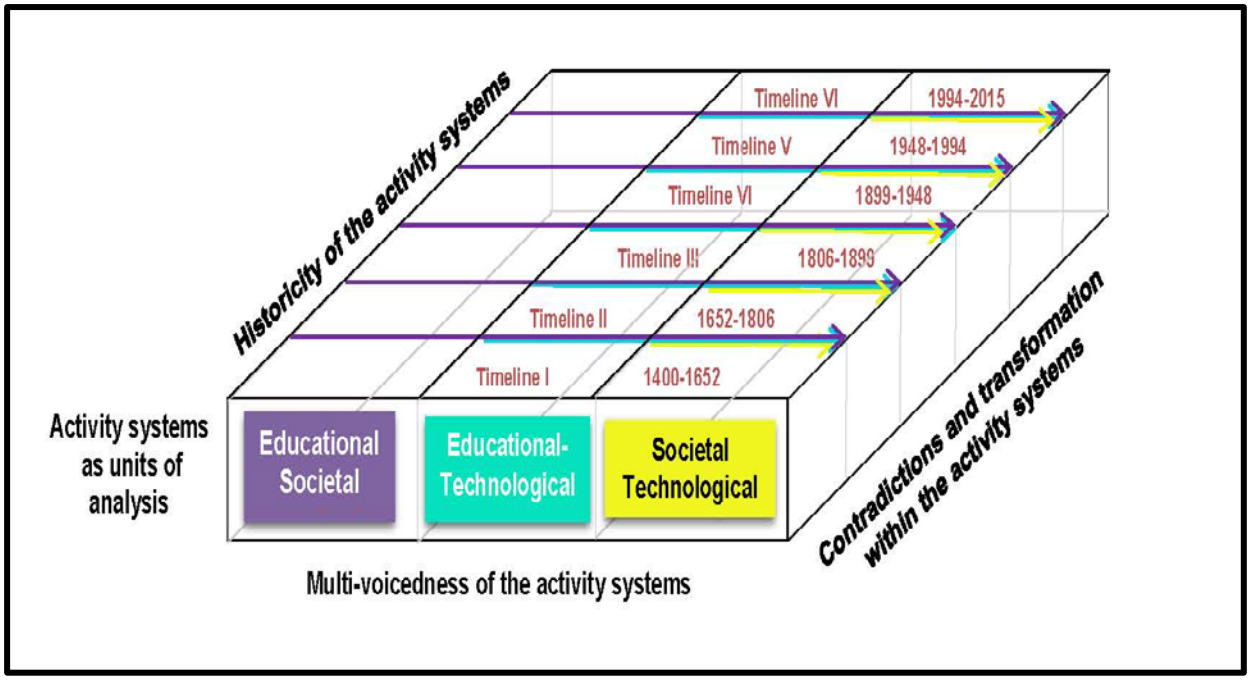


Figure 4.1: Analysis process of the historical research inquiry

4.4 CONGLOMERATION OF ACTIVITY SYSTEMS TO DEVELOP CONTRADICTIONS FOR HORIZONTAL ANALYSIS

The relationship between the three activity systems can be described as a triangle, with the three components being interdependent and representing a reciprocal relationship.

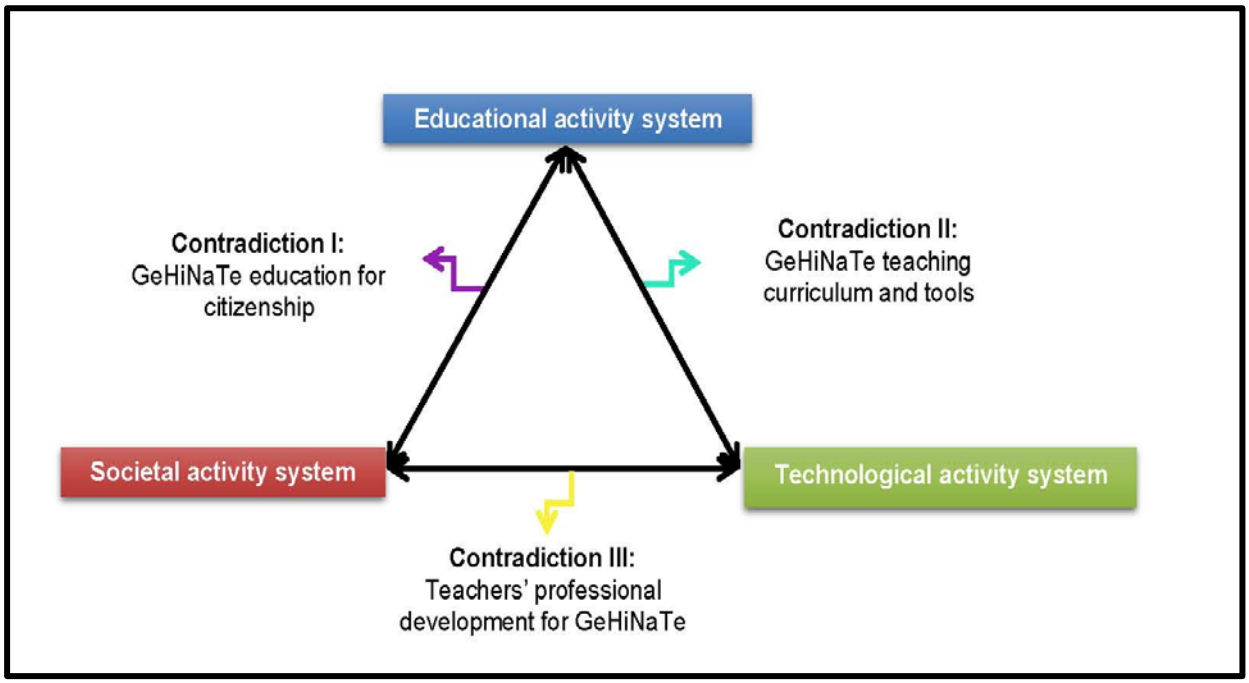


Figure 4.2: Triadic representation of the contradictions between the three activity systems

By placing these three activity systems in tension with one another, conglomerating them, the researcher was enabled to understand the contradictions that exist amongst the interconnected and interdependent systems, that cannot be understood in isolation or without a historical context (Bruguière, Tiberghien, & Clément, 2014; Engeström, 2001).

4.4.1 Contradiction I: GeHiNaTe education for citizenship

The first contradiction can be presented by the multi-voicedness between the Educational activity system and the Societal activity system across the six time periods; this contradiction is called “the GeHiNaTe education for citizenship”. The reason for this name is because the Educational activity system represents the two knowledge bases with their distinctive typologies that are required for a Foundation Phase teacher to teach GeHiNaTe (Subject-Matter Knowledge and Pedagogical Content Knowledge); the Societal activity system is also concerned with how teachers can equip learners to become Scientific Literate (Vision I, Vision II, and Scientific Literacy for a Knowledge Society), with the purpose to develop citizens who can take part in the society in a socio-scientific responsible manner. By placing these two activity systems in relation to one another, the researcher was enabled to depict how GeHiNaTe

education for citizenship has transformed historically by drawing on the previous chapter's vertical discussions and constructed knowledge bases.

The researcher will discuss aspects such as the following: the nature of the communal civic identity within the South Africa context and how socio-political and economic activities and processes contribute to the development of the communal civic identity; what the aspirations were that society cultivated for its citizens, like developing learners who are employable, responsible, actively involved in socio-political activities, and demonstrating appreciation and sensitivity towards the environment and its people and Socio-Scientific Issues; if the teaching of GeHiNaTe for citizenship was present in the education system; what society's view about the role, function and purpose of GeHiNaTe education was and whether it was believed that knowledge about History, Geography, Natural Sciences, and Technology contributes to citizenship. The depicted historical contribution that these two conglomerated activity systems had on the development of Beginning Knowledge education in the Foundation Phase in South Africa will be explicated.

4.4.2 Contradiction II: GeHiNaTe teaching curriculum and tools

The second contradiction can be presented by the multi-voicedness between the Educational activity system and the Technological activity system across the six time periods; this contradiction is called "the GeHiNaTe teaching curriculum and tools". The reason for this name is because the Educational activity system represents the two knowledge bases with their distinctive typologies that are required by a Foundation Phase teacher to teach GeHiNaTe (Subject-Matter Knowledge and Pedagogical Content Knowledge); the Technological activity system is also concerned with these knowledge bases of the teacher (Knowledge of Content, Pedagogy and Technology), but with a specific focus on the integration of Technology in teaching and learning to prepare learners for the future. By placing these two activity systems in relation to one another, the researcher was enabled to depict how the GeHiNaTe teaching curriculum and tools have transformed historically by drawing on the previous chapter's vertical discussions and constructed knowledge bases.

The researcher will discuss aspects such as the following: describe the educational context in which teachers introduce cultural tools for GeHiNaTe education to the Foundation Phase learner; what GeHiNaTe content was included in the curriculum for the young child; the sharing of collective knowledge through presenting curricula from other countries to South African societies; and how cultural tools were utilised by the teacher to present or communicate the intended GeHiNaTe curricula to the young learner. Within this contradiction, the researcher will

draw on the previous chapter's evidence on whether the South African curricula are preparing learners, through adept knowledge bases of teachers, for the advances of Technology and utilising Technology to demonstrate their thinking and application of GeHiNaTe concepts, language and skills in future social situations. The contribution that these two conglomerated activity systems have on the development of Beginning Knowledge education will be communicated accordingly.

4.4.3 Contradiction III: Teachers' professional development in GeHiNaTe education

The third contradiction can be presented by the multi-voicedness between the Societal activity system and the Technological activity system across the six time periods; this contradiction is called "the Teachers' professional development in GeHiNaTe education". The reason for this name is because the Societal activity system is concerned with equipping learners with Scientific Literacy knowledge and skills (Vision I, Vision II, and Scientific Literacy for a Knowledge Society), with the purpose to develop citizens who can take part in the society in a socio-scientific responsible manner and become employable. The Technological activity system is also concerned with these societal notions and preparing learners for the twenty-first century through Technology, by developing adept knowledge bases within teachers (Knowledge of Content, Pedagogy and Technology) on the integration of Technology in teaching. By placing these two activity systems in relation to one another, the researcher is enabled to depict how GeHiNaTe teaching curriculum and tools have transformed historically, by drawing on the previous chapter's vertical discussions and constructed knowledge bases. The researcher will discuss aspects such as the following: describe the importance of teachers being equipped with GeHiNaTe knowledge in teacher education and professional development programmes within the Foundation Phase; what a teacher's role is in terms of introducing GeHiNaTe cultural tools and knowledge bases to the young child as a form of mediated action; and what knowledge teachers need to have about GeHiNaTe to teach it in the Foundation Phase. Within this contradiction, the researcher will draw on the previous chapter's evidence on whether the teacher requires adept knowledge of Scientific Literacy, GeHiNaTe education and Educational Technology for teaching the South African curricula in the Foundation Phase. The contribution that these two conglomerated activity systems have on the development of Beginning Knowledge education will be communicated accordingly.

4.5 TIME EPOCHS

The three activity systems, Educational, Societal and Technological, have been shaped and transformed over extensive periods of time and therefore it is pivotal to understand these activity systems against their own history (Engelbrecht & Lubbe, 1987; Engeström, 2001; Le Roux, 2013c; Wolhuter, 2013a). When investigating the historical period, the local history of the relevant activity system should be recognised, as well as what has shaped it; for example, the knowledge bases present in these times as well as the cultural tools utilised to transfer and preserve these knowledge bases (Engeström, 2001).

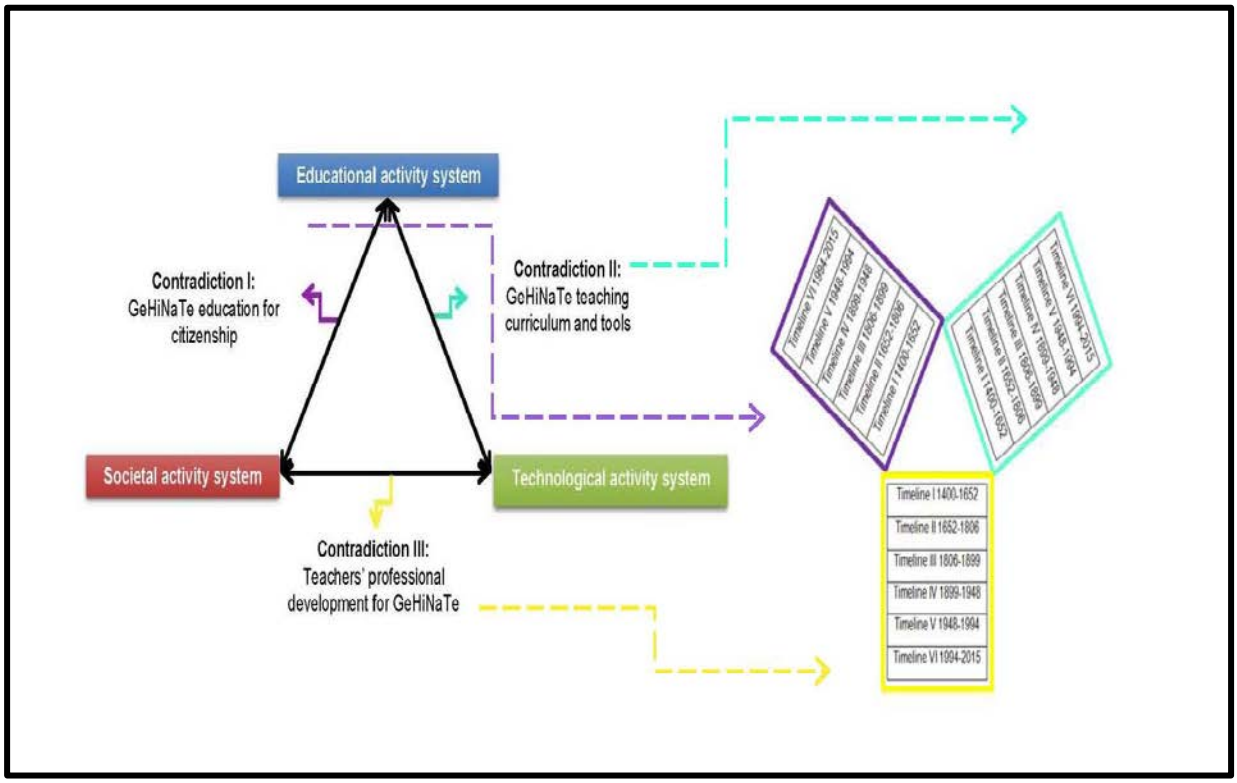


Figure 4.3: Contradictions between the three activity systems depicted over six historical periods

There are six educational periods identified for this research inquiry. These periods were introduced in the Performance chapter (see pages 65 and 66) and will now be used to horizontally analyse the three conglomerated activity systems according to these periods.

4.5.1 Pre-Colonial times: Traditional education (1400-1652)

4.5.1.1 Context

According to Soreto (2013, p. 37), most scholars tend to use Colonial times as the beginning of South African history; however, the Pre-Colonial epoch plays an important role in the history of South Africa. The Pre-Colonial era acknowledges several indigenous communities, before other settlers, which form part of the diverse society that is celebrated in South Africa (Le Roux, 2013c; Seroto, 2013). The Pre-Colonial era can be described as the period of time before colonisation of a region or territory, in other words, the time before a region or country became a colony (Dever & Falconer, 2008). Some of these native groups in South Africa were the KhoiKhoi, the San and other Bantu-speaking people, who inhabited the Cape Colony before they were exposed to Europeans (Le Roux, 2013c; Seroto, 2013).

During the era of Pre-Colonial times, Early Childhood Education internationally was focused on basic educational skills associated with reading, writing and arithmetic (Dever & Falconer, 2008; Verster et al., 1982a, 1982b), whilst in South Africa it was primarily to teach children survival skills, which changed to formal education, with the settling of immigrants in native lands (Le Roux, 2013c; Seroto, 2013). It is therefore crucial to acknowledge the indigenous knowledge systems that a community has developed prior to colonisation, as their historical legacies and traditions impacted on their growth, knowledge, cultural tools, world-views, and development as a community (Asabere-Ameyaw et al., 2012; Horsthemke, 2004; Le Roux, 2013c; Seroto, 2013). South Africa's current education systems acknowledge the importance of indigenous knowledge systems and that identities are grounded in the cultural heritage of a South African society (Horsthemke, 2004; Le Roux, 2013c; Seroto, 2013).

4.5.1.2 Contradiction I

During the Pre-Colonial times, the communal civic identity was represented by homogenous and heterogeneous KhoiKhoi, San and other Bantu-speaking groups. The aspirations that these social groups had for their members were reflected in their ability to adapt, merge and assimilate with other groups' traditions, philosophical views and customs, indicating a strong sense for socialisation and civic behaviour (Elphick & Shell, 1989; Welsh, 1998). Furthermore, these groups demonstrated the knowledge and skills to participate in cultural, social and survival activities of crop-growing, cattle-herding and hunting activities to sustain the communities they were part of, thus developing a strong communal civic identity (Asabere-Ameyaw et al., 2012; Seroto, 2013; Welsh, 1998).

Formal schooling was not yet introduced to these indigenous communities, which also meant the absence of formal education of GeHiNaTe. Yet it is believed by scholars that these communities' understanding of the importance of History, Geography, Natural Sciences, and Technology knowledge bases was demonstrated in certain ways (Asabere-Ameyaw et al., 2012; Semali & Kincheloe, 1999; Seroto, 2013); for example, their ability to live and survive in diverse environments in an effective and efficient manner, and the transference of knowledge, skills and values regarding social, physical, cultural, religious, and economic activities to other members through cultural tools, language and communal activities (Semali & Kincheloe, 1999; Seroto, 2013).

Education within indigenous communities was closely intertwined with social life, character building, moral development, and to attain physical attributes to sustain living within the community (Seroto, 2013). Indigenous groups acquired knowledge bases associated with living and survival and therefore did not acquire basic educational skills of reading, writing and arithmetic, although knowledge bases associated with GeHiNaTe could as well have been taught to learners in an informal manner (Asabere-Ameyaw et al., 2012; Coetzee, 1963; Elphick & Shell, 1989). The acquisition of basic educational skills, like reading, writing and arithmetic, was not present because knowledge was conveyed, presented and preserved through the senses (auditory, kinaesthetic and verbal), as opposed to symbols, and classified by McLuhan (1962) as the tribal age. Whilst their understanding of Geography, History, Natural Sciences, and Technology knowledge bases was demonstrated through a deep understanding of themselves in relationship to their natural environment and to community members, their knowledge of weather and star patterns, and their distribution of knowledge through their language, arts, rituals, tools, and social, political and economic activities (Semali & Kincheloe, 1999).

It was also considered important to develop a sense of belonging, to participate actively in family and community affairs, and to understand, appreciate and promote the cultural heritage of the community at large (Seroto, 2013; Welsh, 1998). The strong communal civic identity that these communities cherished and the dependence that these societies attached to having knowledge of how to survive and sustain life in diverse environments, indicate that GeHiNaTe education for citizenship was present during the Pre-Colonial times.

4.5.1.3 Contradiction II

Migration was common amongst the native groups and, during their travelling, they left traces of existence and which knowledge bases were transferred through cultural tools (Giliomee &

Mbenga, 2007; Seroto, 2013). Teaching and learning through social interaction with members of the indigenous groups during the Pre-Colonial times played an important role in how the young learner acquired knowledge and skills by focusing on content and methods that signified and sustained their way of living and believing (Elphick & Shell, 1989; Muller, 1981; Seroto, 2013; Welsh, 1998). Children were progressively introduced to these activities, by demonstrating how to use the media and artefacts appropriately to accomplish the task at hand (Kaku, 2011; Seroto, 2013). According to Kaku (2011), it was important to practically demonstrate to young children how to hunt, herd, cook, or farm, which can be associated with GeHiNaTe knowledge bases (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012). Therefore, mediation through cultural tools was considered pivotal for knowledge transference.

Knowledge is generated as lay people seek to find solutions to problems in their daily lives, by drawing on current societal wisdom and other local resources that may be available, and by using intuition and creativity (Asabere-Ameyaw et al., 2012; Semali & Kincheloe, 1999). In other words, as explained by Levi-Strauss (1966), indigenous knowledge can still be seen as scientific knowledge because this group's knowledge system is constructed within their culture, which is not easily disconnected from their environment and religion, but, instead, is given structure mainly in accordance with the needs of the culture. The nature of indigenous knowledge systems is more dynamic than is often assumed or acknowledged for the sake of clarity on indigenous knowledge systems (Asabere-Ameyaw et al., 2012; Semali & Kincheloe, 1999; Seroto, 2013). It refers to the incorporation of philosophies and knowledge of indigenous communities, before introduction to immigrants, that were based on the historical and cultural understandings of the group in direct relation with their environment and religion for the survival of their people (Semali & Kincheloe, 1999).

The indigenous communities' understanding of the role and function of Technology and Natural Sciences knowledge bases was demonstrated through activities of developing tools and resources, to producing products from livestock and agriculture, and to protecting members from dangers and the elements, to name just a few (Asabere-Ameyaw et al., 2012; Semali & Kincheloe, 1999; Seroto, 2013). Some of the knowledge that was probably taught to the young child could have incorporated domains associated with educational subjects like Geography, Arts, History, Music and Dance, Physical education, Politics, and Philosophy (Elphick & Shell, 1989; Seroto, 2013). As defined by Aikenhead et al. (2011), and described by Linder et al. (2011), the transference of knowledge and skills to others was also accomplished through utilising cultural tools. Cultural tools utilised during political, social and cultural activities, included physical instruments, artefacts and instruments, and the non-physical instruments included signs and symbols (Elphick & Shell, 1989; Seroto, 2013). Thus, cultural tools and

communication were still much dependent on interactions and the auditory sense input (Fuller, 2005; McLuhan, 1962).

The teaching of GeHiNaTe in this time period was present because the transference of knowledge was demonstrated through physical cultural tools and intellectual cultural tools to ensure the survival and the sustainment of life of the community.

4.5.1.4 Contradiction III

Formal education, as it is known in its contemporary sense as an established building with a prescribed curriculum by an appointed teacher, did not take place within these indigenous communities in Pre-Colonial times (Coetzee, 1963; Elphick & Shell, 1989). Nonetheless, it was a matter of importance to these communities to ensure that knowledge was transferred to future generations and did not perish within a community. This demonstrates the notion that not only knowledge was of importance, but also the act of a teacher or significant elder person to teach the young child (Elphick & Shell, 1989; Muller, 1981; Seroto, 2013; Welsh, 1998). Extensive responsibility was placed on elders' shoulders to transmit cultural values, knowledge and skills, and the use of cultural tools through kinship-based activities (Elphick & Shell, 1989; Seroto, 2013). The importance of teachers for the teaching of GeHiNaTe was considered pivotal during these times, as the elders or significant adults were responsible for transferring the knowledge bases to the young and teaching them to use the cultrual tools associated with the knowledge base (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012). Without teachers within the society, important knowledge bases were to become extinct, which in turn threatened the survival and sustainability of the community (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012).

4.5.2 Colonial times: Education during Dutch Colonisation (1652-1806)

4.5.2.1 Context

To establish a halfway house in the Cape required considerable manpower, which could only be obtained by importing more slave labour, due to the unwillingness of the natives to provide their services willingly, and the fact that the enslavement of indigenous people was forbidden by the Dutch Eastern India Company (Elphick & Shell, 1989; Le Roux, 2013b). The motivation for immigrating to a different continent included reasons such as to escape prosecutions that were politically, economically, or religiously driven, and also the establishment of a halfway

refreshment station that was considered a lucrative venture for foreigners (Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a). European immigrants, under governance of the Dutch commercial enterprises (later Dutch East India Company), settled in the southern demographic region of Africa and imported slaves from northern and eastern Africa to facilitate the process (Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a). South Africa was therefore under governance of the Dutch commercial enterprises and, later, the Dutch East India Company (Le Roux, 2013b; Seroto, 2013).

The Colonial time period represented a time where the communal civic identity of homogenous and heterogeneous KhoiKhoi, San and Bantu-speaking community groups was disrupted with the arrival of various foreign social groups, described as immigrants and slaves (Welsh, 1998). The settlement of immigrants resulted in the introduction of new religions, views, customs, and a local education system to the locals (Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a). Settlers were still closely associated with the parent country and, therefore, did not easily discard their own customs, religions, knowledge systems, and cultural tools (Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a). The diversity of these latter-mentioned changes became even more complex, as immigrants who settled in this new region did not all originate from only one country; these settlers represented diverse and distant countries with their own knowledge systems, world-views, cultural tools, and so forth (Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a). The political, economic and social atmosphere amongst these groups were volatile, as more individuals of European descent and other countries aimed to establish themselves in the southern part of Africa (Booyse et al., 2013).

In an attempt to restore the balance in adopting one social-institutional system, the Dutch settlers claimed authority and power over these groups and also introduced their notions, religion, education, language, culture, and other customs to indigenous communities and non-European settlers (Le Roux, 2013b; Welsh, 1998). The Dutch Eastern India Company had sovereign rights and governmental authority; it had power over the territory and the people, and was able to send commissioner-generals to the Cape to introduce any sort of action or dealing with specific instruction by the Netherlands to the Colony (Le Roux, 2013a; Welsh, 1998). It is understandable that, during times of Colonisation, indigenous groups and immigrants had opposing views on the role of education, which wreaked havoc in the Colony (Le Roux, 2013a; Welsh, 1998). For example, indigenous groups perceived children working as part of the learning process, whereas Western countries were of the opinion that children should go to communal dame schools, where children learned and did not work (Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a).

As time passed, indigenous groups succumbed to the settlers' ways and their beliefs about schooling which resembled the start of many changes to South Africa in every aspect of existence (Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a).

4.5.2.2 Contradiction I

The aspiration of the government was to establish a communal civic identity which valued, engaged and participated in political, social, economic, cultural, religious, and linguistic activities, as prescribed by and valued in Dutch culture (Coetzee, 1963; Elphick & Shell, 1989; Le Roux, 2013a). To idealise these mentioned aspirations, the government needed to amalgamate communities, and formal education was a way of attaining this objective. Through education, Dutch knowledge bases, which were embedded in ideologies of specific religious principles and also advance communication between rulers, slaves and immigrants could be transferred to individuals, by teaching members to read, speak and write in Dutch (Coetzee, 1963; Elphick & Shell, 1989; Le Roux, 2013a). Because Colonisation of land was a world-wide phenomenon, role-players were advised to be sensitive towards social and educational transitions, especially in terms of transition from informal to formal education, as such learners were now introduced, for the first time, to typographic cultural tools and abstract symbols for communication (McLuhan, 1962; Rückriem, 2003).

It is important to understand that the attempt to amalgamate communities was made for socio-political and economic purposes, and not to progress citizenship. Knowledge was considered a powerful cultural tool which should be controlled, meaning that those communities with advanced and superior knowledge, resources, land, and education were the rulers of social groups (Coetzee, 1963; Hodson, 2008; Le Roux, 2013a). This could be the reason why GeHiNaTe was not taught to all learners because not only does knowledge of History and Geography accentuate the need for citizenship and cultural heritage, but it also teaches individuals about participating in social, economic and political processes and activities (DeBoer, 1991; Hodson, 2008). The same with knowledge of Natural Sciences and Technology – these knowledge bases were considered superior knowledge, above that of laypersons, and directly associated with superiority, economic wealth, innovation, and progress in knowledge and tools (DeBoer, 1991; Hodson, 2008). Therefore the teaching of these knowledge bases was reserved to only the elite societal groups (DeBoer, 1991; Hodson, 2008).

Another reason for only teaching basic educational skills (like reading, writing and arithmetic), and not GeHiNaTe and religious subjects was that, once a slave has adopted the Christian religious system, becoming a Christian, then the owner could lose ownership of the slaves

(Booyse et al., 2013; Coetzee, 1963; Muller, 1981; Welsh, 1998). The underlying role and public understanding of acquiring knowledge was to equip individuals with basic educational skills to become employable and manageable, which was in accordance with the Dutch civic identity (Booyse et al., 2013; Coetzee, 1963; Muller, 1981; Welsh, 1998). Education was not implemented to promote equal citizenship and acquire Scientific Literacy through GeHiNaTe education for all (Booyse et al., 2013; Coetzee, 1963; Muller, 1981; Welsh, 1998). The communal civic identity that the Dutch government envisioned was socio-politically and economically motivated. Unlike the Colonial times, there was a weak communal civic identity among the slaves, indigenous communities and immigrants, and because the establishment of an education system was unsuccessful, the value of GeHiNaTe education for citizenship was under threat during the Colonial times.

4.5.2.3 Contradiction II

The encounters with immigrants and traders from ships also introduced natives and immigrants to cultural tools, artefacts and media, which led to the advancement in knowledge and improved communication (Giliomee & Mbenga, 2007; Welsh, 1998). Inventions, especially such as the elaboration of the printing press, introduced the opportunity for communities over the world to engage with cultural tools to advance knowledge (Kaku, 2012; Seroto, 2013). Progressive thoughts and influences of GeHiNaTe scholars, like Newton, Aristotle and Da Vinci, to name a few, introduced scientific knowledge and the transference thereof, to generations to come because the need for teachers, cultural tools and knowledge bases is pivotal for the survival of communities (Dever & Falconer, 2007; Semago & Semago, 2013).

The education of children during Colonial times was different to what has just been discussed for the children from indigenous communities. The curriculum intended for South Africa was developed by curriculum developers from the Netherlands, who was the ruling government in the Colonial times. This played an important role in the development of today's education (Le Roux, 2013a). The motive for education was to equip all social groups with basic educational skills in order to promote communication amongst the diverse racial groups and indirectly uphold the labour efficiency of servants and slaves, which was of crucial importance to the Dutch Eastern India Company (Coetzee, 1963; Elphick & Shell, 1989; Le Roux, 2013a).

The church and the Dutch Eastern India Company played the centre role in organisation and administration of education in reference to the curriculum content to be taught, the didactical methods utilised for instruction, the implementation and choice of discipline methods, the teaching sources and resources used, the language of instruction, the location of the school, the

recruitment and appointment of teachers, and which children, based on their ethnic and social status, were allowed in which school (Coetzee, 1963; Elphick & Shell, 1989; Le Roux, 2013a). Missionary stations were on the rise in an effort to help indigenous, orphaned and slave children to acquire basic educational skills (Coetzee, 1963; Elphick & Shell, 1989; Le Roux, 2013a). It can be deduced from scholarly work that GeHiNaTe content was not formally incorporated as a subject in the curriculum for the young child in the Colonial times, although the importance of creating experiences of reality through nature and the learners' immediate environment was strongly recommended when teaching the young child, and the pivotal role of a teacher with adept knowledge was acknowledged (Verster et al., 1982a, 1982b).

The cultural tools present in these times included the phonetic alphabet, which adopted symbols and visual representations of knowledge (Fuller, 2005; McLuhan, 1962). Some examples of these tools were the educational grammars used to teach alphabet letters to children that had words and pictures on it in order to represent a letter (Coetzee, 1963; Elphick & Shell, 1989; Le Roux, 2013a).

Figure 4.4: Educational resources used during the Colonial times

(Adapted from Digitale Bibliotheek voor de Nederlandse Letteren (http://www.dbnl.org), the Granger Collection, and (Dever & Falconer, 2008, p. 25))

The external cultural tools utilised in the literature era enabled scholars to print and distribute their knowledge that was previously preserved through writing, sketches and lore mediums (Dever & Falconer, 2008; Giesecke, 2005; Le Roux, 2013a). The external cultural tools of a curriculum and the acquisition of basic educational skills during Dutch Colonisation in South Africa contributed to the importance of this time period, as immigrants and settlers from abroad helped society to develop from the tribal age into the literacy and printing ages (Giesecke, 2005; McLuhan, 1962). Through the establishment of schools and the introduction of formal education, learners were taught basic educational skills of reading, writing and arithmetic primarily from Scripture, and some other cultural tools common to the literacy and printing age (Behr, 1988; Coetzee, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a). The teaching of GeHiNaTe in this time period was more complex due to the diverse community groups present in this time period. However, the transference of GeHiNaTe knowledge was demonstrated through physical cultural tools and educational cultural tools to ensure the survival and the sustainment of the community, as well as the acquisition of basic educational skills to promote communication and employability.

4.5.2.4 Contradiction III

The traditional or indigenous transference of GeHiNaTe knowledge was challenged during the identification and introduction of teachers from the Netherlands and other European countries to South African communities to establish a new and formal way of education and learning (Le Roux, 2013; Semago & Semago, 2013). The reason for establishing schooling in South Africa was a socio-politically and economically motivated decision, and schooling was not available to all members. The teaching of GeHiNaTe subjects was not included in the intended curriculum during the Colonial times and there was a serious lack of teachers and schools to provide education to everyone (Coetzee, 1963; Le Roux, 2013a). Thus, the quality of education was not equal for all because learners from lower socio-economic status or non-white racial background only received basic education from untrained teachers, whilst learners from affluent families were taught diverse knowledge bases from adept teachers (Dever & Falconer, 2007; Semago & Semago, 2013). In other words, the training of teachers on the subject, in collaboration with the utilisation of cultural tools for educational purposes, enabled the teacher to better prepare learners to participate in societal activities and processes. This was the case because the affluent learner acquired a more advanced knowledge base than the mere basic educational skills, which in turn deepened their social, economic and educational knowledge and skills, making them more employable and Scientific Literate (Le Roux, 2013; Semago & Semago, 2013).

The importance of teachers for educating members of society was realised to advance communication and productivity; however, the teaching of GeHiNaTe by a trained, professional teacher was restricted to only certain learners from affluent families. The government realised the power that a qualified teacher had to promote quality education, but also how powerful specific knowledge systems were to keep segregation intact between social groups (DeBoer, 1991, 2000; Hodson, 2008).

4.5.3 Industrial and Progressive era: Education under the British rule (1806-1899)

4.5.3.1 Context

The industrial era refers to the period of transition in cultural tools from physical human labour to new manufacturing processes, people migrating from rural town communities to urban cities represented by factory communities, and the distribution of books and typographical text which had an influence on society, economy, education, and politics (Cooper & Sixsmith, 2003; Dever & Falconer, 2008; Giesecke, 2005). According to Dever and Falconer (2008), the Progressive era can be described as the period of social involvement and political reformation.

The first 400 years of South Africa were portrayed as a period of colonialism through the notion of the Dutch Eastern India Company aiming to utilise the Cape for commercial reasons; meanwhile, the following 100 years under British rule can be described as a period of both colonialism and imperialism, where the notion was set on gaining authority over South Africa through acquiring a hold over the land and the people living in it (De Kock, 1986; Giliomee & Mbenga, 2007). These two different ruling authorities during these two time epochs had some similarities, but also differences. Ruling by the Dutch was, as mentioned, for commercial and trading reasons and the focus was on the Cape region and establishing a colony to perform the work. However, the British view was to abolish racial discrimination, slavery and enforced labour, and rather to possess this country and ensure work for all people (Giliomee & Mbenga, 2007; Pretorius, 2012). Thus, the community that has assimilated over the past 400 years under Dutch ruling had to find a new workable and civil way to redefine their social status in the absence of slavery under the rule of British leaders (Giliomee & Mbenga, 2007). The redefinition of this already assimilated heterogeneous group faced another 100 years of disagreements, wars, debates, and clashes between the natives and settlers regarding aspects such as possessing geographical land, having equal social-economic status and access to resources, sustaining their traditional cultural, ethnic, linguistic, and religious customs, having political rights, and having equivalent access to education like children from an affluent background (Giliomee & Mbenga, 2007; Pretorius, 2012; Welsh, 1998).

4.5.3.2 Contradiction I

The political, economic and social position in South Africa during the Industrial and Progressive era was even more volatile than that of the Colonial time period, due to the change in ruling and also the urge of the government of Britain to acquire power over South Africa and the people through annexing land, resources and propagating an Anglican communal social identity (De Kock, 1971; Giliomee & Mbenga, 2007). The government of Britain knew that gaining control over resources, land and the employment of labourers, their social identity and the education system of the people, could result in gaining control over the entire South Africa (De Kock, 1986; Giliomee & Mbenga, 2007). The aspirations held by British government were much like those of the Dutch, namely to develop civic values embedded in British ideologies, to exemplify intellectual conduct and morals that were applicable to the demands of life and to develop good citizens in relation to social, civil and spiritual life in all ranks of the society (Le Roux, 2013a, 2013e).

The focus of education under British rule was set to Anglicise all education systems and dogmatic education was replaced with non-confessional instruction (Le Roux, 2013a; Verster et al., 1982a, 1982b). The Anglicisation policy also displayed an important view that government held about the society of South Africa (Coetzee, 1958, 1963; Le Roux, 2013c). The assumption was that the British curriculum and knowledge, religion, culture, and the English language were superior to those of the Dutch, the slave communities and the indigenous communities. Thus, the notion was to convert all to British ways to improve the behaviours and morals of the people (Coetzee, 1958, 1963; Le Roux, 2013c). The government also required that, in order to acquire knowledge, learners had to adopt the British religion, culture and language and accept it as superior to those of the Dutch (Coetzee, 1958, 1963; Le Roux, 2013a). Partaking in education and societal notions required from communities to adopt British customs, traditions, culture, language, and religion (Coetzee, 1958, 1963; Le Roux, 2013a). In other words, the importance of education was threatened when the British government announced the Anglicisation policy and implementation of British curriculum, and evoking fear in communities in losing their culture and traditions (Coetzee, 1958, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a).

The British government realised that, in order to acquire a communal civic identity, it was crucial to promote economic, political and social activity and participation among the individuals (Bruguière et al., 2014; Stengers, 2014). Therefore more schools were established and more opportunities by members of community to start their own business endeavours were permitted (De Kock, 1986; Giliomee & Mbenga, 2007). The government of Britain conceptualised their view on the importance of education, and how the knowledge bases could address social ills, increase employability, help attain progress in everyday life, and foster communication among people through basic educational skills (Coetzee, 1958, 1963; Le Roux, 2013a). Although

society was amalgamated, a strong Dutch communal civic identity developed over the two centuries, which was not easily surrendered for British civic identity (Coetzee, 1958, 1963; Giliomee & Mbenga, 2007; Le Roux, 2013a). The communal civic identity that Britain government envisioned to replace the Dutch civic identity with, was as usual, socio-politically and economically motivated. As already depicted, individuals did not freely and easily accept a new communal civic identity and, because the Colonial times already transformed individuals to adopt Dutch notions, it would not be easily replaced with British notions, despite the ideals that the government envisioned for a new communal civic identity (Coetzee, 1958, 1963; Le Roux, 2013a).

As with the Colonial times, discrimination in the type and quality of education learners received was the order of the day – it depended on the learners' social status, gender, religion, and linguistic preference and the knowledge bases for these groups differed. As could be expected, GeHiNaTe education was only available to learners from affluent families (Coetzee, 1958, 1963; Le Roux, 2013c). The formal teaching of GeHiNaTe in this time period was still not intended and, because knowledge of certain subject domains were associated with power and authority, the transference of GeHiNaTe knowledge was prohibited. These social-political and economic circumstances convinced parents from homogenous communities (Afrikaner, indigenous, et cetera) to teach their children themselves during the migration periods. Learners from racial groups other than white, were not always allowed into schools and/or were settled far away from established schools; thus, they primarily received basic education, such as reading and writing skills, from missionaries who used the Bible and Christian literature as study material (Coetzee, 1958, 1963; Le Roux, 2013c). Access to schools depended on social and economic status, and many families, with an average of eight children, lived in appalling conditions and could therefore not afford schooling (Coetzee, 1958, 1963; Le Roux, 2013a). Furthermore, children were sometimes viewed as a means of income because of the economic circumstances they were situated in and therefore did not attend school (Coetzee, 1958, 1963; Dever & Falconer, 2008; Le Roux, 2013a).

The establishment of an education system was still under way and therefore the value of GeHiNaTe education for citizenship was still under threat during the Industrial and Progressive era. The three major contributions to the poor educational situation and an incoherent communal civic identity in South Africa were due to the following: the lack of finance to establish and sustain schools; the lack in qualified teachers to teach; and the conflict over the medium of instruction, and the fear of losing one's cultural identity (Coetzee, 1958, 1963; Le Roux, 2013c).

4.5.3.3 Contradiction II

As stated elsewhere, the Industrial era refers to the period of transition in cultural tools and the distribution of books and typographical text which had an influence on society, economy, education, and politics (Cooper & Sixsmith, 2003; Dever & Falconer, 2008; Giesecke, 2005). Although South Africa was still lagging behind with regards to progressive cultural tools, in comparison with international societies, typographic cultural tools and knowledge systems have also reached South African soil and changed how people functioned and lived, both locally and globally (Coetzee, 1963; Giliomee & Mbenga, 2007; Muller, 1981). The printing press was the most prominent manner of duplicating and distributing knowledge, which was utilised as a cultural means of teaching in schools.

The content included in the curriculum implemented in established schools primarily focused on the acquisition of basic educational skills (reading, writing and spelling), primarily in the English language and secondarily in Dutch, whilst some reference was also made to basic arithmetic skills and other knowledge systems (Coetzee, 1958, 1963; Le Roux, 2013c). Missionary education played an important role in the future of formal education in South Africa, especially amongst children from black, Indian and coloured backgrounds. The teaching of GeHiNaTe education was still not present in the intended curriculum because of the lack of teachers, established schools that were regularly attended, and the language of teaching and learning (Coetzee, 1958, 1963; Le Roux, 2013c). The teaching of GeHiNaTe was still not formally incorporated as a subject in the curriculum for the young child, although the value of real-life experiences of the learner and the interaction with nature and the learners' immediate environment was strongly recommended (DeBoer, 1991; Verster et al., 1982a, 1982b).

Figure 4.5: Educational resources used during the Industrial and Progressive era

(Adapted from Digitale Bibliotheek voor de Nederlandse Letteren and Booyse et al. 2013, p. 6)

The education of children in the migrating Voortrekker groups was focused on reading and reciting the Lord's Prayer, the Ten Commandments, the twelve articles of faith, and hymn books, as well as the Heidelberg Catechism (Coetzee, 1958, 1963; Le Roux, 2013c). Other educational resources that were utilised, that briefly introduced GeHiNaTe content, were the Trap der Jeugd, Hollandsche Vereeniging donated books and "A, B, C met de Haan" as illustrated above (Coetzee, 1958, 1963; Le Roux, 2013c). The acquisition of GeHiNaTe knowledge was transferred through physical cultural tools and educational cultural tools to ensure the survival, sustainment and employability of the community, and to also acquire basic educational skills.

4.5.3.4 Contradiction III

The British government was devoted to developing a centralised, compulsory education system, with frequent routine visits by inspectors to ensure that schools were teaching the British curriculum in English (Coetzee, 1958, 1963; Le Roux, 2013c). The major contributions to the challenges the educational system in South Africa experienced were due to the lack of finance to establish and sustain schools, the lack of qualified teachers, and the underlying conflict experienced by communities due to the required English medium of instruction and fear of losing one's cultural identity (Coetzee, 1958, 1963; Le Roux, 2013c). The educational standards were almost non-existent because teachers were either poorly qualified or not qualified at all, like itinerant teachers, missionaries, slaves, women of households, and members of the church (Coetzee, 1958, 1963; Le Roux, 2013c). In a desperate attempt to uplift the educational situation in South Africa, government started appointing itinerant teachers, and identified and convinced educational experts from Europe to relocate to South Africa to help train teachers (Coetzee, 1958, 1963; Le Roux, 2013c). These mentioned attempts by government to implement a successful education system made them realise and acknowledge how important teacher training and the proper education of knowledge systems were.

Because of the assimilated social groups, learners had unique needs which should be accommodated and respected (Coetzee, 1958, 1963; Le Roux, 2013c). As with the Colonial times, the government realised how important an education system was to attain aspirations developed by authorities on political, social and economic activities and processes. The urge to increase schools in the regions and to appoint qualified teachers resonates the fact that teachers were pivotal role players to teach members of society to behave in a certain way, as the government envisioned.

The teaching of GeHiNaTe to all learners was still not part of the intended curriculum, which iterated the notion that this subject, taught by a sophisticated teacher, has the power to disrupt social, political and economic status. However, education in its basic form, taught by a skilled teacher, is of immense value to promote employability, communication and a communal civic identity amongst the individuals of society.

4.5.4 Child Study Movement era: Education in the midst of missionaries, Boer Republics, wars and the end of union (1899-1948)

4.5.4.1 Context

On the heels of the Industrial and Progressive movement was the Child Study Movement, which impacted Early Childhood Education through research endeavours that generated knowledge, theories and understanding on how children learn and develop in the early years (Dever & Falconer, 2008). The Child Study Movement era indicates a timeframe where an attempt was made to apply methods of modern science to understand the development of children (Dever & Falconer, 2008). The Child-Study movement arose in the last decade of the nineteenth century in several Western countries, and was inspired by social reform activities, aimed to improve the health and welfare of children (Dever & Falconer, 2008; Roopnarine & Johnson, 2009). The connection between child-study, schools, teachers, and movements for educational reform, was particularly strong because many Childhood Studies activists viewed the educational system as the most promising avenue to improve the conditions of children, and to create conditions for a better and more just society (Dever & Falconer, 2008).

By the end of the nineteenth and beginning of the twentieth century, South Africa witnessed its first war due to the determination of natives and Boer settlers to no longer tolerate extortion by Britain and their fearing the possibility of losing their land, identity, language, and heritage to foreign authority (De Kock, 1968; Giliomee & Mbenga, 2007). The repercussions of the war had devastating effects on the social, educational, political, and economic domains of South Africa and also caused further conflicts and battles regarding land and work opportunities (Coetzee, 1963; Giliomee & Mbenga, 2007; Van Jaarsveld, 1984). Families were broken up due to men's compulsory participation in war; women and children were held in devastating organised concentration camps and died, due to illnesses and negligence; families and livestock, remaining on farms, were murdered and killed, and crops and residences were destroyed; and after the war, South Africa was facing famine and economic depression (De Kock, 1968; Giliomee & Mbenga, 2007). Thus, it was a fight for anti-colonialism associated with Britain (Giliomee & Mbenga, 2007; Pretorius, 2012).

After the war, which Britain won by holding Boer families captive in concentration camps and forcing them to surrender out of concern, a new society had to be re-established (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973). The atmosphere was described as a continuum of English versus Afrikaans, patriots versus traitors, imperialists versus anti-imperialists, the worker's class people versus the capitalist class, and overall differences on ideas about religion, culture, race, customs, and language (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973). Within these highly complex and sensitive social circumstances, South Africa's economical position had to be rebuilt and re-established, due to the famine and poverty that people were exposed to and died from (Giliomee & Mbenga, 2007).

Segregation between social and racial groups was evident and further propagated by a movement by Boer groups away from Angelical customs, religious traditions and language use towards an independent Afrikaans-orientated authority (De Kock, 1968; Giliomee & Mbenga, 2007). Although the social, economic and political tendencies during this time epoch were described as volatile, complex and momentous (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973), the Child Study Movement influenced South African education in various ways, for example, segregated but free primary education, Eurafrican normal schools, farm schools, and moving away from Dutch instruction to Afrikaans or double-medium instruction (Booyse, Le Roux, Seroto, & Wolhuter, 2013; Horsthemke, Siyakwazi, Walton, & Wolhuter, 2013).

4.5.4.2 Contradiction I

In the midst of all the conflict and wars, an important turn in events took place towards the cultivation of a communal civic identity and the advancement of a particular type of citizenship and, possibly, the encouragement of Scientific Literacy by the implementation of laws, orders and acts (Coetzee, 1963; Giliomee & Mbenga, 2007; Van der Schÿf, 1969). This could be seen as an effort to communicate and transfer to generations to come what was considered important to society through education (Coetzee, 1963; Giliomee & Mbenga, 2007; Van der Schÿf, 1969). Although these laws, orders and acts were politically motivated to bring about peace and stability during social-political and economic volatile times, these laws, orders and acts did not foster unconditional acceptance of homogenous communities (Booyse et al., 2013).

With the signing of the peace endurance between the English and Afrikaners, the Boers knew that Britain would hasten the pace to unify the four colonies in order to gain more control over land and people and establish this country as a British South Africa (Booyse et al., 2013; Giliomee & Mbenga, 2007). Soon to follow was the constitutional law, which was mostly

determined by white political leaders, and these leaders discussed and decided on how matters relating to race, language, education, employment, and voting rights were to be handled in the future (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973). As to be expected, these laws, orders and acts were developed to advance a specific homogenous social group, to the detriment of indigenous groups' communal civic identity and the way they were educated and treated socially (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973). Examples of these laws, orders and acts were the implementation of native black laws by Britain to regulate their entrance into the cities by always carrying passes for identification; to segregate black from white people by establishing townships outside the borders of white towns and limiting their chances of acquiring or possessing land; separation in the type and quality of education which black, Indian and coloured children received, in comparison to white children; and also segregation in political participation of black opposed to white people in the form of voting rights (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973). The Protestant churches reinforced the act of segregation, and equal but differential development and an independent national future for natives were recommended and proclaimed (Giliomee & Mbenga, 2007).

During times of peace and order, more schools were opened by government, with learners obliged to attend school and receive an education in either English or Dutch and become literate and employable when they left school or furthered their studies, by attending universities (Booyse, 2011; Coetzee, 1963). Afrikaners expressed their opinions about the education system of Britain and managed to receive financial support from the Netherlands to establish their own private schools, which continued with the education system that they have grown accustomed to, namely parents' influence in education, mother tongue instruction and religious instruction as the main aim of education (Booyse, 2011; Coetzee, 1963). Teaching content, methods and class sizes were constantly challenged due to the segregated nature of the education system to assure that these educational institutions and curricula served the identity, needs and rights of every race group. This also meant that GeHiNaTe education was only taught to certain social groups (DeBoer, 1991; Verster et al., 1982a, 1982b).

It is interesting to note that the government developed an increased awareness of how GiHeNaTe education fostered citizenship and Scientific Literacy. British government implemented laws, orders and acts with regards to which language to utilise for instruction, the content to be included in the History and Geography syllabi, which religious dogma should be taught, and the selection and appointment of teachers and head masters that were patriotic to the British culture (Coetzee, 1963; Giliomee & Mbenga, 2007; Van der Schÿf, 1969). There were four regions (Cape, Natal, Orange Freestate and Transvaal) under which education systems were implemented. Two of the four regions were under British rule, and continuous

efforts were made by Britain to interfere with the education system of the remaining two Republics as well (Booyse, 2011; Giliomee & Mbenga, 2007). The end of the war, and the unification of the four regions as one, which was ruled by Britain, led to decisions and implementation of laws, orders and acts that promoted segregation in race, which influenced education systems, didactics and content for all children for the years to come (Booyse, 2011; Coetzee, 1963; Giliomee & Mbenga, 2007). Educational policies were reviewed and rewritten after conduction of educational experts by government, and upon their recommendations and memorandums adjustments being implemented, some of these examples that promoted education for citizenship were the Selborne Memorandum of Education, the Smuts Act, the Hertzog Act, Dr Muir's Memorandum, the Bantu Education Act, the Nicol Commission of Enquiry, and the Eiselen Report (Booyse, 2011; Coetzee, 1963; 1958; Giliomee & Mbenga, 2007).

The strong homogenous British communal civic identity, that was propagated through laws, orders and acts, reemphasises the notion that citizenship is important for sustainability of a country. It is also derived that developing a knowledge society is idealised; however, education and knowledge is used as a power tool to bring division between communities. Knowledge systems associated with GeHiNaTe education were highly valued during the Child-Study movement era, but not equally taught to all learners.

4.5.4.3 Contradiction II

South Africa experienced a fragmented education system, namely a central authority government controlling education through means of four provincial educational systems, each consisting and implementing education differently for the diverse racial groups (Booyse, 2013a). Education within this time period was not making proper progress, due to the political instability and restrictions, poor socio-economic circumstances and diverse religious views held by diverse members of society (Booyse, 2013a; Coetzee, 1963; Giliomee & Mbenga, 2007). South Africa experienced major hindrances during this time frame and had their origins in two equally profound, but opposing education systems of the world, namely those of Britain and the Netherlands, which brought about diverse views about childhood, development and education (Booyse, 2013a; Coetzee, 1963; Giliomee & Mbenga, 2007).

The education systems implemented by British authorities were adamant to Anglicise and denationalise the Afrikaner child, by omitting the teaching of subject content in Dutch in schools (Booyse, 2013a). The determination was thus to destroy Afrikaner supremacy in schools and make English obligatory. These acts were not welcomed by Afrikaner societies or

native/indigenous groups who have adopted Afrikaans as mother tongue and set out to establish private schools or village schools to teach culture, religion and language associated with Dutch customs and traditions (Booyse, 2013a; Coetzee, 1963). Curriculum documents, explicating what should be taught in Anglican and Dutch traditional schools, were not detailed. It can be deduced that the foci remained on the acquisition of the basic educational skills of reading, writing and spelling, primarily in the English language, and secondarily in Dutch in the early years (Booyse, 2013a; Coetzee, 1963). The teaching of History and Geography content in the early years was included in the curricula, but topics relating to these subjects were handled with great sensitivity to inhibit the promotion of an Afrikaner culture and identity (Booyse, 2013a; Coetzee, 1963).

The Child Study Movement era continued to advance in cultural tools and more physical tools were utilised to teach learners, as these tools incorporated more than one sense (McLuhan, 1962). Teachers were empowered and advised to use technological cultural tools, such as radio devices, sound reinforcement apparatus, photocopying machines, science apparatus, and the library, to assist teaching and help learners acquire knowledge of different subjects and become competent in Technology as well (Behr, 1988; Booyse, 2013a; Coetzee, 1963; Giliomee & Mbenga, 2007; Welsh, 1998). During these times, the importance of becoming proficient in and adaptable to the use of technological devices in education was emphasised and the government realised that skills and knowledge of how to use Educational Technology were to be implemented in schools to ensure social and communicative progression in society (Coetzee, 1958, 1963).

These advancements and developing competencies in utilising such cultural tools to advance thinking and knowledge transference can be considered a contributing factor. The sharing of knowledge bases associated with GeHiNaTe became more evident in curricula, stating that, to develop a communal civic identity and improve socio-political and economic participation, the teaching of this subject to all members of society is required.

4.5.4.4 Contradiction III

During the South African war, the women and children were held in concentration camps. The women were concerned about their children's education, which resulted in the establishment of private school camps under the rules and regulations of Britain authority (Booyse, 2011; Giliomee & Mbenga, 2007). Britain used this opportunity to orientate and indoctrinate children, according to British ideologies, by ascribing curriculum fit for English culture; only English as instruction medium was allowed (Booyse, 2011; Giliomee & Mbenga, 2007). There was a

severe shortage in qualified teachers and the willingness to teach children during times of war and peace (Booyse, 2011; Giliomee & Mbenga, 2007). Up unto this point in time, education had undergone three stages of development, namely being influenced mostly by churches and missionaries, then the introduction of state influence of control in education systems because churches could not maintain and sustain suitable education or educational sites; and then the state control over education (Booyse, 2011; Coetzee, 1963). The issue of teacher appointment was always a point of concern because qualified and competent teachers were hard to find, employ and keep at schools (Booyse, 2011; Giliomee & Mbenga, 2007).

In international literature, more scholars were emphasising the pivotal responsibility a teacher had to teach GeHiNaTe knowledge to the learner, as topics on Nature Study were considered a point of departure to gain learners' attention for a lesson and introduce them to their world (DeBoer, 1991; Verster et al., 1982a, 1982b). The importance of teachers for developing a fit society through education was repeated with the increase in appointments of teachers and the establishment of schools.

4.5.5 Great Society era: Apartheid education under National Party ruling (1948-1994)

4.5.5.1 Context

The time period internationally known as the Post World War II or Great Society era resembled an era of recovery after great conflict and poverty, the reestablishment of the workforce and education, that resulted from suffering and stress and a hope of reconstructing norms and values within society which would overcome the tribulations that society had endured for almost half a century (Dever & Falconer, 2008; Lascarides & Hinitz, 2000). The social, political and economic climate shifted in terms of reconstruction of countries by investments by government within the labour market, an increased global involvement and connectedness between countries, and a refocus on the value of education in developing a well-educated population (Dever & Falconer, 2008). Efforts were made by world organisations to inaugurate and maintain harmony and sanctuary for the entire world through international cooperation (Frost, 1966). The economic position of South Africa, following World War II, caused a development of increased international interest in this country's military equipment, minerals and agricultural goods. This helped South Africa to become financially strong in the 1960s and reinvest in her own infrastructure and industrial organisations, which increased work opportunities for a society that had been exposed to horrific conditions (Booyse, 2013b, 2013c; Giliomee & Mbenga, 2007).

The large-scale urbanisation of people also demanded from government to make drastic changes in the provision of formal public school education (Booyse, 2013b, 2013c; Giliomee &

Mbenga, 2007). The adoption of Nationalism within South Africa introduced ideologies of segregation in the constitutional law, although the notion was not on behaving in a racist manner, but rather that the relationship between white and non-white communities was still supported – with this act government wanted to give each race the opportunity to develop its own cultural identity without sacrificing any traditions, religious views or its language (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973). Because communities were classified according to race as white, coloured, black, and Indian and each population was assigned to certain regions, land, education systems, and buildings, and strict laws prohibited interracial relationships and activities it communicated strong notions of Apartheid to the world (De Kock, 1968; Giliomee & Mbenga, 2007). Based on these Apartheid activities, leaders from third world countries demanded that Western countries withdraw from the colonies and recommended that South Africa be isolated from international ventures because of being the last country who had a constitution still based on white supremacy and racism (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973). However, the West was not as easily convinced of withdrawal because South Africa was profitable with its rich access to minerals, excellent military equipment and training, and the South African geographical harbours were important for western economic ventures (Giliomee & Mbenga, 2007; Pretorius, 2012; Van Jaarsveld, 1973).

4.5.5.2 Contradiction I

Education and societal activities under the ruling of the National Party were described by Booyse (2013a, 2013b) and Steyn, Steyn, De Waal, and Wolhuter (2011), as the establishment, maintenance and control of detailed laws and structures that were persistent in segregated and independent development of white, coloured, Indian, and black communities (Booyse, 2013a, 2013b). By upholding this notion, the strong representation of segregated education and social activities and processes contributed significantly to the development and implementation of policies, acts and regulations that promoted white-community advancement, progression and employability, but to the detriment of non-white communities (Booyse, 2013b, 2013c; De Kock, 1971; Giliomee & Mbenga, 2007). Although these segregated laws were developed with the ideology in mind that each race group would be given the opportunity to develop and flourish independently within its own region, with its own buildings and infrastructure, this was not entirely the truth (Booyse, 2013b, 2013c; Steyn, Steyn, De Waal, & Wolhuter, 2011). What seemed to have emerged was a complex and often unclear combination of policies, philosophies and pedagogy to justify Apartheid education and the separation of the communal civic identity into a white community and a non-white community (Booyse, 2013b, 2013c; Kallaway, 1997). These laws and ideologies were not blindly accepted by the non-white communities and resulted in socio-political and economic tension and conflict, in order to voice

non-white communities' concerns of and objection to being treated inferiorly, especially in aspects such as the quality of education, their role as citizens, and vocation opportunities (Booyse, 2013b, 2013c; Steyn et al., 2011).

In terms of the aspirations that were held for citizens of South Africa, that were implemented through GeHiNaTE education, there was a split between what was envisioned for white communities, as opposed to non-white communities (Booyse, 2013b, 2013c). Furthermore, the Bantu act was interpreted as a deliberate act to segregate black communities from the white, coloured and Indian communities, to undermine their development to only fit within inferior vocational positions, remain in surroundings of low economic income, not equipping children with the skills to critically consider and discern knowledge, and being inhibited from participating in leadership roles (Beckmann, 2011; Booyse, 2013b, 2013c; Hoadley, 2010; Hugo, 2010).

Aspirations for white communities were to equip learners with knowledge and skills through the subject Environmental Studies (Geography, History and Natural Science), that promoted knowledge and ideas about political and social participation within the learner. Through having access to quality basic and tertiary education, learners from white communities had an opportunity to qualify for lucrative socio-economic vocational positions (Booyse, 2013b, 2013c; Kallaway, 1997). Learners from non-white communities, and especially black learners, were advised to only obtain basic education for four years following a curriculum, that excluded Environmental Studies, that equipped them with skills for certain vocational positions (Booyse, 2013b, 2013c; Hoadley, 2010; Hugo, 2010).

Therefore, not providing all learners with the same educational and social participation opportunities, resulted in a disrupted communal civic identity and oppression of racial groups (Christie & Collins, 1982; Hoadley, 2010). The development of segregated and diverse education training not only permitted the reproduction of social-class inequalities, but also hindered the acquisition and development of Scientific Literacy skills and citizenship for South Africa (Christie & Collins, 1982; Hoadley, 2010). The strongly segregated white and non-white civic identity that was propagated through laws, orders and acts of the National Party reemphasised the notion that white-supremacy citizenship was considered important for the sustainability of South Africa (Booyse, 2013b; Christie & Collins, 1982; Hoadley, 2010). It is also derived that developing a segregated knowledge society was idealised and realised by only educating white communities with knowledge systems associated with GeHiNaTe education and thus only promoting Scientific Literacy and citizenship in learners from white communities.

4.5.5.3 Contradiction II

The new government was obliged to improve the conditions, provision and maintenance of the education system of the non-white communities and the Eiselen directive was appointed to investigate this matter (Beckmann, 2011; Booyse, 2013c; Horsthemke et al., 2013). With the release of the Eiselen Commission Report, a large number of weaknesses in the education system was identified and the recommendations that were made was to help all learners actualise their potential in their own unique way and culture (Booyse, 2013c; Horsthemke et al., 2013; Steyn et al., 2011). Education, still segregated and not integrated, had to help all learners progress and be prepared for the socio-economic and political demands of the country and its ideologies (Booyse, 2013c; Horsthemke et al., 2013; Steyn et al., 2011). The education system under the National Party ruling made provision for formal schooling according to four phases and each phase lasted three years, with limited choices of subjects (Booyse, 2013b; Le Roux, 2013c). Learners with learning or cognitive barriers were trained in practical and vocational orientated courses, whilst learners without learning or cognitive barriers were provided education in eight programmes in the higher grades, namely a technical, commercial, agricultural, humanities, natural sciences, art (including music, drama, ballet, and the fine arts), domestic, and a general programme (Booyse, 2013c; Le Roux, 2013c).

Although the emphasis remained with the acquisition of basic educational skills associated with Language and Mathematics in the early years, the South African curriculum now also formally included content of Geography, History and Natural Sciences under the name “Environmental Studies” (Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991). The teaching of some GeHiNaTe concepts and skills was introduced to the young child through Environmental Studies (Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991). This subject aimed to develop within the child knowledge and skills to function within the environment, developing aesthetic appreciation values, knowledge of agricultural science, observation and research skills, and a realisation of dependence on the environment (Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991). The inclusion of Environmental Studies in the proficiency curriculum was the first step towards the formal introduction of GeHiNaTe concepts and skills to the learner.

Within this era the development and progress of technological external devices, like the telephone and the first computer, introduced a new dimension to learning and communication, as classroom equipment stimulated more than one sense of learners (auditory and visual) and these different inputs stimulated new methods for learning and did not just rely on memorisation and imagination anymore (Coetzee, 1963; Grovè & Hauptfleisch, 1985; Grovè, 1982). An example would be where learners were visually introduced to animals through picture books or they had to recall from memory when they had seen such an animal in their environment; now

they could also experience a dimension of movement and context when watching it on television; the experience of hearing a story being read from a book was now intensified with the introduction of more actors to read the story with fitting sound effects as a form of support (Grovè, 1982; Grovè & Hauptfleisch, 1985). The implementation of the telephone and the computer brought about new concepts of being connected with people who are a great distance away, or being able to communicate with a complete stranger by dialling a number or entering a virtual address into the device (Lektorsky, 2009; Siu & Lam, 2005).

The formal teaching of GeHiNaTe was now intentionally included in the curriculum, although not all learners were exposed to the same subject content or received teaching by a trained teacher. The acquisition of GeHiNaTe knowledge was transferred through physical cultural tools, the Environmental Studies curriculum and educational cultural tools to promote citizenship amongst learners and to acquire basic educational skills and life skills that could be applied to the learner's daily life.

4.5.5.4 Contradiction III

There was a steady increase in developments recorded in international literature regarding Science, Technology, Medicine, and Communication, which required a specific set of knowledge and skills to operate these inventions that ought to be developed by education systems (Frost, 1966; McClennan & Dorn, 1999). Because South Africa was still developing a country, due to the political segregation acts of Apartheid, many first world countries isolated themselves from South Africa to emphasise their opinion of disregard and disgust on the socio-political happenings (De Kock, 1968; Giliomee & Mbenga, 2007). The advancement in scientific and technological knowledge bases and developing Scientific Literate societies were on a steady pace in first world countries, whilst South Africa remained behind. South Africa additionally experienced socio-economic and political tensions after World War II, which led to the realisation and reinvestigation of the segregated education and social system by order of the white government (Booyse, 2013c; Giliomee & Mbenga, 2007). These segregated and biased socio-economic and political activities and processes exercised by the government, resulted in diverse crises which negatively affected South Africa (Booyse, 2013c; Giliomee & Mbenga, 2007). Examples of these were a weak economy, due to a weak knowledge bases development in all of society; sanctions preventing researchers and society to participate and progress through international involvement; and an overall low societal moral and weak communal civic identity (Booyse, 2013c; Giliomee & Mbenga, 2007).

The complex changes and advances that were witnessed in society, because of the advancement in knowledge bases and the transference thereof, illustrate how crucial it has become to not only equip society with GeHiNaTe knowledge, but also to train teachers with the knowledge and skills about GeHiNaTe teaching to the young child. The teacher has to guide learners from everyday conceptualisation, as represented through topics that reflect the learner's daily experiences, to abstract scientific understanding by using appropriate language and skills which can foster Scientific Literacy competencies (Du Raan, 1978; Lea & Gildenhuys, 1967a, 1967b; Departement van Onderwys, 1991).

The performance curriculum utilised topics to teach GeHiNaTe knowledge and skills to learners in a more integrated and socially relevant manner, which in turn required adept knowledge from the teacher to identify the underlying GeHiNaTe concepts and skills. Although it has been established that teachers teaching GeHiNaTe education in the early years required adept content and pedagogical knowledge, it is a matter of concern that the teacher preparation practices did not necessarily equip teachers with these knowledge bases.

Firstly, tertiary institutions also implemented segregated training, which resulted in teachers from non-white communities receiving insufficient training, as opposed to teachers from white communities (Bunting, 2002). Therefore, the school communities in which these two sets of teachers were appointed, also reinstated the segregated knowledge bases transferred to the learners, meaning the learners from white communities received more advanced knowledge bases about GeHiNaTe from more skilled teachers.

Secondly, tertiary institutions were also classified into two sectors, namely universities and technicons (Bunting, 2002). Training from the university equipped student teachers with knowledge about sciences, whilst technicons equipped student teachers with knowledge about technology (Bunting, 2002). The term "science" in this sense meant scholarly activities and processes in which advanced knowledge bases were acquired by student teachers, whilst the term "technology" was more concerned with applying knowledge bases (Bunting, 2002). There was a clear distinction between these two sets of student teachers, making university student teachers more prestigious and sophisticated than technicon student teachers (Bunting, 2002).

Colleges of education were incorporated into existing universities and technicons as faculties or schools, allowing student teachers to either acquire a B Prim Ed degree or a lower level National Professional Diploma in Education (Centre for Education Policy Development, Centre for Evaluation and Assessment, Human Sciences Research Council, & South African Institute for Distance Education, 2005). Thus, teachers received a lower knowledge base classified qualification which was only attainable by white-community teachers (Bunting, 2002; Centre for Education Policy Development et al., 2005).

From this it can be derived that the transference of GeHiNaTe knowledge bases to the young child through education was at risk because teachers were receiving inadequate training because of the stigma of teaching being classified as a low type of knowledge base and the emphasis remaining on teaching learners basic educational skills in the early years.

4.5.6 Accountability and Electronic era: Outcomes-based education in a democratic South Africa (1994-2015)

4.5.6.1 Context

The Accountability and Electronic era resembled a time period of transitions and changes in the global economic market and an increase in the acquisition of goods and services (consumerism) and privately owned enterprises (Dever & Falconer, 2008; McClennan & Dorn, 1999). Electronic and digital tools have become more apparent, accessible and sophisticated than before and brought about socio-emotional challenges in individuals to establish and sustain significant relationships with people in both physical and virtual worlds, and also considering the reality of artificial intelligence in the future where computers and robots will become more integrated in every aspect of human life (Kaku, 2011; McClennan & Dorn, 1999). The advancements in Technology and cultural tools have influenced vocations, knowledge systems, education, and individuals' personal lives tremendously (Bunch & Hellemans, 2004; Dever & Falconer, 2008; Rückriem, 2009).

South Africa is still experiencing an arrearage in technological advances; for instance, not all citizens are capable of using or have access to technological devices due to financial reasons as well an inappropriate teaching and learning opportunities (Steyn et al., 2011; Wolhuter, 2013c). South Africa has demonstrated commitment by launching projects and policies to assist citizens in keeping up with the technological advances that are evident internationally (Booyse et al., 2013; Horsthemke et al., 2013). Within these eras, socio-scientific issues have also been witnessed, like an increase in global warming, the endangerment of animal species and natural resources, and many natural disasters which led to changes in demographic location and rebuilding ruined infrastructure in various parts of the world (McClennan & Dorn, 1999; Ratcliffe & Grace, 2003). The outbreak of HIV/Aids, which emerged in the 1980s, and was spread at a lethal pace, resulted in generation gaps seen in society and new-born babies retracting the disease due to negligence and ignorance (McClennan & Dorn, 1999; Ratcliffe & Grace, 2003; Volti, 1999).

4.5.6.2 Contradiction I

The post-apartheid regime brought about noteworthy changes within the socio-political, educational and economic domains. Some of the most notorious moments in this era were the drafting and acceptance of a new constitution and bill or rights, which are recorded as the most progressive in the world (Brits, 2012; Wolhuter, 2013b, 2013c). With the declaration that South Africa is a democratic republic, various changes and transformations were envisaged, namely land reformation, social-economic status and vocational reformation, as well as educational reformation (Brits, 2012; Gilliomee & Mbenga, 2008). Within this time period, the societal context was mostly concerned with political developments, the dispensation of the constitution, determining the demographical, linguistic and geographical profile of society, and stabilising South Africa's economic situation (Brits, 2012; Wolhuter, 2013b, 2013c). It was important for non-white communities to also be valued and viewed as national talent and develop values of acceptance, respect, liberty, and peace (Booyse, 2013b, 2013c; Steyn et al., 2011).

Due to the overall dissatisfaction of non-white communities about their social and political position under the National Party ruling, the demands for liberation and equality were investigated and reconsidered after the election and the declaration of South Africa as a democratic country (Brits, 2012; Wolhuter, 2013b, 2013c). The aspirations that were envisioned by government to cultivate a democratic society emphasised the development of a communal civic identity that acknowledges the importance of equal opportunities in aspects of political participation, quality of education and better socio-economic positions (Brits, 2012; Wolhuter, 2013b, 2013c). The strive towards a democratic communal civic identity brought about changes in notions to advance education and social participation to develop citizenship within learners and, in turn, encouraging Scientific Literacy knowledge and skills.

A time has come for equal opportunities in education, which are directed at the needs of society, the free practicing of religious and cultural ways, and acknowledgment of diverse languages in the South African population (Booyse, 2013c; Le Roux, 2013d; Steyn et al., 2011). The African National Congress demanded an education policy which ought to be based upon the following ideals, which are the diametrical opposite of those of the education system before 1994 (Brits, 2012; Wolhuter, 2013b, 2013c). These ideals consisted of intrinsic goals, namely democratisation, desegregation, decentralisation, equalisation of educational opportunities, multicultural education, and external social goals to promote eradication of economic poverty, liberating society, emancipating cultural expression, taking part in processes of a democratic society, and nation building (Brits, 2012; Wolhuter, 2013b, 2013c).

It is interesting to note that the government developed an increased awareness of how education fosters citizenship and Scientific Literacy by not only developing a new nationalised

curriculum with a different pedagogical approach, but also inviting international scholars to help design such a curriculum (Hoadley & Jansen, 2003; Jansen & Chistie, 1999; Spady & Schlebusch, 1999). The African National Congress government implemented laws, orders and acts, which recognised all eleven languages of South Africa in education. The content included in the curriculum incorporated Geography, History, Natural Sciences, and Technology; and governed the selection and appointment of teachers that have undergone training through tertiary institutions (Booyse et al., 2013; Steyn et al., 2011). The Accountability and Electronic era are associated with the improvement of learner achievement through redefining roles and responsibilities, education policies, researching the development and education of the young child, and the implementation of an education system which serves the specific society's needs (McCulloch & Crook, 2008). Increasing availability of federal and state resources for schools foreshowed a strong Accountability and Electronic era movement (Dever & Falconer, 2008; Roopnarine & Johnson, 2009).

However, Wolhuter (2013c) observed that racial segregation was now replaced with socio-economic segregation, and that two grossly different but parallel educational systems were now evident; the one for the rich (private schools on par with international standards); and one for the state schools (not on par with international standards). Thus, it can be deduced that although diverse populations in South Africa came to realise that education for all learners, regardless of race, gender, socio-economic status, demographic profile, or linguistic preference, was of great importance, the system still had glitches (Wolhuter, 2013c).

The strong homogenous democratic communal civic identity that was propagated through laws, orders and acts reemphasises the notion that citizenship is important for sustainability of a country. Knowledge systems associated with GeHiNaTe education were acknowledged and highly valued during the Accountability and Electronic era, and finally it was now being taught to all learners, regardless of their race, social status or language preference.

4.5.6.3 Contradiction II

The new education system of South Africa was referred to as "the people's education", which is based on the notion of and reaction in contradiction to segregated education (Jansen & Chistie, 1999; Pinar, 2010). The new education reflected the interests of emancipating those individuals through education who were discriminated against and placed in a disadvantaged position (Booyse, 2013c; Brits, 2012; Jansen, 1999; Wolhuter, 2013c). The learner-centred pedagogy within this time was to equip learners with critical thinking and problem-solving skills, and to move away from teacher-centred pedagogy, which overemphasised rote learning and acquiring

content knowledge in the Apartheid regime (Booyse, 2013c; Brits, 2012; Jansen, 1999; Wolhuter, 2013c). Government idealised the development of a society that consists of self-regulated learners who will become independent in their thinking and who will develop into life-long learners (Booyse, 2013c; Brits, 2012; Jansen, 1999; Wolhuter, 2013c). Education was focused on acknowledging and accommodating diverse learning needs, to realise diverse but equal vocational aspirations for all, and to develop a curriculum that caters for a unique demographic profile (Booyse, 2013c; Brits, 2012; Jansen, 1999; Wolhuter, 2013c).

The previous content-driven curriculum in the Apartheid era was described as a banking system where teachers deposited knowledge into empty minds, and the type and quality of knowledge were not the same for all, whilst the outcomes-based education system was considered the people's education for liberation (Booyse, 2013c; Brits, 2012; Jansen, 1999; Wolhuter, 2013c). Within the competency curriculum, the inclusion of Social Sciences, Natural Sciences and Technology concepts and skills was more evident and focused on developing Scientific Literacy in learners than was previously the case (Department of Education, 2002, 2003, 2011c).

Cultural tools, especially technological devices, are part of the modern society's frame of reference and with the coevolution of knowledge generation and knowledge dissemination, it has become even more part of teaching, learning and living (Giesecke, 2005). Due to weak socio-economic circumstances in South Africa, the education system has not yet accomplished the goal of equipping its entire society with the literacy to use the available cultural tools or to progress with globalisation (Pretorius, 2012; Steyn et al., 2011; Wolhuter, 2013c). A new form of segregation was evident: less than ten percent of citizens could afford cultural tools which utilise Technology and Technology-based pedagogy and the advancement in knowledge that comes with the territory (Steyn et al., 2011; Wolhuter, 2013c). The curriculum could not efficiently provide scientific and technological literacy to equip society with these advances because access to these devices and virtual worlds was too expensive for state-subsidised schools (Steyn et al., 2011; Wolhuter, 2013c). The use of cultural tools was still predominantly portrayed and depicted through the same lenses and pedagogy that have been developed by the culture of the printing press and books (Steyn et al., 2011; Wolhuter, 2013c). Although the advantages and necessity of adopting blended or a more appropriate multi-media approach in teaching were justified (Giesecke, 2005), the socio-economic situation in South Africa prohibited such advancements and knowledge acquisition by all learners.

The formal teaching of GeHiNaTe was now intentionally included in the curriculum and all learners were exposed to the same subject content and intended to receive teaching by a trained teacher. The acquisition of GeHiNaTe knowledge was transferred through physical cultural tools, the Life Skills curriculum and educational cultural tools to promote citizenship,

Scientific Literacy competencies and basic educational skills, which were extended with the entering of the next educational phase of teaching.

4.5.6.4 Contradiction III

South Africa has undertaken to develop a new communal civic identity that was diametrically the opposite of that which was determined by the National Party government, which also affected the way in which education in South Africa was now visualised and implemented (Wolhuter, 2013c). The new education policy, in the form of acts and White Papers, was set to address all previous discrimination acts by idealising democracy, equal educational opportunities, a national education system, desegregation, and multicultural education (Wolhuter, 2013c). The competency curriculum welcomed input from international scholars and curriculum developers to generate a curriculum fit for a democratic society which addressed previous discriminations (Wolhuter, 2013c). With the newly developed and designed competency curriculum, major changes were incorporated, such as the content within the Foundation Phase curriculum that was more integrated than before by organising it around topics; Life Skills knowledge bases were also to be applied in such a way to support the acquisition of basic educational skills by the young learner (Department of Education, 2002, 2003, 2011c). The subjects within the Life Skills curricula, associated with GeHiNaTe knowledge bases, required adept knowledge from teachers to interpret and identify underlying concepts and skills within the topics, and to guide Foundation Phase learners from everyday conceptualisation of their experiences to abstract scientific understanding (Department of Education, 2002, 2003, 2011c). The teaching of GeHiNaTe education through the competency curriculum of the Foundation Phase had the potential to foster scientific thinking and reasoning skills and help learners become Scientific Literate and informed citizens for the future, but required informed and knowledgeable teachers to attain these outcomes (Department of Education, 2002, 2003, 2011c).

After the commissioning of the first-ever National Teacher Education audit, it was found that the fragmented and segregated provision and training of teachers were to the detriment of education (Centre for Education Policy Development et al., 2005). The newly developed and designed curriculum of South African education required teachers to be sufficiently equipped to meet the educational needs of a growing democracy with Scientific Literate competencies to meet the demands for the twenty-first century global environment (Centre for Education Policy Development et al., 2005). Teachers required adept conceptual knowledge, subject matter knowledge, pedagogical knowledge, and knowledge of Technology and Education Technology to interpret and implement the intended curriculum (Centre for Education Policy Development et al., 2005). The current generation of teachers was the first to experience and interpret a

curriculum that was non-racial, set on democratic transformation and Scientific Literacy (Bunting, 2002; Centre for Education Policy Development et al., 2005; Wolhuter, 2013c).

According to international literature, the teaching of GeHiNaTe education in early years emphasised greater professional autonomy and adept knowledge of History, Geography, Natural Sciences, and Technology education to utilise appropriate pedagogies and Educational Technologies to bring about radical changes in learners' behaviour. However, the Life Skills curriculum, and its diluted focus on History, Geography, Natural Sciences, and Technology education within the early years, did not yet comprehend the value of this subject, as the focus of education and teacher training remained on the acquisition of reading, writing and arithmetic skills.

4.6 TRANSFORMATIONS

As noted by Engeström (2001), the historical cycles through which activity systems move to produce qualitative transformations take relatively long, as the contradictions of an activity system are triggered and cause individuals or communities to question and deviate from their/its established norms or to collaborate as a community to deliberately change the activity system through collective effort (Engeström, 2001). As Engeström (2001) explained, in order for an activity system to change, an expansive transformation is required, indicating a reconceptualising of the current status quo and embracing a radically wider horizon of possibilities than in the previous mode of the activity. The following quote by Engeström (2001, p. 137) illustrates why transformation is important in an activity system to prevent stagnation.

> It is the distance between the present everyday actions of the individuals and the historically new form of the societal activity that can be collectively generated as a solution to the double bind potentially embedded in the everyday actions (Engeström, 1987, p. 174).

In light of this quotation, some of the major transformations that were witnessed in this historical research inquiry, derived from the vertical and horizontal analysis, are as follows:

The first transformation was the change in the communal civic identity that the South African society witnessed. This was one of the most influential transformations up to the present day in this historical analysis. Society underwent changes in civic identity, from being distinct heterogeneous indigenous communities, to being colonised under Dutch and British ruling respectively, with the attempt to marginalise all individuals under one superior homogenous society – which caused havoc and protest. The results of the oppression of the so-called

“inferior” groups, based primarily on race, were finally overcome by the selection of a new government, announcing South Africa as a democratic society with its inhabitants having equal rights and opportunities.

The second transformation witnessed, was the change in the knowledge bases, represented through curricula. Due to colonisation, South Africa was introduced to a formal education system that advanced with the times, to the point where basic educational skills were taught to all learners and the teaching of GeHiNaTe increasingly became more acknowledged and included in the formal intended curriculum for the young child. The value, role and purpose of a qualified teacher to teach learners such knowledge bases were also increasingly recognised. Although teachers were initially used for socio-political and economic reasons by the government to control society, this factor has been emancipated to the point where teachers have a free choice to be trained as a teacher through higher institutions of education and to reinvest their knowledge by teaching at schools.

The third transformation is related to the cultural tools that not only advanced knowledge systems, but were also used to transfer and preserve these cultural tools for future generations. Thus, with the arrival and governing of Dutch and British settlers, South Africa was not only introduced to formal education systems and curricula, but also to the advancement in cultural tools, from tribal, to typographic, to those of the electronic age. All these transitions were painful periods of transition, which caused much destruction and suffering to the communities at the midst of these shifts. However, the progression and advancement that is evident in the current society, justifies such struggles.

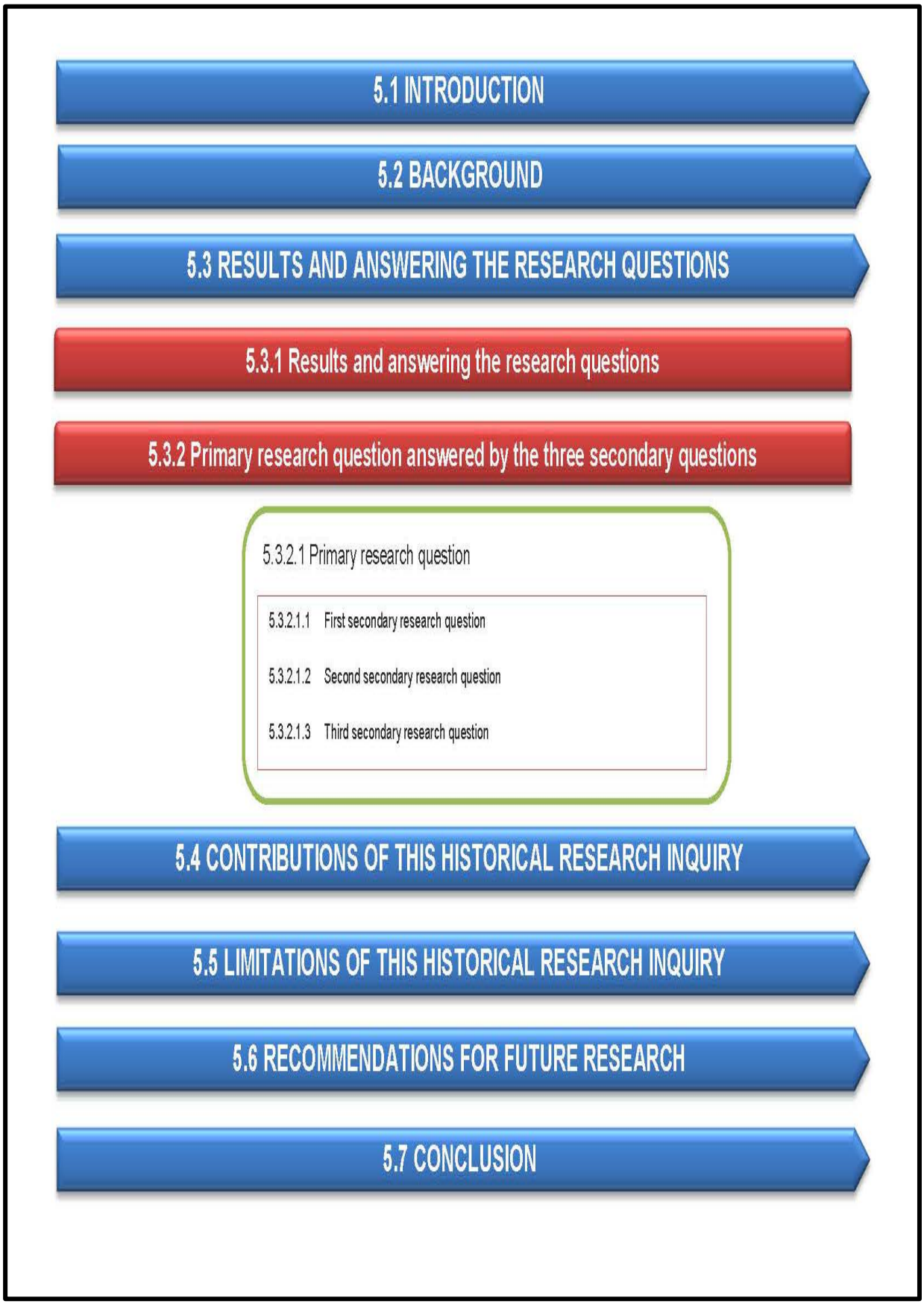
4.7 SUMMARY

The horizontal analysis of the three activity systems, Educational, Societal and Technological, enabled the researcher to historically map out how the knowledge bases of teachers have developed and advanced, in order to teach a subject like GeHiNaTe within the early years and in the future. Through horizontally and historically analysing the tensions between these conglomerated activity systems, it was indicated, in international bodies of scholarly work, how the education of GeHiNaTe has increasingly been acknowledged as having a pivotal role, in terms of the advancement of knowledge systems and the fostering of Scientific Literacy and citizenship within the young child.

In terms of the three contradictions, it can be deduced that the teaching of GeHiNaTe in South African education over the six periods has acknowledged the value of these knowledge bases and what their functions are. The use of cultural curriculum and tools for GeHiNaTe education

has evolved and progressed over the years, but the full potential of these knowledge bases and tools has not been actualised yet. The development of teacher preparation programmes for GeHiNaTe teaching in the Foundation Phase has undergone much change in order to attain quality teaching. However, with the over-emphasis still on the acquisition of basic education skills by the young child, teachers are not sufficiently trained to interpret and implement the Beginning Knowledge curriculum for the Foundation Phase in South Africa.

CHAPTER 5: REPORTING AND COMMUNICATING



5.1 INTRODUCTION

The assumption, that elicited the need for this historical research inquiry, was that the teaching of Life Skills content, therefore Beginning Knowledge, in the Foundation Phase, is primarily focused on supporting and strengthening the acquisition of basic skills (reading, writing and arithmetic), associated with Languages and Mathematics (Department of Education, 2011c). Due to the nature of the contextual and conceptual identified gaps in the body of scholarship about Beginning Knowledge education in the Foundation Phase in South Africa, the researcher also identified a methodological gap and utilised a historical research design as means to conduct this particular inquiry.

Inquiries with a historical research inquiry as methodology are not as common in South African literature and, therefore, even less common within the scope of studies regarding Beginning Knowledge education. A possible reason for downplaying the value of a historical research inquiry may be because the value attached to past educational theories and practises, specifically those from the Apartheid regime, is not considered to be beneficial to current practices. Thus, attempts to reinvestigate and reintroduce local or indigenous GeHiNaTe education, through historical methodology, have been devalued, long downplayed or even dismissed in South African bodies of scholarship (Asabere-Ameyaw, Sefa Dei, & Raheem, 2012).

However, decades of research studies by international scholars have shown that both GeHiNaTe education and the execution of historical research inquiries promote indigenous knowledge and local knowledge bases, citizenship, Scientific Literacy and a communal civic identity amongst societies (Fleer & Pramling, 2015; Hodson, 2008; Partnership for 21st century skills, 2009; Ratcliffe & Grace, 2003). Therefore, the pursuit of this historical research inquiry, as established in the Initiation chapter (see Heading 1.5.3.3), was to adopt the role of a historical researcher, in order to allow the researcher to become a metaphorical time traveller who can travel back and forth between the past, present and possible future. The historical researcher was in search of the diverse dialogues that have taken, are taking, and will take place on the importance of GeHiNaTe Education in Early Childhood Education or, as it is known in the South African context, Beginning Knowledge education in the Foundation Phase.

The significance of this study, as summarised in this chapter, is to (re)identify, (re)contextualise, and (re)communicate these dialogues according to the six historical research periods 1400-1652; 1652-1806; 1806-1899; 1899-1948; 1948-1994; 1994-2015 (see Headings 1.5.3.3 and 3.3) utilising the three activity systems (Educational, Societal and Technological). This endeavour was undertaken in the quest to develop a better understanding of how Beginning

Knowledge education, embedded in the Life Skills content, has originated and developed in the Foundation Phase curricula of South Africa, by consulting international and national bodies of scholarship.

5.2 BACKGROUND

This Reporting and communicating chapter summarises the previous Performance and Interpretation chapters investigation of the vast amount of international and national scholarly work that was disseminated about the GeHiNaTe education in Early Childhood Education. The way in which Beginning Knowledge has developed over a relatively long historical period was investigated by utilising a reconstructed Hybrid Cultural-Historical Activity Theory (see Heading 1.5.2.3). This theoretical framework assisted the researcher to make sense of and convey how the social, historical, cultural, philosophical, media, and technological implications have contributed to the development of Beginning Knowledge education in the Foundation Phase in South Africa.

With this historical research inquiry, the need for an authentic educational understanding of the value of GeHiNaTe education in the early years was investigated, based on the fact that this particular subject has always played a vital role in the formation, construction, design, and enactment of indigenous knowledge bases to be acquired by society (Asabere-Ameyaw et al., 2012). As already noted in the Performance and Interpretation chapters, it is through the communal interrogation of ideas, concepts, principles, symbols, as well as cultural and social values of the bodies of scholarship about GeHiNaTe education (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012), that this historical research inquiry could further contribute to the existing Beginning Knowledge body of scholarship (see Heading 1.5).

Mouton (2001) and Trafford and Leshem (2008) reiterated the importance of the concluding chapter of a research inquiry. Mouton (2001) and Trafford and Leshem (2008) stated that the concluding chapter depicts or demonstrates the holistic picture of the entire research process that gives closure to the researcher's thoughts and dialogues. Trafford and Leshem (2008) called the following visual presentation the "magic circle" because it indicates an overview of the entire research process and it has a built-in assessment instrument. It gives the author an overview of the entire study and explains how she has established cohesion.

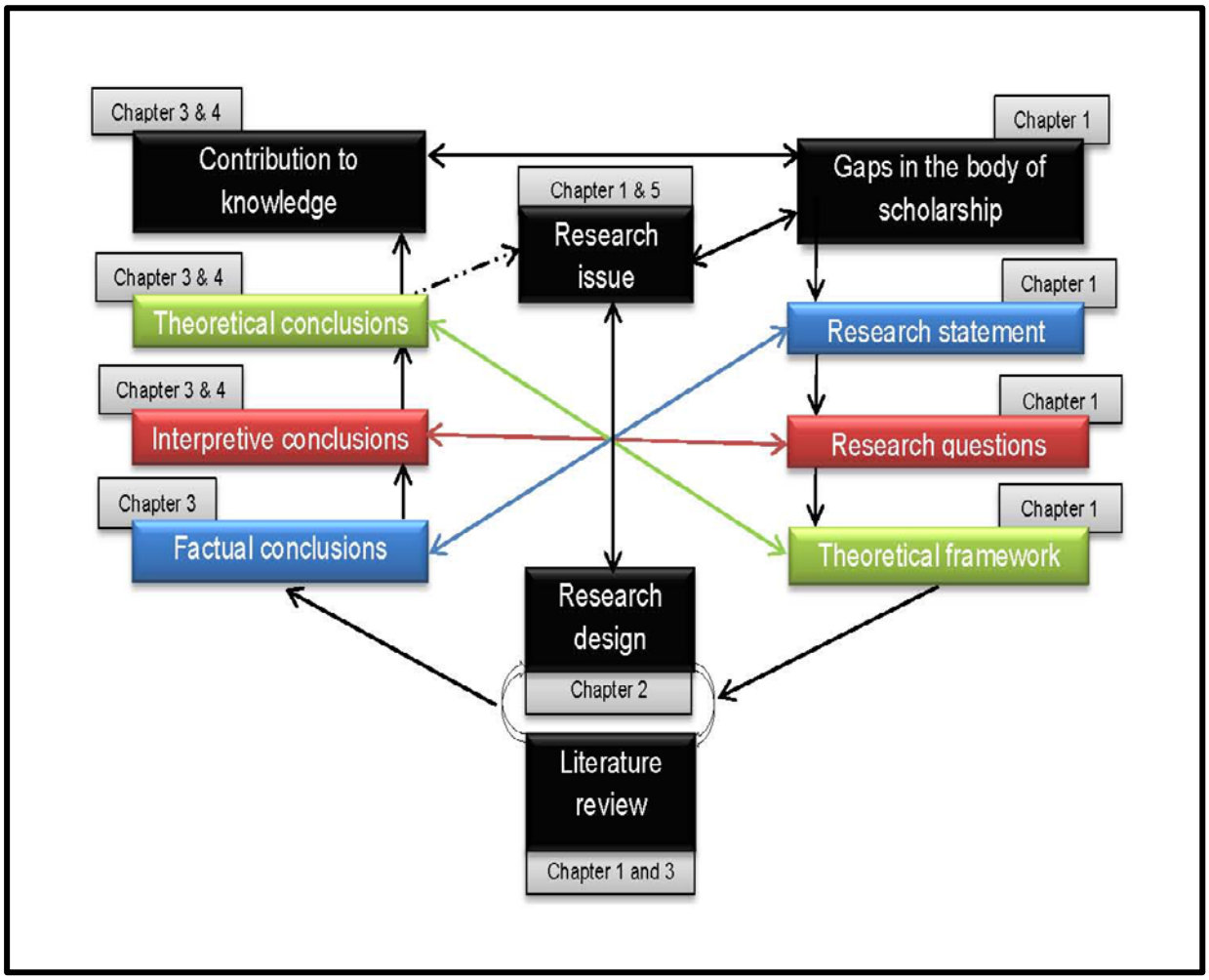


Figure 5.1: Overview of the historical research inquiry (the "magic circle")

(Adapted from Trafford and Leshem, 2008, p. 170)

This strategic overview starts with the three gaps that were identified (see Headings 1.5.1, 1.5.2, and 1.5.3) in order to justify this research inquiry, which was then established as an authentic research issue through a preliminary literature review (see Heading 1.5.1.3), and the newly developed and coined theoretical framework (see Heading 1.5.2.3). From the research problem follows the purpose statement (see Heading 1.3), which culminated in research questions (see Heading 1.4) from which a conceptual framework was derived. By conceptualising the expectancies of the research inquiry, the researcher was able to identify a suitable research design (see Heading 1.5.3.3 and Design and Planning chapter 2). The literature review did not only reflect on the relevancy of the research issue, but also on the suitability of the research design to be utilised. As illustrated with the magic circle, the

confirmation of all the relevant and interconnected aspects present in a research inquiry also improved the internal consistency of the study (Trafford & Leshem, 2008).

The role of the magic circle for this historical research inquiry can be described as follows: the research statement relates directly with the scholarly grounded and factual conclusions that were generated by the three activity systems, through vertical (see Performance chapter 3) and horizontal (See Interpretation chapter 4) analyses by utilising the Hybrid Cultural-Historical Activity Theory. Thus, cohesion between the problem statement and the factual conclusion, in turn, improved the internal consistency of identified and generated data (Trafford & Leshem, 2008). Answers to the research questions emerged as the author analysed, interpreted, and made sense of the existing and emerging bodies of scholarship.

Because the research questions, together with the theoretical framework, guided the processes of constructing, integrating and analysing the data, the trustworthiness of the data through internal theoretical consistency, as data verification strategy, was increased (Trafford & Leshem, 2008). The theoretical framework, namely the coined Hybrid Cultural-Historical Activity Theory, assisted the researcher to derive theoretical conclusions through analysing the activity systems vertically and horizontally. This is considered the most critical aspect of the entire research inquiry, as these findings address the initial research issue, reiterate the relevance of the conducted researcher and the generated findings can be adopted in the existing corpus of knowledge (Trafford & Leshem, 2008).

5.3 RESULTS AND ANSWERING THE RESEARCH QUESTIONS

5.3.1 Results and answering the research questions

The purpose or intention of this historical research inquiry was communicated in the Initiation chapter (see Headings 1.3 and 1.5) and should be answered in this final chapter (Trafford & Leshem, 2008). For this historical research inquiry, one primary and three secondary research questions were coined to guide the researcher through the entire process (see Heading 1.4.1 and 1.4.2). Each of the secondary research questions also represented a gap in the body of scholarship. Therefore, the primary research question was indirectly answered by the three secondary research questions. In other words, the three secondary research questions formed the foundations of the overarching notions that the primary research question aimed to answer.

5.3.2 Primary research question answered by the three secondary questions

As described in the previous chapters (see Headings 1.5.2.3 and 1.5.3.3), the historical research design, that is embedded in the coined Hybrid Cultural Historical Activity Theory, incorporated the five principles of Engeström (2001), which served as guiding principles to analyse and interpret the bodies of scholarship (see Headings 1.5.2.2 and 1.5.3.3). These five principles are (i) historicity; (ii) activity systems; (iii) multi-voicedness; (iv) contradictions; and (v) transformations.

(i) Historicity is concerned with how the activity systems develop and change over time and reminds the researcher to be sensitive towards the local history and context in which the activity system is located at the different points of time (Engeström, 2001).

(ii) Activity systems are described as collective actions undertaken by a group of individuals towards a common goal. Such an activity system functions on its own, but also interrelates with other activity systems (Engeström, 2001).

(iii) The activity system also signifies multiple voices, traditions, interests, cultural tools, and conventions, that are represented or denoted within a certain historical time period (Engeström, 2001).

(iv) The contradictions are described as the historically growing operational tensions that exist within and between the activity systems, that can bring about change or stagnation (Engeström, 2001).

(v) Sometimes activity systems undergo transformation when the purpose and motivation of the activity has been reconceptualised by the members and they want to embrace the possibility for change and move away from the former mode of the activity (Engeström, 2001).

5.3.2.1 Primary research question

The primary question was: “How did Life Skills education, with specific focus on Beginning Knowledge, develop historically as a subject domain within the Foundation Phase curricula in South Africa?” (see Heading 1.4.1). This primary research question was indirectly answered by the three secondary research questions explicated below.

5.3.2.1.1 First secondary research question

The primary research question was systematically answered by answering the first secondary research questions related to the contextual gap. This question was: “How did the respective activity systems, namely the Educational, Societal and Technological activity systems, contribute to the historical development of Beginning Knowledge, by utilising a vertical analysis? (see Headings 1.5.1 and 5.3.1.1.1). This table conveys the answers to the first secondary question regarding how Beginning Knowledge education in the Foundation Phase in South Africa has undergone historical development.

Table 5-1: Answers of the first secondary research questions (contextual gap)

(i) Historicity	(ii) Activity systems	(iii) Multi-voicedness	(iv) Contradictions	(v) Transformations
National and international literature about GeHiNaTe education in the early years between 1400 and 2015	Identification and description of the three activity systems, namely: • Educational • Societal • Technolo-gical	Three activity systems discussed according to specific criteria per activity system: • Educational (Subject-Matter Knowledge and Pedagogical Content Knowledge) • Societal (Scientific Literacy and Scientific Literacy Knowledge) • Technological (Knowledge of Content, Pedagogy and Technology)	Influences from outside the activity systems: • Education system from abroad • Communities from abroad • Cultural tools from abroad	Changes adopted in respective activity systems: • Informal to formal teaching of GeHiNaTe • Autocratic to democratic society • Media transitions (Tribal-typographic-digital)

The five principles, with their summative answers about the contextual gap, as depicted in the table above (see Table 5-1), need to be clarified in order to give a comprehensive view of the findings under each of the principles related to this historical research inquiry. These findings are discussed under the five listed principles and the results further bulleted, as follows:

(i) Analyses of both international and national bodies of scholarship that related to the education of Geography, History, Natural Sciences, and Technology in the early years, looking at the six consecutive historical periods were performed. From these latter mentioned analyses the researcher was then enabled to construct a new and integrated historical knowledge base about Beginning Knowledge education in South Africa. It seems that the majority of the literature about GeHiNaTe education (internationally) and Beginning Knowledge education (nationally) in the early years was focused on the time period of 1948 to 2015. The literature regarding GeHiNaTe education and Beginning Knowledge education between 1400 and 1948 was not as explicit; however, the data that has emerged from this historical time period helped to shape the respective knowledge bases of Geography, History, Natural Sciences, and Technology education in the early years. In other words, the accumulative and long qualitative cycle over which this historical research inquiry was conducted, illustrates how Beginning Knowledge has been transformed up until the point that it was formally taught in schools.

(ii) The development of Beginning Knowledge education in the Foundation Phase in South Africa did not occur in isolation; in fact there were different contributing factors that helped shape the development of this subject. The Hybrid Cultural-Historical Activity Theory, as theoretical framework, assisted the researcher to identifying three activity systems as major contributors to the development of Beginning Knowledge education in the Foundation Phase in South Africa. These are the Educational, Societal and the Technological activity systems.

(iii) In order to make sense of how each activity system has contributed respectively to the development of Beginning Knowledge education in the Foundation Phase in South Africa, specific criteria were identified for each activity system. As depicted in the table, the criteria for the activity system Educational were Subject-Matter Knowledge and Pedagogical Content Knowledge, with their typologies. For the Societal activity system, the criteria were Scientific Literacy and Scientific Literacy Knowledge. For the Technological activity system, the criteria were Knowledge of Content, Pedagogy and Technology. These selected criteria depicted how the knowledge bases, that a teacher requires to teach GeHiNaTe education in the early years, have developed.

The respective criteria of each activity system were applied upon identifying and selecting relevant literature about GeHiNaTe education and Beginning Knowledge education in the early years. The respective criteria for each activity system also enabled the researcher to compare the international and national bodies of scholarship about GeHiNaTe education and Beginning Knowledge education with one another. Based on these comparisons (see

the Performance chapter 3) it can be derived that the knowledge base that is reflected in the South African curriculum for Beginning Knowledge education is sufficient and appropriate, as compared to the international requirements for the development of Scientific Literate citizens for the twenty-first century. However, it should also be noted that the competency curriculum for Beginning Knowledge education (1994-2015), as it is currently implemented, can be improved. The South African curriculum has the potential to reflect the notions held by international scholars about the importance of GeHiNaTe education for future citizenship and a Scientific Literate society.

(iv) Some of the major influences that caused contradiction within each of these activity systems, seem to have originated externally from the South African context. As depicted in the table, the three contradicting trends that were identified were:

- Firstly, within the Educational activity system, foreign curricula from the Dutch (1652-1806) and the British (1806-1899), respectively, were introduced to the homogenous and heterogeneous communities that were living in the Southern parts of Africa. The implementation of these curricula was for the purpose to implicitly teach these indigenous, settler and slave communities the basic educational skills related to reading and writing and, sometimes, how to do arithmetic.

- Secondly, the arrival of the settlers/immigrants, slaves and missionaries brought change and tension to the Societal activity system. It was expected by the ruling party or government to merge the heterogeneous communities into one homogenous community to promote a Dutch or Anglican communal civic identity.

- Thirdly, the introduction of foreign Dutch and British curricula respectively, and the arrival of foreigners also introduced new cultural tools, especially that of a phonemic alphabet, which is represented through symbols and pictures.

(v) These above-mentioned external contradictions that were introduced to each of the three activity systems, seems to have served as the original impetus for transformations that have been witnessed in the history of South Africa. Some of these transformations, which contributed to the historical development of the Beginning Knowledge education in the Foundation Phase in South Africa, can be described as follows:

- The first trend, in the Educational activity system, was the transition from informal Beginning Knowledge education (1400-1948) to formal Beginning Knowledge education (1948-2015).

- The second trend that occurred in the Societal activity system, was the gradual amalgamation of heterogeneous communities into homogenous communities, until finally becoming an emancipated and democratic society (1994-2015).

- The third inferred trend was the initial adoption of the typographic cultural tool, which resulted in the transition in knowledge transference from tribal (1400-1652) to that of typographic (1652-1948) means. The typographic era made way for Sciences and Technology to help societies become digitalised (1948-2015), which is more evident in the globalised world.

5.3.2.1.2 Second secondary research question

The second secondary research question which represents the conceptual gap for this historical research inquiry is: "How did a conglomeration of the Educational, Societal and Technological activity systems contribute to the historical development of Beginning Knowledge, by utilising a horizontal analysis? (see Headings 1.5.2 and 5.3.1.1.2)". The below depicted table (see Table 5-2) also conveys the answers to the second secondary question regarding how Beginning Knowledge education in the Foundation Phase in South Africa has undergone historical development.

Table 5-2: Answers to the second secondary research questions (conceptual gap)

(i) Historicity	(ii) Activity systems	(iii) Multi-voicedness	(iv) Contradictions	(v) Transformations
National literature about Beginning Knowledge education in the early years over six historical periods: • 1400-1652 • 1652-	Conglome-ration of the three activity systems: • Educational-Societal • Educational-Technolo-gical • Societal-Technolo-gical	Derived labels for the conglomerated activity systems: • GeHiNaTe education for citizenship • GeHiNaTe teaching curriculum and tools • Teachers' professional	Influences within the conglomerated activity systems: • Differing communal civic identities and emphasis on basic literacy education and not Scientific Literacy education • Knowledge bases are transferred through cultural tools. Delay in current tools for teaching	Changes adopted in conglomerated activity systems: • Democratic society with an equal education • Performance to competency curriculum • Teacher preparation programmes reconsidered

1806 • 1806-1899 • 1899-1948 • 1948-1994 • 1994-2015		development in GeHiNaTe education	and the intentional teaching of GeHiNaTe affected the development of adept knowledge bases in learners • Quality of teacher training is of concern and focus is on basic education and not GeHiNaTe education	and restructured

Once again, the five principles, with their summative answers about the conceptual gap, are depicted in Table 5-2, and also need to be elucidated in order to give an inclusive view of the findings under each of the principles related to this historical research inquiry. These findings are also discussed under the five listed principles and the results further bulleted, as follows:

(i) As stated before, the researcher analysed both international and national bodies of scholarship, in order to construct a new and integrated historical knowledge base about Beginning Knowledge education in South Africa. The researcher then studied this newly constructed knowledge base and contextualised the derived data by looking at it through a metaphorical lens, as represented by South African bodies of scholarship. In other words, during the process of horizontally analysing the newly constructed knowledge base, the researcher was enabled to contextualise and describe how each of the six epochs, within the entire historical period from 1400 to 2015, assisted in shaping the development of Beginning Knowledge education in South Africa. The six periods are: Pre-Colonial times – traditional education (1400-1652); Colonial times – Education during Dutch Colonisation (1652-1806); Industrial and Progressive era – Education under the British rule (1806-1899); Child Study Movement era – Education in the midst of missionaries, Boer Republics, wars and the end of union (1899-1948); Great Society era – Apartheid education under National Party ruling (1948-1994); and Accountability and Electronic era – Outcomes-based education in a democratic South Africa (1994-2015). The vast amount of accumulative, contextual-specific and qualitative data of the history of South Africa and South African education helped to show how transformations within South Africa ultimately contributed to the formal teaching of Beginning Knowledge in schools.

(ii) The three activity systems enabled the researcher to vertically construct knowledge bases that produced Educational, Societal and Technological knowledge bases, as discussed with the previous research question. In order for the researcher to now be able to

contextualise the generated data from a South African point of view, she had to determine how these systems influence one another. The researcher conglomerated the three activity systems and horizontally analysed the already integrated historical knowledge base for Beginning Knowledge education. These conglomerated systems, as depicted in Table 5-2, are Educational-Societal; Educational-Technological; and Societal-Technological.

(iii) The application of these conglomerated activity systems enabled the researcher to make sense of the possible reasons that helped shaped Beginning Knowledge education within South Africa over a long historical period.

- In order to better understand what the researcher means with contextualising the constructed knowledge bases, she firstly conglomerated the Educational-Societal activity systems. The derived label given is “GeHiNaTe education for citizenship”, as these two activity systems are concerned with teacher knowledge about GeHiNaTe education, and how a society can be shaped for citizenship and twenty-first century skills through the teaching of this subject.

- Secondly, the conglomeration of the Educational-Technological activity systems enabled the researcher to develop a better understanding of how GeHiNaTe education can be transferred by utilising teaching curricula and educational tools. The name that was given to this conglomerated system is “GeHiNaTe teaching curriculum and tools”.

- The third conglomerated system is represented through the Societal-Technological activity systems and the label given is “Teachers’ professional development in GeHiNaTe education”. The researcher looked into the knowledge bases of tools for knowledge transference and what type of citizen society envisions for the future. The researcher concluded that the training and development of teachers to fulfil the role of transference of GeHiNaTe knowledge for citizenship in the early years, is necessary in this context.

(iv) With this analysis of the conglomerated activity systems, the contradictions seem to have originated internally.

- The first internal contradiction, that evolved from GeHiNaTe education for citizenship, seem to be due to the differing communal civic identity within South Africa that greatly impacted the education system. Education for the young child was predominantly focused on the acquisition of basic literacy skills and not on acquiring knowledge bases

associated with Beginning Knowledge. Furthermore, knowledge bases through the curriculum were not equally taught to all learners. Thus, education for citizenship and the promotion of Scientific Literacy were probably also jeopardised.

- The second internal contradiction that was evident in GeHiNaTe teaching curriculum and tools, was the drawn-out and delayed teaching of adept Geography, History, Natural Sciences, and Technology knowledge bases to the young child in South Africa (1948-2015). A probable reason for the delayed onset of formal GeHiNaTe education was the socio-political and economic circumstances in South Africa, that resulted in sanctions against South Africa (1948-1994), and thus, most current international educational tools and curricula did not reach the South African schools earlier.

- The third contradiction, labelled the "Teachers' professional development in GeHiNaTe education", conceivably inferred that a sophisticated education system requires adept and sophisticated teachers to implement it and unlock the knowledge bases to the young child. In the history of South Africa, the availability of teachers and the quality of teacher training have continuously caused concern for the government. In terms of the training of the Foundation Phase teacher, institutions of higher education also predominantly focus on equipping teachers with adept basic education (Mathematics and Languages) knowledge bases and not with adept knowledge bases to teach Beginning Knowledge in the early years.

(v) These above-mentioned internal contradictions seem to have produced pivotal information on why specific transformations have been witnessed in the history of South Africa and its education system. Some of these trends that contributed to the historical development of the Beginning Knowledge education in the Foundation Phase in South Africa, can be described as follows:

- The first trend, in the Educational-Societal activity system, was the transition from an autocratic society with unequal education opportunities (1400-1994) to a democratic society with equal educational opportunities (1994-2015).

- The second trend, in the Educational-Technological activity system, was when the intended curriculum changed from a performance curriculum, supporting segregated education (1948-1994), into a competency curriculum that promotes integrated and inclusive education (1994-2015). Another transition within this activity system was the first implicit teaching of Geography, History, Natural Sciences, and Technology (1968-2015). Although the socio-political reason for unequal education was addressed with

the democratic constitutional law, a new form of segregation emerged, due to economic poor circumstances in South Africa. Not all schools can afford the same educational tools (electronic devices and resources), which hinders the equal and sophisticated development of Scientific and Technology Literacy in all communities.

- The third trend, in the Societal-Technological activity system, represents the professional preparation and development of Foundation Phase teachers for GeHiNaTe education in the early years. Although teacher preparation programmes were reconsidered and restructured in the new democratic South Africa (1994-2015), the training and development of teachers with adept knowledge bases to teach Beginning Knowledge education in the Foundation Phase has not reached its full potential. Teachers in the Foundation Phase are primarily trained to teach basic skills of reading, writing and arithmetic.

5.3.2.1.3 Third secondary research question

Lastly, the methodological gap answered the research question: "How did a historical research design, as research methodology, contributed to making sense of the development of Beginning Knowledge education?" (see Headings 1.5.3 and 5.3.1.1.3). The last depicted table of secondary questions (see Table 5-3) summarises the answers to the third secondary question on how the researcher made sense of the historical development of Beginning Knowledge education in the Foundation Phase in South Africa.

Table 5-3: Answers to the third secondary research questions (methodological gap)

(i) Historicity	(ii) Activity systems	(iii) Multi-voicedness	(iv) Contradictions	(v) Transformations
Genetic analysis to describe the core development of the inquiry	Hybrid Cultural-Historical Activity Theory assisted the researcher to identify activity systems	Hybrid Cultural-Historical Activity Theory assisted the researcher to identify criteria for the vertical analysis process	Hybrid Cultural-Historical Activity Theory assisted the researcher to identify principles for the horizontal analysis process	How culture, history, activity, media, and ecosystems contributed to the development of Beginning Knowledge education

The five principles, with their summative answers about the methodological gap, as depicted in the table above (see Table 5-3), need to be clarified in order to give a comprehensive view of the findings under each of the principles related to this historical research inquiry. These findings are discussed under the five listed principles and the results further bulleted, as follows:

(i) In the process of vertically and horizontally analysing both international and national bodies of scholarship, the researcher was able to apply the genetic law of cultural development of Vygotsky, that was presented, through the uniquely constructed theoretical framework, to the inquiry process (see Heading 1.5.2.2). In order to make sense of how Beginning Knowledge education has developed in the Foundation Phase in South Africa, the researcher had to investigate the historically progression thereof, by tracing it back to reflect the developmental changes that have occurred within this subject from 1400 to 2015. The development of this subject has undergone development due to transformations and progress which were influenced by social relations and tools that ultimately inspire thinking, learning and progression in reasoning.

(ii) In order to make sense of how, why and when the developmental transitions have taken place in the knowledge base associated with Beginning Knowledge, the researcher identified the three activity systems through the coined Hybridised Cultural-Historical Activity Theory as theoretical framework.

(iii) From this coined Hybridised Cultural-Historical Activity Theory and the identification of the three activity systems, the researcher first constructed and integrated knowledge bases for GeHiNaTe education from international and national bodies of scholarship before analysing it. Thus, the first procedure was to vertically analyse the knowledge bases respectively according to the Educational, Societal and Technological activity systems, each with its underlying criteria as discussed.

(iv) As mentioned above, the researcher had to conceptualise the knowledge bases and, therefore, horizontally analysed the knowledge bases through conglomerating the activity systems as Educational-Societal, Educational-Technological and Societal-Technological, with their unique labels, as discussed.

(v) By applying this uniquely Hybridised Cultural-Historical Activity Theory to analysing the vast amount of historical knowledge bases, the researcher was able to make sense of how cultural, historical, activities, media, and ecosystemic components have contributed to the development of the knowledge base associated with Beginning Knowledge education in the Foundation Phase in South Africa.

5.4 CONTRIBUTIONS OF THIS HISTORICAL RESEARCH INQUIRY

The purpose of this historical research inquiry was to understand how Beginning Knowledge education developed historically in South Africa in order to establish a newly constructed and integrated knowledge base that can be utilised by scholars and educationists for future research endeavours about this topic. As already mentioned in the Initiation chapter (see Headings 1.5.1, 1.5.2, and 1.5.3), this historical research inquiry was one of the first studies about the historicity, philosophy, sociology, and science of Life Skills education, with a specific focus on Beginning Knowledge education in the Foundation Phase curricula of South Africa. This study contributes to the body of scholarship on contextual, conceptual and methodological level.

The contextual gap identified in the body of scholarship was illustrated when the researcher attempted to understand how the currently intended curriculum for Beginning Knowledge education has originated and developed. The researcher historically re-examined, rediscovered, and represented the international and national bodies of scholarship on how Beginning Knowledge education in the Foundation Phase has developed. Because the national body of scholarship of Beginning Knowledge in South Africa was described as vague, incomplete and difficult to access and interpret, the researcher has attempted to map out and construct a scientifically supported knowledge base to address this concern from a local point of view.

The conceptual gap identified in the body of scholarship, required from the researcher to revert to international studies relating to historical studies of GeHiNaTe education in Early Childhood Education. The researcher embraced the opportunity to reintroduce past knowledge bases of both bodies of scholarship with the existing frame of reference and help develop new insight and perspective on the importance of Beginning Knowledge education in the Foundation Phase for citizenship, Scientific Literacy, and to prepare learners for the twenty-first century. In order to assimilate international and national bodies of scholarship, the researcher hybridised theories to develop a new theoretical framework that assisted her to analyse and discern between the diverse contributing voices within the bodies of scholarship and construct a new integrated knowledge base of the historical development of Beginning Knowledge education, without jeopardising its South African identity and character.

The methodological gap stemmed from the notion to make sense of the development of Beginning Knowledge education in the Foundation Phase in South Africa by conducting a research inquiry to potentially address the contextual and conceptual gaps in the body of scholarship to some extent. The Hybrid Cultural-Historical Activity Theory enabled the researcher to conduct such a historical inquiry as this theoretical framework embraces the

aspects of culture, history, activity, media, and ecosystems that contributed to the development of Beginning Knowledge education in the Foundation Phase in South Africa.

5.5 LIMITATIONS OF THIS HISTORICAL RESEARCH INQUIRY

As discussed in the Initiation chapter (see page 37), due to the enormous timeframe and literature that were consulted in this historical research inquiry, it was important to put perimeters in place to prevent the study from becoming a mile long and only an inch deep, but this also resulted in limitations.

The limitations identified within this historical research inquiry on a contextual, conceptual and methodological level, were the following:

- Only Beginning Knowledge education within the Life Skills subject was investigated and not the rest of the focus areas associated with Physical, Personal and Social well-being, or Creative arts. Therefore a true depiction of the entire Life Skills subject was not possible.

- Scholarly work and documents for teaching Geography, History, Natural Sciences, and Technology at the Intermediate Phase were also not included in this inquiry and therefore the way in which knowledge bases are transferred from one level to the next, when learners enter and exit educational bands, was not investigated.

- The important role of teacher preparation programmes and the curricula intended for Higher Education and Training institutions on Beginning Knowledge education to the young child could also not be investigated in this inquiry.

- Because of the difficulty in locating all Colonial and Provincial curricula intended for South African schools from 1652 to 1948, some crucial contextual and academic information could have been missed during the research inquiry.

- A limitation of this historical research inquiry on a methodological level is that, due to the nature and huge documentary scope of this research inquiry, the researcher could not embrace data-gathering techniques, like interviews, narratives, questionnaires, and so forth. The researcher relied on existing electronic and printed (current and archived) materials and sources of scholars and participants.

5.6 RECOMMENDATIONS FOR FUTURE RESEARCH

From the analysis of the Educational activity system, both vertically and horizontally, it can be deduced that the teaching of Beginning Knowledge education in South Africa has progressed and transformed significantly over the years. However, the Subject Matter Knowledge and Pedagogical Content Knowledge of teaching of Beginning Knowledge education in the Foundation Phase in South Africa is still facing challenges and is not yet on par with most recent findings and recommendations of international scholars on how to sufficiently teach it to the young child. Beginning Knowledge education in the Foundation Phase in South Africa requires an in-depth investigation on how to bring knowledge bases up to date with international findings relating to Subject Matter Knowledge and Pedagogical Content Knowledge.

By analysing the Societal activity system, both vertically and horizontally, it can be deduced that the teaching of Beginning Knowledge education in South Africa has always been economic, socially and politically motivated, and still is. The importance of and the need for sophisticated teaching of Beginning Knowledge education in the Foundation Phase in South Africa, in order to promote Scientific Literacy, sensitivity and awareness of Socio-Sciences issues, and citizenship for the twenty-first century, are not optimally actualised and communicated in the curriculum. It would be recommended that curriculum developers and educationists reinvestigate how the knowledge, language and skills are organised and communicated in the current curriculum, and better align it with the international bodies of scholarship that were presented in the Performance chapter. The next crucial step would then also be to revisit the curriculum of teacher preparation programmes to determine whether teachers are sophistically trained to teach Beginning Knowledge education in the early years.

The vertical and horizontal analysis of the international and national bodies of scholarship, associated with the Technological activity system, conveyed that the teaching of Beginning Knowledge education in South Africa has not advanced as much with technology as would be expected. The teaching of Beginning Knowledge education in the Foundation Phase in South Africa could assist teachers in preparing learners for the twenty-first century through advanced GeHiNaTe knowledge and skills. Although the curriculum of Beginning Knowledge education is acknowledged, the utilisation of Education Technology and cultural tools for knowledge transference is not optimally realised or implemented in schools, due to the economic situation of South Africa, which causes concern when compared with international advancements.

It would also be highly recommended that future research will endeavour to embrace aspects that have been described as limitations within this study, in order to depict a more encompassing and in-depth knowledge base for Life Skills education.

5.7 CONCLUSION

Geography, History, Natural Sciences, and Technology express the core of human existence on a level of understanding one's interconnectedness with History-Nature-knowledge, and, ultimately, the deep relationship with a supreme source in the metaphysical realms (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012). These subjects are inherently and genetically disposed in all societies' knowledge bases and are therefore not a sole product of a society or country, as one may sometimes be led to believe (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012). Geography, History, Natural Sciences, and Technology introduce the role and opportunities for knowledge transference and knowledge progressions to promote understanding, interconnectivity and a sense of belonging between individuals (Anamuah-Mensah, 2012; Asabere-Ameyaw et al., 2012).

This historical research inquiry conveyed and aimed to clarify the tensions as well as the intellectual identity that is associated with Beginning Knowledge education in the Foundation Phase in South Africa. The effective research, teaching, curriculum development, and training of Beginning Knowledge education in the Foundation Phase in South Africa will necessitate a communal value and respect for this subject. By developing a communal future aspiration for the advancement of Beginning Knowledge education in the Foundation Phase in South Africa, one can potentially assure the continuous production of new knowledge bases, which will progress and advance, without losing consideration and respect for the subjects' historical roots.

The following quote serves as the closing thought for this historical research inquiry, which hopefully serves as an ignition for the equal and fair teaching of Beginning Knowledge education in the Foundation Phase in South Africa:

> The insistence on the restoration on our past, histories, cultures, heritages and holding on to a sense of place and identities in struggles over the production, interrogation, validation and dissemination of knowledge is vital to how we can generate and pursue science and technology education for social development (Asabere-Ameyaw et al., 2012, p. 218).

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