**A neglected opportunity: entrepreneurship education in the Senior Phase Technology subject curriculum**

**Abstract**

Technology is a school subject that forms part of the compulsory curriculum for high school learners in South Africa, and is a core theme in the subject Design and Technology in Botswana high schools. Knowledge and production skills acquired in the subject are applied to solve real-world problems according to the steps of the design process. The simultaneous development of learners' problem-solving and production skills in the subject suggest that Technology could play a vital role in preparing learners as entrepreneurs. Such learning could result in innovation or the manufacture of income-generating products. In these two countries, where youth unemployment is a constant challenge, developing such skills as part of learners' school curriculum may contribute to alleviating the unemployment and poverty levels of young people. For any subject to effectively support entrepreneurship education, however, its curriculum should be designed to sustain such development. A structured qualitative curriculum analysis was used to investigate if and how entrepreneurship education is included in the Technology curricula of lower high school levels in Botswana and South Africa. A concurrent benchmarking study was conducted to identify strengths and areas for improvement regarding entrepreneurship education as part of these two Technology curricula. Recommendations for the strengthening of entrepreneurship education in both curricula were made, with the anticipation that implementation of recommended improvements could contribute to the alleviation of youth unemployment in both countries.

**Key words**

Curriculum analysis; Design and Technology; entrepreneurship education; Technology education; youth unemployment

**Background and purpose**

South Africa and Botswana share an 1840-long border, across which learners (of all ages, including tertiary students) occasionally migrate, and are exposed to education on 'both sides of the fence'. The two countries share another common factor that affects many of their learners, namely high levels of youth unemployment (Schrage, 2015; Steenekamp, 2014; Tabulawa, 2011). South Africa's unemployment rates rank amongst the highest in the world (Meyer, 2014; Steenekamp, 2014). The unemployment rate for South Africa was 26.4% in 2015; with approximately 55% youth[1] unemployment (The World Bank, 2016c; 2016d). Similarly, Botswana has an unemployment rate of around 20% (Schrage, 2015; The World Bank, 2016a) and about 34% unemployed youths (The World Bank, 2016b). High unemployment rates contribute to poverty and slow economic growth, which negatively affects youth and their future prospects.

Though education is not a cure for youth unemployment, some believe that education has a role to play in decreasing unemployment. For instance, Meyer (2014) states that education and knowledge assists entrepreneurship. Egolum and Chukwuma (2013) suggest that educational systems be transformed, through the inclusion of entrepreneurial skills, in an effort to reduce unemployment. Aligned with their suggestion, several scholars believe that including entrepreneurship education in schooling may contribute to reducing unemployment. Ugwu, La'ah and Olotu (2013) state that insufficient entrepreneurship education, rather than a lack of skills or innovation, might be blamed for increasing unemployment.

Including entrepreneurship education in schooling is not a straightforward answer to unemployment, but if it is appropriately formulated and implemented, it will form part of a potential contributor to addressing the problem in a positive way. Expanding on this idea, Dienye (2011) argue that national economic and social development requires entrepreneurship education, effective curricula, trained teachers and clear learning aims. Entrepreneurship education therefore does not just consist of relevant content, but also includes other elements, such as an effective curriculum and trained teachers, to support its implementation.

---

[1] The Word Bank classifies 15-24 year olds as "youth" (The World Bank, 2016b).

Of the elements that affect entrepreneurship education, a well-structured curriculum is possibly one of the main influences on its effectiveness. As such, the World Bank mentions curriculum as one of the four major program characteristics that is essential in their conceptual framework for entrepreneurship education (Valerio, Parton & Robb, 2014). Referring to a curriculum that supports entrepreneurship, the European Commission (2014) suggests that entrepreneurship should be a curriculum requirement, rather than an optional pursuit; and that entrepreneurial skills can be taught as a part of different subjects, or as a subject on its own.

The rationale for this study stems from this background of high levels of youth unemployment, and the potential that entrepreneurship education holds for addressing this challenge, which was combined with the notion that particular school subjects would be especially suitable for the inclusion of entrepreneurship education. The researchers both have an extensive history with and experience of the school subject Technology in Botswana and South Africa and believe that this subject would be particularly suitable for the inclusion and reinforcement of entrepreneurship education. This belief is based on the problem-solving and production skills embedded in the two Technology curricula[2], which present learners with opportunities to produce income-generating products. Combining these skills in the Technology curriculum with entrepreneurship education can expand learners' preparation as entrepreneurs, and in doing so, contribute to reducing unemployment levels in these two countries.

The purpose of the study was therefore to investigate if and to what extent entrepreneurship education is included in the Technology curricula currently in use in South African and Botswana schools. The study analysed the curricula for Technology in the Senior Phase (South Africa) and the comparable subject Design and Technology in the Lower Secondary Level (Botswana). The Senior Phase includes Grades 7, 8 and 9, while the Junior Secondary Level includes Years 1, 2 and 3. Learners in this phase are around 13 to 15 years of age and in many instances, learners leave school after this phase to find employment. The study centred on investigating the potential of the Technology curricula of South Africa and Botswana

---

[2] To streamline text the term "Technology curricula" is used in this article to refer to both the curricula for Technology in the Senior Phase (South Africa) and Design and Technology (D&T) in the Lower Secondary Level (Botswana).

to contribute to these learners' entrepreneurship development before they exit the schooling system.

## Literature review

The literature review included three main components, namely entrepreneurship education, Technology education (focussing on South Africa and Botswana), and entrepreneurship education as part of a Technology curriculum.

### *Entrepreneurship education*

Various descriptions for and opinions about entrepreneurship education exist. People often – too narrowly – only associate entrepreneurship education with business (European Commission, 2014). Robb, Valeria and Parton (2014) differentiate between *entrepreneurship education*, which "focus on building knowledge and skills about or for the purpose of entrepreneurship" and *entrepreneurship training*, which focus on "building knowledge and skills, explicitly in preparation for starting or operating an enterprise". Our view is that the *process* (developing learners' entrepreneurship skills and helping them to realise the purpose and importance of entrepreneurship in society) is no less important than the *result* (having an enterprise or business from which to sell products). The conceptualisation of entrepreneurship education by Jones and English (2004) as skills and personal characteristics that can be taught, with the purpose of developing new and innovative plans into potential business opportunities, was therefore selected as the most appropriate for this research.

Ugwu et al. (2013) however stresses that skills development is not the key to employability – especially if there are no jobs. They emphasise the need for entrepreneurship education, which will support learners to create a job if there isn't one. Countries struggling with high levels of unemployment may consequently choose to give precedence to skills development or entrepreneurship education to address that particular need of their society (UNESCO, 2016). A recommendation that the entire school curriculum in Botswana be vocationalised in an effort to reduce youth unemployment (Tabulawa, 2011), is an example of a curriculum that endeavours to address their country's needs. Also reflecting the country's effort to address unemployment, schools in South Africa were pressured to develop learners as

employers rather than employees (Marks, 2012). Calls for the expansion of entrepreneurship education in South Africa have been voiced for years, including suggestions for its inclusion in the formal school curriculum (North, 2002; Steenekamp, 2014). Entrepreneurship education was formally introduced in the school curriculum as part of *Curriculum 2005* (Marks, 2012). Research at the time suggested that entrepreneurship should not be offered as a subject on its own, but rather be included in other subjects (North, 2002) and it was initially embedded in a subject called Economics and Management Sciences (Marks, 2012).

Though Economic and Management Sciences include some entrepreneurship content, its main purpose is to develop learners' financial literacy and to prepare learners for different economic and business environments (Department of Basic Education (DBE), 2011; Du Toit, 2016). Often such business education subjects focus more on the management of an enterprise, rather than creating (the process of developing an idea) an enterprise (Sirelkhatim & Gangi, 2015). Economic and Management Sciences might therefore not be the ideal vehicle (or subject) for developing entrepreneurship education in South African learners. In addition, since the first introduction of entrepreneurship education into the South African school system, the curriculum has undergone a number of major changes. These changes affected the resulting (current) curriculum in several ways, including its core organising principle, its content, the subjects contained in it and its method of implementation. Considering these two adverse issues, together with Steenekamp's (2014) statement that entrepreneurship is not being taught widely, nor effectively enough in the secondary school curriculum, it seemed worthwhile to investigate the current curricula of other subjects in which entrepreneurship education could be embedded as part of the school curriculum.

A recent analysis of the non-language subject curricula currently used in the South African Senior Phase (Du Toit, 2016) identified three other subjects (excluding Economic and Management Sciences), which contain topics related to entrepreneurship education. These subjects are Life Orientation, Social Sciences and Technology. The researchers' familiarity with the Technology curriculum and its content led to the further investigation of this subject as a potential contributor to entrepreneurship education.

### Technology education

Even in its conception stages, Technology education was referred to as a potential contributor to addressing South Africa's high levels of unemployment (Ankiewicz, 1993). Technology[3] as a school subject was first introduced into the South African school curriculum as part of Curriculum 2005, coinciding with the introduction of entrepreneurship into the school system. The subject was intended to develop learners' Technology-related skills such as management (e.g. of time and resources), entrepreneurship, and communication (verbal, written and graphic) (Reddy, Ankiewicz, De Swardt & Gross, 2003), all of which are still needed and relevant in current contexts. Technology education was envisioned to include life-relevant, meaningful learning, supported by the development of a range of skills, including entrepreneurship skills. The current Curriculum and Assessment Policy Statement (CAPS) for Technology has clear potential to support entrepreneurship and this should be addressed in the curriculum (Umalusi, 2017).

The South African and Botswana curricula have undergone several changes since the initial introduction of the subject Technology more than a decade ago. The CAPS for Technology in the Senior Phase of South African schooling describes Technology as the use of knowledge, skills, values and resources to meet people's needs and wants by developing practical solutions to problems, while also considering social and environmental factors. It is also supposed to contribute to learners' preparation for the world of work (DBE, 2011). The Botswana syllabus for Design and Technology in the Junior Secondary level states that the subject can empower the youth of that country to "become resourceful, self-reliant and economic participants in their communities", that it develops generic skills, knowledge, values and attitudes that are useful for the world of work, and that it afford learners opportunities for self- employment (Department of Curriculum Development and Evaluation (DCDE), 2008).

Undoubtedly, the subject has the potential to develop several skills in learners, but it is necessary to investigate if entrepreneurship is considered one of the skills associated with Technology education and how it manifests in the subject.

---

[3] Technology as a school subject should not be mistaken for Information and Communication Technology (ICT – a computer-based subject), nor other technologies such as electronic devices.

### *Entrepreneurship education as part of the Technology curriculum*

The review of literature focussed only on Technology school subjects in Africa, and revealed that a number of African countries have realised the entrepreneurial potential that technology subjects holds. Entrepreneurship education has been an obligatory feature of all technology and vocational subjects in Kenyan schools for decades (Robb et al., 2014). Chikasanda, Otrel-Cass and Jones (2011) describe how "the skills acquired in technical education were viewed as helpful for students to engage in small scale production to earn a living after leaving school" in Malawi. Teachers in Malawi reportedly also view technical education as an  instrument that provide learners with skills that should contribute to learners' self-reliance and potential employment, which in turns could help to alleviate poverty and unemployment (Chikasanda et al., 2011). Mozambican curriculum reforms have combined entrepreneurship with technical and vocational education since 2006 (Robb et al., 2014). According to Egolum and Chukwuma (2013) the Nigerian curriculum for Science, Technology and Mathematics emphasizes entrepreneurial skills, specifically to support opportunities for self-employment and in so doing reduce unemployment. The main reason for linking entrepreneurship and Technology education is clearly the potential the subject holds to create opportunities to generate income and create own employment, and it is an opportunity that countries with high unemployment, such as South Africa and Botswana, cannot disregard.

In order for Technology to support this potential, it has to be structured to explicitly include two components: (1) making (production) knowledge and skills – used to design, develop and make a product, and (2) entrepreneurial knowledge and skills – that support the development of the product into an income generating opportunity, such as cost calculations or marketing skills. These two components are not independent from each other, but should be taught together, using real life situations and a problem-solving approach to structure learning. The European Commission emphasises this, by stating that "Entrepreneurial competency and skills can be acquired or built only through hands-on, real life learning" (2014). In a compilation of preferred pedagogies for teaching entrepreneurship, Gibb, Hannon, Price and Robertson (2013) reiterate the importance of connecting entrepreneurial learning to real life situations, thereby making the learning more relevant for learners. Based on this understanding, content in a Technology curriculum should be underpinned by

three main objectives, that is: knowledge development, skills development and problem-solving in a real life context. Technology content and entrepreneurship education should be merged in all three objectives.

Given that it has been established that the development of Technological knowledge and skills, as well as problem-solving in a real life context, are evident in the subjects' curricula (Du Toit & Gaotlhobogwe, 2016), the current study investigated if and to what extent entrepreneurship education is included in the Technology curricula currently in use in South African and Botswana schools, with the intention of addressing the high levels of unemployment in those countries. The next section describes the research methodology used in the investigation.

## Research methodology

The qualitative document analysis was conducted within a constructivist paradigm, with the purpose of constructing detailed descriptions of entrepreneurship education as part of Technology education. A pair of Technology curriculum specialists, with decades of Technology education experience between them, systematically and concurrently analysed the curricula currently in use for Technology in the Senior Phase (South Africa) and the comparable subject Design and Technology in the Lower Secondary Level (Botswana). The investigation was scaffolded around four *a-priori* themes to find evidence in the Technology curricula of (1) the inclusion of references to Technology as a means to address unemployment or create employment opportunities; as well as (2) knowledge, (3) skills and (3) real life content to support entrepreneurship education.

## Findings and discussion

The findings are presented to reflect the four main themes that were investigated: Technology education's potential to reduce unemployment; knowledge related to entrepreneurship education; skills related to entrepreneurship education; and real life links or content related to entrepreneurship education. In this study, entrepreneurial knowledge and skills were reasoned to be those that support the development of a

product into an income generating opportunity, such as cost calculations or marketing skills.

*Technology education's potential to reduce unemployment*

The Botswana Design and Technology (D&T) syllabus contain a number of explicit references to the subject's potential to contribute to reducing unemployment and create self-employment opportunities in that country. The D&T syllabus unambiguously states that this programme "...considers the increasing youth unemployment of junior secondary school leavers..." and that it "...seeks to instil a spirit of self-reliance in learners to enable them to become resourceful and economically active in their communities" (DCDE, 2008). As part of the rationale for D&T, the syllabus describes the subject as being useful to "the majority of school leavers who might need to go into self-employment projects". One of the aims for the three year Junior Secondary D&T programme is also to "develop entrepreneurial skills that they [learners] can apply in their day-today business transactions and to market their products effectively" (DCDE, 2008). There is no doubt that D&T as a subject is intended to prepare Botswana learners for product development with the purpose of potential self-employment. The explicit mention of this in the introductory section of the syllabus will augment teachers' understanding of this purpose of the subject and it should therefore transpire more clearly as part of learners' education in D&T.

In contrast, unemployment and self-employment is not at all mentioned in the South African Senior Phase Technology CAPS document. A generic reference to employment is included in the curriculum, stating that Technology skills "provide a solid foundation for ... the world of work" (DBE, 2011). Another reference to careers mentions that "Technology will teach learners the opportunity to learn... while creating positive attitudes, perceptions and aspirations towards technology-based careers" (DBE, 2011). The latter statement has more to do with attitudes toward work, than linking learning to the creation of employment opportunities. Subsequent to explaining the importance of design, the Technology curriculum lists careers that use design, naming different types of engineers, textile designers, architects and dieticians (DBE, 2011) but no mention is made of learners creating their own employment, or of the potential of the subject to address unemployment. The findings indicate that this is a neglected opportunity, since Technology offers subject-specific knowledge, the

development of vocational skills, as well as several 21st century skills, all of which can contribute to entrepreneurial learning (Umalusi, 2017).

The next section describes the findings regarding the inclusion of knowledge related to entrepreneurship education in the Technology curricula.

*Knowledge of or related to entrepreneurship education*

The broad theme of 'Knowledge related to entrepreneurship education' was developed after it emerged that direct references to 'entrepreneurship' was scarce in the Botswana syllabus, and absent in the South Africa Technology CAPS. The theme include explicit knowledge content in the Technology curricula that would normally be associated with (or related to) entrepreneurship education. Such content include marketing, costing of products, identifying target markets, advertising and packaging of learners' products. Content knowledge related to production (making) skills was omitted, as we categorised it as Technology subject knowledge for the purposes of this study.

Marketing is evidently related to entrepreneurship education and appears as a separate topic in all three years of Botswana's Junior Secondary level D&T syllabus. In each year it is positioned between the topics of Graphics (graphical communication) and the Design process (DCDE, 2008) – in other words, learners gain knowledge regarding the marketing of products before they learn how to design and produce a product. Such knowledge will influence which type of products they choose to make, as well as what materials and methods will be used in its production. The topic 'Marketing' incorporates sub-topics such as identifying a target market for their product; determining the cost of their product; selecting appropriate advertising strategies; and using IT in advertising (DCDE, 2008). The sub-topics recur in each of the three years of the Junior Secondary level that will support progression of learning across the phase. The use of the words "their product" in each case was regarded as significant, as it indicates that the entrepreneurship education is directly linked to each learner's product, making the learning more relevant to their own experiences and therefore more valuable.

References to entrepreneurship knowledge are less explicit in the South African Technology curriculum. In a curriculum section describing the importance of

Design as part of Technology education (DBE, 2011), some non-specific entrepreneurship-related (consumer) references are included: developing solutions to problems, needs or wants; developing critical consumers; and using design excellence to attract consumers when there are similar products on the market. The same section on Design includes a list of knowledge and skills which designers need. Two entries on that list were identified as being related to entrepreneurship knowledge, specifically knowledge of the design process and knowledge of types and properties of suitable materials, and how to use them optimally. Each of these two entries could be grouped with production knowledge, as well as entrepreneurship knowledge. As an example: an entrepreneur would need to know that a certain type of material would be more suitable to the client's needs or more suitable to make the product unique.

Analysis of the learning content in the Technology CAPS revealed a number of references to content knowledge related to entrepreneurship. In Grade 7, content about design considerations are included, specifically regarding products that are 'fit-for-purpose' (DBE, 2011). Including this content in the first year of the Phase could lay an important foundation for the design of suitable products throughout the Phase. Grade 8 learning content includes "preparing a realistic budget detailing expected costs" (DBE, 2011), which is related to entrepreneurship knowledge. The remainder of that same sentence however focuses on Technology content ("... of constructing a real mine shaft headgear"). Mining headgear will be far removed from the real lives of many South African learners, questioning the relevance of this learning for all learners, and questioning if they will link the learning regarding budgets for mining head gear to budgets for their own products.

The content knowledge in the Grade 9 Technology curriculum was determined to be most conducive to support entrepreneurial knowledge development. Learners are required to work in teams as 'Contracting Companies' that have to solve a problem or need in a community (DBE, 2011). As part of the development of the solution several aspects related to entrepreneurship knowledge is included: costing, knowledge about tender processes, analysis of existing products in terms of fitness-for-purpose, safety for users, costs of materials, construction, real materials, labour and transport. Learners then have to design and make a prototype or working model of the product,

teams collaborate to produce an evaluation instrument and present their products as a 'tender' to a 'Tender Board'. This structuring of content recurs in each term, but it is rather prescriptive regarding the product, which is based on Technology content, such as building a bridge or designing systems where mechanical, electrical, hydraulic or pneumatic systems are combined. From their experience in classrooms and interaction with teachers, the researchers appreciate that such topics are not interesting to all learners and that learners do not always recognise the potential of applying the 'tender process' to their own products. It would be more appropriate to allow learners to develop other types of products, suitable to support entrepreneurial enterprises, if entrepreneurship is to be kindled in the subject. Despite these inclusions in the Technology CAPS, the researchers were of the opinion that the lack of explicit mention of entrepreneurship means that the underlying message of potential entrepreneurial possibilities will not reach learners.

The next section of the paper reveals the findings regarding skills related to entrepreneurship that was uncovered in the Technology curricula.

### *Skills related to entrepreneurship education*

This study supports the view that entrepreneurial skills can be taught, learned and developed (Oosterbeeck, van Praag & Ijsselstein 2010; Tengeh, Iwu & Nchu, 2015). Though the term 'entrepreneurship skills' appears widely in literature, it is rarely explained or expanded upon. This study focused on skills which will support and enable the successful development and implementation of entrepreneurial opportunities. Entrepreneurship skills include creativity and innovation (or risk taking); creative problem-solving; teamwork, problem-solving, meeting deadlines, working within budgetary constraints; market awareness, taking initiative; flexibility; effective presentation skills; and effective identification, selection and use of resources (Chimucheka, 2015; European Commission, 2013; European Commission, 2011; Marques & Albuquerque, 2012; Oosterbeeck et al., 2010; Tengeh, Iwu & Nchu, 2015).

The development of entrepreneurial skills that learners can "apply in their day-to-day business transactions and to market their products effectively" is one of the explicit aims for the three-year Junior Secondary D&T programme (DCDE, 2008). Several of the skills listed previously in this paper as related to entrepreneurship, are also included in the aims of the ten-year Basic Education programme, of which D&T forms

part: application of computation skills in order to solve day-to-day problems; critical thinking, problem-solving ability, individual initiative, creativity interpersonal and inquiry skills; the ability to express themselves clearly (presentation skills) (DCDE, 2008). The same entrepreneurship-related skills recur in the D&T aims: apply critical thinking, problem solving, computational, manipulative, inquiry and creative skills through designing, making and evaluating in a real life context. All these examples appear in the introductory section of the syllabus and no further evidence of entrepreneurship skills were uncovered in the rest of the document. It would be preferable that explicit references to the development of such skills be included throughout the syllabus, to support teachers' grasp of the importance of entrepreneurial skills as part of learners' development in D&T. Such inclusions will provide more pedagogical guidance to encourage entrepreneurial learning in the subject.

Several skills related to entrepreneurship education are listed as part of the generic aims of the National Curriculum Statement Grades R-12, which appear in the introductory section of the Technology curriculum document (DBE, 2011), as well as all other subject-specific curricula in all school phases. These skills include: identifying and solving problems and make decisions using critical and creative thinking; working effectively as individuals and with others as members of a team; organising and managing themselves and their activities responsibly and effectively; collecting, analysing, organising and critically evaluating information; and communicating effectively. They are however generic and not subject-specific.

The following statement is included in the CAPS as part of the Purpose of Technology: "The subject stimulates learners to be innovative and develops their creative and critical thinking skills. It teaches them to manage time and material resources effectively, provides opportunities for collaborative learning and nurtures teamwork" (DBE, 2011). The purpose of Technology therefore explicitly includes the development of these skills related to entrepreneurship. The "use a variety of life skills in authentic contexts (such as decision making, critical and creative thinking, cooperation, problem solving and needs identification)" appears in a list detailing the "Unique features and scope" of Technology (DBE, 2011). In the curriculum section describing the importance of Design, a list of knowledge and skills which designers need include the following entries related to entrepreneurship skills: understanding of the problem, need

or opportunity; calculating quantities and costs of the materials needed; and presenting the solution effectively to the client / customer (DBE, 2011).

Furthermore, in the subject-specific sections of the Technology curriculum, the skills related to entrepreneurship are mostly similar to the ones that form part of the design process. These skills are investigating (doing research, analysing products, comparisons); drawing (sketching and developing ideas); designing (identifying and selecting appropriate materials, methods and finishes); evaluating (judging quality, comparing, adjusting to fit the needs of the consumer more closely); and communication (presenting findings and products to a target group). These skills are each explained in detail as part of the design process, which is described as the backbone for teaching (pedagogy) in Technology education (DBE, 2011). All of these skills, together with production (making) skills, could also form part of the production process. The numerous references to skills related to entrepreneurship are encouraging, but the lack of any mention of entrepreneurship or the potential for self-employment is troubling. If explicit references are not included in the curriculum, the message that the subject could be useful to support entrepreneurial development will not reach learners.

The final theme discussed is the emergence of real life references in the Technology curricula that could support entrepreneurship education.

### *Real life links to entrepreneurship education*

Linking school learning to real life situations is imperative to make the learning more relevant and valuable to learners (Heinonen & Poikkijoki, 2006; Shamatov, 2014). Marques and Albuquerque (2012) reiterates this for entrepreneurship education, by stating that the best way "to teach entrepreneurial skills, is through student centred and active experiential learning (including for instance their own experiences of life)".

It is therefore meaningful that the objective of offering "authentic, real-life opportunities for learners to interact with each other within teams when they develop technological solutions" was identified in the curricula for both Technology and D&T (Du Toit & Gaotlhobogwe, 2016). Several other references to real life learning were uncovered in both Technology curricula. The Botswana D&T syllabus refers to learners applying "technological knowledge and principles to solve their day to day problems in real life situations" (DCDE, 2008). In addition, learners will also be formally assessed on their

ability to "use technology to solve real life problems in the community" (Botswana Examinations Council, 2013). The South African Technology curriculum prescribes that learners "must be able to identify and explain a problem, need or opportunity from a given real-life context" (DBE, 2011) and that costing must be completed for a "real-life solution" (DBE, 2011). As part of Assessment guidance in the CAPS, South African learners are required to "simulate a real-life problem and solve it", and they should "reflect the result back to a real-world problem and implement its solution" (DBE, 2011). The analysis however indicated that despite several references to real-life learning, none of those are linked to or related to entrepreneurship or self-employment opportunities.

Combining this absence of explicit references to real-life entrepreneurial content in the curricula with a comment by Chikasanda et al. (2013), that teachers lack the knowledge and understanding to create learning experiences that incorporates problem solving situated in real-life contexts, increases the urgency of addressing this oversight in the curriculum documents.


**Conclusions and recommendations**

In countries where unemployment levels are high, such as Botswana and South Africa, it makes sense to include explicit and clear entrepreneurship education in the school system. Merging entrepreneurship education with an existing subject that already incorporates physical production skills, in combination with other skills related to entrepreneurship, such as problem-solving, critical thinking and teamwork, makes even more sense. Other African countries have realised the potential of Technology education to contribute to entrepreneurship education, but in Botswana and South Africa this opportunity has been neglected in the current Technology curricula. It is recommended that the Technology curricula of Botswana and South Africa could be better suited to support the development of entrepreneurship in the following ways: it should explicitly state that Technology content and skills can contribute to creating opportunities for entrepreneurship or self-employment for learners; and explicit references to entrepreneurial learning and – application possibilities in both Technology content and Technology skills should be included. Preferably, real-life

examples of how Technology content or skills could be utilised as entrepreneurial or self-employment opportunities should be used to underpin this important objective.

We concur with North (2002) that the teaching of entrepreneurship will "undoubtedly contribute to the full development of learners and the social wellbeing of the nation at large". Bolstering the entrepreneurship education in the Technology curricula will add entrepreneurship knowledge and skills to the subjects' existing production skills. Such a combination will undeniably contribute to reducing unemployment if learners are made aware of the entrepreneurship and self-employment opportunities available to them.

**References**

Ankiewicz, P.J. (1993). Aspects of the planning of technology education for South African schools. Paper presented at the IDATER 1993 Conference, Loughborough: Loughborough University. Retrieved from https://dspace.lboro.ac.uk/2134/1558

Botswana Examinations Council. (2013). *Junior Certificate Examination Syllabus: Design & Technology Code 017*. Gaborone, Author.

Chikasanda, V.K., Otrel-Cass, K., & Jones, A. (2011). Teachers' views about technical education: implications for reforms towards a broad based technology curriculum in Malawi. *International Journal of Technology and Design Education*, *21*,363–379. http://dx.doi.org/10.1007/s10798-010-9125-5

Chimucheka, T. (2015). The contribution of entrepreneurship education in improving entrepreneurial skills and knowledge of SMME owners and managers. *Journal of Economics, 6*(2),149-155.

Dienye, V.U. (2011). Education and societal development: The quality imperative. *African Journal of Education and Technology, 1*(3),15-24.

Department of Curriculum Development and Evaluation (DCDE), Botswana. (2008). *Three year Junior Secondary School Syllabus. Design and Technology*. Gaborone, Botswana.

Department of Basic Education (DBE), South Africa. (2011). *Curriculum and assessment policy statement (CAPS): Senior Phase Grades 7-9 Technology*. Pretoria, Government Printing Works.

Du Toit, A. (2016). Foundations in the South African Senior Phase curriculum for entrepreneurship education in Consumer Studies. *Journal of Family Ecology and Consumer Sciences, 44*,11-20.

Du Toit, A., & Gaotlhobogwe, M. (2016). *Analyses and benchmarking of Technology subject curricula: the Junior Secondary level in Botswana and Senior Phase in South Africa*. Unpublished research report.

Egolum, E.O., & Chukwuma, M.U. (2013). Development of entrepreneurial skills in secondary school students through Science, Technology and Mathematics (STM) education. *Academic Discourse: An International Journal, 6*(1),1-9. Retrieved from http://www.globalacademicgroup.com/node/304.

European Commission. (2014). *Entrepreneurship Education: A guide for educators.* Brussels: Entrepreneurship 2020 Unit. DOI:10.2769/51003

European Commission. (2013). *Entrepreneurship Education: A guide for educators.* Brussels: Entrepreneurship and Social Economy Unit. Retrieved from http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/files/education/entredu-manual-fv_en.pdf

European Commission. (2011). *Entrepreneurship Education: Enabling Teachers as a Critical Success Factor. A report on Teacher Education and Training to prepare teachers for the challenge of entrepreneurship education.* Brussels: Entrepreneurship Unit. Retrieved from http://ec.europa.eu/DocsRoom/documents/9272/attachments/1/translations/en/renditions/native

Gibb, A., Hannon, P., Price, A., & Robertson, I. (2013). *A Compendium of pedagogies for teaching entrepreneurship.* IEEP. Retrieved from http://ieeponline.com/wp-content/uploads/2013/11/Wider-reading-draft-Ped-Note-compendium.pdf.

Heinonen, J., & Poikkijoki, S-A. (2006). An entrepreneurial-directed approach to entrepreneurship education: Mission impossible? *Journal of Management Development, 25*(1), 80-94. DOI 10.1108/02621710610637981.

Jones, C., & English, J. (2004). A contemporary approach to entrepreneurship education. *Education & Training, 46*(8/9), 416-423. DOI: 10.1108/00400910410569533

Marks, J.T. (2012). *Kolb interrupted: An investigation into students' experience of an experiential learning approach to entrepreneurship education.* (Doctoral thesis). University of Cape Town. Retrieved from https://open.uct.ac.za/handle/11427/6884

Marques, L.A., & Albuquerque, C. (2012). Entrepreneurship education and the development of young people life competencies and skills. *Journal of Entrepreneurship Perspectives, 1*(2), 55-68.

Meyer, D.F. (2014). Job creation, a mission impossible? The South African Case. *Mediterranean Journal of Social Sciences, 5*(16), 65-77.

Nchu, R.M. (2016). *The effectiveness of entrepreneurship education in selected high schools in the Cape Town Metropolitan.* (Master's Thesis, Cape Peninsula University of Technology, Cape Town). Retrieved from http://digitalknowledge.cput.ac.za/jspui/ bitstream/11189/3585/1/213092638_Nchu_RM_MTech_Entrep_Bus_2016.pdf

North, E. (2002). A decade of entrepreneurship education in South Africa. *South African Journal of Education, 22*(1), 24-27.

Oosterbeeck, H., Van Praag, M., & Ijsselstein, A. (2010). The impact of entrepreneurship education on entrepreneurship skills and motivation. *European Economic Review* 54,442–454.

Reddy, V., Ankiewicz, P., De Swardt, E., & Gross, E. (2003). The essential features of Technology and Technology education: A conceptual framework for the development of OBE (Outcomes Based Education) related programmes in Technology education. *International Journal of Technology and Design Education 13*, 27-45.

Robb, A., Valerio, A., Parton, B. (Eds.). (2014). *Entrepreneurship education and training: Insights from Ghana, Kenya, and Mozambique.* World Bank Studies. Washington, DC: World Bank. DOI:10.1596/978-1-4648-0278-2

Schrage, J. (2015). *Mainstreaming education for sustainable development in Botswana: A case study research of Teacher Education Institutions.* (Master's Thesis). Uppsala University, Sweden. Retrieved from http://uu.diva-portal.org/ smash/get/diva2:840248/FULLTEXT01.pdf

Shamatov, D. (2014). Education quality in Kyrgyzstan and the programme for International Student Assessment (PISA). In D.B. Napier (Ed.), *Qualities of Education in a Globalised World* (pp. 43-62). Rotterdam, Sense Publishers.

Sirelkhatim, F., & Gangi, Y. (2015). Entrepreneurship education: A systematic literature review of curricula contents and teaching methods. *Cogent Business & Management, 2*:1052034. DOI: 10.1080/23311975.2015.1052034

Steenekamp, A.G. (2014). *An assessment of the impact of entrepreneurship training on the youth in South Africa.* (Doctoral dissertation). North-West University, Potchefstroom. Retrieved from https://dspace.nwu.ac.za/handle/10394/9698

Tabulawa, R. (2011). The rise and attenuation of the basic education programme (BEP) in Botswana: A global–local dialectic approach. *International Journal of Educational Development, 31*,433-442.

Tengeh, R.K., Iwu, C.G., & Nchu, R.M. (2015). The embeddedness of entrepreneurship education in the curricula of non-business university programmes: Preliminary evidence from South African Universities of Technology. *Socioeconomica – The Scientific Journal for Theory and Practice of Socio-economic Development, 4*(7),111-126.

The Word Bank. (2016a). *Botswana: unemployment rate.* Retrieved from www.theglobaleconomy.com/Botswana/Unemployment_rate/

The Word Bank. (2016b). *Botswana: youth unemployment rate.* Retrieved from www.theglobaleconomy.com/Botswana/Youth_unemployment/

The Word Bank. (2016c). *South Africa: unemployment rate.* Retrieved from www.theglobaleconomy.com/South-Africa/Unemployment_rate/

The Word Bank. (2016d). *South Africa: youth unemployment rate.* Retrieved from www.theglobaleconomy.com/South-Africa/Youth_unemployment/

Ugwu, A.I., La'ah, E., & Olotu, A. (2013). *Entrepreneurship; performance indicator for innovative/skill acquisition: Imperative to Science and Technology Education (STE).* Paper presented at the World Conference on Science and Technology Education, 29 September–3 October, Sarawak, Malaysia. Retrieved from http://stemstates.org/assets/files/333_WSTE2013-19-08-_UGWU_ALOYSIUS-I.pdf

Umalusi. (2017). *Umalusi curriculum evaluation: Senior Phase Technology. A Comparative Analysis of the National Curriculum Statement (NCS) and the Curriculum and Assessment Policy Statement (CAPS).* (*In process*).

United Nations Educational, Scientific and Cultural Organization (UNESCO). International Bureau of Education (IBE). (2016). *What makes a quality curriculum? Current and Critical Issues in Curriculum and Learning.* In-Progress Reflection, March, 2016, No.2 IBE/2016/WP/CD/02. Retrieved from http://unesdoc.unesco.org/ images/0024/002439/243975e.pdf

Valerio, A., Parton, B., and Robb, A. (2014). *Entrepreneurship education and training programs around the world: Dimensions for success.* Washington, DC: World Bank. DOI: 10.1596/978-1-4648-0202-7.