



Hierdie vorm is ook in Afrikaans beskikbaar

(Op die NWU Webblad gaan na <https://intranet.nwu.ac.za/opencms/export/intranet/html/en/in-im-rs/researchethics/index.html> en selekteer dan die verlangde dokument vanuit die lys)

The latest version of this form in English

(On the NWU Website go to <https://intranet.nwu.ac.za/opencms/export/intranet/html/en/in-im-rs/researchethics/index.html> and then select the required document from the list)

NWU Office for Research Support – Ethics Committee

NWU ETHICS APPLICATION FORM
Faculty of Education Sciences
Application for Approval for Scientific Projects
with Human Participants, Biological Samples of
Human Origin or Vertebrates

Version 1.05 (Mei 2008)

CONFIDENTIAL! / VERTROULIK!

***NB!** This document contains confidential information that is intended exclusively for the applicant(s), the Ethics Committee of the North-West University and the designated adjudicators. Should this document or parts thereof come into your possession in error, you are requested to return it to the Ethics Committee of the North-West University without delay or destroy it. Unauthorised possession, reading, studying, copying or distribution of this material, or any other form of abuse, is illegal and punishable.*

Instructions and recommended path for the completion of your application:

1. Read/study the [information guide](#) and familiarise yourself with the terminology, principles, concepts, instructions and procedures.
2. All applicants complete § 1, 2 & 3. **Tip:** *Navigate from the table of contents to appropriate sections in this application form. Hold [Ctrl] + click with the mouse on the appropriate heading.*
3. Select the sub-sections from § 4, 5, 6, 7 & 9 that are applicable to your project (by utilising the table of contents) and complete.
4. Liaise with appropriate officers and colleagues mentioned in § 8, complete, print the pages and have them signed.
5. If applicable, compile a typical form for informed consent to be submitted with your ethics application form. You may use the model form on the Webpage of the Ethics Committee, or you may compile your own form (or multiple forms for e.g. sub-projects with different participant target groups) according to the guidelines.
6. Submit the completed Ethics Application Form via e-mail to ethics@nwu.ac.za (contact person Ms Hannekie Botha).
7. Send the original hard copies of the signed pages to the Office of the Ethics Committee, Box 116, PUK, North-West University, Potchefstroom, 2520 (contact person Ms Hannekie Botha).

NWU Ethics Number (for office use only)

N	W	U	-	0	0	0	0	7	-	1	0	-	S	2
Institution				Project Number						Year			Status	

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Campus	Potchefstroom	Faculty	Education Sciences
Project Head	Prof Seugnet Blignaut	Research Focus Area / Unit	5.1 Teach-learn
Project Title	ICT in Education		

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Please note! Document navigation

Use this table of content to jump-link to appropriate sections (Ctrl on the keyboard + mouse-click on the page number). Use Ctrl + Home to jump back to the top of the document and scroll down to the Table of Contents again. The mouse wheel may work best for scrolling.

As you complete the application form, page numbers may change and the links in the table of contents below will not work correctly any longer. You then need to update it as follows: highlight the table of contents below, press “F9” on you keyboard and select to “update page numbers only”.

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Section 1: Project Classification

Complete every option of all the questions in this section and sign. This section is used to classify your project and select suitable evaluators. *(This application form is currently being developed in Web format. As soon as it has been designed and made available, this section will be used to compile your individualised electronic ethics application form, so that only those sections that apply to your project are included. This will simplify the completion of the application form for you and prevent you having to complete an unnecessarily long application form with irrelevant questions.)*

1.1 Date of application

(Fill in below the date of the first submission of this ethics application)

2	0	0	9	-	1	2	-	0	1
c	c	y	y		m	m		d	d
Date									

1.2 In this project use is made of:

(Mark ALL options as "Yes" or "No" with X in the appropriate box – more than one option may be "Yes".)

Description	Yes	No	
Human participants (subjects)	- humanities qualitative	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	- humanities quantitative	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	- biological / biomedical scientific	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	- all other (e.g. economic, judicial, etc.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Filed privileged information or stored biological samples of human origin (e.g. medical files or samples collected for another project or medical diagnosis)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Animal subjects (vertebrates)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

1.3 Context of the Project

(Mark ALL options as "Yes" or "No" with X in the appropriate box – more than one option may be "Yes".)

Description	Yes	No	
Scientific Research (experiment or study)	- Project falls within a research focus area	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	- Project falls outside a research focus area	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	- Project includes postgraduate study (e.g. doctorate or masters)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	- Project includes contract work	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Training (education purposes) ...excluding research-based Master's & Doctoral – see "Scientific Research" above	- For staff of the North-West University	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	- For students (undergraduate or postgraduate learners)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	- For other learners (not associated with University)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other context (specify below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Other context (specify)

Type here

1.4 This application:

(Select the correct option from the dropdown box)

More information

An application cannot include both a pilot study and the full project. Where a pilot study is necessary for the planning of the full project (i.e. to determine the optimal conditions / number of participants / etc.), the ethics application for the pilot study must be submitted separately. After ethical approval, the pilot study must first be completed, whereupon the application is made for ethical approval of the full project based on the results of the pilot study. For a full project adequate data is available to plan the final study, or the project is only for training purposes. See also the "Information Guide for the NWU Ethics Application Form" (available on the Webpage) for further explanation.

Description	Response
Is this an application for a full project or a pilot study ?	Full project
Has this project also been evaluated by another ethics committee (e.g. multi-institutional projects)?	Yes, and approved
Are there any contractual agreements with any person, group or institution involved in this project (see §2.7)?	No

1.5 This project encompasses experimentation with use, administration or restraint of, or other intervention with:

(Mark ALL options as "Yes" or "No" with X in the appropriate box – more than one option may be "Yes".)

Description	Yes	No
Persons who are particularly vulnerable or incompetent to give informed consent (e.g. minors, own students, intellectually incompetent persons, defenceless communities)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Human stem cells, germ line cells, embryos and/or foetuses	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Living cell and tissue cultures	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Use of genetic material, genetic manipulation, or genetically manipulated animals, plants or other organisms / tissue / cells	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Injections, blood samples, swabs and similar interference	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Use of drugs / medicines	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Use of radio-active substances	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Use of toxic substances or dangerous substances	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Use of food, fluids or nutrients	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Psychometric measuring instruments and questionnaires	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Any other aspect of potentially ethically sensitive nature (specify below)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Other aspects (specify)

Type here

1.6 For this project the following persons were included in the project team:
(Fill in the number concerned with ALL options.)

Description		Number	
		Local	Foreign
All projects (everyone completes this)	– Project Head	1	0
	– Project supervisor	1	0
Only for research projects (experiment or study)	– Co-workers (researchers of the North-West University)	0	0
	– Co-workers (researchers outside the North-West University)	0	0
	– Co-workers (postgraduate students of the North-West University)	0	0
	– Assistants / field workers	0	0
Only for training / educational projects (educational purposes)	– Co-workers (lecturers of the North-West University)	0	0
	– Co-workers (lecturers outside the North-West University)	0	0
	– Students (undergraduate learners of the North-West University)	0	0
	– Students (postgraduate learners of the North-West University)	0	0
	– Other learners (not associated with the North-West University)	0	0
	– Assistants / field workers	0	0
Sponsors		0	0
Other members of the project team, <i>excluding professional supervisors mentioned below in §1.7 (specify below).</i>		0	0

Other members of the project team (specify)

Type here

1.7 The following professional supervisory persons are involved in this project (may in no way be directly involved with the research)
(Fill in the number involved in ALL options.)

Researcher / Supervisor	Number	Researcher / Supervisor	Number
Supervisory Doctor	0	Supervisory Psychologist	0
Supervisory Nurse	0	Supervisory Pharmacist	0
Supervisory Veterinary Surgeon	0	Other Supervisory Person (specify below)	0

Other supervisory person (specify)

Type here

1.8 I hereby declare that the above information in “Section 1: Project Classification” is complete and correct and that I did not withhold any information.

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>

Remember to save your document regularly as you complete it!

Section 2: Project Head, Co-workers and Supervisors

2.1 *Details of Project Head*

Name and details of the Project Head. **N.B!** Only NWU staff, or extraordinary professors in collaboration with staff of the North-West University, may register as Project Heads. A complete Medicines Control Council format *curriculum vitae* (MCC format CV¹) must be attached by applicants for whom a recent CV is not available centrally to the University, as well as by all first applicants.

¹ The template for the MCC format CV is available from the Webpage of the NWU Ethics Committee.

More information

The "Project Head" accepts final, overall responsibility for the management of the total project. The Project Head is sometimes referred to in research projects as the Principle Investigator. The Project Head is a part of the project team.

The MCC format CV contains BRIEF SUMMARY of information relevant to the project under the headings "Personal Details", "Academic and Professional Qualifications", "Registrations at Professional Councils", "Current Personal Medical Malpractice Insurance Details" (if applicable), "Relevant Related Work Experience and Current Position", "Participation in Relevant Research in the Last Five Years", "Peer Reviewed Publications and Conference Presentations in the Past Five Years", "Date and Details of Last GCP/GLP Training", "Any additional Relevant Information Supporting Demonstrating Abilities to Participate in Conducting this Project"

Surname	Full Names	Title
Blignaut	Seugnet	Prof.

NWU Campus	Faculty	School / Subject Group / Institute
Potchefstroom	Education Sciences	Niche Area Educational Technology for Effective Teaching, Learning and Facilitation

Status	Rank / Designation	NWU Staff No.
Permanent Staff	Prof	21152276

Research Focus Area / Research Unit (if applicable)	Qualifications ² (as applicable for project)	Professional Registration ³ (body & category)
5.1 Teach-learn	PhD	

Telephone		NWU-box or Postal Address
Work	Home / Cell	
018 299 4566	0834693700	Internal Box 539

E-mail Address
seugnet.blignaut@nwu.ac.za

² Fill in all qualifications relevant to the project, e.g. Ph.D., M.Sc., M.B.Ch.B., B.Pharm., B. Cur., M.Psig., etc.

³ Fill in your category of professional registrations with councils that are applicable to the project, e.g. HPCSA if medical doctor, SAPC if pharmacist, SANC if nurse, HPCSA if clinical psychologist, SACNASP if scientist of SA Council of Natural Science Professions, etc.

2.2 Details of Project Supervisor

2.2.1 Is the Project Head also the project supervisor?
(Please mark with **X** in the appropriate box)

More information

Where the Project Head is not physically present or consistently available and where supervision of the research activities is necessary, or where the Project Head is relatively inexperienced (e.g. junior researchers in the case of a research project, or lecturers in the case of training), a suitable researcher / lecturer may be designated as project supervisor. The project supervisor is part of the project team.

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>

2.2.2 If “No” (i.e. if the Project Head is not the research supervisor) details of the supervisor must also be supplied. If “Yes”, this part can be left blank.

Surname	Full Names	Title
	t	
NWU Campus	Faculty	School / Subject Group / Institute
- select -	- select -	
Status	Rank / Designation	NWU Staff No.
- select -		
Research Focus Area / Research Unit (if applicable)	Qualifications ⁴ (as applicable for project)	Professional Registration ⁵ (body & category)
- select -		Type here
Telephone		NWU-box or Postal Address
Work	Home / Cell	
E-mail Address		

⁴ Fill in all qualifications relevant to the project, e.g. Ph.D., M.Sc., M.B.Ch.B., B.Pharm., B. Cur., M.Psig., etc.

⁵ Fill in your category of professional registrations with councils that are applicable to the project, e.g. HPCSA if medical doctor, SAPC if pharmacist, SANC if nurse, HPCSA if clinical psychologist, SACNASP if scientist of SA Council of Natural Science Professions, etc.

2.3 Other Members of the Project Team

2.3.1 Names, qualifications and associations of all other co-workers (researchers and postgraduate students in the case of a research project, or lecturers in the case of training) and assistants / field workers who form part of the project team (excluding professional supervisors who may not be directly involved in the project – see §2.4):

Name	Qualifications ⁶	Professional Registration ⁷	Association and/or Function
Ronald Noel Beyers	Masters Degree	Click and type here	PhD student 21986444
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here

(Type one name per row, or type "none" if there is no other team member)

⁶ Fill in all qualifications that are relevant to the project to be able to act as professional supervisor, e.g. M.B.Ch.B., B.Pharm., B. Cur., M.Psig., etc.

⁷ Fill in all categories of professional registrations with councils that are applicable to the project to be able to act as professional supervisor, e.g. HPCSA if medical doctor, SAPC if pharmacist, SANC if nurse, HPCSA if clinical psychologist, etc.

2.4 Professional Supervisors

2.4.1 Name and qualifications of all supervisory professional persons (e.g. doctor, psychologist, nurse, pharmacist, etc.) **N.B!** The professional supervisor(s) may not be part of the project team!

More information

In all cases where medical emergencies may possibly arise, the physical presence of a doctor and a registered nurse is required. For the drawing of blood samples (e.g. diet manipulation and similar studies) the presence of a registered nurse is sufficient.

Name	Qualifications ⁸	Professional Registration ⁹	Function
Prof. M. Herselman (Nelson Mandela Metropolitan University of Technology)	PhD	Click and type here	Co-Promoter
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here
Click and type here	Click and type here	Click and type here	Click and type here

(Type one name per row, or type "none" if there is no supervisory person.)

2.5 Conflict of Interests & Sponsors

2.5.1 Declare with full details any conflict of interests of any one member of the project team or professional supervisor (see § 2.1, 2.2, 2.3 & 2.4).

Name of Researcher	Complete Description and Declaration
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable

(Type one name per row, or type "none" if there is no member of the project team or professional supervisor with a conflict of interest.)

⁸ Fill in all qualifications that are relevant to the project to be able to act as professional supervisor, e.g. M.B.Ch.B., B.Pharm., B. Cur., M.Psig., etc.

⁹ Fill in all categories of professional registrations with councils that are applicable to the project to be able to act as professional supervisor, e.g. HPCSA if medical doctor, SAPC if pharmacist, SANC if nurse, HPCSA if clinical psychologist, etc.

2.5.2 Give full details of all sponsors of the project (name, address, affiliation with the project and the nature and extent of each sponsor's contribution).

Name of Sponsor	Contact Details	Affiliation & Contribution
None	Not Applicable	Not Applicable
None	Not Applicable	Not Applicable
None	Not Applicable	Not Applicable
None	Not Applicable	Not Applicable
None	Not Applicable	Not Applicable

(Type one name per row, or type "none" if there are no sponsors.)

2.5.3 Is any participant in the project directly or indirectly involved with one or more of the sponsors? Give full details.

Name of Participant	Association with Sponsor
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable

(Type one name per row, or type "none" if there are no such participants.)

2.5.4 Does any member of the project team receive any form of remuneration or other benefits from the sponsor(s), either directly or indirectly? Give full details.

Name of Team Member	Details
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable

(Type one name per row, or type "none" if there are no such team members.)

2.6 **Collaborations**

Declare with full details all collaboration agreements, e.g. with researchers or lecturers from another institution, national or international, who will be working on a defined section of the project.

More information

Your local team may collaborate with a team from a different institution in South Africa or internationally, thereby, for example, to incorporate and benefit from their expertise and/or facilities. Typically in such cases you take responsibility for a certain part of the project and the collaborator for a different part. These responsibilities and agreements must be fully described and declared here.

Name of Collaborator	Full Description and Declaration
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable

(Type one name per row, or type "none" if there are no contractors.)

2.7 **Contractual Agreements**

Declare with full details all contractual agreements (e.g. with team members, collaborators or sponsors) on the project.

Please note! A copy of any contractual agreements **MUST** be submitted to the Office of the Ethics Committee, together with submission of this application.

More information

Sometimes there are e.g. contractual obligations with co-workers of organisations outside the University. These contractual obligations may e.g. place restrictions on certain aspects on the availability of raw data i.t.o. intellectual right of ownership. Particularly where foreign co-workers are involved, these contracts can get complex. Therefore you must indicate here what these contractual obligations encompass, whether the University approved and sanctioned it and declare and describe any other potential legal and ethical implications thereof.

Name of Contractor	Full Description and Declaration
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable
None	Not Applicable

(Type one name per row, or type "none" if there are no contractors.)

Remember to save your document regularly as you complete it!

Section 3: General Project Background

In this section the general project information is highlighted as of scientific interest, to give the selection panel a broad overview of the project and to sketch the context. You can therefore represent and discuss it here typically as you would do it for publication in a technical magazine or for a funding application. You also don't have to highlight and defend any ethical justifiability in Section 3, since it is done in Sections 4, 5 and 6.

3.1 Full, descriptive title of the project

Promoting Human Capital Development through ICT Creativity and Innovation

- 3.2 Has this project been already been evaluated and approved by a scientific committee (e.g. a committee for higher degrees, research committee, educational committee, etc.)? If "Yes", provide details. If "No", provide a reason.
(Please mark with **X** in the relevant block and provide details if "Yes")

More information

The NWU Ethics Committee may have to rely on the expertise of a scientific committee (e.g. a committee for higher degrees, research committee, educational committee, etc.) regarding the evaluation of the scientific and/or educational merits and design of the project. Usually a project should have been evaluated and approved by such a committee before submission of an Ethics Application. If, however, this is not possible, the Ethics Committee must be notified as such and will have to evaluate the scientific and/or educational merits and design of the project, since scientific justifiability is implicit in ethical justifiability.

Yes	No	Details
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Project Proposal approved November 2009

3.3 Envisaged commencement and completion date of the project

More information

Here you can indicate the expected commencement and ending dates of the project, which may be anything from a day to a few years. Projects are approved by the ethics committee for a maximum of 5 years, whereupon a new application must be submitted again. The full expected duration of the project, even if it is more than 5 years, must be filled in below. Even if the expected duration of the project is uncertain, you can still make an estimate here and report the progress with the annual report.

Commencement Date						Completion Date													
2	0	0	9	-	0	4	-	0	1	2	0	1	0	-	0	5	-	3	0
c	c	y	y		m	m		d	d	c	c	y	y		m	m		d	d

3.4 Background & Motivation

More information

Describe the need for this specific project (e.g. literature background and the scientific or clinical problematic nature and observations that gave rise to the planning of this project) in order to place the proposed project in perspective and support it with relevant literature references.

This research is based on the researcher's experiences of over two decades of interacting with a wide range of learners, where modern technologies provided a stimulating digital curriculum interface to interact with individuals on their terms. The researcher discovered differences amongst learners through many of these interactions, ranging from the simple introduction of animations in Science lessons, to stimulating multidimensional competitions involving the application of a range of skills, solving the challenges of a transport divide for outreach projects, and the initiation of a high level

national project to address skills development among the youth in South Africa. Experience from involvement in international projects also provided a key input into the formulation of many of the ideas including recognition for two strategic projects at international level.

The researcher aims to highlight the importance of understanding not only hardware and software issues, but more importantly the human elements (“warmware”) of introducing technologies into the classroom, which in many respects, are potentially the most difficult. Learners today, whether they are from successful private schools or deep rural previously disadvantaged schools, have a great deal in common. Talent is mostly not identified in the latter schools because of a lack of systems to do so as well as teachers being inadequately prepared to stimulate these learners effectively.

The introduction of Outcomes Based Education (OBE) approach in South Africa was designed to transform the country’s needs as far as genuine skills development is concerned. However, the system is producing few learners with suitable competencies in Mathematics, Science and Technology. Modern Information Communication Technologies (ICTs) have the potential to share top teachers through virtual interactive classrooms to support learners in more rural underserved areas to address real educational needs (Miller, 2000).

The experience of the researcher has led directly to the birth of a programme to develop youth in Africa, especially in the areas of Science, Technology, Engineering and Mathematics and Innovation (STEMI), not from a purely academic perspective, but rather to provide opportunities to promote creativity and innovation as well as entrepreneurial opportunities through stimulating hands-on experiences.

In many respects these interventions start where such programmes as computer literacy stop, focusing more on a constructivist approach to empower learners rather than simply to teach or train them. There is an opportunity for human capital development to begin from an early age as possible through a range of identified projects which capitalize on the strengths of ICTs to reach out to the broader educational community. However, it is unclear how ICTs can promote creativity and innovation for human capital development in South African schools. This study aims to address this knowledge gap in the South African context.

The best way to appreciate the merits and consequences of being digital is to reflect on the difference between bits and atoms. While we are undoubtedly in an information age, most information is yet delivered in the form of atoms: newspapers, magazines, and books. Our economy may be moving toward an information economy, but we measure trade and we write our balance sheets with atoms in mind (Negroponte, 1998: 11). This dichotomy is reflected in the diverse educational approaches being adopted in schools across South Africa today. On the one hand, learners are being exposed to traditional education using text books, when they are available, while other learners are being fully prepared for life in a digital world to participate in the knowledge economy by progressive educators and their respective institutions. Transforming education into a modern system should also address the digital needs of the learners from within the curriculum. If transformation fails to take cognizance of the Net Generations ability to deal with information, amongst other characteristics as described by Oblinger and Oblinger (2005: 2.4-2.5), then the system will fail to develop learners with digital age literacy and other 21st century skills needed to cope with life in a technological world that they are growing up in.

The world of Knowledge Age work requires a new mix of skills to jobs that require routine manual and thinking skills are giving way to jobs that involve higher levels of knowledge and applied skills like expert thinking and complex communicating (Trilling *et*

al., 2009: 7). Keeping pace with change is an essential element of producing successful learners exiting from the grade 12 examinations in South Africa. The thought of a school that can learn has become increasingly prominent during the last few years. It is becoming clear that schools can be recreated, made vital, and sustainably renewed not by fiat or Command, and not by regulation, but by taking a learning orientation. This means involving everyone in the system in expressing their aspirations, building their awareness, and developing their capabilities together (Senges *et al.*, 2000: 5).

Schools across the country are faced with a learner population of “native speakers” of the digital language of computers, video games and the Internet (Prensky, 2001: 1) expecting to be taught differently. The intention of the introduction of OBE (Department of Education, 2002; Department of Education, 2003) has shifted the focus of the educational process to one of skills development and not the behaviorist paradigm of pure information transfer. Based on the author’s experience there are also a growing number of more progressive educators who are grappling with the demands of introducing modern ICTs into the learning process. Providing these teachers with a better understanding of this environment may help them to capitalize on the strengths of a technology enabled teaching and learning environment by capitalizing on the power of ICTs to create virtual classrooms which can also digitally include remote learners in geographically separated classrooms.

The establishment of the Young Engineers and Scientists of Africa (YESA) project was conceived to initiate the development of a science, engineering and technology (SET) pipeline to nurture creative and innovative skills. This must be seen as a long-term investment in human capital development (HCD) to support the grand challenges of the Department of Science and Technology’s (DST) 10 year strategic plan (Department of Arts Culture Science and Technology, 1996) to form the foundation stones of the National System of Innovation (NSI) for South Africa, ultimately contributing to the Millennium Development Goals of 2015. Interventions that actively engage learners should be further investigated with the view to having an impact on all schools across the country. The *Fab Kids* and *Digital Kids* projects are just two of these interventions which can provide a vehicle for the nurturing and identification of learners with talent. The outcomes of this investigation will have implications for the following national projects:

- Apex 3 Project – Interconnecting all 500 Dinaledi Schools (Matsepe-Casaburri, 2008).
- EduNet – interconnecting all schools in the country (Department of Education, 2004).
- National System of Innovation (Department of Science and Technology, 2004).
- Youth Into Science Strategy, Nurturing Youth Talent for a Stronger National System of Innovation:
 - Department of Science and Technology (Department of Science and Technology, 2006).
 - National Youth Strategy: Employment of unemployed Science graduates through the Department of
 - Science and Technology (Department of Science and Technology, 2008).
 - E-Caders: Employment of unemployed Computer Science graduates through the Department of
 - Science and Technology (Mangena, 2006).
 - E-Skills development: ICT skills for modern life, the work place and technical skills (e-Mzansi
 - Information Society, 2009).

Computer literacy has to be the starting point to empower learners to access information but far too often this is the end point stifling opportunities for creativity and innovation while not promoting entrepreneurial opportunities. To overcome this there is

a need to sensitize teachers to the complexity of the learning environment especially where ICTs are introduced for teaching and learning which is a notion supported by John (s.a.) and Valcke et al. (2005: 13-17). Teachers may perceive their learners to be in one place whereas in reality they may be somewhere else resulting in lost opportunities to effectively engage more individuals in the learning process. The transition to an OBE model emphasizes a learner-centric approach where individuals are expected to become central to the learning process (Schulze, 2003: 6-12) and not target of the content. This study relies heavily on a constructivist approach to empower learners to take ownership of the learning process utilizing the power of modern ICTs with a strong career guidance and entrepreneurial component. The availability of a broad range of commercial and open source solutions has expanded the options available for teachers to use in the classrooms across all subject areas.

The introduction of YESA, and the subsequent piloting of a range of interventions to address some of the above issues has identified the need to massify the project through the constitution of a national delivery vehicle. All NSI discussions should start with the SET pipeline from grade 1 to acknowledge the contributions of the formative years. In order for the pipeline to produce more learners with better qualifications in SET it is proposed that these interventions should start working with learners from as young an age as possible. In addressing the question of how long it takes to produce a PhD many adult respondents fail to consider the effects of the formative years. The general response is approximately two to three years whereas in fact a PhD is a culmination of a life time of experiences. The following six key concepts to be highlighted throughout the study include and are contextualized below:

- The Net Generation
- The National System of Innovation
- The Digital Divide
- Social Inclusion
- Constructivism
- 21st Century Skills development.

The Net Generation

It is common to bemoan how kids no longer have activity hobbies, and, as they get older, how so few are interested anymore in technical careers. These may have been temporary casualties of the digital revolution, artifacts of an overemphasis of bits over atoms as young and old sat before their computer screens. Kids' toys emulate grown-up tools: a child's play with an erector set was not too far off from the work of an engineer (Gershenfeld, 2005: 251).

Throughout history corporations have organized themselves according to strict hierarchical lines of authority. Everyone was a subordinate to someone else - employees versus managers, marketers versus customers, producers versus supply chain subcontractors, companies versus the community. There was always someone or some company in charge, controlling things, at the "top" of the "food chain". While hierarchies are not vanishing, profound changes in the nature of technology, demographics, and the global economy are giving rise to powerful new models of production based on community, collaboration, and self-organization rather than on hierarchy and control (Tapscott *et al.*, 2008: 1).

These changes in society and the way children play should to be reflected in what happens in classrooms on a daily basis if what goes on in the classroom is to be relevant to all learners exiting the education system, especially in the 21st century. Educators around the world are heatedly debating how to prepare students for living and working in the 21st century (Caspari *et al.*, 2007: 2). The world is changing around us and the current Net Generation born after 1994 are growing up not knowing what life was like without technology.

If the Net Generation values Experiential learning, working in teams, and social networking, what are the implications for classrooms and the overall learning environment? Brown (2005: 122) in dealing with learning spaces refers to these new classroom capabilities have, in turn, sparked interest in new pedagogical approaches. Wireless networking, for example, makes real-time or synchronous interaction (such as real-time polling) among all class participants a very real (and increasingly practical) possibility. Videoconferencing makes it feasible for an invited expert from a remote institution to join a class session. Discussions, notes, and other in-classroom events can be captured and disseminated for further study. It is important to note that these approaches mesh well with educating the Net Generation habits of Net Gen students, such as their enjoyment of social interaction, their preference for experiential learning activities, and their use of technology. In these and other ways, technology acts as the lever that makes it possible to develop new and more effective pedagogies. Hence the classroom and the activities associated with it are evolving. Alexander (2004: 26) summarized the requirement for change through the comments of a student: One student was saying that one should not be told the answer about the journey. He said that a learning journey would be one in which you don't know the answers until you yourself have thought about it, but that might not be the answer, it's just what you think at the time. The bottom line is this: if you understand the Net Generation you will understand the future. You will also understand how our institutions and society need to change today (Tapscott, 2009: 11).

All parties associated with education today, including teachers, policy makers, employees and parents in developing countries like South Africa, have to take cognizance of this in order to bring about systemic change in classrooms across the country. This has implications for the long-term economy of the country as learners progress into the real world to become economically active members of society. The old paradigm of the teacher driving the knowledge bus has to change if the education system is to generate more effective knowledge workers for the future. The journey that the Net Generation are demanding implies that they want to dictate when and where they want to get on the bus, which route that want to take and what sequence they want to undertake it in. The end goals remain the same but the knowledge and life experiences gained by each individual may differ depending on the technologies used, the social networks they participate in and they way they construct meaning of the world they are growing up in.

National System of Innovation

Twenty first century innovators do not need to behave like the Stone Age men who accidentally discovered fire Scientists and technologists can use existing knowledge and technology to generate new ideas and new products (Pandor, 2009). In initiating a SET pipeline the emphasis of the various interventions is on creating an Innovation Ecology. This is the work environment, a setting that can enable, encourage, foster, and catalyzes the generation of ideas and creation of value out of them. It supports individuals, teams, and the whole organisation in the journey towards sustainable growth and success that are based on on-going innovation (Dvir *et al.*, 2007).

As in a biological approach Innovation Enabling Ecology in the work environment can enable, encourage, foster, and catalyse the generation of ideas and creation of value out of them. It supports individuals, teams, and the whole organisation in the journey towards sustainable growth and success that are based on the balanced portfolio of innovation covering incremental, radical and disruptive innovation (Dvir, 2008). Assuming an ecological approach also allows for a process of interdependence where the nurturing of the minds of the learners is enhanced through the interrelatedness of all contributing socioeconomic, cultural, historical and other factors which are brought to bear on the child. The role of YESA is to engage the learners in the process with the

view to developing the feeder stock for the human capital needed for a national system of innovation (Department of Science and Technology, 2009). The “Innovate America” report identified the need for a new 21st Century innovation economy focused on talent, the capacity to take risks, and the continuous renewal of an innovative infrastructure. Reports by the National Academy of Engineering and the Task Force for the Future of Innovation have reached similar conclusions. Significant characteristics that must be addressed for industrial and societal competitiveness include that

- 1) the bar for innovation is rising,
- 2) innovation is diffusing at ever-increasing rates,
- 3) innovation is becoming increasingly multidisciplinary and complex,
- 4) innovation is becoming more collaborative requiring cooperation and communication among scientists and engineers and between creators and users,
- 5) workers and consumers are demanding higher levels of creativity, and
- 6) innovation is becoming global in scope with mutual demands from centers of excellence and from consumers (Dismukes, 2005: 30).

The various interventions of YESA is an attempt to address these same issues by starting from as young an age as possible with the intention of increasing the pipeline to feed the NSI. Idea creation is no longer a question of finding a deep personal vision you dream of bringing forth. Idea creation is now a far more nomadic process that rests on seeing an opportunity in the moment and seizing it, long before you even know where the trail will lead. It is far more about being awake and alert, flexible and sensitive, than it is about being forceful and commanding. The well-worn advice of searching your soul for something you love to do may no longer be quite as relevant. It comes from a gardening mentality, and the new economy is the domain of hunters and gatherers (Tarlow *et al.*, 2002: 3).

The stimulation of a national system of innovation will be central to the empowerment of all South Africans as they seek to achieve social, political, economic and environmental goals. The development of innovative ideas, products, institutional arrangements and processes will enable the country to address more effectively the needs and aspirations of its citizens. This is particularly important within the context of the demands of global economic competitiveness, sustainable development and equity considerations related to the legacies of our past. A well-managed and properly functioning national system of innovation will make it possible for all South Africans to enjoy the economic, socio-political and intellectual benefits of science and technology (Department of Arts Culture Science and Technology, 1996).

There are a number of organizations that are operating in the NSI space. The objectives of the National Research Foundation (NRF), for example, is to support and promote research through funding, human resource development and the provision of the necessary research facilities, in order to facilitate the creation of knowledge, innovation and development in all fields of the natural and social sciences, humanities and technology. In doing so, it contributes to the improvement of the quality of life of all the people of the country (National Research Foundation, 2009). Added to this is the National Advisory Council on Innovation (NACI) which was created by legislation to advise the Minister of Science and Technology of South Africa, and through the Minister, the Ministers Committee and the Cabinet, on the role and contribution of science, mathematics, innovation and technology, including indigenous technologies, in promoting and achieving national objectives (National Advisory Council on Innovation, 2009).

There are also a number of school based competitions which also promote the spirit of innovation starting at school level. The Federation of Engineering, Science and Technology Olympiads and Competitions (FESTOC) provides a management service

for the various national Science, Technology, Engineering and Mathematics (STEM) Olympiads and competitions from Grades 1-12. The introduction of the *Digital Kids* and *Fab Kids* programmes as part of YESA has highlighted the prospects of starting where computer literacy stops. Key ingredients of these programmes include the nurturing of creativity and innovation through the adoption of a constructivist methodology within a nontraditional learning environment. These sessions have identified learners many talented learners.

The yardstick for the NSI is generally the number of PhDs that a country produces. To increase capacity in the pipeline it is necessary to return to the source and make a long-term investment from an early age as possible to grow the human capital feeder stock. YESA is the start of such an initiative and will feed into the South African government's awareness of the need to stimulate entrepreneurship, innovation and growth amongst knowledge-intensive businesses. Science and technology education, innovation and commercialisation are integral components of our National System of Innovation (NSI). The key challenges are adequate funding, skilled human resources, improved private sector R&D, protecting and exploiting intellectual property, and integrating a fragmented government science and technology system (Comins, 2009). Baskaran and Muchie (2006: 238), in a study involving Innovation Systems for ICT in Brazil, China, India, Thailand and Southern Africa, show clearly that the context of the national system of innovation, whether it exists in a weak, strong, bifurcated, lopsided and uneven way or whether it is in a state of birth, emergence, consolidation, maturity or decline, has serious consequences in the manner in which information and communication technologies are created, appropriated, diffused and used in many of the economies. For the economies in the developed world, ICT develops as industrial sectors and promote economic growth and is essential for daily life and society. It has become central to the existence and reproduction of society, economy and various institutions. This reinforces the notion of learners being encouraged to go beyond the confines of computer literacy as well as the school curriculum to become highly sought after ICT practitioners and innovators.

The Digital Divide

Bridging the digital divide as early as possible has the potential to provide future economically active citizens with the tools to cope with life in a technological world. It is imperative that a broad range of strategies are adopted to digitally include learners from both urban and rural communities to ensure equal access to information and to unleash their creative and innovative talents coupled to the promotion of e-literacy amongst the broader population. Certainly the digital divide is not making the headlines in the way education, health, employment and crime do, but I believe it has an underlying impact on all of these areas, and more. Connecting people to ICT skills can connect them to new or better jobs, to new forms of communication and social interaction, to community infrastructures and government services, to information to help with homework, to consumer power and convenience. It can save people time and money, open new doors and new worlds. Digital inequality matters because those without the right combination of access, skill, motivation or knowledge to make digital decisions are missing out in all areas of life. And that does not just impact on individual lives but on families, communities, on political processes, democracy, public services and the economic and social health of the nation as a whole (UK OnLine Centres, 2007). Van Dijk (1999) distinguishes four kinds of access in the context of the Digital Divide:

- *Lack of any digital experience* caused by lack of interest, computer fear and unattractiveness of the new technology ('psychological access')
- *No possession of computers and network connections* ('material access')
- *Lack of digital skills* caused by insufficient user-friendliness and inadequate education or social support ('skills access')
- *Lack of significant usage opportunities* ('usage access') (Van Dijk, 1999: 23).

On the other hand, Norris (2001) sees the concept of the digital divide to be understood as a multidimensional phenomenon encompassing three distinct aspects. The global divide refers to the divergence of Internet access between industrialized and developing societies. The social divide concerns the gap between information rich and poor in each nation. And finally within the online community, the democratic divide signifies the difference between those who do, and do not, use the panoply of digital resources to engage, mobilize, and participate in public life (Norris, 2001: 5). This study will propose an alternative of the digital divide which is often portraided as a 'chasm'. The alternative is to view the situation as a technology ladder which provides for learners to find their niche ranging from access (first rung), to computer literacy (second rung) all the way up to ICT enabled innovators at the top. This model will also contextualize the ICT development strategy to feed the NSI process.

Social Inclusion

Although ICT has not created a parallel world that one must leap into at all cost, it has contributed to a profound change in the real world we live in. While the dot-com economy has gone bust, the underlying information economy surges on. While notions of cyberspace fade away, real-life applications of ecommerce, e-governance, and Internet-enhanced learning thrive. And while the current U.S. administration does not emphasize a digital divide, many governments around the world are stressing the importance of ICT for social inclusion (Warschauer, 2004: 12). The shift from a focus on a digital divide to social inclusion rests on three main premises: (1) that a new information economy and network society have emerged; (2) that ICT plays a critical role in all aspects of this new economy and society; and (3) that access to ICT, broadly defined, can help determine the difference between marginalization and inclusion in this new socioeconomic era (Warschauer, 2004: 12). To achieve this in the long term individuals at school level should experience the implications of this firsthand in order to be more in tune with the impact of social inclusion in the future work place. Put simply, the seeds need to be sown while learners are at school wherever possible and in whatever format. Whitney (2007) refers to learners with Special Education Needs. Yes, these learners need to be brought into main stream education as part of social inclusion but the authors also argues that main stream learners can also potentially benefit from these encounters as part of a more holistic educational experience (Ben, 2007: 1).

Constructivism

"If students can't learn the way we teach, we must teach them the way they learn" (Carol Ann Tomlinson, quoted from Adams *et al.*, 2008: 19). This poses a real challenge to the teachers to transform their methodologies to take into account the needs of the generation of learners before them. Understanding their needs and the way they think and operate while working in their digital world should no longer be optional for a teacher in a developed or developing world. The key idea that sets constructivism apart from other theories of cognition was launched about 60 years ago by Jean Piaget. It was the idea that what we call knowledge does not and cannot have the purpose of producing representations of an independent reality, but instead has an adaptive function. This changed assessment of cognitive activity entails an irrevocable break with the generally accepted epistemological tradition of Western civilization, according to which the knower must strive to attain a picture of the real world. While the revolutions in the physical sciences in this century have led to the realization that such a picture seems impossible even according to physical theory, most philosophers hang on to the belief that the progress of science will somehow lead to an approximation of the ultimate truth (Von Glaserfeld, 2005: 3). The theories and reasoning behind the constructivist views on learning have far-reaching implications on the methods and practices of teaching. The constructivist viewpoint sees the learner in a much different light than many of the traditional methods of teaching may cater to. According to the idea of constructivism, the individual plays a key role in actively constructing his or her own knowledge and understanding. In this way of thinking, information cannot be directly

given to children and adolescents and put into their minds, but rather, they discover knowledge through exploring their own world and thinking critically on the ideas presented to them. If this is true for modern educators, then their job is much more than to simply instruct children and pass information on to them. Instead, teachers become facilitators and guides rather than directors and molders of learning. They cannot force the information onto students, but rather they can present the information to them and help them to explore and interpret it in their own way (Schall, 2006). Constructivism refers to a cluster of related views (radical constructivism, social constructivism, sociocultural approaches, emancipatory constructivism, social constructionism) that all rest on the assumption that learning is an active process of constructing meaning and transforming understandings (Gravett, 2001: 18). The constructivist view influenced by Piaget, place emphasis on the mental processes of individuals in meaning making. An important proponent of this belief is Von Glasersfeld, whose view is termed *radical constructivism*. However, according to social constructivists (founded by Vygotski), the construction of individual meaning takes place in social contexts (Gravett, 2001: 20). *Social constructivists* therefore emphasises the role of language, dialogue, and shared understanding (Schulze, 2003: 6). Radical constructivism offers a radical break from the dualism of the positivist view, seeing perception and understanding as being part of a dynamic process. It also refutes the possibility of objective truth in any absolute sense, in that knowledge as a construction cannot be seen as something separate from the construer. However, this view raises the problem of the status of communication and of shared knowledge (Littledyke, 1998: 6). Naiman defines creativity as the act of turning new and imaginative ideas into reality. Creativity involves two processes: thinking, then producing. Innovation is the production or implementation of an idea. If you have ideas, but don't act on them, you are imaginative but not creative (Naiman, 2007).

A more elaborate definition of the term Innovation is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services (Harvard Business School Press, 2003: 2). There are generally two types of Innovation: incremental and radical. Incremental innovation is generally understood to exploit existing forms or technologies. It either improves upon something that already exists or reconfigures an existing form of technology to serve some other purpose.

In this sense it is innovation at the margins. A radical innovation, in contrast, is something new to the world, and a departure from existing technology or methods. The terms breakthrough innovation and discontinuous innovation are often used as synonyms for radical innovation. More recently, Harvard professor Clayton Christensen has used the term disruptive innovation to describe a technical innovation that has the potential to upset the organization's or the industry's existing business model. In almost all cases, these innovations are radical. Disruptive technologies displace the established technology and precipitate the decline of companies whose business models are based on them. In many instances, disruptive technologies create new markets (Harvard Business School Press, 2003: 3). The establishment of YESA has provided an opportunity to encourage learners to allow their creativity to come to the fore especially through the FabKids and Digital Kids programmes. The intention is to demonstrate that over a period of time it is possible to nurture this creative spirit to the point where individuals are able to see opportunities for incremental innovation and ultimately move on to stimulate radical innovation in the different sectors that they may find themselves in.

21st Century Skills

Preparing our students for the workforce and being good, active participating members of society: that's what this is all about - it is about constant improvement (Oberg, 2004: 129). Our children live in a global, digital world – a world transformed by technology and human ingenuity. Many of today's youngsters are comfortable using laptops, instant messaging, chat rooms, and cell phones to connect to friends, family, and experts in

local communities and around the globe. Given the rapid rate of change, the vast amount of information to be managed, and the influence of technology on life in general, students need to acquire different, evolving skill sets to cope and to thrive in this changing society. These enGauge 21st Century Skills go a step further. Advances in the cognitive sciences show that learning increases significantly when students are engaged in academic study through authentic, real-world experiences. The enGauge 21st Century Skills build on extensive bodies of research – as well as on calls from government, business, and industry for higher levels of workplace readiness – to define clearly what students need to thrive in today’s Digital Age (enGauge, 2003). A key element of Friedman’s Flat World is the notion of the world getting smaller being enhanced by technologies through a process of globalization. This raises the issues of an ever increasing population being left on the wrong side of the digital divide as new forms of collaboration are introduced. So schools had better make sure they are embedding these tools and concepts of (horizontal) collaboration into the education process (Friedman, 2006: 315) to ensure that future citizens emerging from the educational process are better equipped. In order to succeed in a modern world an education system has to convey more than just information. It has to develop more learners with the right skills, attitudes and values to transform information and experience into knowledge. This process requires an additional set of 21st century skills to be taught in the classroom to enable learners to operate effectively in Friedman’s Flat World.

Main research question

How can technology in education promote creativity and innovation for human capital development at school level to teleport more learners up the technological ladder?

Sub-questions

- What are the implications for using broadband communication technologies to digitally link two geographically separated classrooms?
- What are the implications for the development of a multi-layered solution to address the needs of rural communities?
- How can the development of a new educational model identify the complexity of the learning environment to inform and provide practical experience thereof to the teacher of the diverse nature of an ICT enabled classroom?
- How can a rapid-prototyping environment be used to stimulate creativity and innovation?
- How can digital literacy be taught as part of Technology Clubs at schools?

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3.5 Project Objectives

More information

Describe the specific aims with the project (e.g. research aims, objectives with the study, learning outcomes, etc.). Where applicable, provide a formulated research problem for the project.

The main purpose of this research will be on establishing 'proof of concept' for all the different interventions. In essence there were many lessons learnt by the researcher based on experiences in a post-constructivist environment which could influence the methodologies of future YESA interventions. These experiences included local and international experiences such as the Formula One in Schools Project and other international projects such as the World School Forum and the International Student Project for Gifted Children which could be brought to bear on education within a South African context. This has to be contrasted with the under resourced schools in South Africa that YESA is mandated to operate in. It is anticipated that the types of problems to be encountered will focus more on the "warmware" issues of administration, getting permission to proceed, and obtaining the buy-in from the teachers. This is expected to be in stark contrast to the willingness on the part of the learners to actively engage in the new learning process. The main problem to be investigated will be whether it is possible to establish a pipeline for Science, Engineering and Technology at school level that can initiate human capital development from as early age as possible where ICT form an integral component. In a post apartheid society meeting the needs of the people cannot be solved simply by throwing money at the problem. To bring about effective social transformation is a complex process involving the management of many variables where this study will focus largely on learners in the educational sector. The problems that were identified and as influencing the direction of the investigation included:

- Gearing teachers up to adapt to the new demands and expectations of teaching in a digital age
- Teachers with low or no educational qualifications especially in the science and technology fields
- Poor quality of teachers in township and rural areas
- Low penetration rates for technology in schools
- Low emphasis of creativity and innovation and other 21st century skills in schools even within the newly introduced OBE system
- Learners being ill prepared for life in a technological world.

This study will have the following key **Objectives**:

- To investigate a small scale intervention into digitally-including remote learners in geographically separated virtual classrooms
- To conceptualize a multi-layered approach for the provision of a range of

community-focused solutions on top of a communications network infrastructure

- To conceptualize an alternative educational model which highlights similarities and differences between teachers and learners where ICTs are used in the classroom
- To pilot a *FabKids* intervention, which utilizes a rapid-prototyping environment to promote creativity and innovation
- To pilot a Digital Kids intervention, within the context of Technology Clubs which focuses on the development of digital literacy amongst learners using open source software.

3.6 Project Design, and Procedures / Methods / Techniques

More information

Describe, as applicable, the project layout (e.g. how many human participants / animal subjects and what classification into test groups is planned), what type and how many experiments / studies / interactions / interferences are planned to achieve the project objectives and what interventions / procedures / techniques / methods / approaches / therapy will be used, how data will be collected, etc. Describe in full how the project will be carried out, also with reference to the order of all the steps.

This information lays the basis for Sections 4, 5 & 6 where aspects of ethical importance, as applicable, are discussed. There is therefore no need for you to highlight any ethical justifiability already in this section, but you can discuss it in subsequent sections where it comes up.

Action research will be used primarily to gather data in the form of qualitative information regarding the viability of the ULwazi Project, Fab Kids and Digital Kids project. Contrasting ontologies, epistemologies and models of humankind will demand different research methods. Investigators adopting an objectivist (or positivist) approach to the social world and who treat it like the world of natural phenomena as being hard, real and external to the individual will choose from a range of traditional options - surveys, experiments, and the like. Others favouring the more subjectivist (or anti-positivist) approach and who view the social world as being of a much softer, personal and man created kind will select from a comparable range of recent and emerging techniques - accounts, participant observation and personal constructs, for example (Cohen *et al.*, 1984: 8). The field of education lends itself to both quantitative and qualitative research. The research methodology/approach to be followed will in this study be dictated by the nature of the data and the research problem. Qualitative research methodologies are methodologies dealing with data that are principally verbal, while quantitative research methodologies are those dealing with data that are principally numerical (White, 2005: 80). It could be said that social research (in fact all science) is organized around two activities: measurement and interpretation. Social researchers measure aspects of social reality and then draw conclusions about the meaning of what they have measured (Babbie *et al.*, 2007: 2). Most of this study will be based on qualitative research interspersed with aspects of a quantitative approach using a mixed methodology approach. The research methodology adopted for this study can best be described as a mixed methodology design of combining qualitative and quantitative research methods (Creswell, 1994 cited in De Vos, 1998: 361). The mixed methods entail using aspects of both the qualitative and quantitative paradigm at all or many of the methodological steps in the design.

Qualitative Approach

Qualitative research is more concerned with understanding social phenomena from the perspectives of the participants. This happens through the researcher's participation in the daily life activities of those involved in the research or through historical empathy with participants in past social events (White, 2005: 81). Qualitative research approaches collect data through observations, interview, and document analysis and summarize the findings primarily through narrative or verbal means (Lodico *et al.*, 2006: 15). Reason and Bradbury (2006: 1) see action research as a practice for the systematic development of knowing and knowledge, but based in a rather different form from traditional academic research. It has different purposes, is based in different relationships, and has different ways of conceiving knowledge and its relation to practice. These are fundamental differences in our understanding of the nature of inquiry, not simply methodological niceties. In this study the researcher was intimately involved in conceiving, developing and conducting all the different interventions. Action research will play a critical role in identifying the need for the different interventions whereby the positive outcomes of one intervention will directly be ploughed back into the next while attempting to come to terms with the negative outcomes.

Quantitative Approach

Quantitative research seeks to establish relationships (if ... then) and to explain causes of changes in measured social facts. Quantitative research mostly has a hypothesis in which the relationship between variables, such as the dependent and independent variables, has to be explained as its point of departure (White, 2005: 81). In the case of this research a pilot questionnaire was compiled to quantify some of the participant's responses, but no detailed statistical analysis could be conducted due to the small sample size. Therefore, a qualitative approach will be used and where appropriate, quantitative data will support this approach. Cohen and Manion (1984: 213) indicate that action research is essentially an on-the-spot procedure designed to

deal with a concrete problem located in an immediate situation. This means that the step-by-step process is constantly monitored over varying periods of time and by a variety of mechanisms (e.g. questionnaires, diaries, interviews and case studies) so that the ensuing feedback may be translated into modifications, adjustments, directional changes, re-definitions, as necessary, so as to bring about lasting benefit to the ongoing process itself rather than to some future occasion, as is the purpose of more traditionally oriented research. Unlike other methods, no attempt is made to identify one particular factor and study it in isolation, divorced from the context giving it meaning. That the findings are applied immediately, then, or in the short term is another important characteristic. The case study method allows investigators to retain the holistic and meaningful characteristics of real-life events - such as individual life cycles, small group behaviour, organizational and managerial processes, neighbourhood change, school performance, international relations and the maturation of industries (Yin, 2009: 4). Action research is a flexible, situationally responsive methodology that offers rigor, authenticity and voice (Cohen *et al.*, 2000: 312).

Literature Study

Information for the literature review will be obtained through a variety of resources. These include:

- Personal Library
- University Libraries: University of Pretoria and the North-West University
- Internet search engines: Google, Yahoo, Ask.com, OAlster Search, etc.
- CSIR Research tools CSIRIS for the management of print, books, and online information covering multidisciplinary fields
- Databases: EBSCOhost, JSTOR, Sabinet, ScienceDirect.

Paradigms

How one view the world is largely a function of where you view it from, what you look at, what lens you used to help you see, what tools you use to clarify your image, what you reflect on and how you report your world to others. Thus an empirical researcher will see only those things which are conveniently measured in empirical ways. A sociologist will only be concerned with patterns affecting groups and will have little chance of learning about individual motivations except as they relate to group behaviour. The behaviourist will focus on reporting and controlling behaviors, whereas the anthropologist's concern will be on the underlying meaning. Thus, research reflects the values, beliefs and perspectives of the researcher. This is not the same, however, as saying that research is subjective. For valid research, similar approaches should lead to similar conclusions, but different approaches can hardly be expected to lead to exactly the same conclusions. These different approaches cannot be expected to ask the same questions, let alone realize similar answers. Thus, few researchers are truly unbiased or value-neutral, obviously carrying a baggage of beliefs, assumptions, inclinations and approaches to reality (Anderson *et al.*, 1998: 3).

According to Burrell and Morgan (1979: 22-23), the functionalist paradigm views the social world as consisting of concrete artefacts and relationships that can be identified, studied and measured through natural sciences from an objectivist point of view. The interpretive paradigm is concerned with understanding the world as it is. Interpretivism views the social world from subjective experiences of individuals. The radical humanist paradigm also views the social world from an ideographic perspective, as does the interpretive paradigm, but the frame of reference focuses on overthrowing the limitations of existing social structures. The radical structuralist paradigm focuses on structural relationships within a social world, providing explanations for the basic interrelationships within the context of social formations. The radical structuralist paradigm is concerned with radical change and emancipation.

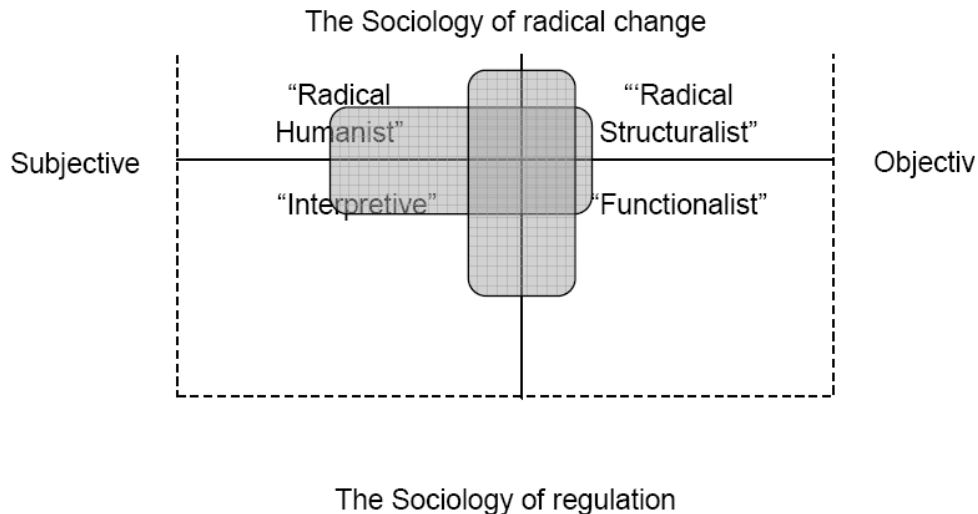


Figure 1. Four paradigms for the analysis of social theory (Burrell & Morgan, 1979:22)

Figure 1 represents Burrell and Morgan’s (1979: 22) analysis of social theory representing the objectivism – subjectivism and the order- conflict dimensions. This study is not exclusively located in one specific camp but leans more towards the subjective – Humanist and Interpretive mode while also advocating change through the Humanist Structuralist mode.

Population and Sample

For the purposes of this research schools in the greater Tshwane were used. The primary target were the senior grades from grade 8 to 12. The selection of the schools included private, government schools as well as township schools from Mamelodi and Soshanguve. In terms of the gender issues, an equal number of male and female students were requested where the selection of the learners will be left entirely up to the schools invited to participate. Some of the work was conducted in normal classroom environments while other research will be moved to computer laboratories and the Fabrication Laboratory environment based at the Innovation Hub in the Pretoria and Soshanguve areas. One of the goals of YESA is to establish Technology Clubs at various schools to supplement the traditional education curriculum spelt out in the National Curriculum Statements.

Data Analysis

Please see Addendum I (Letter to Ethics Committee 25 January 2010). A multimodal methodology approach was adopted with a greater emphasis on qualitative investigations to produce low level analysis in terms of frequency counting to highlight basic trends. The intention was to establish a proof of concept for the various interventions with the express view of creating a massification strategy for YESA as a national delivery vehicle.

Ethical Clearance, Information Letter and Indemnity Forms

The researcher has already obtained ethical clearance from the Tshwane University of Technology for this research project (Addendum B). Secondary ethical clearance is requested through the North-West University. The researcher submitted a research request form (Addendum A) to the Gauteng Department of Education to obtain formal permission to do research at schools in the province which was approved (See Addendum G). The researcher will distribute a Gauteng Information Letter, CSIR Indemnity Form and Release Form (combined in Addendum C) to parents via.

schools. Parents will be asked to complete the Indemnity Forms (Addendum C; Addendum D: CSIR Indemnity Form for Digital Kids; and Addendum E: CSIR Indemnity Form for FabKids). Formal consent will be obtained from all schools, as well as parents or legal guardians before learners will participate. All schools and learners will be treated with respect, will participate voluntarily, and will be informed on their right to withdraw at any stage of the research process. Please see Addendum I (Letter to Ethics Committee 25 January 2010)

Procedures

It must be emphasized that the primary methodology of this research will be based largely on a qualitative methodology, with some elements of a quantitative analysis resulting in a multimodal approach. It is for this reason the elementary questionnaires (Addendum F: FabKids Questionnaire) was used to identify simple frequency counts from the sample population taking into consideration such variables as race, age and gender. The researcher collected and analyzed the data gathered. Sample size will be determined by permission obtained from the Gauteng Education Department (Addendum A: Gauteng DoE Research Request Form) as well as access to the schools. It is estimated that the number of learners involved in two of the interventions will be in the order of hundred learners across a broad range of schools (private, government and township) including diversity in ages, genders and race.

Data Collection – FabKids

The data collection of the FabKids was conducted using a Questionnaire (Addendum F) to quantify some of the opinions of the participants with consent from their parents. This was conducted as a pre- and post questionnaire where the researcher was the only person who captured and reviewed the information. The responses will be captured using MS Access database and simple frequency counts used to highlight some of the issues involved.

Data Collection – Digital Kids

No formal methods of collecting data will be used with the Digital Kids sessions. Written consent will be sought from parents to participant prior to a training session.

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3.7 Expected Results

More information

Where and if applicable, describe what possible or theoretically predictable results, or spectrum of results, you expect to get. Where applicable, formulate the research hypothesis. These refer to expectations and not to real results. However, if you do not have any idea of the kind of results you may expect, state so.

The expected outcome of this project is that the pedagogical procedures adopted will be reinforced as suitable methods for the introduction of the Ulwazi Project, Fab Kids and Digital Kids. The focus is on the development of the programmes where information gathered from the learners will be used to substantiate the introduction of the projects into further schools across the country.

Remember to save your document regularly as you complete it!

Section 4: Specific Ethical Implications of Project Design

The information contained in this part is additional to what is contained in “Section 3: General Project Background”. Only answer the subsections that apply to this project.

- Sec 4a: Human participants (subjects)
- Sec 4b: Filed privileged information or stored biological samples of human origin
(e.g. where information or samples are collected for another project or for medical diagnosis)
- Sec 4c: Animal subjects (vertebrates)

Sec 4a: Human Participants (Subjects)

You have already set out the project design and procedures / methods / techniques in detail in § 3.6 above. Now highlight only the following aspects for the evaluators.

4.1 Probable experience of the participants (subjects):

What will the probable experience of participants be and what measures are in place to ensure the welfare of the participants? Describe all the steps in detail and in order, so that the evaluator can form an image of the experience of the subject. (In the case of injections, blood samples, swabs, etc. that will be discussed in Sec 6e, § 6.16, you need only to refer to Sec 6e, without extensive discussion).

More information

While you place emphasis on the probable experience of the participants, refer inter alia to the following aspects, as applicable to your project:

- *Highlight what participants will be expected to do, what will be done to them, what observations will be made and how long it will take. This includes aspects such as all specific interferences, procedures, sample collections (e.g. number, quantities/volumes, frequency, routes of administration and measurements, etc.) and methods of information gathering (e.g. measurements, number, frequency, etc.) and what the probable associated experience of participants will be.*
- *What measures are in place to restrict discomfort and to see to the welfare of the participants.*
- *Provide particularly details on any step that may violate his privacy and/or may result in any form of emotional discomfort or even pain. In this way describe clearly e.g. the use or holding back of provisions / help / advice / treatments / painkillers. What measures are in place to restrict the violation of privacy and/or to minimise discomfort or pain.*

The selection of the learners for both the FabKids and the Digital Kids was left to the schools concerned and the sessions were conducted on a voluntary basis. Learners were expected to participate in sessions that were conducted in a computer environment where additional equipment was found. It must be emphasised that the environments are teaching environments and where the learners observed while interacting with information and procedures presented to them. The researcher presented all the sessions and interacted with the learners as the 'teacher'/presenter.

FabKids Tools and Software

The FabKids project relied on the availability of the FabLabs in the Pretoria and Soshanguvwe areas. The equipment that was available included amongst others, a range of hand tools, computers running either Windows or Linux with Open Office, Vinyl Cutter, Laser Cutter, milling machine, Electronics workbench, etc.

Summary of the activities for the day for FabKids

After a brief welcome learners were introduced to the FabLab. This was followed by an introduction to such concepts as Gershenfeld's "printing of a bicycle" (Gershenfeld, 2005), to stimulate the thought processes and to encourage them to think outside the box.

A critical element of FabKids methodology is the application of the Design Process inherent in the Learning Area of Technology Education at the General Education and Training Phase (GET) for grades 1-9 (Department of Education, 2002). The five steps include: Investigate, Design, Make, Evaluate and Communicate. These steps were contextualised in the challenge presented to the learners. For the purposes of the pilot project all schools were given the same problem of: 'Designing a business card holder that would attract the attention of people walking past a desk'. The FabKids experience is based on the concept of teamwork which is essential for competing in today's global arena, where "individual perfection is not as desirable as a high level of collective performance" (Kotelnikov, nd).

It may be possible to differentiate between collaboration and cooperation with reference to a division of labour. In cooperation, partners split the work, solve sub-tasks individually and then assemble the partial results into the final output. In collaboration, partners do the work 'together'. However, some spontaneous division of labour may occur even when two people really do work together (Dillenbourg, 1999).

The net result of this approach is a "more efficient use of manpower leads to opportunities for informal and incidental learning" (Marsick & Volpe, 1999).

The specific tasks assigned to each team included:

- Team Managers had to oversee all phases of the task.
- Design Engineers were responsible for the capturing of the ideas onto computer using Open Office Draw which were then printed to a laser cutter.
- Electronics Engineers had to assemble the electronic components using a 555 timer circuit and two Light Emitting Diodes (LEDs).
- Media specialists were responsible for the development of the group logos using Open Office Draw or the completion of a report for the day which is published live on the internet via Google Groups.

The selection of the groups and the allocation of the responsibilities were left entirely up to members of each team in order to cater for individual interests. Once the groups were formed, they were tasked to pool their ideas by collectively producing a number of possible solutions as simple sketches on paper which included the dimensions of the different components. At a stage when the designs were nearing completion all the

Design Engineers were extracted from the groups and given a rudimentary introduction to Open Office Draw for approximately 10 minutes. Their instructions included :-

- launching the program in Windows or Linux (Ubuntu)
- defining the page layout size to accommodate the laser printer
- saving their designs regularly
- creating objects such as lines and shapes
- resetting sizes of object to absolute sizes
- rotation of objects and
- merging of shapes

On completion of this the Electronics Engineers were extracted from their groups where they spent approximately three hours with individual attention for the assembly and completion of the circuits. The training was conducted by an intern based at the FabLab.

The first phase of the activity lasted approximately one to two hours after which the Design Engineer transferred their designs to the computer in collaboration with the Team Manager. Their task was to accurately capture their sketches as two dimensional components which, when cut on the laser cutter, could easily be assembled as three dimensional objects. The first prototype was produced on a sheet of cardboard. This 'cheap mistake' is perceived as a critical step in the process as most teams discovered small inconsistencies which had been overlooked during the design phase. Teams were encouraged to 'make mistakes' and to learn from the process rather than be worried by a fear of failure. This is encapsulated in the English Proverb "He who never makes mistakes, never makes anything".

After making the necessary adjustments to the designs the final models were cut out of Perspex using the laser cutter. By this time the circuits were either complete or nearing completion, depending on how efficiently the Electronics Engineers were at identifying problems such as dry soldering joints and the correct placement of components. The circuits and LEDs were integrated into the final models by the whole team.

The Media Specialist was also responsible for a journal report for the day which generally included digital photographs to be posted onto a Google Groups web page.

The management of the day was largely done through a process of "dynamic facilitation which worked with each person's natural inclinations and genius, enabling the group to produce a better solution in faster time, while building trust and new levels of capability" (Rough, 2008). The learners were free to ask for assistance when they encountered problems rather than the adoption of a teacher-led step-by-step process. In essence the Team Managers took full responsibility for the completion of the tasks and all teams did so successfully although two of the 16 sub groups were pressed for time.

Summary of the activities for the day for Digital Kids

The procedures adopted involved a general welcome to the group. The importance of generating digital resources was emphasized with the introduction so that the participants were able to acquire new skills while producing digital materials for either

the teachers to use in the classroom and possibly included in other school based projects. A discussion of the difference between Open Source and Propriety Software focused on the importance of copyright issues and licenses to use the software and under what conditions. The different software components were contextualized within a specific subject area and participants were encouraged to assist each other during the hands-on sessions.

Digital Kids Software

All training took place in computer laboratories that were made available at the various schools. This approach also relied on the ability to install open source software with the permission of the system administrator at the school. The software used includes amongst others:

- Microsoft Paint - Create a series of graphics
- Paint.Net - Editing and creating images
- ULead Gif Animator - Merging a series of images
- Cinema 4D 6E - 3D Graphics and animations
- Microsoft Publisher - Business Cards and Letter Heads
- Microsoft Front Page - Web Page designs
- Microsoft Movie Maker - Capturing and editing video images
- Microsoft Gif Animator - Merging a series of images
- Pivot Stick Animator - Stick animation
- CamStudio - Screen capturing for training videos –
- PB Wiki - Storing work, blogs, collaboration
- Gmail - Email communications
- VLC Media Player - Viewing videos

Welfare of the Participants

The welfare of the participants was of prime importance. Wherever possible a teacher from the participating school was expected to attend the sessions to ensure that normal schools rules would be applied within the teaching environment. All sessions were conducted in an environment which was as close to a 'normal' teaching situation which the learners were accustomed to.

4.2 Choice of techniques / methods / procedures:

As applicable to your project, with reference to available alternatives (if applicable), motivate your choice of the specific procedures / techniques / methods / approaches to achieve your project's aims.

More information

It must be clear to the evaluators that you have chosen a meaningful / best project design to achieve your project aims. Some disciplines will need more information than others. Note the following as applicable:

- *Particularly where alternative standard interventions / procedures / techniques / methods, approaches / therapy exist to what you used in the project, it is important to motivate your alternative choice. In some exceptional cases many options may exist, without there being a standard, and you simply selected one of many on the basis of availability. Whatever your reason, it must simply be highlighted clearly for the evaluators.*
- *Describe in detail how you will ensure that the interventions / procedures / techniques / methods / approaches / therapy are rigorous, such as e.g. reliability / validity / trustworthiness / authenticity. (credibility / transferability / conformability / dependability / etc.)?"*

Action research was used to gather information from the sessions. This included personal reflections on the sessions as well as comments made by the learners. Low level research be conducted and did not involve subjecting learners to rigorous testing procedures. Participants were made aware that the general sessions will be used for research purposes but the emphasis will be on the transfer of skills and the completion of the tasks at hand.

4.3 Dangers / risks and precautions:

Name and explain in context, as applicable, all dangers and risks that are associated with the specific procedures / techniques / methods / approaches that are used in the project. Also explain the necessary precautions to ensure the welfare of participants (subjects) and to ensure the safety of the researchers / assistants / field workers, as well as the community and environment. **N.B!** Where an aspect is, however, covered fully in “Section 6: Matters that Necessitate Additional Information”, you can simply refer to the specific subsection in this application form.

Due to the fact that some of the sessions were conducted on the CSIR campus at the Fabrication Laboratory all participants were required to produce an indemnity form that has been signed by their parents or legal guardians for the Fab Kids project (Addendum E). As part of the introduction the learners were introduced to the different equipment and told which tools were to be used and which were out of bounds.

Regarding the Digital Kids these sessions were conducted on the school premises and therefore fall under normal school activities in the computer laboratories. All participants were required to produce an indemnity form that has been signed by their parents or legal guardians for the Digital Kids project (Addendum D).

Regarding the Ulwazi Project normal science lessons were conducted over broadband radio connections to digitally include remote learners from the neighbouring township schools.

4.4 Expertise, skills and legal competencies:

What expertise, skills and legal competencies are needed to implement the project? Do the Project Head / research supervisor / researcher(s) / assistants / field workers have at their disposal the necessary background / expertise / qualifications / professional registrations to implement the techniques concerned? If not and as applicable, explain how the necessary training will be provided before the project commences.

Due to the fact that FabKids sessions involved working with learners during normal school hours permission to remove learners from schools had to be obtained from the Gauteng Education Department prior to all sessions. The school principals were also approached for final approval. The original Ethics approval was obtained through the Tshwane University of Technology through the Meraka Institute at the CSIR. (See Addendum H and J for original Application). Also see Addendum I (Letter to Ethics Committee 25 January 2010). Regarding the use of the equipment in the FabLabs, this was done under the supervision of the FabLab staff who were in attendance at all times for safety reasons. With respect to the Digital Kids project this was conducted as an extra mural activity and was therefore not subject to requesting permission from the GDE. In this case Ethical Clearance was obtained through the Tshwane University of Technology.

4.5 Facilities:

Describe the place(s) and facilities in detail where the project will be implemented.
(Where the project holds more than minimal risk, all emergency care situations must be carried out within an emergency care space approved by the supervisory doctor.)

Fabrication Laboratories are high tech rapid prototyping environments where learners had access to computers, laser cutters, electronics, vinyl cutters and a range of hand tools. Details of the equipment and software was discussed in section 4.1. Computer laboratories were made available at the respective schools. The ULwazi Project was conducted as after hour's sessions between two schools. Details of the equipment and software was discussed in section 4.1.

4.6 Legal authorisation:

As applicable, describe in detail what authoritarian bodies must grant authorisation for this project (e.g. Department of Health, Medicine Control Council, etc.). Also mention whether authorisation has already been obtained, with reference to attached proof, or how you will go about getting authorisation before the project commences.

More information

You need not duplicate information on the use of medicinal drugs in humans that will be described in full under Sec 6f, but in such cases only mention here approval by the Medicines Control Council and refer to Sec 6f.

Final Approval was obtained from the Gauteng Education Department (Addendum G).

4.7 Goodwill permission /consent:

As applicable, describe in detail what interest group representatives must give permission for this project (e.g. community leaders, church leaders, tribal chiefs or other). Also mention whether permission has already been obtained, with reference to attached proof, or how you will go about getting permission before the project commences.

A letter of introduction was sent out to all parents with the permission of the school requesting consent to participate including indemnity forms (Addendums C, D and E).

- 4.8 Participant: information & voluntary participation (recruitment, consent & assent):
Explain how you will go about ensuring voluntary participation, informed consent and assent for all participants. Also explain in this context the way / process in which you will recruit participants (subjects).

More information

According to law all participants must be fully informed about the implications and risks associated with participation in the project and participation in any project is completely voluntary at all times, unless there are specific reasons why it is not possible (e.g. babies, persons that are intellectually incompetent, etc.) In the latter case ethical justification and precautions must be very clear and consent must be given by the legally competent person who is legally authorised to act on that person's behalf (e.g. the lawful parent / guardian and not a school principal, matron, etc.).

Recruitment of human participants must take place within a specified time frame / schedule (i.e. specified starting and ending date) and cannot continue indefinitely.

Furthermore, participants may withdraw from the project at any time without providing reasons and without accompanying discrimination. Even if there is proxy consent from parents / guardians of minors, these persons must still assent voluntarily (without which participation may not take place). In this part you can therefore explain how you:

– INFORMATION

will go about explaining the project and accompanying implications to all participants (and parents / guardians) where applicable. Where research is not carried out in participants' mother tongue, explain how you will go about conveying the information in an understandable manner. Refer to an attached letter with information for informed consent that will be used, where applicable. Where participants are not literate, the information and process for obtaining informed consent (e.g. oral / tape recording, etc.) must be explained in full and the exact information and questions that will be used must be attached.

– VOLUNTARY PARTICIPATION

will ensure voluntary participation by seeing to it that:

- recruitment takes place in such a way that the participants do not feel intimidated by the process or implicitly "bribed", but decide absolutely voluntarily to participate
- assent of all participants is obtained, especially where minors and other vulnerable persons or groups are involved (e.g. sick and desperate persons, persons who are not intellectually competent, traumatised or emotionally vulnerable persons, etc.).
- it is explained to participants that they may withdraw from the study at any time (without the necessity of providing reasons).

– CONSENT

will ensure that informed consent of every participant, or legally competent person who is legally authorised to act on that person's behalf, is obtained.

After consultation with the principals of the identified schools a teacher was appointed to facilitate the process. The selection of the learners was left entirely up to the school for all the projects where written consent was requested from the parents.

- 4.9 Criteria for participant selection & recruitment:

Describe in full what inclusions and inclusion criteria will be used to select participants (subjects) and motivate.

More information

Refer to inclusion and exclusion criteria and how it is justified (reasons). Also refer to aspects such as race, gender, age limits, institutional affiliation or any other specific relevant criteria. Motivate your choice of the specific group.

The recommendation was that learners had to be interested in Science and Technology and be in Grade 10. Where mixed genders were involved it was suggested that the group comprised of roughly 50% girls and 50% boys. The sessions were also entirely voluntary.

4.10 Benefits for participants (subjects):

Describe the potential benefits that the study might hold for the individual participants, a specific group or the community:

More information
It may be unacceptable to perform experiments in a community that will not be able to benefit from the results of the study (for example, drug studies performed with participation from a community where this community will not be able to afford the drug when it becomes available on the market).

Learners participating in the Fab Kids project were exposed to a high-tech rapid-prototyping environment which they would not normally encounter at school level.

Regarding the Digital Kids project learners were exposed to a range of open source software that they would not normally have encountered at school level which goes well beyond the traditional curriculum.

The Ulwazi Project was designed to supplement the Grade 10 Science Curriculum for the learners in the remote schools.

4.11 Incentive and reimbursement for participants (subjects):

Is any form of incentive or reimbursement offered to participants? If “Yes”, describe it in full in terms of what, how, where, when, how much, terms and conditions, etc.

(Please mark with X in the relevant block and provide details if “Yes”)

More information
Participants may never be bribed to participate and as a general rule participants should not be remunerated for participation as such. However, in exceptional cases when human participants do receive personal financial benefits, the NWU Ethics Committee prefers that these be specified as for transport to participate and for personal sustenance (e.g. meals) during participation.

Yes	No	Description
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Type here

4.12 Misleading of participants (subjects):

Is use made of any form of misleading in the protocol where the participants are not told the complete truth (e.g. placebo or other)? If “Yes”, motivate in full why it is necessary, how it is justified and describe how the participants will be protected against potential negative consequences of the misleading information or placebo. **N.B!** Your attention is drawn pertinently to Annexure 5 of the Ethics Committee’s “Guidelines for the evaluation of the ethical aspects of experimentation with man or animal, August 2003”, as available on the NWU website [\[Web link\]](#).

(Please mark with X in the appropriate box and provide details if “Yes”)

More information
Justification
In case of the treatment (e.g. drug or psychotherapeutic intervention) of a particular disease/condition, the use of a placebo can be justified only if there is no alternative treatment with proven efficacy. When such an alternative treatment exists, the test treatment must be compared with the standard treatment as control, and the use of a placebo is not acceptable.
Protection of participants
Describe, for example, how debriefing will take place and/or how the participants will be monitored.

Yes	No	Motivation
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Type here

4.13 Announcement of results to participants (subjects):

Is there any reason why the information obtained from participants cannot be made available to them immediately? If “Yes”, motivate in full, with reference to when and how the results will in fact be announced.

(Please mark with **X** in the appropriate box and provide details if “Yes”)

Yes	No	Motivation
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Type here

4.14 Confidentiality:

Explain what measures you will take to ensure the confidential handling of the data (information) of participants.

All questionnaire used together with the indemnity and permission forms will be stored in a secure place by the researcher. At the same time no individual names were used in any publications to protect the identity of the individuals.

4.15 Storage and archiving of data:

Explain how, where and how long the research data will be stored. **N.B!** All raw data remains the property of the North-West University. Only copies may leave the storage area, and then only by authorised persons. Where an outside party, e.g. a sponsor, lays claim to the original data, certified copies must be stored on the Campus and the same rules apply as above.

More information

Some legislation, rules and regulations for certain professions stipulate that data must be stored for a specified minimum period, such as e.g. a minimum of 6 years for psychology. Most government departments however store data for a minimum of 7 years and it is recommended as a general rule that data is not stored for less than 7 years. You must therefore indicate here what the requirements are that apply to your project. Furthermore, does any person have the right to request to see and study the original data of published results in order to verify the accuracy and validity thereof?

The original research was conducted at the CSIR and will be stored for the requisite period.

Remember to save your document regularly as you complete it!

Sec 4b: Filed Privileged Information or Stored Biological Samples of Human Origin

Fill this part in only for the use of existing, filed privileged information of humans (e.g. medical files) or existing, stored biological samples (e.g. tissue or fluids) of human origin, e.g. where samples are collected for another project or for medical diagnosis. This part is therefore not filled in if the information or samples will be obtained from a clinical trial, which has already been described in “Sec 4a: Human Participants (Subjects)”.

Sec 4c: Animal subjects (Vertebrates)

Remember to save your document regularly as you complete it!

Section 5: Statistical Justifiability

A special section is devoted to statistical justifiability of your intended project. So e.g. the most sound research problem, methodology and data processing can't make a project succeed if the project design (experimental design) did not take into account statistical justifiability. Poor statistical planning can cause a good project to fail and may render the results useless for answering the set research problems. To involve human participants or animal subjects in such a poorly planned project now would be unethical. It is therefore important to indicate in this section how you as Project Head will ensure that your project design is statistically justifiable.

Sec 5a: Human Participants (Subjects)

Only fill this part in if this project makes use of human participants.

5.1 Approval:

Has this project been approved by Statistical Consultation Service of the North-West University? **N.B!** Approval of the design and statistical justifiability of your project by Statistical Consultation Service before submission of the ethics application is not compulsory. However, it is certainly strongly recommended, since it may identify unnecessary shortcomings beforehand and can speed up the process of ethical approval.

(Mark "Yes" or "No" with **X** in the appropriate box. Provide any additional comments as necessary.)

More information

Qualitative studies do not usually require statistical processing of data. Meaningful project design is, however, still necessary to obtain meaningful results. To the contrary, quantitative studies where data must be processed, do require statistical processing of the raw data as a rule. Ensuring good, meaningful data, appropriate statistical processing and meaningful interpretation of the data begins, however, with thorough planning of the study design.

Yes	No	Additional Comments
<input type="checkbox"/>	<input checked="" type="checkbox"/>	The Council for Science and Industrial Research (CSIR) will conduct all statistical procedures

If "Yes", attach the completed and signed "Sec 8e: Statistical Consultation Service". If "No", ensure that enough information is available in the application form to make it possible for evaluators to check the justifiability of the project design.

5.2 Participant recruitment and randomness:

Describe in full how statistical justifiability (e.g. randomness) will be handled in the recruitment of participants (subjects) and motivate.

This is a convenience sample of school classrooms who agreed to participate in this research study.

5.3 Design:
Describe the study design / experimental design:
(Please mark with X in the applicable right-hand box)

Type	Description	Mark
Parallel Design	Participants divided into groups; one intervention per group	<input checked="" type="checkbox"/>
Crossover Design	Two or more interventions per participant, with “washing out periods” in between	<input type="checkbox"/>
Factorial Design	Participants divided into groups; each group receives a combination of 2 or more interventions or is subject to 2 or more factors that are controlled	<input type="checkbox"/>
Any other design (not listed above – describe below)		<input type="checkbox"/>

Type here for description of any other experimental design

5.4 Exposé of project design:
Describe the group classifications, as applicable:
(Please click in the right-hand box and type the correct number)

More information

N.B! It is important that you calculation of the number of human participants is accurate. If you now indicate an incorrect number of human participants and/or want to amend the number later, it would mean that you would have to apply again to the Ethics Committee for the amendment. The use of a different number of human participants to that for which an application was made and approved, makes your approval invalid, it is illegal and deprives you of any protection that the ethical approval offers.

If you cannot do an accurate forecast and calculation now of the number of human participants required, it is perhaps an indication that you should first apply for a pilot study and then apply for the full project based on the results of the pilot study.

Number of groups	2
Number of participants per group	50
Total number of participants	100

In the case of more complex group classifications, provide a clear schematic representation or other suitable exposé

Type here for more complex exposés, or type “None”

5.5 Motivation for project design:
Motivate the design, group sizes and conditions by referring to similar published studies and/or refer to pilot studies that have already been carried out to justify the above design, number of participants, group sizes and conditions.

More information

So you must e.g. show that the design and group sizes will deliver the required precision and differentiation power to show meaningful differences (effect size). If there is no information, however, this application must be for a pilot study first and you must indicate it clearly as such in the application (see §1.4) and mention that a successive application will be submitted for the full project, in which the information obtained from the pilot study will be included.

Convenience sample consisting of Digital Kids and Fab Kids.

5.6 Allocation to groups:

Describe in full how participants (subjects) will be apportioned to groups randomly (as applicable).

More information

Describe the process of how random apportionment of participants will take place. As applicable, also describe then how the decision will be made as to which of the various interventions / procedures / techniques / methods / approaches / therapy will be apportioned to the various groups.

Convenience sample consisting of Digital Kids and Fab Kids.

5.7 Disturbance variables:

Describe the foreseeable disturbance variables (background variables) of the project and how you will manage them.

More information

What background variables (disturbance variables) are inherent that cannot be kept constant in executing the study, e.g. different researchers carrying out the study / experiment; more than one laboratory being used; different days during which the study / experiment runs, etc. What measures are in place to control / manage / monitor these variables?

None envisioned

Remember to save your document regularly as you complete it!

Sec 5b: Filed Privileged Information or Stored Biological Samples of Human Origin

Sec 5c: Animal subjects (vertebrates)

Remember to save your document regularly as you complete it!

Section 6: Matters that Necessitate Additional Information

Sec 6a: Persons who are Particularly Vulnerable or Incompetent to Give Informed Consent

Please complete this section if there are any minors, students, people who are intellectually incompetent to give informed consent or otherwise vulnerable persons/communities involved in this project.

6.1 This project includes experimentation with, use, administration or restraint of, or other intervention with:

(Mark ALL options as “Yes” or “No” with X in the appropriate box – more than one option may be “Yes”.)

Description	Yes	No
Minors	<input checked="" type="checkbox"/>	<input type="checkbox"/>
People who are intellectually incompetent to give informed consent	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Own students (registered learners at the NWU)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Defenceless communities (e.g. prisoners, institutionalised patients, illiterate persons, rural communities, poverty, etc.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Otherwise vulnerable persons (e.g. due to illness, desperation, emotional trauma, rape, other need, etc.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

6.2 Definition:

Define in more detail the group of people (as marked in question 6.1 above) included in the project.

More information

Explain the group i.t.o. aspects such as precisely who they are, where they come from and what makes them vulnerable.

School classes. Formal permission was obtained from schools as well as parents / legal guardians where appropriate.

6.3 Any association of participants with project team members:

Declare any association of any of the participants with any members of the research team.

More information

Family & friends:

If any of the participants happen to be family or close friends of any member of the research team, it must be mentioned.

Students:

Students may not be recruited individually as participants (subjects). A lecturer / researcher may not allow any person at all to be involved as a participant (subject) of the project if that person is also involved in or registered for any course / module / programme / project that the lecturer / researcher presents.

Patients / clients:

If any of the participants are linked professionally to any of the members of the research team (e.g. patient-doctor relationship) it must be declared.

none

6.4 Motivation:

Explain the necessity for including this specific group of vulnerable people as human participants (subjects).

This study investigates the promotion of human capital development through creativity and innovation and learning, and therefore in a classroom context.

6.5 Management of justifiability:

Explain how ethical justifiability will be ensured from beginning to end.

More information

Minors:

Explain i.a. how the persons will be recruited, how proxy consent will be obtained from the legally competent parent / guardian, how the project will be explained to them and how voluntary assent will be ensured. How will ethical justifiability be ensured from beginning to end?

Students:

Explain how you will ensure that no student is approached individually and that no one will be allowed to be involved as participant (subject) of the project if that person is also involved in, or registered for, any course / module / programme / project that the lecturer / researcher presents. How will ethical justifiability be ensured from beginning to end?

Patients / clients:

Explain how you will ensure that the professional relationship between the participants and the professional member of the project team will always be placed above the interests of the project. How will ethical justifiability be ensured from beginning to end?

Defenceless communities or otherwise vulnerable persons:

Explain how the persons will be recruited, how the project will be explained to them, how consent and voluntary assent will be obtained and how you will ensure that the persons do not feel intimidated by members of the research team or as a result of the pressure of circumstances are intimidated or "exploited". How will ethical justifiability be ensured from beginning to end?

School children were recruited in class context via schools. Formal permissions were obtained from the Gauteng Department of Education (Addendum A and G), schools as well as parents / legal guardians (Addendums C, D and E).

Remember to save your document regularly as you complete it!

Sec 6b: Human Stem Cells, Germ Line Cells, Embryos and/or Foetuses

Sec 6c: Living Cell and Tissue Cultures

Sec 6d: Genetic Material, Genetic Manipulation, or Genetically Manipulated Animals, Plants or other Organisms / Tissue / Cells

Sec 6e: Injections, Blood Samples, Swabs and Similar Interferences

Sec 6f: Use of Drugs / Medicines

Sec 6g: Use of Radio-Active Substances

Sec 6h: Use of Toxic Substances or Dangerous Substances

Sec 6i: Use of Food, Fluids or Nutrients

Remember to save your document regularly as you complete it!

Sec 6j: Psychometric Measuring Instruments and Questionnaires

Please complete this section if any psychometric measuring instruments or validated questionnaires are used in this project.

6.6 Number:

How many psychometric measuring instruments and validated questionnaires will be used in the project?

Description	Number
Psychometric measuring instrument	0
Validated questionnaires	0

6.7 Information about the measuring instrument:

Provide detailed information on the psychometric measuring instrument, so that the evaluators can evaluate the ethically justifiable use thereof.

N.B! If more than one psychometric measuring instrument and/or questionnaire is used, select and copy the whole table and paste as many tables underneath as is necessary. Tip! Place an empty paragraph between the tables.

More information

Give the necessary details about the psychometric measuring instrument to ensure meaningful use. Recognised textbooks or other scientific publications or registered information posters must be referred to in support of the statements.

Psychometric Measuring Instrument

Approved Name	Normal Application
Type here	Type here

Reliability	Validity
Type here	Type here

Other Relevant Information & Literature References
Type here

6.8 Validation for target group:

Is the measuring instrument validated for the target group (e.g. for South African circumstances)? Provide full details.

(Please mark with **X** in the appropriate box and provide details)

Yes	No	Details
<input type="checkbox"/>	<input type="checkbox"/>	Type here

6.9 Precautions:

If applicable, explain the measures that will be in place to protect the participants against the potential detrimental effects of the use of the psychometric measuring instruments:

Type measures here, or type "Not applicable"

Remember to save your document regularly as you complete it!

Sec 6k: Any Other Aspect of Potentially Ethically Sensitive Nature

Please complete this section if there is any aspect of potentially ethically sensitive nature that is not addressed elsewhere in the application.

6.10 Please describe in full any other aspect that may potentially be of an ethically sensitive nature and which must be brought to the attention of the ethics committee:

Type here

6.11 Explain the measures, as applicable, that will be in place to protect the workers, subjects and the environment against the potential detrimental effects of the above-mentioned interference:

Type here

Remember to save your document regularly as you complete it!

Section 7: Other Ethics Evaluations & Risk Insurance

Sec 7a: Evaluation by other Ethics Committees

Please complete this section if this project has been or will be evaluated by any other ethics committees, for example with multi-institutional projects.

7.1 *Number:*

How many ethics committees (including the NWU Ethics Committee) have evaluated / will be evaluating this project?

Description	Number
Total number of ethics committees involved	1

7.2 Provide information about all ethics committees involved in the evaluation and approval of this project.

Name of Ethics Committee	Contact Number or E-mail address	Role
NWU Ethics Committee	ethics@nwu.ac.za	Secondary evaluator
		- select -
Type name here, or type "None"	Type details here, or type "Not applicable"	- select -

(Type one name per row, or type "None" if there are no other ethics committees involved.)

7.3 Provide information about the ethics authorisations of the ethics committees mentioned above (§ 7.2).

Name of Ethics Committee	Authorisation Status	Authorisation Details (conditions, start & end dates)	Authorisation No.
NWU Ethics Committee	Evaluation in process	Not applicable	Not applicable
	- select -	Not applicable	No Applicable
Type name here, or type "None"	- select -	Type details here, or type "Not applicable"	Type details here, or type "Not applicable"

(Type one name per row, or type "None" if there are no other ethics committees involved.)

Remember to save your document regularly as you complete it!

Sec 7b: Risk Insurance

The North-West University has insurance at its disposal to cover the risk of claims against the University in case of damage to subjects/participants due to professional negligence – the maximum cover is currently R30 million per annum (all projects included). However, this is only available if projects are ethically approved and researchers have kept to the protocol.

7.4 Describe the potential risks to which the participants (subjects) / researchers / assistants / field workers / animal subjects are going to be subject in so far as complications may lead to summonses.

Not Applicable

7.5 By which insurance are the risks associated with the project covered (e.g. NWU or other)?

North-West University

7.6 Is this insurance adequate (measured against the probable risks)?
(Please mark with X in the appropriate box)

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>

Remember to save your document regularly as you complete it!

Section 8: Declarations

Applications and declaration are filled in and signed by:

- Sec 8a: Project Head
- Sec 8b: Professional Supervisor(s)
- Sec 8c: Bio-Safety Officer
- Sec 8d: Terrain / Facility Manager(s)
- Sec 8e: Statistical Consultation Service
- Sec 8f: Director of School/Institute & Director of Research

The pages with declarations and signatures must be printed out and signed and sent on by internal post to the Office of the Director: Research Support, Box 116, PUK, North-West University, Potchefstroom, 2520. *As soon as this form is made available shortly in Web format and electronic verification is possible, printouts and signatures will be eliminated.*

NWU Ethics Application

Project Head (Title, Initials & Surname)	Project Title (see § 3.1)
Type here	Type here

NWU Ethics Number *(for office use only)*

N	W	U	-						-			-		
<small>Institution</small>			<small>Project Number</small>						<small>Year</small>			<small>Status</small>		

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Sec 8a: Project Head

Application and Declarations by Project Head

I, the undersigned, hereby apply for approval for the implementation of the experiment as described in the preceding protocol and declare that:

- 8.1 I have satisfied myself thoroughly as to the content of the Ethics Committee's "Guidelines for the evaluation of the ethical aspects of experimentation with man or animal" [\[Web link\]](#) and I will keep to the guidelines as contained in this document;
- 8.2 The information in this application is, to the best of my knowledge, correct and that no ethical codes will be violated with the project;
- 8.3 I will make sure that the project is managed ethically justifiably from start to finish;
- 8.4 in the case of human participants (subjects);
 - 8.4.1 the project objectives cannot be achieved meaningfully through replacement of human participants with alternatives;
 - 8.4.2 I will put it clearly to all participants (subjects) and am satisfied with the principle that participation (including assent) in any research project is absolutely voluntary and that no pressure, of whatever nature, will be placed on any potential participant to take part;
 - 8.4.3 I will put it clearly to all participants (subjects) and am satisfied with the principle that any participant may withdraw from the study at any time and may ask that his/her data no longer be used in the study, without stating reasons and without fear of any form of prejudice;
 - 8.4.4 every participant who takes part in the experiment will receive the accompanying form for informed consent and it will be ensured that every participant understands the information (including the process and risks) fully;
 - 8.4.5 every participant will sign the informed consent in writing before the study commences, or give recorded oral consent when the former is not possible;
 - 8.4.6 the written proxy consent of the parents or legal guardians of all minor subjects will be obtained before the experiment commences;
 - 8.4.7 any foreseeable risk is restricted to the minimum, any permanent damage is avoided as far as possible and that appropriate precautions and safety measures are in place;
 - 8.4.8 confidentiality of all the information of all participants will be respected and ensured;
- 8.5 in the case of animal subjects,
the project objectives cannot be achieved meaningfully through replacement of animal subjects (e.g. lower order animals without consciousness / feeling or tissue or other models);

- 8.5.1 the experimental design is such that the minimum number of animal subjects is used, no animals are wasted unnecessarily and the optimal quantity of data is obtained from the studies with the number of animals used;
- 8.5.2 any discomfort/suffering for animal subjects is kept to the minimum and no unnecessary suffering is caused;
- 8.5.3 the potential predominant advantages arising from the project exceed the risks and disadvantages for the animal subjects;
- 8.6 I and all co-workers / assistants / field workers are appropriately qualified, capable and legally competent to implement the proposed studies / procedures / interventions;
- 8.7 I will not deviate from the approved protocol and that I understand approval for the project will be cancelled if I deviate from the protocol without the approval of the Ethics Committee;
- 8.8 in the case of a full project (not pilot study),
 - 8.8.1 All pre-research for the implementation of the project (pilot studies) have been finalised completely;
- 8.9 the experimental design is such that it is scientifically justifiable;
- 8.10 where necessary, I have the necessary permits at my disposal or will obtain them before the relevant actions are carried out;
- 8.11 I will ensure that all raw data is stored safely and remains in the possession of the North-West University;
- 8.12 I will report in writing any problems or complications experienced during the project without delay to the Ethics Committee;
- 8.13 I undertake to respect intellectual property rights throughout and to avoid any form of plagiarism;
- 8.14 I will report annually to the Ethics Committee (or as determined by the Ethics Committee) on the prescribed form concerning ethical aspects of the project;
- 8.15 I will report to the Ethics Committee on the prescribed form concerning ethical aspects of the project when the project is terminated.

Name (Title, Full Names & Surname)	Qualifications																				
Prof. Seugnet Blignaut	PhD																				
Signature	<div style="text-align: center;"> <table border="1"> <tr> <td>2</td><td>0</td><td>1</td><td>0</td> <td>-</td> <td>0</td><td>1</td> <td>-</td> <td>2</td><td>8</td> </tr> <tr> <td>c</td><td>c</td><td>y</td><td>y</td> <td></td> <td>m</td><td>m</td> <td></td> <td>d</td><td>d</td> </tr> </table> </div>	2	0	1	0	-	0	1	-	2	8	c	c	y	y		m	m		d	d
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c	c	y	y		m	m		d	d												

Remember to save your document regularly as you complete it!

NWU Ethics Application

Project Head (Title, Initials & Surname)	Project Title (see § 3.1)
Type here	Type here

NWU Ethics Number (for office use only)

N	W	U	-						-				-		
<small>Institution</small>			<small>Project Number</small>						<small>Year</small>			<small>Status</small>			

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Sec 8b: Professional Supervisor(s)

The supervisory professional person fills this section in (where applicable)

As supervisory professional person you must note that the risk insurance from the university does not cover you and you will therefore be dependent on your own insurance. The Ethics Committee relies completely on the professional judgement of the supervisory professional person with regard to the nature and extent of the supervision, as well as the degree of risk linked to the project.

8.16 In your opinion, what should the nature and extent of supervision during the project be?

Study and research guidance

8.17 Will you ascertain the state of health of every participant (subject) before the commencement of any participation?

(Please mark with X in the appropriate box and provide details)

Yes	No	Remarks (optional)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Type here

8.18 In your opinion, what is the degree of risk for the subjects involved in the project? *Take note: Arrangements to meet the supervision requirements must be made mutually between the doctor and the Project Head.*

No expected risk for the subjects

Name (Title, Full Names & Surname)	Qualifications
Prof. M. Herselman (Nelson Mandela Metropolitan University of Technology)	PhD

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Signature	Date																				

Remember to save your document regularly as you complete it!

Please fill this page in where applicable, print it (where information covers more than one page, print double-sided), have it signed and send the original signed hard copy on to the Office of the Director: Research Support (Box 116, PUK, North-West University, Potchefstroom, 2520) by ordinary / internal post.

NWU Ethics Application

Project Head (Title, Initials & Surname)	Project Title (see § 3.1)
Type here	Type here

NWU Ethics Number (for office use only)

N	W	U	-						-			-		
<small>Institution</small>			<small>Project Number</small>						<small>Year</small>		<small>Status</small>			

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Sec 8c: Bio-Safety Officer

The bio-safety officer (usually an appointment at an institution, such as at the North-West University) completes this section (where applicable)

The Ethics Committee relies completely on the professional judgement of the bio-safety officer with regard to the safety risks linked to the project, as well as whether adequate safety measures are in place to be able to manage these risks responsibly.

8.19 Are the safety risks for man and environment, as described in this application, correct according to your professional judgement?
(Please mark "Yes" or "No" with X in the appropriate box)

Yes	No	Remarks (optional)
<input type="checkbox"/>	<input type="checkbox"/>	Type here

8.20 According to your professional judgement, are there adequate precautions and expertise in place to manage these risks responsibly?
(Please mark "Yes" or "No" with X in the appropriate box)

Yes	No	Remarks (optional)
<input type="checkbox"/>	<input type="checkbox"/>	Type here

Name (Title, Full Names & Surname)	Qualifications
Type here	Type here

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Signature	Date																				

Remember to save your document regularly as you complete it!

NWU Ethics Application

Project Head (Title, Initials & Surname)	Project Title (see § 3.1)
Type here	Type here

NWU Ethics Number (for office use only)

N	W	U	-						-			-		
<small>Institution</small>			<small>Project Number</small>						<small>Year</small>			<small>Status</small>		

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Sec 8d: Terrain / Facility Manager(s)

The terrain/facility manager(s) (e.g. the manager or overseer of the offices, school, clinic, centre, laboratory or animal subject centre where the project or research activities will be carried out) completes this section (where applicable)

The Ethics Committee relies completely on you with regard to the suitability and availability of the terrain or facilities to be able to carry out the project.

8.21 Is the terrain / are the facilities available to carry out the project, as described in this application?
(Please mark "Yes" or "No" with X in the appropriate box)

Yes	No	Remarks (optional)
<input type="checkbox"/>	<input type="checkbox"/>	Type here

8.22 Is the terrain / are the facilities suitable for carrying out the project, as described in this application?
(Please mark "Yes" or "No" with X in the appropriate box)

Yes	No	Remarks (optional)
<input type="checkbox"/>	<input type="checkbox"/>	Type here

Name (Title, Full Names & Surname)	Qualifications
Type here	Type here

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Signature																					

Remember to save your document regularly as you complete it!

NWU Ethics Application

Project Head (Title, Initials & Surname)	Project Title (see § 3.1)
Prof. Seugnet Blignaut	Promoting Human Capital Development through Creativity and Innovation at School Level

NWU Ethics Number *(for office use only)*

N	W	U	-						-			-		
Institution			Project Number						Year			Status		

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Sec 8e: Statistical Consultation Service

The statistician of the Statistical Consultation Service of the North-West University completes this section (where applicable).

More information

Prior consultation with Statistical Consultation Service can eliminate many problems, simplify and expedite the evaluation and also prevent applications from being returned due to poor project planning and/or statistical justifiability. Where the Project Head has sufficient statistical expertise at his disposal, this is, however, not compulsory.

The Ethics Committee relies completely on the professional judgement of the statistician.

Have you ascertained the experimental design of the study and is it statistically justifiable according to your judgement?

(Please mark with **X** in the appropriate box and provide details)

Yes	No	Remarks
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The Council for Science and Industrial Research (CSIR) will conduct all statistical procedures

Name (Title, Full Names & Surname)	Qualifications
The Council for Science and Industrial Research (CSIR) will conduct all statistical procedures	

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Signature	Date																				

Remember to save your document regularly as you complete it!

NWU Ethics Application

Project Head (Title, Initials & Surname)	Project Title (see § 3.1)
Prof. A.S. Blignaut	Promoting Human Capital Development through Creativity and Innovation at School Level

NWU Ethics Number *(for office use only)*

N	W	U	-							-										
Institution			Project Number							Year		Status								

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Sec 8f: Director of School/Institute & Director of Research

I, the undersigned, hereby declare that the above project is scientifically justified, that experimentation may proceed if it is approved by the Ethics Committee and that the Project Head/researcher has enough physical facilities, equipment and money at his disposal to implement and complete the project.

School Director / Institute Director:

Name (Title, Full Names & Surname)	Capacity
Prof. E.J. Spamer	Director: School of Continuing Teacher Education

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Signature	Date																				

Research Director:

The director of the research focus area or of the research unit signs here.

Name (Title, Full Names & Surname)	Capacity
Prof. Seugnet Blignaut	Leader of the Niche Area Educational Technology for Effective Teaching, Learning and Facilitation

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Signature	Date																				

Remember to save your document regularly as you complete it!

Credits

Compiled on request of the NWU Ethics Committee by Prof Christiaan B Brink (PhD)

Advisory panel: Prof Hester Klopper, Dr Alan MacLeod, Prof Nico Malan, Dr Douw van der Nest, Dr Francois van der Westhuizen, Mev. Michelle Viljoen, Prof Marié Wissing

Other credits: Many individuals contributed in various ways to formulate, develop and compile previous ethics application forms of the University, of which excerpts were used to formulate some of the contents of the current ethics application form.

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For Official Use	
Ref. No.	

GAUTENG DEPARTMENT OF EDUCATION



RESEARCH REQUEST FORM

REQUEST TO CONDUCT RESEARCH IN INSTITUTIONS AND/OR OFFICES OF THE GAUTENG DEPARTMENT OF EDUCATION

1. PARTICULARS OF THE RESEARCHER

1.1	Details of the Researcher	
	Surname and Initials:	Beyers RN
	First Name/s:	Ronald Noel
	Title (Prof / Dr / Mr / Mrs / Ms):	Mr
	Student Number (if relevant):	
	ID Number:	5807285063080
	Gender (Male/Female):	Male

1.2	Private Contact Details	
	Home Address	Postal Address (if different)
	Building 43 C	
	CSIR Campus	
	Meiring Naudé Road	
	Brummeria, Pretoria	
	Postal Code: 0001	Postal Code:
	Tel: (012) 8414601	
	Cell: 083 310 8842	
	Fax: (012) 841 4720	
	E-mail: rbeyers@csir.co.za	

2. PURPOSE & DETAILS OF THE PROPOSED RESEARCH

2.1	Purpose of the Research (Place cross where appropriate)	
	<i>Undergraduate Study - Self</i>	
	<i>Postgraduate Study - Self</i>	
	<i>Post-Doctoral Study</i>	
	<i>Private Company/Agency – Commissioned by Provincial and/or National Government Department/s</i>	
	<i>Private Research by Independent Researcher</i>	
	<i>Non-Governmental Organisation</i>	
	<i>National Department of Education Commissioned Study</i>	
	<i>Commissions and Committees</i>	
	<i>Independent Research Agency</i>	
	<i>Statutory Research Agency</i>	X
	<i>Independent Study by Higher Education Institution</i>	

2.2	If Post-Graduate Study – Please indicate by placing a “X” in the appropriate column		
	<i>Honours</i>	<i>Masters</i>	<i>Doctorate</i>

2.3	Full title of Thesis / Dissertation / Research Project

2.4	Value of the Research to Education (Attach Research Proposal)

2.5	Student and Postgraduate Enrolment Particulars (if applicable)
<i>Name of institution where enrolled:</i>	
<i>Degree / Qualification:</i>	
<i>Faculty:</i>	
<i>Department:</i>	
<i>Name of Supervisor / Promoter:</i>	

2.6	Employer (where applicable)
<i>Name of Organisation/School:</i>	
<i>Position in Organisation:</i>	
<i>Head of Organisation:</i>	
<i>Street Address:</i>	
<i>Postal Code:</i>	
<i>Telephone Number (Code + Ext):</i>	
<i>Fax Number:</i>	
<i>E-mail:</i>	

2.7	PERSAL Number (where applicable)
------------	---

--	--	--	--	--	--	--	--

3. PROPOSED RESEARCH METHOD/S

(Please indicate by placing a cross in the appropriate block whether the following modes would be adopted)

3.1 *Questionnaire/s (If Yes, supply copies of each to be used)*

YES		NO	X
-----	--	----	---

3.2 *Interview/s (If Yes, provide copies of each schedule)*

YES		NO	X
-----	--	----	---

3.3 Use of official documents

YES		NO	X
<i>If Yes, please specify the document/s:</i>			

3.4 Workshop/s / Group Discussions. (If Yes, Supply details)

YES	X	NO	
Discussion will take place amongst learners (and educators) as part of lesson plan.			

3.5 Standardised Tests (e.g. Psychometric Tests)

YES		NO	X
<i>If Yes, please specify the test/s to be used and provide a copy/ies</i>			

4. RESEARCH PROCESSES

4.1 *Types of Institutions.* (Please indicate by placing a cross alongside all types of institutions to be researched).

INSTITUTIONS	Mark with "X" here
<i>Primary Schools</i>	
<i>Secondary Schools</i>	X
<i>Technical Schools</i>	
<i>ABET Centres</i>	
<i>ECD Sites</i>	
<i>LSEN Schools</i>	
<i>Further Education & Training Institutions</i>	
<i>Other</i>	

4.2 *Number of institution/s involved in the study.* (Kindly place a sum and the total in the spaces provided).

Type of Institution	Total
<i>Primary Schools</i>	
<i>Secondary Schools</i>	6
<i>Technical Schools</i>	
<i>ABET Centres</i>	
<i>ECD Sites</i>	
<i>LSEN Schools</i>	
<i>Further Education & Training Institutions</i>	
<i>Other</i>	
GRAND TOTAL	6

4.3 **Name/s of institutions to be researched. (Please complete on a separate sheet and append if space is deemed insufficient).**

Name/s of Institution/s
St Alban's College, Pretoria
St Mary's DSG, Pretoria
Glen High
Willow Ridge High
Mamelodi High
Gatang High

4.4 **District/s where the study is to be conducted. (Please mark with an "X").**

District	
<i>Johannesburg East</i>	
<i>Johannesburg South</i>	
<i>Johannesburg West</i>	
<i>Johannesburg North</i>	
<i>Gauteng North</i>	
<i>Gauteng West</i>	
<i>Tshwane North</i>	X
<i>Tshwane South</i>	
<i>Ekhuruleni East</i>	

District	
<i>Ekhuruleni West</i>	
<i>Sedibeng East</i>	
<i>Sedibeng West</i>	

If Head Office/s (Please indicate Directorate/s)

NOTE:

If you have not as yet identified your sample/s, a list of the names and addresses of all the institutions and districts under the jurisdiction of the GDE is available from the department at a small fee.

4.5 *Number of learners to be involved per school. (Please indicate the number by gender).*

Grade	1		2		3		4		5		6	
<i>Gender</i>	B	G	B	G	B	G	B	G	B	G	B	G
<i>Number</i>												

Grade	7		8		9		10		11		12	
<i>Gender</i>	B	G	B	G	B	G	B	G	B	G	B	G
<i>Number</i>							36	36				

4.6 *Number of educators/officials involved in the study. (Please indicate the number in the relevant column).*

<i>Type of staff</i>	Educators	HODs	Deputy Principals	Principal	Lecturers	Office Based Officials
<i>Number</i>						

4.7 *Are the participants to be involved in groups or individually? Please mark with an "X".*

Participation	
<i>Groups</i>	X
<i>Individually</i>	

4.8 *Average period of time each participant will be involved in the test or any other research activity (Please indicate time in minutes)*

Participant/s	Activity	Time
Learners	Hands-on activities at the FAB LAB	480 min

4.9 *Time of day that you propose to conduct your research. Please mark with an "X".*

School Hours	During Break	After School Hours
X	X	X

4.10 *School term/s during which the research would be undertaken. Please mark with an "X".*

First Term	Second Term	Third Term
		X

25 February 2008

Dear Ron Beyers (CSIR)

**RE: Ethical clearance for your CSIR projects under Meraka institute:
(Digital Kids and Fab Teachers)**

This is to confirm that the Faculty of ICT's Research and innovation committee has decided to grant you ethical status on the above projects. All evidence provided was sufficient and therefore the ethical reference numbers allocated to these projects from this committee are as follows:

- Digital Kids – ethical reference number is: **2008/02/digitalkids/ethics/csir**
- Fab Teachers – ethical reference number is: **2008/02/fabteach/ethics/csir**

In order to comply to ethical requirements please ensure that you allow all research participants to complete the attached ethical consent form and keep the evidence for your records for a period of two years. Also please protect yourself from any criticism or problems in future by adding the following disclosure on your website:

Please indicate what each of these projects are all about (its scope and requirements from participants) and that confidentiality of personal information of participants is coded and that it will not be disclosed to any other parties. Participation is voluntarily and refusal to participate will not involve any penalty or loss of benefits and that participants can withdraw from participation at any point during the duration of the project. The benefits of the project is to (complete). The persons to contact for questions on this project is ... (complete).

Whenever you have to request permission to conduct this project from any department or from a school also use the attached template as a guideline. This will be enough to cover you from any ethical harm or risks. I hope you find this in order and we wish you every success with these projects. It is important to keep records of any correspondence relating to ethics in relation to this project.

Kind regards

Prof ME Herselman
Chairperson: Faculty Research and Innovation Committee
Faculty of Information and Communication Technology
Tshwane University of Technology
(012) 382 5758
(012) 382 4839 (fax); herselmanme@tut.ac.za

22 January 2007

Headmaster
Mamelodi High School

Fab Kids' Pilot Project

Dear Sir

Is it possible to email a bicycle to a friend somewhere else in South Africa or even another part of the world and have them print it for you? The standard answer is most probably 'no' as the vast majority of people are stuck in an old paradigm of 'ignorance is bliss' and they are not able to conceptualize the situation. If one had to pause for a moment one would realize that it is possible given the revolution in new technologies and materials.

Being able to spend time in a high tech environment could potentially be a career changing opportunity for some learners and the **Fab Kids' Project** is aimed at achieving just that. The pilot project aims to conduct low level research based on the assumption that there will be no significant difference in the outcomes of such an experience between learners from two private schools, two urban schools and two previously disadvantaged schools.

Learners will be given a challenge for the day and will be exposed to a variety of tools in order to complete the task. It is envisaged that there will be four members in a group where each one will have to adopt a different role; team manager, CAD (Computer Aided Design) specialist, electronics specialist and media specialist. The team will be working towards the completion of the challenge with each member contributing in their own unique way after they have had some basic training. Based on the success of this pilot project, further interventions will focus on exposing more learners to working in a high tech laboratory to unleash their creative and innovative minds.

Your school is invited to send your grade twelve students from Grade 10 to attend a one day session to be held at the Fab Lab (Innovation Hub) opposite the CSIR's main entrance in Meiring Naudé Road. Nearer the time, indemnity forms will be sent to the school to be issued to the selected learners for their parents to sign. No learner will be allowed to attend the session with these forms being signed.

We look forward to working with your learners in a stimulating environment.

Yours sincerely

Ron Beyers
rbeyers@csir.co.za
Project Manager
Young Engineers of South Africa Programme
083 3108 843

CSIR Indemnity Form

Agreement to participate in an initiative to expose learners to presentations, as a component of the Digital Kid's Project to be held at the Meraka Buildings (43), Pretoria.

In respect of my minor child,,
a Grade learner at,
as the parent/natural guardian of, I
hereby confirm my unconditional permission for him/her to accompany a
CSIR/Innovation Hub employee to visit the CSIR premises in Pretoria, on
...../2008

I do hereby on behalf of,
acknowledge and declare that I agree that he/she will visit the
CSIR/Innovation Hub and all activities related thereto at his/her own risk and
on the express condition that neither the CSIR/Innovation Hub, nor their
officers or employees, shall be liable to me or the child or my child's executors
for any damage arising out of loss of life or bodily injuries suffered by him/her,
or for any loss of or damage to his/her property or estate arising out of any
accident or cause which may occur during such trip, or whilst in transit,
whether or not such accident or other cause arises out of negligence, failure,
incompetence or any act whatsoever, on the part of such officers or
employees, and on behalf of myself and the child, I do hereby indemnify, hold
harmless and absolve the CSIR/Innovation Hub and their officers and
employees from any damages whatsoever and legal expenses or costs, which
may arise out of his/her participation in the said activities.

SIGNED at.....on this the.....day of.....2008

.....

Signature parent/natural guardian

WITNESSES:

1.....

2.....

Parent/natural guardian's contact details:

Telephone number:.....

Cell phone number:.....

Email.....

CSIR Indemnity Form

Agreement to participate in an initiative to expose learners to presentations, as a component of the Fab Kid's Project to be held at the Fab Lab. Innovation Hub, Pretoria.

In respect of my minor child,,
a Grade learner at,
as the parent/natural guardian of, I
hereby confirm my unconditional permission for him/her to accompany a
CSIR/Innovation Hub employee to visit the CSIR premises in Pretoria, on
...../2007

I do hereby on behalf of,
acknowledge and declare that I agree that he/she will visit the
CSIR/Innovation Hub and all activities related thereto at his/her own risk and
on the express condition that neither the CSIR/Innovation Hub, nor their
officers or employees, shall be liable to me or the child or my child's executors
for any damage arising out of loss of life or bodily injuries suffered by him/her,
or for any loss of or damage to his/her property or estate arising out of any
accident or cause which may occur during such trip, or whilst in transit,
whether or not such accident or other cause arises out of negligence, failure,
incompetence or any act whatsoever, on the part of such officers or
employees, and on behalf of myself and the child, I do hereby indemnify, hold
harmless and absolve the CSIR/Innovation Hub and their officers and
employees from any damages whatsoever and legal expenses or costs, which
may arise out of his/her participation in the said activities.

SIGNED at.....on this the.....day of.....2007

.....

Signature parent/natural guardian

WITNESSES:

1.....

2.....

Parent/natural guardian's contact details:

Telephone number:.....

Cell phone number:.....

Email.....

CSIR Indemnity Form

Agreement to participate in an initiative to expose learners to presentations, as a component of the Fab Kid's Project to be held at the Fab Lab. Innovation Hub, Pretoria.

In respect of my minor child,,
a Grade learner at,
as the parent/natural guardian of, I
hereby confirm my unconditional permission for him/her to accompany a
CSIR/Innovation Hub employee to visit the CSIR premises in Pretoria, on
...../2007

I do hereby on behalf of,
acknowledge and declare that I agree that he/she will visit the
CSIR/Innovation Hub and all activities related thereto at his/her own risk and
on the express condition that neither the CSIR/Innovation Hub, nor their
officers or employees, shall be liable to me or the child or my child's executors
for any damage arising out of loss of life or bodily injuries suffered by him/her,
or for any loss of or damage to his/her property or estate arising out of any
accident or cause which may occur during such trip, or whilst in transit,
whether or not such accident or other cause arises out of negligence, failure,
incompetence or any act whatsoever, on the part of such officers or
employees, and on behalf of myself and the child, I do hereby indemnify, hold
harmless and absolve the CSIR/Innovation Hub and their officers and
employees from any damages whatsoever and legal expenses or costs, which
may arise out of his/her participation in the said activities.

SIGNED at.....on this the.....day of.....2007

.....

Signature parent/natural guardian

WITNESSES:

1.....

2.....

Parent/natural guardian's contact details:

Telephone number:.....

Cell phone number:.....

Email.....

Pre-Session Questionnaire

Name		Grade		Gender	M / F
------	--	-------	--	--------	-------

1. List your four best subjects in order best first and your marks next to each subject.

Subjects	Marks
1	
2	
3	
4	

2. How were you selected to participate in this project?

.....
.....

3. Had you heard about the DIGITAL KIDS project before you were invited to join the workshop?

.....
.....

4. What are your hobbies and interests?

.....
.....
.....

5. What career path are you thinking of at this stage?

.....
.....

6. What is your understanding of what an engineer does?

.....
.....
.....

7. Do you classify yourself as being computer literate?

.....
.....

8. Have you done any video editing or animations before?

.....
.....

9. What are your expectations for today?

.....
.....
.....
.....

10. What Science/Technology related competitions have you entered into before?

.....
.....
.....

Post Session Questionnaire

Name		Grade		Gender	M / F
------	--	-------	--	--------	-------

1. What did you **enjoy** the most of today's DIGITAL KIDS Experience?

.....
.....
.....
.....
.....

2. What did you **NOT** enjoy regarding today's DIGITAL KIDS Experience?

.....
.....
.....

3. What would you have changed if you had the choice?

.....
.....
.....
.....

4. Would you recommend that your friends participate in a similar programme?

.....
.....

5. What would you have done to improve your designs?

.....
.....
.....

6. What did you learn today?

.....
.....
.....
.....
.....
.....
.....

7. Would you consider a career in Science, Engineering and Technology after having had such a unique experience?

.....
.....



UMnyango WezeMfundo
Department of Education

Lefapha la Thuto
Departement van Onderwys

Date:	30 August 2006
Name of Researcher:	Beyers Ronald
Address of Researcher:	Building 43 C CSIR Campus Meiring Naudé Road Brummeria, Pretoria
Telephone Number:	(012) 8414601
Fax Number:	(012) 8414720
Research Topic:	Exploring educational opportunities that Fab Labs can provide
Number and type of schools:	6 Secondary Schools
District/s/HO	Tshwane North

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

Permission has been granted to proceed with the above study subject to the conditions listed below being met, and may be withdrawn should any of these conditions be flouted:


1. *The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.*
2. *The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.*
3. *A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.*

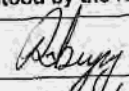
Office of the Senior Manager – Strategic Policy Research & Development
Room 525, 111 Commissioner Street, Johannesburg, 2001 P.O.Box 7710, Johannesburg, 2000
Tel: (011) 355-0488 Fax: (011) 355-0286

4. A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.
5. The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.
6. Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Senior Manager (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.
7. Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year.
8. Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.
9. It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.
10. The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.
11. The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.
12. On completion of the study the researcher must supply the Senior Manager: Strategic Policy Development, Management & Research Coordination with one Hard Cover bound and one Ring bound copy of the final, approved research report. The researcher would also provide the said manager with an electronic copy of the research abstract/summary and/or annotation.
13. The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.
14. Should the researcher have been involved with research at a school and/or a district/head office level, the Senior Manager concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards


ALBERT CHANEE
ACTING DIVISIONAL MANAGER: OFSTED

The contents of this letter has been read and understood by the researcher.	
Signature of Researcher:	
Date:	10/09/06

IS ETHICAL APPROVAL NEEDED FOR MY RESEARCH? CHECKLIST AND DECLARATION

1. PROJECT TITLE/THESIS NAME:

Digital Kids
in Collaboration with the Young Engineers of South Africa

Tertiary Institution:

Meraka Institute

Degree (if applicable):

Course number and name:
(if applicable):

2. BRIEF DESCRIPTION OF PROJECT:

Briefly describe the major aim(s) of the project (up to 50 words)

Exposing learners to a digital environment using a range of multi-media tools to create and edit digital images in a variety of formats including videos and still images.

3. PRINCIPAL RESEARCHER (APPLICANT) - STAFF OR STUDENT (underline):

Name & Surname:

Mr Ron Beyers

Address:
(students only)

Meraka Institute, CSIR

Contact Numbers:
Cell, Home & Work

(Tel)012 841 30287 (Cell) 083 310 8843

Student no:

E-mail:

rbeyers@csir.co.za

4. DECLARATION:

The information supplied is, to the best of my knowledge and belief, accurate. I/we have considered the ethical issues involved in this research and believe that I have adequately addressed them. I/we have read the current guidelines for ethics approval for research projects involving human participants published by the Faculty of ICT (TUT), and clearly understand my/our obligations and the rights of participants. I/we understand that if the methods used in this research change in any way I must inform the Faculty of ICT (TUT) and obtain their written approval before proceeding. I/we will comply with all other ethical policies of the institution.

Principal researcher:

Date:

Supervisor: (if applicable)

Date:

I have read this form, understood the nature of the research project and declare that it complies with all ethical standards and policies. It is appropriate for this research to be conducted in this University.

Head of Department:
HOD Name Printed:

Date:

No	Checklist	YES	NO
1	Have you accessed advice from the Ethics Committee (TUT) in relation to your project, or had access to and read the Policies and Procedures of the HSRC/MRC/ Dept of Health/ National Zoological Gardens of SA (underline applicable one) on ethics?		No
2	Are humans used as participant in the research?	Yes	
3	Could humans (participants or researchers) be at risk of, or actually, adversely affected (physically, culturally, socially, financially, psychologically) by your research?		No
4	Will the participants be given relevant information relating to the project and what is expected of the participants?	Yes	
5	Will they voluntarily consent, in writing or by return of questionnaires, to be involved in the project?	Yes	
6	Will the methods achieve the stated objectives of the project? i.e. does the sampling methodology adequately enable stated objectives to be met and inferences to be made?	Yes	
7	Do you have any known/special relationship with the participants? E.g. teacher-student, doctor-patient, friend/family		No
8	Are members of the particular ethnic, societal or cultural group to be the principal participants or a sub-group of the research?		No
9	Are any participants limited in their ability to give informed and voluntary consent? e.g. children, disabled, infirmed		No
10	Are social and cultural sensitivities, or intellectual and cultural property issues, relevant to your group of participants?		No
11	Could the collection of information from or about your participants cause them physical, psychosocial or environmental harm, or create a risk of such harm (refer to the definition of page 4)?		No
12	Can your participants be individually identified through the data collected, either directly or by inference, by the researchers or anyone else?		No
13	Are the participants asked potentially sensitive, incriminating, confidential or personal questions about themselves or their organization?		No
14	Does the project require extraction or use of body tissues or fluids?		No
15	Is there any reason you are unable to store your data to keep it secure against unauthorized access, for 2 years following the completion of the project?		No
16	Has any other organization provided financial or in-kind support for this project?		No
17	Are you unsure as to whether or not there may be any other ethically-relevant procedure in your project?		No
	Have you answered YES to any of questions 7 - 17 go to question 20 Have you answered NO to any of the above go to question 21	Go to 20	Go to 21
20	You MAY require ethical approval for your project. Please contact your supervisor/research officer for guidance.		
21	You may NOT require ethical approval for your project, but forward this signed form to the Research Officer at your.		

The Faculty will deliberate, within 1 week of receipt, on this information before confirming acceptance on ethical grounds.

Projects requiring approval by another (non- Faculty of ICT at TUT) ethics committee

The Faculty is not able to appraise the following types of research projects. Instead, application must be made, using the appropriate forms, to an accredited animal or regional Health and Disability Ethics Committee, details of which can be obtained from the Research Officer at the Faculty.

- Research involving or affecting animals;
- Research using genetic modification (see below);
- Clinical trials using human participants i.e. trials requiring completion of Statutory Declaration B of Appendix 9;
- Any research using patients, facilities, information, funds or staff of the District Health Board, or patients or health care information from an organization providing health services;
- Research involving human remains;

Projects not requiring ethical approval by any ethics committee

While ethical consideration must still be upheld, the following do not require specific Faculty approval:

- Research that does not involve humans, animals or the environment and does not in any way adversely affect humans, animals or the environment;
- Evaluation conducted within the Faculty of ICT (TUT) for quality assurance purposes;
- Research involving existing, publicly available documents or data (e.g. analysis of archival records, which are publicly available);
- Preliminary interaction or discussion where the exact research aims have not yet been formulated;
- Research in which a single investigator is the subject of his or her own research, and where no physically hazardous procedure is involved;
- One-off interviews with public figures, e.g. politicians, prominent authors;
- Seeking a professional or authoritative opinion, except where this is part of a study of the profession or area of expertise;

Ethical Principals

A national and international standard for ethical research emphasizes eight governing principles:

- Informed and voluntary consent;
- Respect for participant's rights, confidentiality and preservation of anonymity;
- Minimization of harm;
- Cultural and social sensitivity;
- Limitation of deception;
- Respect for intellectual and cultural property ownership;
- Avoidance of conflict of interest;
- Research design adequacy.

Definitions

Harm:

Harm is defined as that which adversely affects the interests of an individual or a group. The types of harm extend to physical, psychological, economic and social harm. Harm includes discomfort, anxiety, pain, fatigue, embarrassment and inconvenience.

The following situations may impose harm or the risk of harm:

- Lack of anonymity for participants;
- Lack of confidentiality of information;
- Requests for sensitive information;
- Use of deceit;
- Use of medically invasive procedures;
- Cultural insensitivity;
- Use of "vulnerable" participant or those unable to give fully informed and voluntary consent.

Information and resources for research ethics

Addendum H

Prof ME Herselman
Tel: (012) 3825758/3824838
E-mail: herselmanme@tut.ac.za

Mrs Adri Coetzer
Tel (012) 3824838
Fax: (012) 3824839
e-mail: coetzera@tut.ac.za

223 Water Road
Walmer
Port Elizabeth

25 January 2010

Candidate: Ronald Noel Beyers

University number: 21986444

Qualification / Degree: PhD **Qualification code :** 404110

Curriculum code: O901P

Descriptive name: Learning and Teaching

Title of dissertation: Promoting Human Capital Development through Creativity and Innovation at School Level

Link with the Research Focus Area: NWU Research Niche Area: Educational Technology for Effective Teaching and Learning

Supervisor / promoter: Prof. A.S. Blignaut

Co-supervisor /- promoter: Prof. M. Herselman (Nelson Mandela Metropolitan University of Technology)

TO WHOM IT MAY CONCERN

This is to confirm that all the research that is presented to the Ethic Committee at the North West University has already been completed. The original work and the Intellectual Property forms part of the Young Engineers and Scientists of Africa (YESA) which was completed prior to 2009.

YESA was incubated within the Meraka Institute at the CSIR since 2006. Prior to commencing ethics clearance was requested and approved through the Tshwane University of Technology on behalf of the Meraka Institute.

The Thesis in question is in the final phases of submission in preparation for the May 2010 deadline.

Yours truly

Ron Beyers

Student Number : 21986444

IS ETHICAL APPROVAL NEEDED FOR MY RESEARCH? CHECKLIST AND DECLARATION

1. PROJECT TITLE/THESIS NAME:

Fab Teachers
in Collaboration with the Young Engineers of South Africa

Tertiary Institution:

Meraka Institute

Degree (if applicable):

Course number and name:
(if applicable):

2. BRIEF DESCRIPTION OF PROJECT:

Briefly describe the major aim(s) of the project (up to 50 words)

To demonstrate the proof of concept of introducing teachers to the concept of Fab Kids at FabLabs. Teachers will be exposed the same design process as the learners in a high-tech rapid proto-typing environment and given the same challenge as the Fab Kids to identify whether teachers can operate in such an environment.

3. PRINCIPAL RESEARCHER (APPLICANT) - STAFF OR STUDENT (underline):

Name & Surname:

Mr Ron Beyers

Address:
(students only)

Meraka Institute, CSIR

Contact Numbers:
Cell, Home & Work

(Tel)012 841 30287 (Cell) 083 310 8843

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4. DECLARATION:

The information supplied is, to the best of my knowledge and belief, accurate. I/we have considered the ethical issues involved in this research and believe that I have adequately addressed them. I/we have read the current guidelines for ethics approval for research projects involving human participants published by the Faculty of ICT (TUT), and clearly understand my/our obligations and the rights of participants. I/we understand that if the methods used in this research change in any way I must inform the Faculty of ICT (TUT) and obtain their written approval before proceeding. I/we will comply with all other ethical policies of the institution.

Principal researcher:

Date:

Supervisor: (if applicable)

Date:

I have read this form, understood the nature of the research project and declare that it complies with all ethical standards and policies. It is appropriate for this research to be conducted in this University.

Head of Department:

Date:

HOD Name Printed:

No	Checklist	YES	NO
1	Have you accessed advice from the Ethics Committee (TUT) in relation to your project, or had access to and read the Policies and Procedures of the HSRC/MRC/ Dept of Health/ National Zoological Gardens of SA (underline applicable one) on ethics?		No
2	Are humans used as participant in the research?	Yes	
3	Could humans (participants or researchers) be at risk of, or actually, adversely affected (physically, culturally, socially, financially, psychologically) by your research?		No
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5	Will they voluntarily consent, in writing or by return of questionnaires, to be involved in the project?	Yes	
6	Will the methods achieve the stated objectives of the project? i.e. does the sampling methodology adequately enable stated objectives to be met and inferences to be made?	Yes	
7	Do you have any known/special relationship with the participants? E.g. teacher-student, doctor-patient, friend/family		No
8	Are members of the particular ethnic, societal or cultural group to be the principal participants or a sub-group of the research?		No
9	Are any participants limited in their ability to give informed and voluntary consent? e.g. children, disabled, infirmed		No
10	Are social and cultural sensitivities, or intellectual and cultural property issues, relevant to your group of participants?		No
11	Could the collection of information from or about your participants cause them physical, psychosocial or environmental harm, or create a risk of such harm (refer to the definition of page 4)?		No
12	Can your participants be individually identified through the data collected, either directly or by inference, by the researchers or anyone else?		No
13	Are the participants asked potentially sensitive, incriminating, confidential or personal questions about themselves or their organization?		No
14	Does the project require extraction or use of body tissues or fluids?		No
15	Is there any reason you are unable to store your data to keep it secure against unauthorized access, for 2 years following the completion of the project?		No
16	Has any other organization provided financial or in-kind support for this project?		No
17	Are you unsure as to whether or not there may be any other ethically-relevant procedure in your project?		No
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- Requests for sensitive information;
- Use of deceit;
- Use of medically invasive procedures;
- Cultural insensitivity;
- Use of "vulnerable" participant or those unable to give fully informed and voluntary consent.

Information and resources for research ethics

Prof ME Herselman
Tel: (012) 3825758/3824838
E-mail: herselmanme@tut.ac.za

Mrs Adri Coetzer
Tel (012) 3824838
Fax: (012) 3824839
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