DETA

distance education and teachers' training in africa

CONFERENCE 2015

PROCEEDINGS

20–24 July 2015

Mauritius Institute of Education

Réduit, Mauritius

Editor: Dr Folake Ruth Aluko

Assistant Editor: Dr Hyleen Mariaye

UNIVERSITEIT VAN PRETORIA
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Mauritius Institute of Education

"The Future We Want":
Teacher development for the transformation of education in diverse African contexts

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Proceedings of the 6th biennial International Conference on Distance Education and Teachers' Training in Africa (DETA) held at the Mauritius Institute of Education, Réduit, Mauritius

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The Distance Education and Teachers' Training in Africa (DETA) Conference strives to provide a platform for educationists in Africa to meet and deliberate on educational issues in Africa.

This document is also available online at www.deta.up.ac.za

PROCEEDINGS POLICY

The *Distance Education and Teachers' Training in Africa Proceedings* is a Pan-African medium for articles of interest to researchers and practitioners in distance teacher education, and especially those presented during the Distance Education and Teachers' Training in Africa (DETA) conference. The publication is interdisciplinary in approach and its purpose is to provide practitioners who work within the African context the opportunity to disseminate original research and new developments within their field.

Due to the Pan-African nature of the conference, the editors have sought the professional support of an International Advisory Board made up of experts in the field of distance teacher education. These are mostly from African countries, but also include experts from the United Kingdom and the United States who have been involved in various projects on the continent. The consultant editors are also professionals in the same categories.

This is the fourth edition of this publication. Previous editions have, until now, existed as a repository on the conference website (www.deta.up.ac.za). These editions have been published biennially following the preceding conferences. From 2018, the editors plan to publish the publication twice a year as an in-house online journal. Further information on the new developments will be made available in due course.

The views expressed in the publication are those of the respective authors.

OPEN ACCESS POLICY

The *Distance Education and Teachers' Training in Africa Proceedings* (with a possible name change to be communicated in due course) is housed at the Unit for Distance Education in the Faculty of Education of the University of Pretoria, South Africa.

PEER-REVIEW PROCESS

All research articles submitted to the *Distance Education and Teachers' Training in Africa Proceedings* have undergone a rigorous peer-review process. The process involves initial editor screening, anonymized refereeing by at least two referees, and a final reading by a critical reader. The reviewers are requested to complete a brief written report, along with a score sheet of whether the article is suitable for publication in the Proceedings.

Authors are requested to submit a covering letter indicating that their paper has not been previously published or is under consideration for publication elsewhere.

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PREFACE TO THE DETA CONFERENCE PROCEEDINGS

The sixth DETA conference, with the theme "The future we want": teacher development for the transformation of education in diverse African contexts, was held in Mauritius in July 2015. It had the ambitious agenda of bringing together more than 200 delegates from more than 15 African countries to reflect on the future of education in Africa.

This target was largely met with 115 paper presentations by delegates from Botswana, Burundi, Ghana, Kenya, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, South Africa, Tanzania, Togo, Uganda, Zambia, Zimbabwe, Canada, France, Germany, the United Kingdom and the United States. The presentations considered the following subthemes:

1. Teaching children in diverse African contexts
2. Pedagogies that will achieve "the future we want" for education in Africa
3. The role and impact of technology on teacher development
4. Quality in education as a prerequisite to establish "the future we want" for education in Africa

DETA conferences have now become a unique and regular biennial event on the African academic calendar, offering a platform for practitioners and researchers in education to collectively reflect on how educational policies, while guided by local contexts, can be attuned to achieving a shared vision for the continent. It also focuses on how practices can be enhanced by learning from the experiences of others; and on how theories and models borrowed from the North can be challenged by more culturally sensitive perspectives developed from empirical data produced in a diversity of African contexts.

International educational targets also shape our contexts and protocols, which seek to bring about a common focus to solve perennial concerns in education, of which quality remains a priority. What the conference brought out unambiguously was the need to mobilise massive resources and willpower in order to guarantee access to an education that empowers individuals and communities to effect the necessary economic, social and political change. Countries cannot achieve this ambitious

social reconstruction project through education without including teachers, their training and quality in the equation. The correlation between innovation in educational practices and the work of the teacher scholar is well established, yet Africa lags behind in terms of its scholarly and research productions, despite the richness of its contexts.

Conferences such as DETA can not only add to the discourse, policies and practices in education, but also contribute to the development of the next generation of academics by initiating them into the rigour of the peer-review process. This document is a modest contribution to the publication landscape. While displaying the merits of ongoing research projects in schools and universities, it also signposts the challenges currently faced by African teacher scholars on the one hand, and institutions of higher learning on the other, in upscaling the quality of academic productions in teacher education.

Aware of the varied profiles of participants, the double-blind peer review process sought to be supportive and developmental by providing constructive comments to authors on structure, substance and form. Twenty drafts covering the conference subthemes were submitted. Of the 20 drafts received, 11 were provisionally accepted and returned to the authors for improvements. Eventually, four submissions were converted into shorter reports on creative and innovative educational projects or small-scale research, while the remaining six were retained in the more traditional article format.

The process of putting together *Distance Education and Teachers' Training in Africa Proceedings* indicated some critical areas for both reflection and concerted action for us as a community of scholars to be able to position Africa on the research and publication map. Converting postgraduate dissertation work into a conference presentation is a necessary rite of passage for emergent researchers and, judging from the corpus of dissertation-derived submissions, the sixth DETA Conference was no exception. Yet, it seems that more support is needed to facilitate this process for postgraduate students.

A common observation by the editors of this volume relates to the quality of empirical data presented in submissions for publication. While strong submissions

were received, they were worrisomely scarce. Methodological awareness and rigour in writing in terms of attention to language, referencing and proper academic style are unequivocally on the decline for reasons that we can only, at this point, conjecture about. Yet, we look to the seventh edition of the conference proceedings with hope for a reversal of this trend.

Perhaps it is an ideal time to reflect on whether African scholars, through a virtual network of institutions of teacher education, could develop a coherent strategy to build capacity for academic writing as part of the professional development agenda of teachers and the induction of teacher educators. Currently, Africa accounts for less than 1% of all the research publications in the world. Most of these African publications are written by South Africans. We know this figure has to go up and be more evenly distributed across nations, and that all of this needs to happen fairly soon. Whether it will depends on our capacity to work together. This has prompted the organisers to include a session on research in support of quality teacher education in the preconference workshop that forms part of DETA 2017. This session includes a theme on getting from presentation to publication.

It is our hope that readers of these proceedings will be inspired by the engagement of authors in their practice as scholars and practitioners. We also hope that the authors will feel that value has been added to their thinking and writing through the submission of their papers and the peer-review process. It is also our expectation that students of education across faculties will be motivated to present their own research to a vibrant community, which DETA organisers have painstakingly created through years of dedicated service.

This volume also includes a book review of *Assuring institutional quality in open and distance learning (ODL) in the developing contexts,* edited by Aluko, Letseka and Pitsoe (2016).

Lastly, we are happy to bring to your attention that, from 2018, the conference proceedings will become an online in-house journal, *Distance Teacher Education Journal,* to be housed at the Unit for Distance Education in the University of Pretoria. We believe this is a route to opening access to its contents in support of making research more freely available. We plan to initially publish it twice a year, with a view to increasing the number of editions.

Dr Folake Ruth Aluko
Dr Hyleen Mariaye

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FULL PAPERS

TEACHING THE TEACHERS OF TEACHERS OF TEACHERS

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ABSTRACT

Nigeria, like many other countries, is currently in the process of curriculum reform to make the school curriculum more responsive to the changing needs of a 21st-century knowledge economy. This entails re-thinking not only **what** is taught, but also **how** it is taught. It is almost axiomatic that teachers teach the way they themselves were taught. Therefore, if we wish to change practices in the classroom, we first need to change practices in the colleges of education, where teachers are trained, by offering appropriate continuing professional development (CPD) to college lecturers.

The design and development of a CPD programme for college lecturers was therefore the focus of one of the recent initiatives of the Teacher Development Programme (TDP) in consultation with the National Commission for Colleges of Education (NCCE) in Nigeria, which was facilitated by the South African Institute for Distance Education (*Saide*).

In the belief that the programme should practise what it preaches, the design and development of this programme was based on an activity- and resource-based and collaborative hermeneutic model.

The article outlines the process followed and the outputs achieved, and may provide a useful example for others contemplating the development of a similar programme.

Keywords: *Continuing professional development (CPD), hermeneutics, activity-based learning, resource-based learning, collaborative learning, modelling*

INTRODUCTION

Nigeria, like many other countries, is currently in the process of curriculum reform to make the school curriculum more responsive to the changing needs of a 21st-century knowledge economy. This entails re-thinking not only **what** is taught, but also **how** it is taught. It is almost axiomatic that teachers teach the way they themselves were taught. Therefore, if we wish to change practices in the classroom, we first need to change practices in the colleges of education where teachers are trained, by offering appropriate continuing professional development (CPD) to college lecturers.

The design and development of a CPD programme for college lecturers was therefore the focus of one of the recent initiatives of the Teacher Development Programme (TDP) in consultation with the National Commission for Colleges of Education (NCCE) in Nigeria, which was facilitated by the South African Institute for Distance Education (*Saide*[1]). Although it was a programme design and development, rather than a research initiative, the process involved a typical action-research cycle, as articulated by Lewin (1946; 1948), which involves planning, acting, observing and reflecting or revising. The CPD programme detailed in this article deliberately adopted the term "teacher educators" rather than "college lecturers" to flag the proposed change in pedagogic approach it sought to influence.

The article outlines the process followed and the outputs achieved, and may provide a useful example for others contemplating the development of a similar programme.

PROBLEM STATEMENT AND THEORETICAL FRAMEWORK

In its 2012 Curriculum Implementation Framework, Nigeria's NCCE sets out the key changes that the reform process seeks to bring about with regard to the curriculum for the training of teachers (NCCE, 2012). It identifies the need for a shift in emphasis from what is taught to what is learned (NCCE, 2012:11) and also recognises that it is not only content that is learned, but also skills and attitudes (NCCE, 2012:112). This requires a restructuring of the teacher education curriculum to reflect the identified specialised teaching areas and programmes as follows: Early Childhood Care and Education (ECCE), Primary Education (PED),

1 *Saide* prefers use of the name *Saide* rather than the acronym or full name as the scope of its work now goes beyond distance education provision.

Junior Secondary Education (JSE), Adult and Non-formal Education (ANFE), and Special Needs Education (SPED). These recommendations arose from a series of workshops and discussions involving the NCCE and the Teacher Education in Sub-Saharan Africa (TESSA)-initiative. In the Framework, it is noted that the move from a content-based to a competency-based learning approach will have implications for the ways in which education courses are conceptualised, what learning materials will be appropriate, what teaching methods should be employed, how teaching practice is mediated, how methods courses are presented and how assessment is designed and implemented (NCCE, 2012:15).

The problem and response

The problem to be addressed then, was how to ensure that the curriculum reform would be implemented by teacher educators who had not been directly involved in the reform process and who might feel threatened by and/or resistant to the kinds of changes required. Moreover, it was clear that the scope of change was such that professional development would need to be introduced as an ongoing activity and not as a once-off event.

The TDP, which is supported by UKAID, sought to respond to the reform challenge for teacher educators by creating an initial CPD programme that would provide a start to engaging constructively with the reform agenda. However, it also sought to turn the design, development, implementation and review of this initial CPD programme into a model process that might subsequently be used, with amendments based on learning from experience, for the design, development and implementation of subsequent, more in-depth CPD interventions. *Saide* was commissioned to facilitate the design and development of the initial CPD programme.

Theoretical framework

The approach taken to the work with Nigerian teacher educators was framed within a qualitative interpretivist paradigm and stemmed from a belief that teachers and teacher educators have curriculum agency – teachers do not simply enact a curriculum; they partly create it through the practical decisions they make in their different contexts of teaching. *Saide* believes there is no single right way to teach, and there are always some differences between the ways in which the curriculum is planned, mediated and experienced (Carl, 2009; Mays, 2015; Slattery, 2006; Woolfolk, 2007).

The design and development of a CPD programme that is aimed at developing the capacity of teacher educators to mediate the new curriculum reform approaches needed to reflect these understandings, and so a series of workshops was proposed following a hermeneutic cycle of enquiry (Gadamer, 2004; Danner, 1995; Kissack, 1995), and action-research-type processes, in which each workshop would reflect and build on what had gone before and be modified in light of the discussions on that experience. Hermeneutics seemed an appropriate theoretical lens because it is concerned with a process of continual interpretation and re-interpretation of texts and contexts in pursuit of increasingly enhanced understandings (Stanford, 2005; Kinsella, 2006). This kind of iterative process is consistent with what the literature recommends about programme design and development, particularly in the kind of open and distance and e-learning (ODeL) mode that seemed most appropriate for CPD.

Short literature review on programme development

It is noted that the provision of appropriately designed learning materials is critical for all kinds of resource-based learning that might be classified under the broad description of ODeL and that these materials need to incorporate a range of media and approaches to cater for a wide variety of learning purposes and learning styles (COL, 2005; Dede, Dieterle, Clarke, Ketelhut & Nelson, 2007; Lockwood, 1992; Randell, 2006).

However, good materials are a necessary but insufficient requirement for successful learning: it is equally important in all modes of provision to encourage students to be actively engaged in the learning process (CHE, 2007; Moll, 2003) and to provide a wide range of support strategies during that process (Mills, 2003; Subotzky & Prinsloo, 2011).

It is also necessary that assessment should support the learning process in an integrated way rather than being seen as something that happens only at the end of the process (Coats, 1988; Beets, 2014). The importance of formative feedback on assignments, in particular, has long been recognised in the distance education literature as an essential component of effective programme design and implementation (Freeman & Lewis, 1998; Morgan & O'Reilly, 1999; Mothata, Van Niekerk & Mays, 2003; Raggatt, 1994; Rowntree, 1987; Rowntree, 1990).

Decisions made about what to include and how to mediate engagement with the selected content need to be informed by the understanding that the target learners are full-time working adults with considerable experience, which can be both a source of value (in that teacher educators can learn from one another's experience and feedback and they have the opportunity to try out possible new approaches immediately in practice) and a potential barrier (in that extensive experience of working in particular ways can result in reticence, and even active resistance, to exploring alternative approaches) (Gravett, 2005; Illeris 2008; Merriam, Caffarela & Baumgartner, 2007; Nwokeochu, 2014; Rogers, 2002).

In the kind of blended ODeL model that seems most appropriate for the Nigerian college context, the traditional concerns of distance education (access, scale and affordability) need to be balanced by the new possibilities of online facilities to augment face-to-face learning and support (cooperative and collaborative learning, tracking progress through the use of learning analytics, and improved quality through interventions designed to close the feedback loop from performance to practice so that understanding of what does and does not seem to work are used to improve the programme in subsequent iterations) (Garrison & Vaughan, 2008; Cleveland-Innes & Garrison, 2010).

It is necessary to integrate cognitive, social and teaching presence in the design of such a learning programme – for example, by providing a coherent knowledge structure, developing a community of inquiry and providing a variety of support mechanisms (Anderson & Elloumi, 2004; Anderson, 2008). The inclusion of more cooperative and collaborative approaches allows for the development of "wisdom communities", in which participants can continue to learn from and build on one another's professional experience, even after the formal programme has ended (Gunawardena, Ortegano-Layne, Carabajal, Frechette, Lindemann & Jennings, 2006).

Hence, there is a need for an integrated design process to develop appropriate learning programmes (Welch & Reed, 2005; CHE, 2014; Louw, 2007; Koper & Tattersall, 2005; RSA, 2014) and to think systemically about the fit or lack of fit between learning and teaching needs, and institutional structures and processes on the one hand, and the aspirations and *habitas* of institutions, academics and learners on the other (Moore & Kearsley, 1996; Moore & Kearsley, 2012; Prinsloo, 2009). One way to manage this is to make use of a structured integrated programme and course design process as illustrated in the *Saide*'s course design guide (*Saide*, 2015).

PROCESS AND OUTPUTS

In the end, five workshops were run over a seven-month period (programme design, course design, materials development, materials review and training of master facilitators), following the kind of cyclical key-steps approach suggested by the experience of the National Association of Distance Education Organisations of South Africa (Nadeosa) and *Saide* (Welch & Reed, 2005; *Saide*, 2015).

During the course of November 2014, the TDP and *Saide* discussed the design and logistics for an initial workshop that would cover the following issues:

- Curriculum design
- Course design
- Materials development
- Open educational resources
- Forward planning

The workshop was to be followed by a supported materials development process. The outputs by the end of the workshop were the following:

- A CPD programme outline and implementation plan
- Outlines for each of the constituent modules
- Draft materials for each of the constituent modules, including assessment tasks, print-based materials and digital materials
- Guidelines for sustaining such curriculum and materials design and development processes

It was agreed that, in light of the context and target audience, a blended ODeL approach would be followed, using a mix of resource-based, independent learning, face-to-face contact and group discussions and work-integrated learning with ongoing support and monitoring by email and mobile phone communication.

In the belief that the programme should practise what it preached, the design and development of this programme was based on an activity- and resource-based and collaborative model. Design and development focused first on the design and development of introductory, developmental and consolidating activities that would provide evidence of achievement of purpose and outcomes. Then resources were sourced, adapted or created to enable these activities to be completed. Participants worked in specialist teams, but opportunities were created for inter-team review and

feedback to help ensure a coherent programme experience, but also to foster the cross-pollination of effective ideas and approaches. By modelling such an approach through a series of interlinked development workshops, it was hoped that the teacher educators involved would feel sufficiently capacitated to model these approaches to their peers, who would, in turn, model these approaches to their teacher students, who, in turn, would, hopefully, adopt such practices in their classrooms.

The CPD development process was launched in an initial workshop in November 2014 and involved 50 teacher educators drawn from six colleges of education from three states in Nigeria: Kano, Katsina and Zamfara.

The first key message of the workshop was that curriculum design required a holistic and integrated approach that considered the complex interaction of internal and external stakeholder expectations, student needs and expectations, the identification and development of appropriate content and learning resources, learning and learner support, an appropriate assessment strategy and appropriate supporting human, physical and information and communication technology (ICT) infrastructure.

The key output for the first session was a draft programme overview geared towards bridging the gap between what teacher educators could be assumed to already know and be able to do, and what was expected of them as a result of the recent education reforms and the emerging understanding of skills needed in 21st-century societies.

The second key message of the first workshop was that the design of individual courses needed to be aligned to the design of the curriculum as a whole, and needed to follow similar iterative and collaborative development processes. All learning resources, whether print-based or in digital format, were to take issues such as the following into consideration in the design and formative evaluation processes:

- Introduction and orientation
- Selection and coherence of content
- View of knowledge
- Presentation of content and interactivity
- Activities, feedback and assessment
- Language
- Layout and accessibility

However, how these guidelines were interpreted in practice depended on the level, context and purpose of the different courses. Particular attention needed to be given to ensuring there was coherence, sequencing and progression, from in-course self-assessment activities to formative assignment activities and summative activities that provided evidence appropriate to the stated exit-level outcomes or objectives; and also that formative feedback (and feed forward) comments should be provided at each key stage in the learning journey.

It was further noted that introductory course units needed to play multiple roles. In addition to providing an orientation to underpinning foundational disciplinary knowledge, initial course units also needed to help students provide a scaffolded engagement with the features of the chosen learning style and mode of provision.

The key output for the second session of the first workshop was the development of draft module outlines related to each of the key areas of the programme outline.

The focus of the third session of the first workshop was the design of appropriate activities and feedback to encourage students' active engagement with the learning process. Participants had the opportunity to engage with examples of a wide range of different kinds of activities developed for other programmes in teacher education, such as the TESSA materials and the South African Advanced Certificate in Education in School Management and Leadership (which are available as open educational resources (OER)).

Working teams in the following areas (derived from a brainstorming process) were then given time to update their draft module outlines, now including key topics and learning activities:

- Early Childhood Care and Education Primary Education
- Junior Secondary Education
- Adult and Non-formal Education
- Special Needs and Inclusive Education
- Technical and Vocational Education and Training
- Professional Development and Quality Assurance
- Educational Technology
- Teaching and Learning Methods
- Learning Resources

Session 4 then focused on the possibilities of using OER to support the materials-development process and explored the following questions:

- What are OER?
- Where can we find them?
- How can we evaluate OER?
- How can we adapt OER?
- How can we publish OER?

A comprehensive set of resources (833 MB) was provided to support this workshop and included resources that could be drawn upon throughout the subsequent curriculum and materials-development process. The TDP, in general, and workshop participants, in particular, were recommended to release their own CPD materials under an open licence to allow others to learn from and use the resources developed.

Session 5 involved a recapping of key issues and initial forward planning from a project, team and individual perspective.

Following the first workshop, which provided a big picture overview, designated teams needed to work on finalising the outline for the programme as a whole, as well as the outlines for its constituent modules. This was then followed by a second workshop that explored the implementation model for the proposed programme, unpacked the module design in more detail and revisited the plan and criteria for subsequent materials development. The outline for the second workshop was as follows:

- Day 1: Reviewing the curriculum design for the programme and its constituent modules, including technology integration
- Day 2: Developing a curriculum implementation framework
- Day 3: Developing detailed module and theme maps based on activity- and resource-based approaches
- Day 4: Developing activity-based materials
- Day 5: Reflection, collaborative feedback and forward planning

The key outputs of the second workshop were a revised programme outline, as well as updated constituent module outlines, a flexible implementation model and key activities (introductory, developmental and consolidating) for at least two of the subthemes explored in each module.

After this workshop, the programme was seen to comprise four generic modules (learning and teaching methods, educational technology, learning resources and inclusive education) and one elective specialist module (chosen from Early Childhood Care and Education/Primary Education, Junior Secondary Education, Adult and Non-formal Education or Technical and Vocational Education and Training). These decisions were arrived at through a collaborative discussion process during the workshops, as nothing had been decided prior to the start of the engagement.

Following the second workshop, which provided development teams with clear module maps, designated teams needed to work on finalising the constituent theme maps for their respective modules, and then to develop the materials for at least the first sub-theme. This was followed by a third workshop in January that collaboratively explored issues of level, presentation, language and design, as well as exploring and revisiting the plan and criteria for subsequent materials development.

The third workshop followed in March. It provided development teams with insights into and examples of the development of activity-based independent learning materials (both in print and for sharing via mobile technology). Module teams then worked on their draft materials to a first complete draft stage. They continued to get feedback during this process from *Saide* as needed through emailed comments on draft materials. All the draft materials were then shared via Dropbox.

The fourth workshop in May considered the feedback received and the lessons learned, provided space for supported revision and explored implications for the future review and updating of the curriculum, the materials and the implementation model.

Once the first draft materials had been completed, they were reviewed by representative “typical” students for accessibility and relevance, and by designated discipline experts for content and level. They were also taken through a language and third-party copyright clearance process. It was this fifth version of the programme and its constituent materials that was piloted in the latter part of 2015 and the early part of 2016.

The four design and development workshops were followed by a fifth workshop to train master facilitators.

The CPD programme for the colleges of education sought to achieve at least three things: build the capacity of the teacher educators in developing materials for their

peers, train a core team of master trainers who will sustain the programme, and provide opportunities for teacher educators (on a continuous, regular basis) to update their knowledge of subject matter and pedagogical skills (activity-based, learner-centred pedagogy).

By modelling an activity- and resource-based and learner-centred approach through these five interlinked development workshops, it was hoped that the teacher educators involved would feel sufficiently empowered to model these approaches similarly to their peers, who would, in turn, model these approaches to their teacher students, and then hopefully adopt such practices in their classrooms.

As will be noted, each subsequent workshop built on what had gone before, allowing for both top-down and bottom-up design and development approaches. Discussion and work also continued between the face-to-face workshops in direct contact within institutional development teams and via email and Dropbox to facilitate collaboration between colleges, as participants were spread geographically. In addition, a concerted effort was made to solicit feedback on the draft curriculum and materials from potential participants and discipline experts, who were not part of the original design and development process.

The programme was being piloted at the time of writing. The supporting materials developed during the process comprised the following:

- Programme outline
- Implementation model
- Orientation PowerPoint
- Module 1: Overview of the NCCE-TDP CPD programme for teacher educators
- Induction PowerPoint
- Module 2: Orientation to teaching and learning methods
- Module 3: Introduction to learning resources
- Module 4: Introduction to supporting learners with special educational needs
- Module 5: Introduction to educational technology
- Module 6: Introduction to Early Childhood Care and Education and Primary Education
- Module 7: Introduction to Junior Secondary Education
- Module 8: Introduction to Technical Vocational Education and Training
- Module 9: Introduction to Adult and Non-formal Education.

The final version of all the materials is intended to be published under an open licence. A more detailed outline of the curriculum design process and outputs is already available as an OET at: http://www.oerafrica.org/resource/developing-curriculum-and-learning-resources-guidelines-effective-practice.

OVERVIEW OF THE CPD PROGRAMME

A programme is more than a list of modules. Figure 1 summarises the way in which the programme was organised to make for a coherent learning experience.

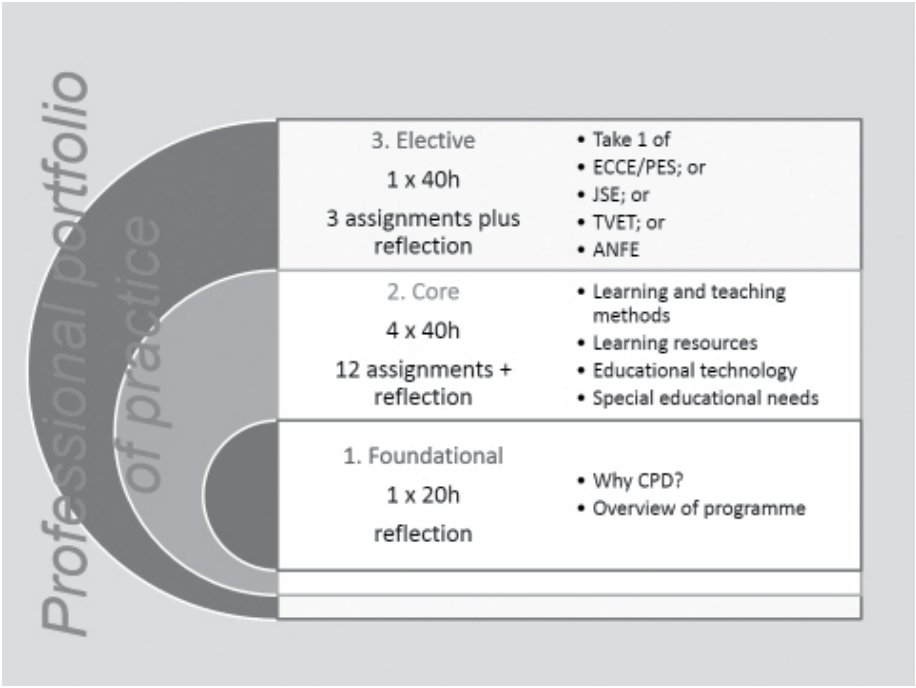

Figure 1: CPD programme overview

In the pilot, all potential participants were invited to an orientation session and took a copy of the Foundational Module 1 with them. This allowed them to make informed decisions about whether to engage with the programme and, if so, which elective to choose. Even those who did not sign up for the full programme thus gained an

orientation to the need for CPD, as well as insight into the key expectations of the curriculum reform.

All those who registered for the programme completed the four core modules and registered for one elective module in which they were guided towards exploring the implications of the four core modules for the ways in which they would teach a particular elective subject.

There were no examinations. Instead, teacher educators completed a number of assignments and reflections that they compiled into an initial portfolio of professional practice, which they could subsequently maintain throughout the rest of their professional careers.

The three formative assignments completed for each of the core and elective modules were designed to provoke reflection on prior learning and experience, promote exploration of new ideas in practice, and consolidate learnings into changed practices. Supporting, regular contact sessions were then designed to provide opportunities to discuss, including contest, the examples and guidelines provided in the materials, as well as the examples that participants themselves developed for their assignments.

Each module was designed to comprise 40 hours of learning (31 hours of self-study and nine hours of contact sessions). The programme of five modules was to be mediated over 20 weeks over two semesters, although in practice different colleges piloted the programme in slightly different ways. The full programme, from orientation through induction to completion, was designed to take 220 hours to complete.

In designing and facilitating the programme, it was important that *Saide* should model the kind of approaches advocated in the curriculum reform process and in the draft programme and its materials. Accordingly, the facilitation process involved the following practices and strategies:

- Collaborative determination of outcomes, agendas, responsibilities and time lines
- Resource-based workshops in which there was a deliberate strategy to move the locus of responsibility from the facilitator to self-determined development teams

- Cooperative peer review processes
- Constructive formative feedback against collaboratively developed criteria

Although participants completed an evaluation after each workshop and the evaluation forms were analysed and written up, it was understood that this was for internal reporting purposes rather than for research purposes, and so is not discussed here. It should be noted, however, that the overall feedback was positive and that weaknesses noted in one workshop or phase were demonstrably addressed in the following workshop or phase, as would be expected in a hermeneutic process that employed action-research-type approaches.

CONCLUSION

If one wishes to bring about positive change in the classroom, one of the things one needs to address is the way in which teachers are trained. This indicates the need for CPD opportunities for teacher educators. However, teacher educators typically become trainers after completing a teacher qualification and then, maybe or maybe not, teaching in a classroom. Subsequent qualifications gained will, in many instances, not prepare teacher educators to develop, facilitate and review a CPD programme for their peers. It is therefore necessary to provide an authentic and integrated CPD experience that explores the full development process, from curriculum design to course design to materials development and review and into tutor training. In such a process, it is important that the trainer of the teacher educators, who will, in turn, train their peers, models the kind of resource- and activity-based approaches called for in the curriculum reform itself. The approach described in this paper sought to illustrate such a process.

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REFERENCES

Anderson, T., 2008, *Theory and practice of online learning,* 2nd ed., Athabasca University Press, Athabasca.

Anderson, T. & Elloumi, F. (eds), 2004, *Theory and practice of online learning*, Athabasca University Press, Athabasca.

Beets, P., 2014, 'Curriculum and assessment', in P. Du Preez & C. Reddy, C. (eds), *Curriculum studies: visions and imaginings,* pp. 134–156, Pearson, Pinelands.

Carl, A.E., 2009, *Teacher empowerment through curriculum development – theory into practice,* 3rd ed., Juta, Cape Town.

Cleveland-Innes, M.F. & Garrison, D.R. (eds), 2010, *An introduction to distance education: understanding teaching and learning in a new era,* Routledge, New York, NY and London.

Coats, M.,1998, *Assessment-as-learning: an outcomes-based approach,* keynote address at the ASEESA Conference 'Quality Assessment – Quality Learning', Johannesburg, South Africa, 28 September–1 October 1998.

Commonwealth of Learning (COL), 2005, *Creating learning materials for open and distance learning: a handbook for authors and instructional designers,* Commonwealth of Learning, Vancouver.

Council on Higher Education (CHE), 2007, *Higher Education Monitor No. 6, A case for improving teaching and learning in South African higher education,* October 2007, CHE, Pretoria.

Council on Higher Education (CHE), 2014, *Distance higher education in a digital era: good practice guide,* CHE, Pretoria.

Danner, H., 1995, 'Hermeneutics in educational discourse: foundations', in P. Higgs (ed.), *Metatheories in philosophy of education,* pp. 221–244, Heinemann Higher and Further Education, Isando.

Dede, C., Dieterle, E., Clarke, J., Ketelhut, D.J. & Nelson, B., 2007, '27 media-based learning styles', in M.G. Moore (ed.), *Handbook of distance education,* 2nd ed., pp. 339–352, Lawrence Erlbaum Associates, New Jersey, NJ and London.

Freeman, R. & Lewis, R., 1998, *Planning and implementing assessment,* pp. 309–313, Kogan Page, London.

Gadamer, H-G., 2004, *Truth and method,* 2nd revised ed., translated by J. Weinsheimer D.G. Marshall, Continuum, London and New York, NY.

Garrison, D.R. & Vaughan, N.D., 2008, *Blended learning in higher education. Framework, principles and guidelines,* Wiley, San Francisco, CA.

Gravett, S., 2005, *Adult learning: designing and implementing learning events – a dialogic approach,* 2nd ed., Van Schaik, Pretoria.

Gunawardena, C.N., Ortegano-Layne, L. Carabajal, K., Frechette, C., Lindemann, K. & Jennings, B.,

2006, 'New model, new strategies: instructional design for building online wisdom communities', *Distance Education* 27(2), 217–232.

Illeris, K., 2008, 'Learning, work and competence development', paper presented at INSETA, SAQA, UWC breakfast seminar, Diep in die Berg, 29 October 2008.

Kinsella, E.A., 2006, 'Hermeneutics and critical hermeneutics: exploring possibilities within the art of interpretation', *Qualitative Social Research* 7(3), 19, viewed 23 April 2016, from http://www.qualitative-research.net/index.php/fqs/article/view/145/319.

Kissack, M., 1995, 'Hermeneutics and education: reflections for teachers of the Humanities', in P. Higgs (ed.), *Metatheories in philosophy of education*, pp. 245–261, Heinemann Higher and Further Education, Isando.

Koper, R. & Tattersall, C. (eds), 2005, *Learning design. A handbook on modelling and delivering networked education and training*, Springer-Verlag, Berlin and Heidelberg.

Lewin, K., 1946, 'Action research and minority problems', *Journal of Social Sciences* 2(4), 34–46.

Lewin, K., 1948, *Resolving social conflicts*, Harper, New York, NY.

Lockwood, F., 1992, *Activities in self-instructional texts*, Kogan Page, London.

Louw, H.A., 2007, *Open and distance learning at Unisa,* Unisa Press, Pretoria.

Mays, T., 2015, 'Teaching, learning and curriculum resources', in P. du Preez & C. Reddy (eds), *Curriculum studies: visions and imaginings*, Pearson, Cape Town.

Merriam, S.B., Caffarella, R.S. & Baumgartner, L.M., 2007, *Learning in adulthood – a comprehensive guide,* 3rd ed., Wiley, San Francisco, CA.

Mills, R., 2003, 'The centrality of learner support in open and distance learning: a paradigm shift in thinking', in A. Tait & R. Mills (eds), *Rethinking learner support in distance education: change and continuity in an international context*, Routledge-Falmer, London.

Moll, I., 2003, *What is a learning-centred learning centre? Key questions for distance education*, South African Institute for Distance Education (*Saide*), Johannesburg.

Moore, M.G. & Kearsley, G., 1996, *Distance education: a systems view*, Wadsworth, Belmont, CA.

Moore, M.G. & Kearsley, G., 2012, *Distance education: a systems view of online learning,* 3rd ed., Wadsworth and CENGAGE Learning, Belmont, CA.

Morgan, C. & O'Reilly, M., 1999, *Assessing open and distance learners*, Kogan Page, London.

Mothata, S., Van Niekerk, L.J. & Mays, T., 2003, 'Learner assessment in practice: lessons from the NPDE', *Perspectives in Education* 21(1), 81–99.

National Commission for Colleges of Education (NCCE), Federal Republic of Nigeria, 2012, *Curriculum implementation framework for Nigeria certificate in education*, NCCE, Abuja.

Nwokeochu, S., 2014, *Teacher continuous professional development: a global survey*, International

Forum of Teaching Regulatory Authorities, Toronto.

Prinsloo, P., 2009, 'Discussion document: modelling throughput at Unisa: the key to the successful implementation of ODL', DISA/DCLD, Unisa.

Raggatt, P., 1994, 'Outcomes and assessment in open and distance learning', in F. Lockwood (ed.), *Materials production in open and distance learning*, pp. 137–145, Kogan Page, London.

Randell. C., 2006, *Resources for new ways of learning: a manual for developers of learning resources*, South African Institute for Distance Education (*Saide*), Pretoria.

Republic of South Africa, 2014, 'Policy for the provision of distance education in South African universities in the context of an integrated post-school system', *Government Gazette,* No. 37811, 7 July 2014, Government Printer, Pretoria.

Rogers, A., 2002, 'Learning and adult education', in R. Harrison, A. Hanson, F. Reeve & J. Clarke (eds), *Supporting lifelong learning: volume 1 – perspectives on learning*, pp. 8–24, Routledge-Falmer/OOUK, London and New York, NY.

Rowntree, D., 1987, *Assessing students: how shall we know them?,* 2nd ed., Kogan Page, London.

Rowntree, D., 1990, *Teaching through self instruction*, Kogan Page, London.

South African Institute for Distance Education (*Saide*), 2015, 'Course design guide', viewed 30 September 2015, from http://www.Saide.org.za/design-guide/.

Slattery, P., 2006, *Curriculum development in the postmodern era,* 2nd ed., Routledge, New York, NY and London.

Stanford, 2005, 'Stanford encyclopedia of philosophy: Hermeneutics', viewed 23 April 2016, from http://plato.stanford.edu/entries/hermeneutics/.

Subotzky, G. & Prinsloo, P., 2011, 'Enhancing student success in ODL: Unisa's integrated student success and support frameworks and strategies', presentation at the Nadeosa conference, 30 August 2011.

Welch, T. & Reed, Y. (eds), 2005, *Designing and delivering distance education: quality criteria and case studies from South Africa*, Nadeosa, Johannesburg.

Woolfolk, A., 2007, *Educational psychology,* 10th ed., Pearson, Boston, MA.

PROBLEM-BASED LEARNING IN TEACHER EDUCATION: AN ACTION RESEARCH PROJECT

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ABSTRACT

This paper argues that, although there is a worldwide move from face-to-face to distance education (DE) and open educational resources (OER) in teacher education, there is no guarantee that DE is able to lead to the development of appropriate teaching skills in student teachers. In the wake of the introduction of DE in teacher education at the Mauritius Institute of Education (MIE), a group of teacher educators at MIE have been questioning their own approaches to the teaching and learning process of teacher education. This questioning has encouraged them to revisit their own practices through the adoption of the problem-based learning (PBL) approach to deliver a module in an initial teacher education course. During the implementation of the PBL process, emphasis has been placed on the development of skills and the transformation of students from passive learners to active participants in their own learning. The teacher educators have investigated the implementation of PBL in their teaching through an action-research (AR) project. The research revealed that, when implemented using a face-to-face approach and cooperative learning, PBL was an effective tool in developing meaningful learning among student teachers. The researchers came to the conclusion that DE could have a role to play in the delivery of the theoretical component of teacher education. However, for the development of teaching skills, face-to-face sessions and PBL should be used as an effective tool to help student teachers acquire certain skills and hence help them become more efficient in their future role as teachers.

Keywords: *Problem-based learning, active learning, pedagogy, teaching strategies, teachers' beliefs, classroom practices, self-directed learning, meaningful learning, transformation.*

INTRODUCTION

Within the context of the worldwide demand for access to education and the increasing need for more qualified teachers in all sectors of education, the existing teacher education institutions are not able to meet the demand in many countries. Decision-makers have come to the conclusion that there is a need to adopt new strategies to respond to the high demand in the field of teacher education through the adoption of the distance education (DE) mode of delivery and the use of open educational resources (OERs).

The Mauritius Institute of Education (MIE), founded in 1979, is the only public teacher education institution in the Republic of Mauritius and has already started to move in this direction with some courses. Currently, there are calls and expectations for the MIE to evolve into a state-of-the-art organisation that is capable of providing different modes of teacher education to a larger audience through DE, including online and blended approaches.

It is widely recognised that DE and OER in the field of education provide a number of advantages for students, especially to vulnerable communities living in inaccessible areas, as DE provides larger numbers with access to education. However, in the minds of the authors of this paper and of other researchers (Kangai & Bukaliya, 2011; Hampton, 2002:84), there has always been a nagging question: "How effective is DE in teacher education, especially in the development of teaching skills?" To be more precise, the question was: "Is DE developing the "how to teach" in the classroom among student teachers?"

This question, and the context of change with the advent of DE as an alternative mode of operating in terms of teacher education at the MIE, has led to our reflecting on the effectiveness of the present pedagogical practices of teacher educators in the delivery of modules in teacher education. As a result of this reflection process, we decided to revisit and act on our own pedagogical approaches in the lecture rooms of the MIE. We wanted to experiment with a novel approach in the teaching and learning process of teacher education in Mauritius; that is problem-based learning (PBL). This process was investigated through action-research (AR).

This paper therefore focuses on the AR project that was carried out by a small group of teacher educators in the implementation of PBL in a module for student teachers in their initial professional development as primary school teachers. The project aimed at assessing the extent to which the PBL process was successful at

creating a learning environment that would lead to more meaningful learning for the student teachers.

This research is significant for us, the researchers, in that it allows us to question the current teaching and learning process in teacher education through the exploration of an essentially student-centred approach in a context where there is increasing pressure to adopt the DE mode of delivery because of systemic constraints. The intent was to develop insight into the teaching and learning process in higher education through an in-depth study of data obtained by means of a variety of tools. This research also allowed us to take stock of how our students learn in different situations, for example, through independent reading of the appropriate literature, through cooperative learning groups, through mini lectures and through scaffolding sessions. We were also able to evaluate how innovative they were in their classroom practices, as well as the limitations of that pedagogical venture.

RATIONALE

Our experience as teacher trainers and researchers involved in teacher education led us to believe that many teachers in Mauritius scarcely put the learning gained from the educational theories they encountered during their professional development into practice. Many teachers still stick to the traditional "chalk and talk" approach, although during their professional development, a considerable amount of time was spent on face-to-face sessions. This phenomenon is not particular to Mauritius, because, as Biggs argues: " …many students acquire knowledge in traditional programmes specifically for the purpose of passing examinations (Entwistle & Entwistle, 1997) and often only incidentally acquire the skill of putting knowledge to practical use." (Biggs,1999:207).

Furthermore, while several explanations can be given in the Mauritian context as to why teachers, in general, are unable to make the shift from traditional approaches to more innovative ones, there needs to be a deeper inquiry into teachers' classroom practices across the Mauritian education system. Therefore, in line with our main research question, this research seeks to investigate the teaching and learning process, through a PBL approach, of a teacher education programme, and also to analyse the extent to which PBL can be regarded as an effective tool in the development of more meaningful learning among student teachers.

Our endeavour, as a group of three lecturers, has therefore been to implement an alternative approach to the traditional lecture or face-to-face method in contact

sessions during the initial professional development programme for student teachers. Most of these students were school leavers. Some were university graduates, who had received their academic education in a system in which the traditional transmission model of learning was the norm. In the context of a 30-hour module, Pedagogy, a PBL approach was adopted for primary school student teachers. The aim of the teacher educators/researchers was to assess how far a change in the teaching and learning process during the professional development of student teachers could lead to a change in the quality of their learning experience. This would ultimately influence their own classroom practices. We believe that the findings of this research will lead to pertinent recommendations that will not only influence the face-to-face delivery of the module afterwards, but will also influence our experience as a whole, which could improve alternative modes of study such as DE delivery modes.

OBJECTIVE OF THE STUDY

This AR research study intends to analyse the extent to which the implementation of a specific pedagogical action (PBL) has helped to bridge the gap between theory and practice in teacher education. It also intends to assess the use of PBL as a teaching and learning tool to transform student teachers from passive recipients of educational theories and pedagogical principles into active, self-directed and reflexive learners who take ownership of their learning. The following sections highlight the research questions that guided the study.

Research questions

Main question:

How effective is the problem-based approach in developing more meaningful learning among student teachers?

Sub-questions:

- Will PBL, as an approach, be able to equip learners with the required strategies to take ownership of their learning or to become self-directed learners?
- Will student teachers have developed an in-depth understanding of the basic pedagogical concepts and principles?
- How far will PBL enhance teaching and learning activities in teacher education in general?
- How will PBL enhance the teaching and learning approaches of teacher educators?

LITERATURE REVIEW

Pedagogical innovation for effective learning in higher education is an approach that is becoming increasingly prevalent in institutions of higher learning, as educators are being encouraged to question the effectiveness of their teaching. Biggs (1999:54) argues that one facet of good teaching is "to encourage students to use a deep approach". The second facet of good teaching is to discourage students from using a surface approach. To do this, we need to identify any factors in our own teaching that might have this effect, and eliminate them".

The best way to identify these factors is to research the teaching and learning process. The most common research approach is AR.

Since its introduction in medical schools, PBL has also been applied in other fields, including in teacher education, by some individual teachers or universities (as cited in De Simone, 2014), such as Barrows and Tamblyn (1980), Gijbels, Dochy, Van den Bossche and Segers (2005), Walker and Leary (2009), Derry, Hmelo-Silver, Nagaran, Chernobilsky and Beitzel (2006), Hmelo-Silver (2000), McPhee (2002), Derry et al. (2006) and Hmelo-Silver et al. (2009). Therefore, much of the research comes from the medical schools. A few studies are found in other fields.

According to Gallagher and Gallagher (2013:112), the majority of research in PBL pursues two lines of inquiry: "The first line of inquiry investigates whether students in PBL classrooms learn as much as students in classrooms with traditional instruction. The second line of inquiry investigates whether students can learn discrete learning skills through a PBL curriculum."

This paper adopts both lines of inquiry, but has the added advantage of investigating how the use of PBL impacts on the teacher educator's practice.

The effectiveness of the use of PBL in the teaching and learning process has been confirmed by a number of researchers (Faessler et al., 2006; Hmelo-Silver, 2004; MacKinnon, 1999; Maxwell et al., 2001). According to the research findings, PBL seems to motivate students to engage in their learning with more enthusiasm and to achieve deep learning. The evidence from research conducted in and outside the medical fields suggests that PBL is an instructional approach that offers the potential to help students develop a flexible understanding and lifelong learning skills (Hmelo-Silver, 2004).

PBL and adult learning

Implementing PBL among student teachers involves dealing with adult learners. According to Knowles (1980), life experience is a rich resource for learning. For adults to learn, conditions should not be exactly the same as those used in a learning model or pedagogies for children.

There is therefore a need in teacher education to create an adult-friendly and supportive environment, with mutual planning and setting of tasks, as well as the use of learning contracts and experiential techniques. We can describe our venture in adopting a PBL approach as a step towards creating an adult-friendly environment.

Models of instruction for adults are essentially founded on an adult's ability to develop intrinsic motivation, and autonomous and self-directed learning approaches (Knowles, 1980); this is also the basis of the DE philosophy. That is why DE is increasingly being adopted as a mode of delivery in teacher education.

In fact, the literature reviewed shows that PBL (the teaching approach adopted in this research study) can be adapted for use with students in higher education who are studying through DE. Findings highlight issues on how to make learning more effective and successful, how to make it interactive, how to address students' needs, how to provide support to students to shift to this mode of delivery, how to support student teachers' needs with the use of technology, and how to work with the student teacher and other partners in the team, such as editors, designers, producers, technicians, media specialists and others through whom communication is mediated. Other issues related to the implementation of PBL through DE concern effective strategies to develop appropriate methods of feedback and reinforcement, optimising content and pace, and adapting to different student learning styles (Sherry, 1996).

However, several researchers have addressed issues related to adult education in relation to DE prior to making such statements. Peters (1988), for instance, strongly questions the relevance of adult learning models to a distance mode and draws our attention to the process of individualisation versus an "industrial model". Other researchers, such as Bullen (1995), have also questioned the challenges experienced when individualisation or interaction is lost at the expense of mass production, which can be economically wise, but which does not necessarily support adult learning approaches. Both Peters (1988) and Bullen (1995) then consider it

essential to assess the feasibility and transfer of learning in DE modes of delivery, which can weigh heavily on credibility and standards: "Careful consideration must also be given to implications…for the academic credibility of distance education courses…an across the board approach is not likely to be politically acceptable." (Bullen, 1995:5).

While we have not adopted a DE mode of delivery in our attempt to review the approach to teaching in a teacher education institution, this does not mean that we reject DE as a mode of delivery; we believe that part of the teaching experiment could have been carried out in DE, that is, we could have adopted a blended mode. Our main concern was the development of skills through PBL in a learning environment geared towards adult learning, and considering this as an essential shift from approaches that represented spoon-feeding to autonomous adult learning in a teacher training institution.

We also viewed this research through a transformative paradigm (Mezirow, 1981; 1994; 1997). Transformational learning has been defined as learning that induces more far-reaching change in the learner than other kinds of learning, especially learning experiences that shape the learner and produce a significant impact or paradigm shift, which affects the learner's subsequent experiences (Clark, 1993). We draw from this the fact that the transformation that occurs in student teachers, as the result of the adoption of an alternative approach to teaching and learning, can in effect provoke a change even in an adult learner. This is in line with the view of Mezirow(1994), who posits that transformative learning occurs when adults engage in activities that cause or allow them to see something from a different perspective, and which can cause a shift when integrated into an adult perspective. The transformation may be small or large, and can impact on the adult learner's life, either initially or in time.

An important aspect of this research is its impact on the teacher educators who are also the researchers. A current trend in teacher education is the pressure on the teacher educator to move from being a "teacher" to also being a "researcher", that is, a reflective practitioner. Hökkäa, Eteläpeltoa and Rasku-Puttonenb (2012) mention the "tensions in the work of teacher educators, who are increasingly required to redefine their professional identity, moving away from the traditional identity of "me as teacher" towards that of "me as researcher" (Cochran-Smith 2005; Murray 2007).

RESEARCH METHODOLOGY

This research lies within the qualitative paradigm. The core of the research approach is that AR is the most appropriate method of researching the effectiveness of the implementation of PBL as a teaching and learning approach in teacher education. AR offers a systematic approach to introducing innovations in teaching and learning in higher education. It puts the tutors or trainees in the dual role of both a producer of educational theory and a user of that theory to reflect and improve practice. It is an interesting way of producing knowledge about teaching and learning in higher education, and serves as a powerful way of improving learning and teaching practices in teacher education.

PROJECT IMPLEMENTATION AND MANAGEMENT PLAN

Implementing PBL and its impact on student teachers, as well as on teacher educators

The challenge for the teacher educators involved in this research was to plan the setting up of both the PBL experience for the students and the AR, which meant that both processes had to be planned concurrently.

Designing the environment

The student teachers were introduced to the PBL environment in which they would have to direct their own learning with the help of selected tasks along a structured route by means of the guided questions. Through this process, they would have to accomplish their learning tasks with a degree of autonomy.

Due to time constraints, only two problems or "triggers" could be proposed. These were, in fact, the brief case scenario of teaching and learning instances. The problems or triggers for the PBL process were crafted to address the dissonance between the philosophy of teacher education and traditional classroom practices in Mauritian primary schools.

Before embarking on the PBL process, student teachers were prepared to work collaboratively as a group and to identify the learning strategies they needed to develop. There was a film-viewing session on cooperative learning or lesson planning. This preparation was important, as our students were not accustomed to cooperative learning. Nevertheless, group work is an essential aspect of PBL, as it helps to develop learning communities.

The following steps were planned and implemented for each trigger:

- Copies of the trigger were distributed to students (an example of a trigger or problem is included in the appendix at the end of this paper).
- Learning resources (hard and soft copies) were distributed. Students were also directed towards certain websites that contained pedagogical content knowledge.
- Students participated in group work to discuss the first trigger and to develop their understanding of the problem. They were assisted in this task by the guiding and thought-provoking questions that accompanied the triggers. Students were also scaffolded by the teacher educators, who acted as facilitators.
- Each group delivered group presentations to the whole class on their understanding of the problem and the pedagogical implications. This was followed by feedback from the teacher educators.
- Each group submitted written work on the trigger.
- Teacher educators provided feedback.

The AR data-gathering process

The PBL approach was first implemented during the second semester of 2014. Although the approach continued to be implemented during subsequent semesters, this paper only reports on the experiment during this second semester.

Target group of students: Teacher's Diploma Primary 2013–2015

Cycle 1

Trigger 1 was implemented in this cycle. Data was obtained by evaluating the dynamics of the group work through observation and a checklist. Other types of evaluation included oral presentations by each group, and the written work submitted by each group. Each member of each group undertook self-evaluation. Data was also obtained through weekly meetings between the teacher educators, which included discussion and sharing.

Cycle 2

After reflecting on Cycle 1 by analysing the data obtained during that cycle, the teacher educators crafted Trigger 2 and distributed it to the students. The same process used in the first cycle was followed, data was gathered and reflection took place.

Cycle 3

Data from the second cycle was analysed and questions were crafted to be used to interview a group of students. All students were invited to participate in group interviews, but only a small number responded. The researchers met several times to discuss and reflect on the whole PBL process. This included issues that came up during the implementation of PBL and the AR.

The AR process (description and analysis)

Cycle 1

Cycle 1 related to a problem (Trigger 1) that resonated with the reality of the primary school classroom. The problem addressed related to questions and issues based on a traditional teacher-centred approach to teaching and the need to shift to more constructivist perspectives. Copies of the first trigger or problem were distributed to all groups. At a later stage, they were provided with the questions to trigger thinking and guide a discussion at both an individual and a group level through the PBL approach.

Slowly, student teachers became more actively engaged with background readings (CDs with readings, reading materials and a few handouts, additional links and references to internet sources) in an effort to make sense of underlying issues in the trigger. In the process, they developed a higher level of cooperation and collaboration.

This phase was dominated by some group organisational challenges in terms of role allocation and individual accountability. Gradually, it was observed that the process allowed students to demonstrate tolerance towards each other, learn to work in groups, and listen to and negotiate points of views. Some students demonstrated a lack of confidence when others dominated the group, while others were afraid to voice their views.

Cycle 1 was a determining start to PBL and students experienced both a sense of motivation (Barrows, 1996) and some difficulties inherent to this process. It meant that they had to adapt to a new learning environment (learning in groups and using the PBL approach), while traditional teaching and learning had previously dominated their experience of education.

The student teachers initially found it challenging to tackle the tasks, as they were responsible for their learning. They had to organise the roles of each group member

in terms of oral presentations, group research, discussion and written tasks. Although this was challenging at the start, we found that this mechanism quickly led to a means of revisiting the way they would be engaging in the learning process.

Some students found this experience to be “noisy”, “time-consuming” or “tedious”, as they had to answer their own questions and research the answers through readings. At this stage, they had little understanding of how to organise themselves, while some groups took the lead and became proactive, offering suggestions. Other groups found themselves still struggling after several weeks, as a lot of social and teamwork skills were necessary for PBL.

During group presentation of their work, students demonstrated some knowledge and understanding of the pedagogical concepts, but this was superficial. Variations in trainees’ grasp of some core concepts surfaced between groups. Many trainees included too many theoretical details in their presentations, lost the focus of the main argument, and failed to illustrate how these details were meaningful to practice in the primary school. At this early stage in the PBL process, it appeared that learners’ focus was more on reading and gathering maximum information.

Gaps in understanding and misunderstanding some pedagogical ideas and concepts were noted in the group discussions; these were addressed through guided discussions by teacher educators in their new roles as coaches and facilitators. This resulted in further probing by trainees to clarify issues and concepts.

During the oral presentation of their findings, the teacher educators realised that the student teachers were in need of additional support or scaffolding if they wished the experiment to be successful. Barrows (1986) also argues that a lack of adequate support will affect the effectiveness of PBL as a strategy. Thus, additional support was provided in the form of mini lectures, coaching and clarification of misconceptions. Advice was given to guide the groups towards more research when it was felt that this was needed. All these measures acted to organise the students’ study efforts (Van Berkel et al., 2001).

As a result, their written coursework demonstrated an improved level of understanding of the concepts and constructs. It was noted that there appreciable attempts were made to integrate the background reading into the explanations of some issues. However, it was observed that students’ responses were broad and focused on reproducing the knowledge gained from the readings. This was reflected in their coursework. However, their writing remained at the descriptive level and little critical

thinking was demonstrated. Trainees failed to apply a theoretical explanation to guide their analysis and to make suggestions to improve the teaching process. The level of argumentation was inadequate, and explanations and analyses remained superficial. These findings supported the crafting and organisation of Trigger 2 some weeks later.

Cycle 2

The teacher educators crafted a new problem (Trigger 2) (see the appendix). This focused on issues related to instructional planning using the constructivist approach and on issues related to "differentiated instruction". The aim of presenting this trigger was to allow students to become more critical about teaching and learning in a primary school, and to develop core skills, such as lesson planning and selecting appropriate teaching strategies.

At this stage, the learners' experience of PBL progressed in a number of ways and they were more motivated (Barrows, 1996). The oral presentations improved significantly, as they had already negotiated some basic organisational issues during the first phase (such as a working relationship with peers). As a result of this improved organisation, and some earlier readings for the first trigger, they could interpret a number of concepts the researchers saw them discussing and infusing in the presentations.

Trainees doubled their efforts to address some of their weaknesses, which had transpired from the learning process with Trigger 1. For this stage of the learning process, the students demonstrated a willingness to take ownership of their learning, and they became actively engaged in the learning process.

The students' presentations indicated that some had also begun to read more materials than those found on the CD and the recommended readings provided to them, and they made plans to meet outside the lecture room to discuss the trigger. This stage necessitated fewer interventions from the tutors to direct the group tasks, as the trainees began to own the learning process.

It was generally observed that the trainees were striving harder to analyse issues emerging from Trigger 2. Different groups became more actively engaged in the co-construction of knowledge and developed the skills that were required to elaborate on lesson plans, while also catering for diversity among learners.

According to the feedback obtained from student teachers' reflections on the module, their active participation was stimulated by reading the learning resources provided and those accessed on the internet. As a result, their construction of knowledge and understanding through group discussions and the sharing of ideas on new concepts were richer. The clashes that occurred during the early stages of group work diminished as students made an effort to consider the different viewpoints. This resulted in greater consensus between group members.

Evidence of deep learning was apparent during the oral presentations. Students, in their respective groups, demonstrated a greater in-depth understanding of the pedagogical concepts and constructs linked to lesson planning as they integrated information from their background reading into the presentation of a lesson plan and the subsequent arguments.

Their oral presentations were also characterised by poise, better communication skills, confidence and critical thinking as they challenged each other's views and grew comfortable with the process. However, one major challenge that was experienced at this stage was that many students were still unsure about how to relate theory to practice. The trainees' beliefs about teaching and learning still seemed to be influenced by the traditional teaching methods used at school. This was observed in their presentation of a lesson plan on differentiated instruction. The structure of the lesson plans, though adequately grasped, needed improvement and discussion. Even if the underlying philosophy of teacher training was an inductive constructivist one, their lesson planning reflected more of a behaviourist and deductive approach, although some attempts were made to shift towards a more learner-centered approach. There seemed to be a problem at the level of transfer of learning.

Therefore, the teacher educators had to trigger prompts to provoke more thinking. As with Trigger 1, additional scaffolding, coaching and mini lectures were needed to provide support to student teachers, especially when designing a more constructivist lesson plan (Van Berkel & Schmidt, 2001). The last phase of the cycle was the submission and marking of the written assignment. The newly redesigned lesson plans showed a transfer of learning in the lesson planning process, though more in-depth knowledge and practice were necessary to develop skills for differentiated lesson plans.

Cycle 3

For this cycle, data was obtained through interviews and focused group discussions after students had gone through a period of school-based experience, where they were given an opportunity to teach. Responses obtained show a high degree of enthusiasm among trainees about their teaching experience and the successful implementation of the strategies and methods learned during training. Most students seemed to associate their success in the classroom with their learning experience on the PBL process.

According to the student teachers, they were challenged in their assumptions and representation of teaching at the primary school level by working on the PBL problems that they confirmed triggered a lot of thinking on the issues underlying teaching and learning from both a traditional and a constructivist perspective. They went through their practicum experience with an improved understanding of the Mauritian school context (Savery & Duffy, 2001).

Many of the student teachers confirmed "an increase in our knowledge…and our lesson plan grew better and better", and that some of the pedagogical knowledge acquired was done "through readings" and "during the group discussions". It would seem that these pedagogical gains were infused in some of their classroom practices during the practicum. Students confirmed that they were able to implement some constructivist teaching methods, such as brainstorming, group work and activity-based learning experiences that were devised to arouse their pupils' interests – even if the current teaching context remained traditional. This situation has been highlighted by Rendas, Fonseca and Pinto (2006).

The practicum seemed to have provided the student teachers with an opportunity to test some of their newly acquired knowledge of some teaching strategies. Taking a hindsight position, they felt they had become more critical thinkers; some were even making fun of the class teachers' deductive approach to teaching (De West & Walker, 2013). Such changes in practice pointed to the possibility that using the PBL approach during professional development made learning more meaningful for the student teachers – so much so that it helped foster meaningful change in the trainees' classroom practices.

Time taken to implement PBL led the teacher educators to be realistic, and we decided to restrict ourselves to two triggers instead of three to make room for deeper

learning, both individually and in a group. The implementation of PBL kept all the educators very busy, as the process involved monitoring group work, scaffolding student activities, observing group work, administering different evaluation checklists and time management.

The PBL process also involved a lot of teamwork and collaborative teaching among the teacher educators, as they visited each other's classes.

PBL in teacher education: discussion on emerging issues

A number of issues emerged from the process of implementing PBL in teaching the Pedagogy module in the initial professional development programme of primary school student teachers in Mauritius.

Meaningful learning of pedagogical concepts and practices

Coming from a tradition of teaching that represented "spoon-feeding" from their schooling experiences and lectures or discussions during their professional development, student teachers were confronted with a teaching and learning process that was characterised by non-frontal teaching to self-directed learning. They were expected to own the learning process (Knowles, 1975).

The PBL experiment seems to have resulted in the student teachers being able to learn about and master a number of pedagogical concepts and constructs through self-directed learning, especially through cooperative learning, with some scaffolding from the teacher educators, as testified to by the students themselves:

"We came across a lot of teaching concepts, such as cooperative leaning, how to explain, communication skills, discovering learning, brain-based learning, role plays and questioning...scaffolding…personally I think I've learnt a lot from PBL to be an effective teacher and I look forward to put my acquired knowledge into practice for the best use."

Other trainees emphasised the importance of their independent reading:

"…through readings we were able to increase our knowledge and afterwards apply it in our work."

"…*went through several textbooks to have an understanding of various concepts for writing a lesson plan*."

It must also be pointed out that not all students achieved the same degree of mastery.

The process allowed students to take ownership of their learning and to become actively involved in the construction of pedagogical knowledge, as testified to by one student:

> "*Discovery has taken place...it is true that sometimes, due to lots of assignments, we don't have the time to go and do research work at home, but as it was part of our homework, we have done it and it has been of great help to me – the research work …" (interview)*

At the same time, student teachers seemed to have become aware of their personal growth (Maurer & Neuhold, 2012), as evidenced by these excerpts from the interviews:

> *"We've progressed a lot in terms of knowledge and contribution to work and distribution of work"*
>
> *"Our lesson plan grew better and better each time.*"

The learning process

The learning process through cooperative learning for the student teachers was effective in creating learning possibilities. The students became more meaningfully and deeply engaged in the process of learning by working cooperatively. The positive effects of teamwork were observed by the teacher educators, and were testified to in trainees' feedback:

> *"I have developed social skills, listening more to my friends and encouraging one another…developed team spirit… can now work better in groups…self-development …" (trainee feedback).*

All individuals in each group evaluated themselves positively in terms of the social skills required to function in groups (listening, taking turns, contribution to discussion, quiet voice, reach consensus and valuing each other's ideas).

Team spirit and teamwork were revealed through the students' verbal and non-verbal language. They could increasingly relate to each other's views and were capable of being reflective and critical, and of challenging each other in their

understanding and presentation of their work, instead of being passive (Thomas, 2000). Student teachers' acceptance to take responsibility for their personal growth led them to further develop their social skills as they explained how they shared information to complete their assignments and how this helped in their personal growth (McPhee, 2002) and by doing so, they showed they could move away from the "spoon-feeding" mode to a self-study and team approach.

> "*We met several times through Skype and phones and mails and did corrections…" (student teacher: feedback questionnaire)*
>
> "*We've developed many competencies on teamwork, leadership skills, cooperation, collaboration and socialisation*" *(student teacher: feedback questionnaire)*

Self-evaluation by each member of each group showed that students were taking a critical and reflexive stance (De Jong, Cullity, Haig, Sharp, Spiers & Wren, 2011) regarding the different triggers as they began to take ownership of the learning process.

Our analysis of the process also led us to conclude that student teachers increasingly demonstrated a willingness to question themselves through the self-evaluation process, and they admit that the reflective nature of the tasks "made us reflect on what kind of teachers we want to become…"

Challenge to student teachers' beliefs and representations of local primary education

Both problems crafted by the teacher educators to allow the students to develop their knowledge and understanding of pedagogical concepts and constructs also created a disposition (to a certain extent) in student teachers to question traditional practices in Mauritian primary schools. Having themselves been educated in the context of the traditional transmission model of teaching, they initially thought that that model was the "best". Working on those PBL triggers created an awareness among the students of their assumptions and representations of teaching at primary school level, as evidenced by the following reflection on the coursework:

> "*PBL has indeed helped me to be aware of the real situations or problems actually existing in primary schools and how these can be tackled. I have been able to identify what teaching skills I must acquire to became an effective teacher through PBL…I have developed my interpersonal and communication skills…how a teacher must behave with his pupils in different circumstances."*

At the end of Cycle 2, and during the interviews, we obtained a lot of evidence that the student teachers had a tendency to shift to a more constructivist approach in their construction of the teaching and learning process, especially in the specimen lesson plans that they produced. This may be evidence that there has been a transfer of learning.

Schön (1983) suggests that, in order to allow for reflective practitioners to develop their potential, confrontation with problems is necessary, as it necessitates that learners confront "hunches" to guide their new experiments and develop further reflection. PBL has influenced student teachers in different ways, causing them to review and negotiate their understanding of traditional ways of teaching at primary school level with an approach for self-direction as the process demanded.

This process will inevitably have an impact on their present and future professional development.

Professional growth for teacher educators

The research also provided an opportunity for continuing professional development (CPD) for the teacher educators. The whole process led to their professional growth through reflexivity and an improved understanding of adult learning, while giving the teacher educators the opportunity to take stock of the problems inherent to this new approach to teaching.

In a study conducted by Dolmans et al. (2002), the authors elaborate on how subject area expert tutors tend to focus more on subject matter expertise in a PBL approach, while non-content expert tutors focus more on process facilitation to direct group dynamics. In our case, given that the module taught was non-subject-oriented and predominantly process-oriented, we observed a number of benefits as we experienced the process of encouraging self-directed learning.

The process of interaction was rich, in that we had regular formal and informal meetings. We were prompted by the "newness" of this collaborative endeavour to investigate further and improve each trigger, and discussed our observations and reflections after each interaction and during each cycle. This demanded additional effort and time for planning, as were brought to challenge our assumptions, anticipate new challenges, and report on the team and individual experiences (Barrows, 1986; Pagander & Read, 2014).

The study also influenced our posture as insider researchers (Corbin & Buckle, 2009). For instance, these were our classes and each of us served a dual role as teacher educator and researcher at the same time. We were conducting research in the context with which we were very familiar.

Shifting from one role to the other was problematic and stressful. In the beginning, it was particularly difficult for all three tutors to report in a dispassionate way about the AR. We needed to practice distancing ourselves from the experiences of our respective classes. This is where the approach suggested by Drake (2010) (bracketing our understanding prior to analysis) became important as a process of distancing oneself from the action and research areas. In our case, this process necessitated team moderation, provocation and conflicts throughout the cycles as necessary processes that allowed the data analysis to be meaningful, dispassionate and interpretive for research.

As researchers, we then had to shift from being a reflective practitioner (Schön, 1983) and facilitator in class to thinking deeply about how this process was influencing student teachers and their practice. The overall process thus endowed us with greater tolerance, interpersonal knowledge and insight into the module. The process was also demanding and stressful as, in spite of the planning, we felt constrained by the 30 hours of face-to-face sessions in class, and we often found ourselves negotiating for more slots to advance. Our common understanding of AR using PBL with student teachers as a team initiative was, in itself, a learning process, and was sharpened by the constant process of discussions, implementation and reflection over the cycles. This is in line with what Dolmans et al. (2002) suggest, i.e. that tutors focus more on making the process geared towards self-direction and independence for the learner.

This study allowed us to reflect on another aspect of this module, in particular with regard to the teaching modality, which has traditionally been a face-to-face approach. While a considerable amount of time and energy was spent on the mounting of PBL through an AR project with a focus on the traditional face-to-face approach, we believe we would have to put in greater efforts if this module were to be written or taught through a DE mode. For instance, it would be essential not only to invest in the additional training of staff members, but also to consolidate a practical school-based component within this experience so that trainees could integrate the PBL experiences and triggers, and link these to their learning journey.

CONCLUSION

We started our argument by explaining that we had embarked on a pedagogical project of changing our approach in a specific module of teacher education through a PBL approach by changing the mode of the delivery of courses in teacher education, that is, a move towards DE and OER.

Initially, we were mainly thinking of improving the quality of learning for our students, ensuring that they found the learning to be meaningful and that they went through some sort of transformation from being passive recipients of knowledge to active participants in their own learning. To a certain extent, we were successful in achieving our aims. At the same time, we were able to reflect on the different strategies and methods we adopted to achieve our aims.

During this PBL process, students learned through a variety of modes. They learned through independent reading of the literature on pedagogy from hand-outs distributed by the teacher educators, CDs on the subject, internet materials that, although not really DE materials or OERs, permitted them to develop their knowledge and understanding of different pedagogical concepts, theories and constructs. However, the research revealed that the students needed other aspects of the learning process – the cooperative learning sessions and the scaffolding from the teacher educators –to achieve in-depth learning of the main pedagogical principles, teaching strategies and support processes that may not be in place in many DE programmes. At the same time, student teachers seemed to have come to a better understanding of their role in the teaching and learning process through the PBL process. We were able to observe their transformation from traditionally passive learners into active participants in their learning and the development of their social skills during cooperative learning sessions. Student teachers demonstrated the disposition to be more innovative and inventive in their teaching strategies and

seemed to have understood that they have to resist the pressure in schools to be conventional and traditional in their approach to teaching. At the same time, we witnessed them develop a reflective stance towards education in general, as well as towards the Mauritian education system with its generally traditional classrooms.

All this goes to suggest that, in initial teacher education programmes, student teachers need considerable pedagogical support in terms of the enactment of classroom practices. Teaching involves a number of skills that enable the management of the teaching and learning process in a real classroom situation. It is not easy for the transfer of learning in terms of skills to occur only through reading, understanding and reflecting on the literature, as usually occurs in DE. These teaching skills can only be learned in face-to-face sessions and classroom situations. That is why we are advocating a mixed mode of delivery in teacher education: DE for the theoretical part; face-to-face with more of a PBL approach (so that contact sessions model good practice and are not used to transmit content); and immersion in the school and classroom situation (where teachers need to be able to transfer the theoretical knowledge they have gained from the literature and the experiential learning from the carefully scaffolded face-to-face contact sessions into the dynamic reality of real-life classrooms).

Furthermore, while the use of the PBL approach traditionally taught in a face-to-face manner has been widely researched in trying to understand how learning is enhanced, further investigation is needed to understand its implications in a DE mode. This research can therefore serve as leverage to evaluate the potential areas applicable for such study. A further study will be required to make recommendations about the inclusion of a DE mode in the PBL process.

It is hoped that this research will spearhead a campaign to transform outmoded approaches to teaching and learning in teacher education as we evolve towards alternative approaches to face-to-face delivery.

REFERENCES

Barrows, H.S., 1986, 'A taxonomy of problem-based learning methods', *Medical Education* 20(6), 481–486.

Barrows, H., 1996, 'Problem-based learning in higher education', *New Directions for Teaching and Learning* 68, 3–12.

Biggs, J., 1999, *Teaching for quality learning at university,* Open University Press, New York, NY.

Bullen, M., 1995, 'Andragogy and university distance education', paper presented at the 7th Conference of the International Council for Distance Education, Birmingham, viewed from http://www2.cstudies.ubc.caJ~bul1en/bullenl.htmi.

Clark, M.C., 1993, *Transformational learning. New directions for adult and continuing education.*

Cowan, J., 1999, *On becoming an innovative university teacher*, Open University Press, New York, NY.

Corbin, D.S. & Buckle, J., 2009, 'The space between: on being an insider-outsider in qualitative research', *International Journal of Qualitative Methods* 8(1).

De Jong, T., Cullity, M., Haig, Y., Sharp, S., Spiers, S. & Wren, J., 2011, 'Enabling group-based learning in teacher education: a case study of student experience', *Australian Journal of Teacher Education* 36(5).

De Simone, C., 2014, 'Problem-based learning in teacher education: trajectories of change', *International Journal of Humanities and Social Science* 4(12).

De West, L. & Walker, S., 2013, 'Student perceptions of problem-based learning: a case study of undergraduate applied agrometeorology', *ISRN Education*, Article ID 982942, viewed from http://dx.doi.org/10.1155/2013/982942.

Dolmans, D., Gijselaers, W., Moust, J.S., De Grave, W., Wolfhagen, I. & Van der Vleuten, C., 2002, 'Trends in research on the tutor in problem-based learning: conclusions and implications for educational practice and research', *Medical Teacher* 24(2).

Drake, P., 2010, 'Grasping at methodological understanding: a cautionary from insider research', *International Journal of Research and Method in Education* 33(1), 85–99.

Faessler, L., Hinterberger, H., Dahinden, M. & Wyss, M., 2006, 'Evaluating student motivation in constructivistic, problem-based introductory computer science courses', in T. Reeves & S. Yamashita (eds), *Proceedings of World Conference on e-learning in Corporate, Government Healthcare and Higher Education*.

Fang, Z., 1996, 'A review of research on teacher beliefs and practices', *Educational Research* 38(1), 47–64.

Gallagher S.A. & Gallagher J., 2013, 'Using problem-based learning to explore unseen academic potential interdisciplinary', *Journal of Problem-based Learning* 7(1), 9.

Hampton, C., 2002, 'Teaching practical skills', in A.K. Mishra & J. Bartram, *Skills development through distance education,* Commonwealth of Learning, Vancouver.

Hmelo-Silver, C.C., 2004, 'Problem-based learning: what and how do students learn?', *Educational Psychology Review* 16(3).

Hökkäa, P., Eteläpeltoa, A. & Rasku-Puttonenb, H., 2012, 'The professional agency of teacher educators amid academic discourses', *Journal of Education for Teaching* 38(1), 83–102.

Jones, B., Epler, M.C., Mokri, P. & Pareti M.C., 2013, 'The effects of a collaborative problem-based learning experience on students' motivation in engineering capstone courses', *Interdisciplinary Journal of Problem-based Learning* 7(1), 2.

Kangai, C. & Bukaliya, R., 2011, 'Teacher development through open and distance learning: the case for Zimbabwe', *International Journal on New Trends in Education and their Implications* 2, 113, ISSN 1309–6249.

Knowles, M.S., 1975, *Self-directed learning. A guide for learners and teachers*, PrenticeHall/Cambridge, Englewood Cliffs, NJ.

Knowles, M., 1980, *The modern practice of adult education: from andragogy to pedagogy,* Associated, Chicago, IL.

Maurer, H. & Neuhold, C., 2012, 'Problems everywhere? Strengths and challenges of problem-based learning approach in European studies', paper prepared for the Higher Education Academy Social Science Conference, Ways of Knowing, Ways of Learning, Liverpool, 28–29 May 2012.

MacKinnon, M.M., 1999, 'Core elements of student motivation in problem-based learning', *New Directions for Teaching and Learning* 78, Jossey-Bass, San Francisco, CA.

Maxwell, N. L., Bellisimo, Y. & Mergendoller, J. R., 2001, 'Problem-based learning: modifying the medical school model for teaching high school economics', *Social Studies* 92(2), 73–78.

Merizow, J., 1981, '*A critical theory of adult learning and education', Adult Education* 32 (1981), 3-23.

Mezirow, J., 1994, *Transformative learning theory understanding and promoting transformation learning: a guide for educators of adult,* pp. 252, Jossey-Bass, San Francisco, CA.

Merizow, J.,1997*, Transformative learning: theory to practice. New directions for adult and continuing education.*

McPhee, A.D., 2002, 'Problem-based learning in initial teacher education: taking the agenda forward', *Journal of Educational Enquiry* 3(1).

Michael, J., 2001, 'In pursuit of meaningful learning', *Advances in Physiology Education* 25(3), 145–158.

Pagander, L. & Read, J., 2014, 'Is problem-based learning (PBL) an effective teaching method? A study based on existing research', Institutionen för Kultur och Kommunikation, Linköpings Universitet.

Peters, O., 1988, 'Andragogy as a relational construct', *Adult Education Quarterly* 38(3), 160–181.

Rendas, A.B., Fonseca, M. & Pinto, P.R., 2006, 'Toward meaningful learning in undergraduate medical education using concept maps in a PBL pathophysiology course', *Advances in Physiology Education* 30(1), 23–29, DOI:10.1152/advan.00036.2005.

Savery, J.R. & Duffy, T.M., 2001, *PBL: an instructional model and its constructivist framework*, CRLT Technical Report, No 16-01.

Schön, D.A., 1983, *The reflective practitioner – how professionals think in action,* Basic Books, New York, NY.

Sherry, L., 1996, 'Issues in distance learning', *International Journal of Educational Telecommunications* 1(4), 337–365.

Singaram, V.S., Van der Vleuten, C.P.M., Stevens, F. & Dolmans, D.H.J.M., 2011, '"For most of us Africans, we don't just speak": a qualitative investigation into collaborative heterogeneous PBL group learning', *Advances in Health Sciences Education* 16(3), 297–310, viewed from http://doi.org/10.1007/s10459-010-9262-3.

Thomas, J.W., 2000, 'A review of research on project-based learning', viewed from http://www.ri.net/middletown/mef/linksresources/documents/researchreviewPBL_070226.pdf.

Van Berkel, H.J.M. & Schmidt, H.G., 2001, 'The role of lectures in problem-based learning', paper presented at the Annual Meeting of the American Educational Research Association, Seattle, WA, 10 April 2014.

APPENDIX

Trigger 2

Tina is a primary school teacher with ten years' teaching experience. Every day she has to present her lesson plans/notes to the DHM who will vet and sign the copy book in which her notes are written. Tina used to write elaborate and detailed lesson pans just after she left her teacher training institution, the Mauritius Institute of Education; but after a few years, she started to adopt the same practice as other teachers of long experience – her lesson plans were reduced to a few lines, as in the following example:

English for 24 March 2014 Lesson 7: p.27–28 The Story of the Little Red Hen Teaching the Future Tense C.W. p.28 No 1–5

Tina does not mention the teaching strategies she is going to adopt in order to teach the lesson. Her class consists of 23 pupils of varying abilities, background and interests.

Questions to trigger reflection on Trigger 2:

Main questions/diagnostic	Possibilities? Solutions-driven
• How much does the example of lesson planning given above resemble what you have observed during your school-based experience?	• Produce an elaborate lesson plan for a lesson of your choice in a subject area of your choice. • Explain the importance of lesson planning.
• What are the teaching strategies commonly used by teachers in Mauritian primary schools?	• Identify and explain the importance of teaching strategies that promote active learning and are related to constructivism.
• Do teachers usually cater for the different needs of students?	• Explain differentiation. • Plan a differentiated lesson.

EMBRACING NEW TECHNOLOGY TO ENHANCE TEACHING AND LEARNING FOR SCHOOL LEARNERS

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ABSTRACT

Teaching is under the microscope in terms of delivering quality learning to students in the classroom. New technological tools, such as simulations that extend the understanding of physics concepts, laser discs, video tapes, CDs, computer analysis of digitised videos and presentation software have made their way into the school arena. The new technologies at a teacher's disposal add value to the teaching experience and improve the quality of the teaching service provided. From a basic marketing and public relations perspective, when a school looks to improve its quality of teaching, it should look at the learners' needs in terms of teaching and learning. Learners of today are technologically advanced, since they live in the digital age. Teachers can therefore embrace technology tools that can help facilitate the learning process in the classroom. Since learners enjoy interacting with their cell phones, computers and tablets, teachers today need to use these technology tools for teaching, where possible. New technologies should therefore enhance classroom teaching and learning. In this paper, a literary review of various theorists' views is explored. The research is qualitative in nature and is based on understanding the different approaches taken by different countries and theorists on the subject of adopting new technology in the classroom. By looking in the literature at the various studies undertaken, the pros and cons for embracing new classroom technologies for Africa are examined.

Keywords: *Technology, teaching, learners, students, schools*

INTRODUCTION

We live in the age of computers. Technology has bridged all areas of society, from government to large corporate entities, civil society and education. Technology has changed the classroom dynamics. Traditional instruction in a classroom takes place in a fixed space, while e-learning transcends boundaries and is designed and formatted in a more open and flexible manner. E-learning is remarkable in that the learner can access classroom material at work, at the gym, in the park or in his or her own bedroom. Change is part of teaching, whether it is teaching at school, within Africa or in the world at large. New technology is part of this change. As a teacher, one needs to come to terms with change and embrace it, as technological developments will no doubt play a crucial role in education in the future. Technology can change the teaching experience, introduce a wider variety of learning styles and ensure faster marking of scripts in certain instances. New technology is thus a valuable tool in classroom education that can be used by teachers in Africa. If it can enhance the quality of education, as many theorists advocate, then African teachers need to be trained to use these new technologies in their classrooms.

In the discussion that follows, various themes are put forward for discussion in terms of technology in education, with specific reference to schools. Technology in classrooms in Africa will also be looked at specifically.

LITERATURE REVIEW

Lim, Zhao, Tondeur, Chai and Tsai (2013) argue that schools are under pressure from the media, the public at large and government to ensure that technology is used for teaching and learning. These advocates of using technology in schools believe that students' learning outcomes are enhanced by the considerable magnitude of investment in technology. Bhattacharya and Richards (2001) are of the opinion that teachers need to transcend traditional approaches and become acquainted with new methods of teaching in order to get a clear understanding of the educational functionality of technological tools in their educational practices.

In the literature that was reviewed, various themes, theories and perceptions were explored. The researcher identified two important theories that formed the foundation of the use of new technologies in the classroom. These will be discussed in greater detail below. The discussion will begin with the theoretical framework that supports the use of technology and information and communication technologies (ICTs) in classroom teaching.

THEORETICAL FRAMEWORK

Although there are many theories that support the use of technology and ICTs in the classroom, the researcher focused on two theories: constructivist theory, and neurosciences and 21st-century learning paradigms. The discussion will start by focusing on the constructivist theory.

Constructivist theory

In 1934, Vygotsky set the framework for the constructivist theory. Bruner picked up on this and, in the 1960s, further added to the foundation of constructivist theory Olsen (2000). Olsen (2000) also suggests that there are "two main branches of constructivism". One is based on the philosophical theories of learning and the other is based on psychological theories.

Pagan (2006) posits that a major theme in Bruner's constructivist theory is that learning is an active process, whereby students learn best by constructing new ideas and building new schemas based on current and previous knowledge. Pagan (2006) adds that constructivist instruction theory addresses four important aspects of the learning process: students' predisposition towards learning, how to structure knowledge so that it can be readily understood by the learner, the most effective sequence in which to present materials, and the nature and pacing of motivational rewards and punishments.

In the discussion that follows, the core pillars of constructivist theory will be identified and practical examples will be put forward to expand on how this theory supports the use of technology and ICTs in the classroom.

Taber (2006) identifies the following core pillars that underpin constructivist theory:

- Knowledge should be actively constructed by the learner, not passively received from an external source. Learning is therefore something done by the learner and is not an activity that is imposed on the learner. Information that is required by schoolchildren is readily available on the internet via Google. As a result, learners today like to obtain information online that they can use to understand and complete class assessments, for example. They therefore no longer depend on only what is in the textbook and what they learn in the classroom.
- Learners come to the learning situation (in science, etc.) with existing ideas about many phenomena. Some of these ideas are random and unsubstantiated;

others are more deeply rooted and well developed. The digital age has resulted in learners already being exposed to ideas on the subjects taught in class. In science, learners today understand more concepts than they did in the past as some of them have already seen them on television or on YouTube.

- Learners have their own individual ideas about the world, but there are many similarities and common patterns in their ideas. Some of these ideas are socially and culturally accepted and shared, and are often part of the language, supported by metaphors, etc. They could also often function well as tools to assist understanding of many phenomena. By using technology in the classroom, teachers could play a video in the classroom to show young students how culture affects people's views on eating habits, for example.
- These ideas are often at odds with accepted scientific ideas, and some may be persistent and hard to change. The Big Bang Theory, for example, is often difficult for a school learner with a religious background to understand and process as he or she has already been taught by their priests and family members that God created the world.
- Knowledge is represented in the brain as conceptual structures, and it is possible to model and describe these in some detail. The brain stores information, and through memory, this information can later be recalled. The teacher needs to build constructs in children's minds in a manner that they can later recall and understand information. With the aid of technology, like tools with game simulations, a child can enjoy the learning method and remember what has been taught in the classroom.
- Teachers have to take the learner's existing ideas seriously if they want to change or challenge these ideas. Students have very enquiring minds that should be challenged by the teacher so that new ideas can be learned and processed. The teacher also has to understand the student's views. By positively encouraging a young mind in the classroom, ideas can be shared, which further adds to learning.
- Although knowledge is personal and individual, in one sense, learners construct knowledge through their interaction with the physical world, collaboratively in social settings and in a cultural and linguistic environment. (The relative stress on such factors accounts for the different "versions" of constructivism alluded to earlier.) The world can shape the mind of a student in the classroom. By using technology during classroom sessions, a student can actively engage with other learners by using online platforms to discuss pertinent issues about the world today. A teacher can create chatrooms for students in an ICT class, for example, and ask students to explore how the internet has changed people's lives.

Mos (2003) indicates that, in constructivist theory, learning is not simply about being exposed to new information, but is an active process in which learners should examine, code, decode and interpret new concepts and ideas. Mos (2003) adds that educational models that utilise constructivist theory consider these influences and attempt to match education systems and curricula to each socio-culturally distinct group of students. They also build programmes and train instructors to encourage students to discover principles on their own, using the knowledge they already have to embrace and internalise information. Scientific reasoning is another learning technique that students can employ in constructivist education. As mentioned above, students must formulate and test hypotheses, build and adjust mental models, and form conclusions based on the course material and their own research (Echevarria, 2003). The views explored by the constructivist theorists are indicative of how important ICTs and technology can be in improving teaching in a classroom setting.

Another theory that supports the use of ICTs in the classroom is the neurosciences and 21st-century learning paradigms. The discussion that follows will highlight these learning paradigms in detail.

Neurosciences and 21st-century learning paradigms

Teachers need to understand the learner's brain and how the learner learns and processes information in the classroom. This is not easy. Neurologists, physiologists and educationists are researching this area. The theory below can help us understand how technology affects a child's brain, for example. Jean Piaget, a well-known theorist, made an enduring contribution to psychology and education. Throughout his career, Piaget strongly grounded his work in biology and tied it to education as phenotypic adaptation (Piaget, 1980). According to Smith (2000), Piaget's research famously identified four stages of cognitive development: the sensory-motor stage, the pre-operational period, the concrete operational stage and the formal operational stage. Piaget also proposed adapting these to specific educational settings, along with a biological explanation for how they were instantiated. Multi-sensory teaching skills in the classroom are important. According to Wilmes, Harrington, Kohler-Evans and Sumpter (2008), scientists believe that over 80% of all information that the brain absorbs is visual, making lighting and colour particularly important factors in the learning environment. Additionally, medical research has found that the ear has more extensive brain connections than any other nerves in the body. Therefore, factors such as sound and music have been identified as possible significant contributors to learning in the classroom.

In multi-sensory teaching, the teacher can use hearing and sight to teach learners new concepts in the classroom. For example, if a video is shown during a classroom lesson on poverty showing Justin Bieber talking about poverty in Africa, learners will watch and listen to the video. Secondly, since many classroom students love Justin Bieber, they are more likely to take the lesson on poverty seriously, as a celebrity is commenting on the subject. School learners are very taken in by celebrity role models. Technology can therefore be used in a positive way to stimulate the minds of young, impressionable learners.

The views put forward by the theorists below add to the value and importance of using ICTs as tools to facilitate learning in school learners. Galimberti, Bednare, Donato and Caroni (2006) argue that adolescents experience extensive brain transformation as they move towards cognitive, emotional and social adulthood. As a result, they are particularly susceptible to the outside forces found in the environments of the school, home and recreation. Each new experience interacts with and sculpts the brain, and they will take these experiences with them into adulthood. Of the many external sources interfacing with the teenage brain, technology is prevalent and potent. Anderson (2004) adds that the evidence from neuroscience is indisputable: the teenage brain is a brain in transition. Clearly, these changes are heavily dependent on experiences, and technology plays an integral part in facilitating learning. However, as we learn more about technology and the brain, it is important for educators to keep in mind that instructional technology is dependent on good teaching pedagogy and content knowledge, which are the cornerstones of academic achievement.

Studies conducted by Le Be and Markram (2006) and Paus, Keshavan and Giedd (2008), indicate that there is a relationship between learning and the number of neural connections in a learner's brain. The educational implication is that students who learn a great deal in a subject area grow more neural connections in response to the stimuli they receive. Conversely, neglect of an area inhibits neural connections from forming. For instance, students who dedicate themselves to playing the piano have more neural connections in that part of the brain than those who are not musically inclined. It appears that the introduction of neuroscience into an Initial Teacher Education programme can support and facilitate the transfer of neuroscientific knowledge into best practices in the classroom. It was found that of 95 new teachers who had taken a course on the adolescent brain, over 90% stated that their knowledge of neuroscience research had impacted significantly on their classroom practice (McBride & Todd, 2008; McBride & Pomeroy, 2009).

In light of this, in Africa, teacher training should also include such courses. Since the brain is central to a child's development, teachers in Africa need to understand its workings and the physiology that affects children's learning abilities. Pitler, Hubbell, Kuhn and Malenoski (2007) argue that technology is shaping the world we live in, and, as a result, our students' brains are rewiring and restructuring themselves. Burgeoning findings on the impact of e-learning on the teenage brain has helped inform instruction. Tutorials, gaming and graphic organisers are all compatible with the teenage brain. While computer-based instruction provides the medium, it is important for educators to recognise that the instructional design ultimately determines the effectiveness of the means of instruction.

According to Tokuhama-Espinosa (2011), there has been an increasing call for bidirectional collaboration between educational psychology and neuroscience. The early 1990s saw more international and interdisciplinary cooperation in this arena. Tokuhama-Espinosa (2011) adds that new neuroscientifically based reading curricula, like RAVE-O (retrieval, automaticity, vocabulary, engagement with language, orthography) and Fast ForWord, were developed and are being successfully applied in the classroom. From the above discussion, it is clear that new technologies are important tools that can add value to the teacher's lessons and can assist positively in classroom teaching.

The discussion that follows will focus on the typology of new technological tools used in the classroom.

THE TYPOLOGY OF NEW TECHNOLOGICAL TOOLS FOR TEACHING AND LEARNING

Classroom instruction has evolved beyond the use of textbooks and the blackboard. Since technology has evolved and taken root in many of society's hallways, the classroom too has needed to change, and it has done so by including new technologies as teaching tools. These technologies can be used to assist teachers to enhance their teaching in the classroom. In this century, teachers have an array of new technological tools at their disposal. Some of these technologies are listed below:

- Simulations to extend understanding of physics concepts
- Laser discs, video tapes, CDs
- Real-time data collection and graphic analysis tools associated with computer-interfaced probes and sensors

- Computer analysis of digitised video
- Presentation software
- Interactive student assessment software (Flick & Bell, 2000)

If taken a step further, schools in Africa can use a combination of classroom and e-learning modes of delivery. In e-learning, the Joint Information Systems Committee (2004) indicated the following technology that is being used in e-learning environments:

- Desktop and laptop computers
- Software, including assistive software
- Interactive whiteboards
- Digital cameras
- Mobile and wireless tools, including mobile phones
- Electronic communication tools, including email for discussion
- Virtual learning environments
- Learning activity management systems

Examples and studies will be outlined that indicate how some of the technological tools mentioned above can be used by teachers in the classroom.

Throughout the world, movies are seen as an integral part of society's popular culture. Movies can also be used effectively in classroom teaching as it gives the learner an enjoyable way of learning outside the traditional classroom environment. According to O'Babbon and Golddenberg (2008), movies are an effective teaching tool. A prepared educator can use a movie to stimulate a discussion session in the classroom. A teacher can also use movies to facilitate learning on a topic such as poverty, AIDS or wealth creation. Furthermore, the teacher can use movies to re-emphasise material that is being presented through textbooks or classroom presentations, which students might consider to be boring. By showing a movie in the classroom, a teacher can pair it with interesting methods of framing and debriefing. This provides a form of active learning that can be very useful to learners. A reason for the success of this teaching tool is that the teacher can reach diverse students in the classroom through movies (Robinson, 2000). Another benefit of using movies as a teaching tool is that they help humanise the teacher and encourage learners to engage with them (Wilson, 2004).

Some teachers use technology to stimulate learning in very young learners. O'Babbon and Golddenberg (2008) argue that pre-schoolers are learning to use

technology at a very early age. Tweens (9-12 year olds) and screenagers (tweens and young adults) have become accustomed to using digital devices and media input (Rushkoff, 1996). Screenagers opt to use Google or Wikipedia to do their homework, instead of working through piles of books in a library. This change is attributed to today's learners having become habituated to getting information quickly and easily. This is what makes technology so appealing to them. The view of Younge (2002) is that traditional means of teaching and learning do not always hold the attention of young people, who live in a technology-based, popular culture-worshipping society. O'Babbon and Golddenberg (2008) suggest that educators must be aware of what motivates learners. If they have to teach teenagers and screenagers, for example, their learning needs are often met when a movie is incorporated into their formal education. Watching a movie is very stimulating to a teenage learner, just as discussion during the debriefing can be. Teachers need to understand that movies provide an excellent opportunity to address different types of learning in the classroom. For example, a visual learner takes in a movie visually, whereas an auditory learner learns by listening to the movie and then to the discussion that follows. When teachers address learning styles through popular culture, learners' capacity to learn, understand and retain information is increased. This can be seen in the visual learner's appreciation of moving images and the auditory learner's interest in dialogue and music.

Another tool that is used on the education frontier is e-learning. Khan (2005) suggests that the design and format of e-learning is more open and flexible than traditional learning. It is also not as space-bound as traditional classroom instruction. Kearsley (2002) indicates that traditional instruction is a closed system within the confines of the classroom, school, textbook and field trip. This can often limit the learner. Employing e-learning can allow the teacher access to the learner beyond the traditional space boundary.

Another new technology that is being used increasingly in the education arena is mobile learning. Sharples, Taylor and Vavoula (2005) posit that, given that social interaction is central to effective learning, as indicated by theories on new learning, mobile phones would also impact on educational outcomes by facilitating communication. Mobile phones permit collaborative learning and continued conversation, despite the physical location of students. Mobile learning can also stimulate students from different cultures and backgrounds to talk to each other. This type of learning allows learners to engage in conversations to resolve their differences, understand the experiences of others, and create common interpretations and an understanding

of the world around them. In his study, Ramos (2008) used an English module that contained an audio CD containing the workbook exercises in audio form to help learners with proper pronunciation and dictation. The modules were designed in such a way that SMS quizzes and tests had to be passed in order to complete the modules. In this study, Ramos (2008) indicated that learners expressed excitement regarding the use of mobile phones for learning. One learner mentioned that the learning process was akin to answering trivia questions, with feedback provided immediately on whether the answers were right or wrong; this feedback ensured that the learner did not repeat any errors.

A study by Valk, Rashid and Elder (2010) investigated a project led by the Molave Development Foundation Inc. (MDFI) and funded by the International Development Research Centre (IDRC). It explored the study of Kam, Kumar, Shirley, Mathur and Canny (2009) on improving literacy in rural India using cell phone games in an after-school programme. The children who participated in this programme were from rural, low-income families. With the assistance of an Indian English Second Language (ESL) teacher, Kam et al. (2009) devised a curriculum that was aligned with local ESL learning needs and which represented the equivalent of the material that a qualified teacher could cover in 18 hours in a classroom setting with rural children. The cell phone games targeted listening comprehension, word recognition, sentence construction and spelling, and were constructed at various levels. The programme consisted of two-hour sessions that spanned 38 days from December 2007 to April 2008. The results of the study indicated that the children enjoyed the gaming and that it stimulated their learning.

A study performed by Anderson and Barnett (2013) in the USA examined how a digital game used by learners aged 12 to 13 years increased their understanding of electromagnetic concepts, compared to learners who had conducted a more traditional inquiry-based investigation of the same concepts.

In the discussion that follows, the benefits of using new technology will be explored, with specific reference to the African continent.

BENEFITS OF USING NEW TECHNOLOGICAL TOOLS FOR TEACHING AND LEARNING IN AFRICA

Brush, Glazewski and Hew (2008) have stated that ICT can be used as a tool for students to discover learning topics, solve problems and provide solutions to problems in the learning process. ICT makes knowledge acquisition more

accessible, and concepts in learning areas are understood while engaging students in the application of ICT. In Africa, school learners can use ICT tools in the classroom to discover new learning topics, e.g. doing a Google search on Google Earth. The speed at which the internet provides information makes it a very desirable tool to young teenagers.

In a study conducted by Jewitt, Clark and Hadjithoma-Garstka (2011), the following conclusions were put forward on the benefits to school learners of using ICT in the classroom:

- Using digital resources provided school learners with more time for active learning in the classroom.
- Digital tools and resources provided more opportunity for active learning outside the classroom, as well as self-directed spaces, such as blogs and forums, and access to games with a learning benefit.
- Digital resources provided learners with opportunities to choose the learning resources.
- The resources provided safer spaces for formative assessment and feedback.
- African students can also enjoy these benefits by using ICTs in the classroom, as research has shown this to be the case elsewhere in the world.

Teachers in Africa could videotape their lessons and podcast these to learners who live in remote locations and cannot travel during the rainy seasons. Learners could also use a computer in a local library in their village to access the lessons.

Interesting debates by educational experts suggest that new technology is the way to go. Jochems, Van Merrienboer and Koper (2004:166) suggest that "learning is integrated with other activities such as knowledge, skills, attitudes and competencies, and quality is judged by the impact on the organisation involved". Opting to use new technology in the classroom will change the focus of learning and recreate the role of the teacher.

In Africa, using technology in the classroom would force the learner to become more focused. The learner could develop skills as he or she uses the new classroom technology. This type of classroom learning forces the learner to become more engaged in the learning process. The learners are no longer only concentrating on mastering the academic subject matter, but are also learning a skill. The role of the

teacher is then transformed from merely being the subject expert, the transmission medium or examiner, to being the subject guide, knowledge intermediary and assessor. The teacher becomes the coach in this instance. This adds value to the teacher's everyday duties. Learners see the teacher in a new light: that of motivator and guide. Transforming the teacher into a coach opens up the mode of learning on both sides.

In the discussion that follows, reservations about the educational use of new technologies will be debated.

RESERVATIONS ABOUT THE EDUCATIONAL USE OF NEW TECHNOLOGIES

Today's children are "digital natives". They live in a world where computer technology is on every corner. However, their teachers are much older and had a totally different experience growing up, as they were not exposed to digital technology at every turn. These teachers are the "digital immigrants", who are now tasked with addressing the needs of school learners who are technologically advanced and computer savvy. The role of the teacher has increased tenfold, as teachers have to grapple with these new technologies and make sense of them in order to employ them in their classrooms.

Some educationists argue that new technology can only be used in first-world countries as they have a well-built infrastructure for school programmes that make use of such technologies. Africa has unique problems that include war, famine, poverty, AIDS/HIV and other diseases, and does not have the money to provide expensive technologies in the school system. Spector and Davidsen (2000) suggested that one single and typically simple approach to using technology to support learning would not succeed.

The African continent is not like the rest of the world when it comes to school education systems. In Africa, the school systems are in a state of constant transformation. This has resulted in many problems. An interesting view put forward by Jochems et al. (2004) is that organisational, pedagogical and technological aspects have to be managed in a harmonious manner in order to adequately solve the current educational problems. Learning technologies can play a pivotal bridging role in African schools. They can be the catalyst that can assist ministries of education

within African governments to formalise pedagogical and organisational thinking in such a way that they can be implemented as a workable, technical solution in the long term. African school systems can survive in the global landscape if governments are willing to set aside large amounts of money to benefit the continent as a whole.

In a study conducted in Indonesia, Marwan (2008) suggested the following barriers to integrating technology into teaching:

- **Lack of knowledge and skills.** Despite their active use of technology into pedagogy, most teachers felt that they lacked adequate knowledge and skills for optimally integrating the facility into teaching. One respondent, for example, admitted: "I frequently use technology to support my teaching, but, honestly, I am only able to use basic computer programs such as email programs and PowerPoint. I never use other programs such as those that enable computer-mediated communication (CMC) or desktop teleconferencing. Knowing how to operate other advanced programs would be very useful, I think."
- **Lack of technical support.** For another respondent, "technical staff should be available before, during and after the class sessions". Yet another respondent added: "Once I was about to start my teaching and I had difficulty in turning on the LCD projector … I tried to seek help, but no technical staff was available at the time, so I finally decided not to use the computer in my teaching."
- **Lack of incentives.** Throughout the interviews, lack of incentives was repeatedly mentioned by several teachers. They admitted that no additional incentive was provided by the institution to use the innovations that are available. According to one respondent: "The main reason I use technology for teaching is because I like learning new things and I like technology … If I didn't, I would be less likely to use it, unless there were incentives for that."

Since e-learning is part of the new technological advancement that is taking place in teaching, the next section will touch on this area.

The above barriers cited by Marwan (2008) are also barriers that African teachers face when using technology in the classroom.

Lack of funding to build infrastructure makes it difficult for teachers in Africa to use e-learning. Since the infrastructure for e-learning is not in place in many parts of Africa, it is often difficult for e-learning systems to be implemented.

Secondly, in certain parts of Africa, the reality is that rural communities are dealing with AIDS/HIV and other diseases, as well as dire poverty, which means that dispatching computers to these communities is not the highest on government's agenda, since food, clean running water and medication is considered to be of greater importance. Another shortfall to e-learning is having a great system, but not having sufficient technical support.

Power outages on the African continent are also a major obstacle that slows down the use of ICT in the classroom. Another serious problem associated with new technology in teaching is that African children can become addicted to gaming. This can have an adverse effect on their personalities. They can go home and not be very communicative with their parents, for example, as they become so engrossed in gaming that they cease to distinguish reality from fantasy.

The need to train teachers to understand and use new technologies in the classroom will be discussed in detail below.

THE NEED TO TRAIN TEACHERS TO USE NEW TECHNOLOGY

Research suggests that the successful implementation of technological innovations in the classroom is more likely to take place when teachers are highly reflective about their own teaching practice and goals, in the sense that they consciously use technology in a manner that is consistent with their pedagogical beliefs. In Africa, teachers have to be trained to implement technological tools that could enhance their teaching and learning. Since change is often hard to deal with from a personal perspective, workshops on change should first be introduced, before formal training sessions occur.

It is often good to learn from our counterparts in the West how they managed to conduct training in their countries, and to adapt these techniques, where possible, to the African classroom context. According to the National Staff Development Councils (NSDC) in the United Kingdom (2001), technology purchases had increased dramatically in many school districts in the United Kingdom during the past decade, often with little attention given to the development of teachers' ability to use technology. The NSDC advocated that at least 30% of the technology budget be devoted to teacher development in this area. African ministries of education should also put teacher development programmes in place to upskill teachers on the new technologies. By doing this, teachers can plan and practise what they have learned. The investment made in rolling out new technologies in classrooms would not fail if government explored such initiatives.

African educationalists can learn from the proposals set forth by educationalists abroad in the science field. Flick and Bell (2000) proposed the following guidelines for using technology in the preparation of science teachers:

- Technology should be introduced in the context of science content.
- Technology should address worthwhile science with appropriate pedagogy.
- Technology instruction in science should take advantage of the unique features of technology.
- Technology should make scientific views more accessible.
- Technology instruction should develop students' understanding of the relationship between technology and science.

Flick and Bell (2000) argued that, despite Western society's heavy dependence on technology, few teachers actually understood how technology was used in science, for example. Using technologies in learning science provides opportunities for demonstrating to new teachers the reciprocal relationship between science and technology. New teachers could develop an appreciation of how advances in science drive technology. In Africa, the same is true: teachers need to be trained to apply the new technology to their specific field of teaching. For example, in Africa, a teacher can show a physical science video on solids, liquids and gases during the lesson. They could then take it a step further and stimulate the young minds by showing them YouTube science fair inventions.

Harwell (2003), from the Centre for Occupational Research and Development (CORD) in the USA, recommends that, in preparing teachers on how best to teach content, and then equipping them with knowledge and skills, there should be programmes in place to support professional teacher development. These programmes should not only empower teachers to succeed in the present, but should also enable them to improve their skill over time. This is especially true with respect to technology, which has become an essential tool in teaching and learning, and will continue to play a significant role in education far into the future.

In the science discipline, new technology can be actively integrated into the curriculum to stimulate student learning. Flick and Bell (2000) argued that the impact of digital technologies on science teacher education is more pervasive than curriculum or instructional innovations in the past. Digital technologies are changing the way teachers interact with students in the classroom in a good way. Ahburn and Floden (2006) drew insights from the studies done by Becker (1999),

Zhao and Frank (2003) and Zhao, Pugh, Sheldon and Byers (2002), arguing that studies of teaching and teachers' beliefs have shown that teachers who are more reflective and aware of their own pedagogical beliefs are generally more adaptive and flexible teachers. They can also adopt new technologies more easily.

Technology can also assist teachers in marking their assessments. Teachers in Africa have very large classes and multiple-choice questions can be used as a class assessment. These assessments can then be marked electronically. This can make a teacher's life far less stressful.

Teachers in Africa can use e-learning. The benefit of having an e-learning system is that learners from all age groups could work and study in their own time. This flexibility can benefit many who are illiterate or semi-literate by enabling them to work and study. NGOs can now develop programmes to accommodate such rural people in Africa. In Africa, teachers do not have the training they need to use the new technologies. A way forward is that government can work with the NGOs in rural communities to train teachers in using new technologies to enhance their classroom teaching practice.

Teachers also need technical support staff at hand to assist them when they encounter difficulties in the classroom. School administrators should budget for this and motivate for such support.

The above discussion clearly outlines the need for the training of teachers and technicians. Technicians have to be present to assist teachers if they experience challenges.

CONCLUDING REMARKS

In Africa, we have to look at the new technologies being used elsewhere in the world. Since the explosion of the internet, the world is a global village. Teachers have to respond to these challenges. Using new technologies in teaching can lead to better teaching styles, assessment times and feedback. This would, in turn, improve the overall quality of teaching. In Africa, teachers need proper training to understand the new technologies. The bottom line is, whether we like it or not, change is here in the form of new technologies in the classroom. African teachers must embrace technology as a teaching tool. At the end of the day, technology can never replace the human aspect that only a teacher can bring to the classroom.

REFERENCES

Ahburn, E.A. & Floden, R.E., 2006, *Meaningful learning using technology - what educators need to do*, Teachers College Press, London.

Anderson, J.L. & Barnett, B., 2013, 'Learning physics with digital game simulations in middle school science', *Journal of Science Education and Technology* 22(1), 914–926.

Anderson, T., 2004, 'Teaching in an online learning context', in T. Anderson & F. Elloumi (eds.), *Theory and practice of online learning,* 273–294. Athabasca, AB, Canada: Athabasca University.

Becker, H.J., 1999, 'Internet use by teachers', viewed from http:www.crito.uci.edu/TLC/FINDINGS/internet-use?

Bhattacharya, M. & Richards, C., 2001, 'Innovative course design as action research: instructional technology for teacher education', in C. Crawford, R. Carlsen, I. Gibson, K. McFerrin, J. Price, R. Weber & D. Willis (eds), *Proceedings of Society for Information Technology and Teacher Education International Conference,* pp. 1052–1057, AACE, Chesapeake, VA.

Blackwell, C., 2013, 'Teacher practices with mobile technology integrating tablet computers into the early childhood classroom', *Journal of Education Research* 7(4), 1–25.

Brush, T., Glazewski, K.D. & Hew, K.F., 2008, 'Development of an instrument to measure preservice teachers' technology skills, technology beliefs, and technology barriers', *Computers in the Schools* 25(1), 112–125.

Echevarria, M., 2003, 'Anomalies as a catalyst for middle school students' knowledge: construction and scientific reasoning during science inquiry', *Journal of Educational Psychology* 95(2), 357–374.

Ellen, J., Lowyck, J. & Van den Berg, B., 1999, *Virtual university: will learning benefit? In Socio-economics of virtual universities: experiences from open and distance education in Europe*, Deutcher Studien Verlag, Weinheim.

Flick, L & Bell, R., 2000, 'Preparing tomorrow's science teachers to use technology: guidelines for science educators', *Contemporary Issues in Technology and Teacher Education* 1(1),1–22.

Galimberti, I., Bednare, E., Donato, F. & Caroni, P., 2006, 'Long-term rearrangements of hippocampal mossy fiber terminal connectivity in the adult regulated by experience', *Neuron* 50(1), 749–763.

Harwell, S., 2003, *Teacher professional development: it's not an event, it's a process*, CORD, Waco, TX.

Higgins, S., Xiao, Z. & Katsipataki, M., 2012, *The impact of digital technology on learning: a summary for the Education Endowment Foundation*, Durham University and Education Endowment Foundation.

Jewitt, C., Clark, W. & Hadjithoma-Garstka, C., 2011, 'The use of learning platforms to organise learning in English primary and secondary schools', *Learning, Media and Technology*, viewed from http://dx.doi.org/10.1080/17439884.2011.621955.

Jochems, W., Van Merrienboer, J. & Koper, R., 2004, *Integrated e-learning implications for pedagogy, technology and organisation*, Routledge, London.

Joint Information Systems Committee (JISC), 2004, 'Effective practice with e-learning: a good practice guide in designing for learning', viewed from http://www.jisc.ac.uk/media/documents/publications/effectvepracticelearning.pdf.

Kam, A., Kumar, A., Shirley, J., Mathur, A. & Canny, J., 2009, 'Improving literacy in rural India: Cell phone games in an after-school program', viewed from http://www.cs.cmu.edu/~mattkam/publications/ICTD2009.pdf.

Kearsley, G., 2002, 'Is online learning for everybody?', viewed from http: //home.sprynet.com/~gkearsley/everybody.htm.

Khan, B., 2005, *Managing e-learning strategies design, delivery, implementation and evaluation*, Information Science Publishing, London.

Kramer, B. & Schmidt, H., 2001, 'Components and tools for online education', *European Journal of Education* 36(2),195–222.

Le Be, J.V, & Markram, H., 2006, 'Spontaneous and evoked synaptic rewiring in the neonatal neocortex', *Proceedings of the National Academy of Sciences of the United States of America* 103(35), 13 214–13 219.

Lim, C.P., Zhao, Y., Tondeur, J., Chai, C.S. & Tsai, C.C., 2013, 'Bridging the gap: technology trends and use of technology in schools', *Educational Technology and Society* 16(2), 59–68.

Lowther, D.L., Inan, F.A., Strahl, J.D. & Ross, S.M., 2008, 'Does technology integration work when key barriers are removed?', *Educational Media International* 45(1), 195–213.

Marwan, A., 2008, 'Teachers' perceptions of teaching with computer technology: reasons for use and barriers in usage', viewed from http://www.itdl.org/Journal/jun_08/article04.htm#Top.

McBride, H.E.A. & Pomeroy, M., 2009, 'Neuroscience: a powerful influence on educational practice', paper presented at the Second Biennial International Mind, Brain and Education Society Conference, Philadelphia, PA.

McBride, H.E.A. & Todd, R., 2008, 'From theory to practice: introducing neuroscience into a teacher education program', paper presented at The Jean Piaget Society's 38th Annual Meeting, Quebec City, Quebec.

Mos, L., 2003, 'Jerome Bruner: language, culture, self', *Canadian Psychology* 44(1), 77–83.

National Staff Development Council (NSDC), 2001, *Standards for staff development*, revised edition, National Staff Development Council, Oxford.

O'Babbon, T. & Golddenberg, M., 2008, *Teaching with movies, recreation, sports, tourism and physical education*, Human Kinetics, Leeds.

Olsen, D.G., 2000, 'Constructivist principles of learning and teaching methods', *Journal of Education* 120(2), 347–355.

Pagán, B., 2006, 'Positive contributions of constructivism to educational design', *Europe's Journal of Psychology* 2(1), 318–327.

Paus, T., Keshavan, M. & Giedd, J.N., 2008, 'Why do many psychiatric disorders emerge during adolescence?' *Nature Reviews Neuroscience* 9(12), 947–957.

Piaget, J., 1980, *Adaptation and intelligence: organic selection and phenocopy*. University of Chicago Press, Chicago, IL.

Pitler, H., Hubbell, E.R., Kuhn, M. & Malenoski, K., 2007, *Using technology with classroom instruction that works*, Association for Supervision and Curriculum Development Alexandria, VA.

Prensky, M., 2001, 'Digital natives, digital immigrants', *On the Horizon* 9(5), 1–6.

Ramos, A.J., 2008, 'Final report for sub-project 2, Project MIND: The viability of mobile SMS technologies for non-formal distance learning in Asia', Molave Development Foundation, Makati.

Robinson, M.B., 2000, 'Using active learning in criminal justice: twenty-five examples', *Journal of Criminal Justice Education* 11(1), 65–78.

Rushkoff, D., 1996*, Playing the future: how kids' culture can teach us to thrive in an age of chaos*, HarperCollins, New York, NY.

Serhan, D., 2009, 'Preparing preservice teachers for computer technology integration', *International Journal of Instructional Media* 36(1), 439–447.

Sharples, M., Taylor, J. & Vavoula, G., 2005, 'Towards a theory of mobile learning', in H. van der Merwe & T. Brown, *Mobile technology: the future of learning in your hands*, *m-learn 2005 Book of Abstracts*, 4th World Conference on M-learning, 25–28 October 2005, Cape Town.

Smith, L., 2000, *A short biography of Jean Piage,* viewed from http://www.piaget.org.biography/biog/html.

Spector, J.M. & Davidsen, P.I., 2000, 'Designing technology-enhanced learning environments', in *Institutional and cognitive impacts of web-based education*, Idea Publishing Group, London.

Taber, K.S., 2006, 'Beyond constructivism: the progressive research programme into learning science', *Studies in Science Education* 42(1), 125–184.

Tokuhama-Espinosa, T., 2011, 'A brief history of the science of learning: Part 1 (3500 B.C.E.-1970 C.E.) and Part 2 (1970–the present)', *New Horizons for Learning* 9(1), viewed from http://education.jhu.edu/ newhorizons/Journals/Winter2011/.

Valk, J.H., Rashid, A.T. & Elder, J., 2010, 'Using mobile phones to improve educational outcomes: an analysis of evidence from Asia', *The International Review of Research In Open and Distributed Learning* 1(1), 1–12.

Wilmes, B., Harrington, L., Kohler-Evans, P. & Sumpter, D., 2008, 'Coming to our senses: incorporating brain research findings into classroom instruction', *Education* 128(4), 659–666.

Wilson, M.E., 2004, 'Teaching, learning, and millennial students', *New Directions for Student Services* 106, 59–71.

Younge, J.R., 2002, 'Homework? What homework?' *The Chronicle of Higher Education* 49(15), 35–37.

Zhao, Y. & Frank, K.A., 2003, 'Technology uses in school: an ecological perspective', *American Educational Research Journal* 0(4), 807–840.

Zhao,Y., Pugh, K., Sheldon, S. & Byers, J., 2002, 'Conditions for classroom technology innovations', *Teachers College Record* 104(3), 484–515.

TEACHER TRAINING THAT MEETS THE NEEDS OF MATHEMATICALLY GIFTED LEARNERS

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ABSTRACT

In Africa, there is increasing evidence that progress being made in producing scientists, engineers and technologists is very slow. Yet, there is a total neglect of mathematically gifted students who have the potential to enter these careers. This is mainly due to teachers not receiving adequate training on education for gifted learners. This paper examines the necessity for and provision of suitable training for teachers who are required to teach gifted learners in mainstream classrooms. Using Gagné's differentiated model of gifts and talents (Gagné, 2015), the paper shows how gifts might never translate into talents if teachers are not trained to effectively nurture such talent. The model further implies that gifted students are found in mainstream classrooms, suggesting that all teachers encounter gifted students in a similar way to that in which they encounter learners with learning difficulties. The paper proposes that all pre-service teachers should receive training in education for gifted learners. The paper concludes by suggesting four broad components of a programme for training teachers to teach gifted students: changing beliefs and attitudes, the nature and identification of gifted students, the differentiated curriculum, and the assessment of gifted learners.

Keywords: *Gifts, talents, gifted education, skills development, teacher training*

INTRODUCTION

There is a global discourse that positions mathematical competence as the key that unlocks the gate to many opportunities for individual students and to the welfare of a nation in a 21st-century knowledge economy. Many of the most sought-after careers depend on the use of mathematics. For example, civil engineers use mathematics to determine how to best design new structures; economists use mathematics to describe and predict how the economy will react to certain changes; investors use mathematics to price certain types of shares or calculate how risky particular investments are; software developers use mathematics for many of the algorithms that make programs useful. Despite this global consensus, in Africa, there is increasing evidence that progress in producing such skilled people is not yet satisfactory (Department of Science and Technology, 2008). One might then ask: "What factors are contributing to this failure and what can be done to alleviate the challenges?"

This theoretical paper is premised on empirical evidence that has shown that mathematically gifted individuals have the potential to become the critical human capital needed for driving modern-day economies. The majority of these gifted students in developing countries spend most, if not all, of their academic career in mainstream classrooms, as a result of inclusive practices that led to the dismantling of special schools for the gifted. Although the presence of gifted students in almost every classroom indicates the need for teacher preparation programmes to include content on gifted students, empirical evidence shows that typical traditional pre-service teacher programmes do little to prepare teachers to meet the needs of gifted learners (Diezmann & Watters, 2002; Oswald & De Villiers, 2013). This suggests the need for a paradigm shift in the way traditional teacher training programmes are conceptualised and designed in developing countries. In light of the aforementioned, the purpose of this paper is to examine the necessity for and provision of suitable training for teachers who are required to teach gifted learners in mainstream classrooms. The following questions guide the paper:

- Why should mathematically gifted students and their teachers be of concern to us in the 21st-century economy?
- What competencies do teachers need to effectively teach gifted students?
- How should teacher training programmes be designed to prepare graduates who are ready to teach well in the 21st-century classroom?

MAKING A CASE FOR MATHEMATICALLY GIFTED STUDENTS

According to Smith (2004), it has been widely recognised that mathematics occupies a rather special position in our lives. It is a major intellectual discipline in its own right, and provides the underpinning language for the rest of science and engineering, as well as other disciplines in the social and medical sciences. It provides the individual citizen with empowering skills that prove useful in private and social life, as well as key skills that are required at virtually all levels of employment. There is not a single area of life that is not affected by mathematics. For this reason, many scientists regard mathematics as the language of nature. If our citizens want to learn about nature (and want to learn to appreciate nature), it is necessary to understand the language (mathematics) of nature. Supporting this view is the widely accepted belief that all citizens should be able to cope with the everyday mathematical demands of life (numeracy) at school, in the home, at work and in the community. However, beyond basic numeracy, advanced economies need an increasing number of people with more than the minimum qualifications in mathematics to stay ahead in the field of international competitiveness and to effectively exploit advances in technology. Thus, the goals of contemporary mathematics education are twofold: to develop a numerate citizenry, because mathematics is found everywhere, and to develop a society with sufficient high-level mathematical capability that will give a country the competitive edge in the 21st- century knowledge economy.

In this regard, MacGillivray (2000) suggests three distinctive levels of mathematical capability: the quantitative capability of society, the mathematical capability in the broad spectrum of areas with quantitative links, and the capability in terms of high-level expertise of the discipline of mathematical sciences. It is in the latter two levels of mathematical capability that there have recently been increases in both importance and danger signs (Diezmann & Watters, 2002). In particular, there is a need to understand how to adequately cater for exceptional students, such as those who are gifted in mathematics, so as to achieve the third level of capability (high-level expertise). A major reason why society continues to be concerned about the education of mathematically gifted students is the belief that mathematically gifted individuals have the potential to become the critical human capital that is needed to drive modern-day economies. While this assumption has been made intuitively, Terman's genetic studies (Friedman & Martin, 2011) and the longitudinal Studies of Mathematically Precocious Youth (SMPY) (Lubinski, Benbow & Kell, 2014) are arguably among the most famous longitudinal studies done in psychology to date that have tracked mathematically gifted youth over decades. These studies aimed to confirm or refute

this intuitive thought. Results from these studies have confirmed beyond any doubt that mathematically talented males and females will indeed become the critical human capital that is needed to drive modern-day conceptual economies.

Although the neglect of gifted students in South Africa over the past two decades has been blamed on post-apartheid inclusive practices that were skewed towards addressing the needs of the historically disadvantaged population groups, ample evidence shows that authorities are now coming to realise that a democracy such as South Africa, more than any other system, requires an abundant supply of such talent and leadership if it is to survive and prosper. For example, in 2010, South African President Jacob Zuma appointed the National Planning Commission (NPC) to take a broad, cross-cutting, independent and critical view of the challenges facing the country. In its first diagnostic overview, the NPC (2011) raised its concern that skills acquisition was out of line with the needs of a modernising economy, because there was so much focus on numeracy at the expense of critical skills development. The NPC referred to this gap as "credential inflation" without a concomitant rise in earnings or skills requirements. With respect to students, the NPC's view was that a few well-motivated and talented individuals would be of more importance to the national economy than many who were not at the cutting edge and were content with substandard work. The NPC then recommended the provision of opportunities for excellence for the most talented students.

Following the diagnostic overview by the NPC, the Department of Basic Education set up a task team to investigate the implementation of maths, science and technology (MST) talent development programmes in schools. The evidence gathered by the task team, with specific reference to talent search and development, showed that, more often than not, provincial education departments seemed to focus on under-performing schools, while neglecting gifted learners and learners with MST potential (Department of Basic Education, 2013:48).

Their recommendations were as follows:

- MST talent development programmes should be incorporated into the revised national MST strategy.
- At least one dedicated Mathematics and Science Academy or a special Mathematics, Science and Technology School should be established in each province. The school should preferably have a boarding facility to accommodate learners and teachers from across the province, but it should be managed nationally.

The Department of Science and Technology (2008) made similar observations. It set up a committee to undertake a study titled "Review of Mathematical Sciences Research at South African Higher Education Institutions". Its interviews with students who had chosen mathematical studies left the team wondering how many talented mathematics students had been lost, and how many young people had never had the opportunity to develop a love for mathematical sciences. They further argued that the ultimate health of mathematical sciences depended on strengthening the foundation of mathematics in schools, identifying and nurturing the best students at secondary level, and encouraging such students to enter programmes in the mathematical sciences. Its recommendation was that a vigorous mathematics talent search was needed at school level, particularly in the rural areas, where there is a huge reservoir of untapped talent.

At provincial level, there has been a similar focus on gifted students. For example, a document entitled "Gauteng Mathematics, Science and Technology (MST) Education Improvement Strategy 2009–2014" (Gauteng Department of Education, 2010) set out the strategy and plans to improve MST education in the province. An important observation made in this document regarding gifted students was that the majority of school learners in Gauteng are in schools located in economically disadvantaged communities, therefore, statistically, the largest provincial pool of potential future scientists, engineers and technologists is in these communities. Yet, there are more challenges in respect of MST education in these schools than in more affluent schools. The provincial department lamented that it was "a tragic inevitability that we waste much human potential with each generation of school leavers that suffers as a result of poor MST education" (Gauteng Department of Education, 2010:47–48). Its recommendation was that there is a need for early talent identification, and nurturing and developing this human potential. All these recommendations suggest that if we are to transform student potential into the skills that we need in the 21st century, we need to put well-structured talent development programmes in place for our gifted students.

THEORETICAL MODEL THAT PUTS TEACHERS AT THE CENTRE OF TALENT DEVELOPMENT PROGRAMMES

This paper borrowed from Gagné's differentiated model of gifts and talents (DMGT) (Gagné, 2015) as a theory that represents the process of transforming natural abilities (gifts) into skills (talents). This model is strongly anchored in the separation of these basic concepts (gifts and talents). In 1985, Gagné first conceptualised his

theory of talent development (the DMGT), which is internationally renowned and has been modified over the years.

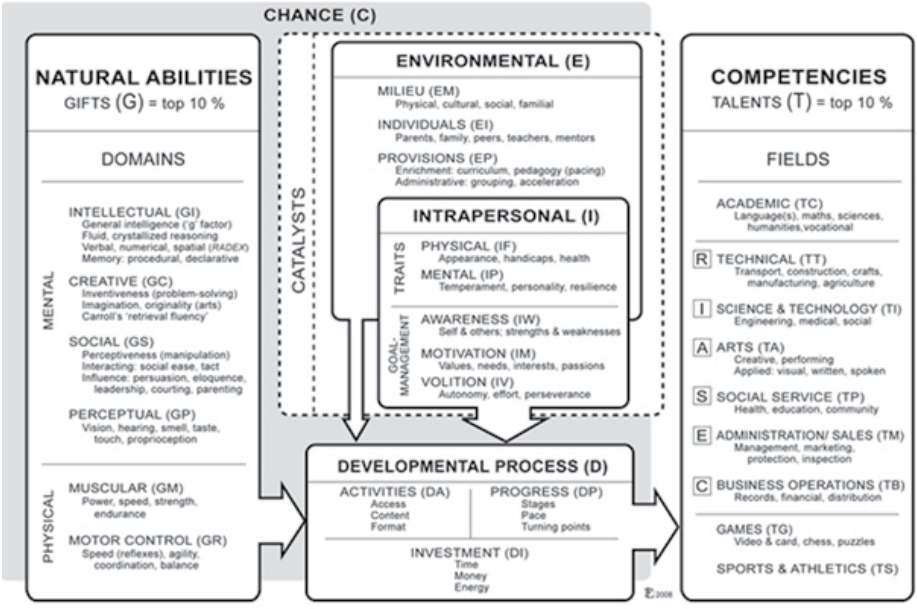


Figure 1: Gagné's differentiated model of gifts and talents (Gagné, 2009) (reproduced with the permission of Gagné)

The DMGT comprises six components, each being assigned an identifying acronym. As indicated in Figure 1, the components demonstrate the progression from natural abilities or gifts (G) to competencies or talents (T). This progression is facilitated through the developmental process (D), which is either assisted or hindered by factors that Gagné describes as catalysts. He groups these catalysts into environmental (E) or intrapersonal (I) catalysts and also includes the chance component (C) as a factor that can impact on all the contributing components of the model.

This model emerged as Gagné (2015:15) defined giftedness and talents as follows:

> *"Giftedness designates the possession and use of untrained and spontaneously expressed outstanding natural abilities or aptitudes (called gifts), in at least one ability domain, to a degree that places an individual at least among the top 10% of their age peers."*

"Talent designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity, to a degree that places an individual at least among the top 10% of "learning peers" (those that have accumulated a similar amount of learning time from either current or past training)."

In this way, Gagné (2015) differentiated between giftedness as raw capacity, and talent as systematically developed ability. One very important outcome of viewing the concept of giftedness and talent through the lens presented by Gagné (2015) is the implication that a child can, by virtue of having naturally high abilities, be recognised as being gifted from a very early age. As the child matures, these abilities will develop into talents; but the course such development takes is dependent upon the impact of what Gagné (2015) describes in his model as "catalysts", that is to say, the influences of environmental and intrapersonal factors.

He also includes the chance factor as being influential in the eventual successful or otherwise outcome of the developmental process. The outcome of a successful developmental process is the maturing of these basic abilities into exceptional competencies or talents. Thus, a person is described as being gifted to highlight that they have exceptional abilities and, when they have favourably developed these abilities, they may be described as being talented. Therefore, to be described as being talented necessarily implies giftedness as a prerequisite. A further implication is therefore that, while such a child will always remain gifted, only when a high level of performance has been attained can they be described as being talented. This is important, as it alludes to the common phenomenon in our schools, and in life, of under-achievement by the gifted, and points us in the direction of beginning to understand – and therefore remedy – this (Gagne, 2009). It supports the important understanding that if, through unfavourable catalytic circumstances, a child's abilities fail to manifest into talents, the basic constituents of their giftedness do not disappear, and therefore neither do their special educational needs. In fact, they are likely to be even more in need of intervention and support.

Besides this distinction between giftedness and talent, another important question that has caused controversy in the field of the education of gifted learners has been the following: "Who deserves to be labelled as a gifted student?". Gagné (2010) was particularly concerned about treating gifted students as belonging to a homogenous group, arguing that there are different levels of giftedness. As an intrinsic component of his DMGT, Gagné then developed a clear and defensible

metric-based (MB) system, which allows for much easier comparisons of subgroups within the gifted or talented populations. The DMGT of Gagné (2010) proposes a five-level system of cut-offs for giftedness. These are the following: "mildly gifted" – 10% (top 1:10); "moderately gifted" – 1% (top 1:100); "highly gifted" – 0.1% (top 1:1 000); "exceptionally gifted" – 0.01% (top 1:10 000); and "extremely gifted" – 0.001% (top 1:100 000) (see Table 1).

Table 1: Levels of giftedness

Level	Labels for giftedness	Proportions
5	Extremely (profoundly)	1:100 000
4	Exceptionally	1:10 000
3	Highly	1:1 000
2	Moderately	1:100
1	Mildly	1:10

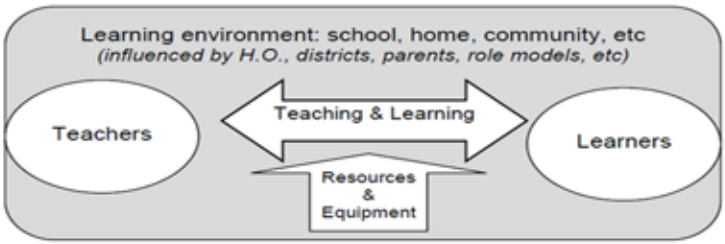
(Source: Gagné, 2000)

Using this MB system, Gagné (2010) argued that the mildly gifted (1:10) – or the top three achievers in a regular class of 30 – already distance themselves significantly in terms of ease and speed of learning. He refers to such mildly gifted students as the "garden variety" – a common English expression in the United States that means the "most common group". Similarly, Renzulli (2012) uses the terms "high achieving" or "schoolhouse giftedness" to refer to students who are good lesson learners in the traditional school environment. So, in this paper, the term "gifted" is used in accordance with the recommendations of Gagné (2015) and Renzulli (2012) to refer to 1:10 students who attend everyday regular class and who demonstrate relatively high mathematical ability.

The focus on these "mildly gifted students" follows the recommendation of Gagné (2015) that the vast majority (90%) of gifted individuals belong to this lowest level, while highly gifted or talented individuals (1:100 000) are a rarity. The level of this rarity is such that even full-time teachers of the gifted may, in the course of their 35-year professional careers, encounter just a few, if any, of these extremely gifted students. His concern was that, when we present extreme examples of behaviour to parents or teachers, we risk conveying a distorted image of gifted individuals, because stakeholders would be tempted to conclude that such a rare population does not justify large investments of time and money to meet their educational needs.

Gagné (2015) therefore recommends that gifted and talented programme coordinators should first think about services for their "garden-variety" or "mildly gifted" students. In education systems that are guided by the inclusive philosophy, the "garden variety" of gifted students spends the majority of their time in regular classrooms – hence it can be argued that every teacher should be regarded as a teacher of the gifted.

What also makes the model of Gagné (2015) particularly relevant for this paper on support for gifted learners is the place given to teaching and learning within the developmental process. In his model, the developmental process of learning, training and practice combines with environmental and intrapersonal catalysts to transform natural aptitudes into skills that can be publicly demonstrated. Gagné (2015) sees the interplay of the catalysts as a chain that breaks if any link is missing, weak, ineffective or does not meet the learner's needs over a period of time. Gagné (2015) further argued that, within environmental catalysts, teachers (individuals) deserved to be labelled the "weakest link", because all the other catalysts (resources) are manipulated by the teacher. Similarly, Clark (2002) argued that classroom teachers have the most significant influence on the learning, development and achievement of gifted learners. In South Africa, the Gauteng Department of Education (2010) also conceptualised a model that places the teacher at the centre of the teaching and learning process. This is known as the intervention model for the MST Improvement Strategy, and is illustrated in Figure 2.



(Source: Gauteng Department of Education, 2010:29)

Figure 2: Intervention model for the MST Improvement Strategy

This model sees teachers and learners as the primary actors in MST education, supported by, but not entirely dependent on, resources and influenced by a range of learning environment factors and role players. The model works from the

assumption that the nature of the teaching and learning behaviour of teachers and learners determines the success of any education system more than any other factor. Research and reality show that the achievements of students, regardless of the type of school at which they are taught, depend on good teachers who are responsible for the quality of their work. Other factors, such as resources and the learning environment, are important, but not definitive. But once we point a finger at teachers as the weakest link, we are indirectly pointing at teacher preparation programmes. In South Africa, Van der Westhuizen and Maree (2006) argue that teacher colleges and universities should be the major advocates for improving gifted education, because they exert a direct influence on the education of gifted children by training (or not training) future teachers. Similarly, Oswald and De Villiers (2013) argue that the quality of gifted education is dependent on the quality of training the teachers receive – yet teachers who took part in their study said that they had not been trained to deal with gifted students.

THE ISSUE OF WHO SHOULD BE TARGETED BY TEACHER TRAINING PROGRAMMES

In countries where gifted education has been separated from mainstream provisions, training has always been targeted at specialist teachers, who then teach in special schools for the gifted. However, separate schooling for the gifted is not favoured in many developing countries, given its association with colonial practices of the past. A major feature of post-democracy reforms in education in many developing countries was a paradigm shift from an exclusive (colonial) system of education for the gifted to an inclusive (democratic) system. These efforts have culminated in the closure of centres for the gifted in some countries, and the emergence of a single education system for all. The majority of authors who oppose separate education for the gifted agree, in principle, that adequate provision can be made for such students in the regular classroom (Ainscow, 2007). In many developing countries, where the objective of education is primary education for all, stakeholders are usually hostile to and resentful of extra resource allocation to programmes for the gifted, which are seen to favour a few students. In such countries, Van der Westhuizen and Maree (2006) warn that it is difficult to justify separate programmes for gifted children; hence meeting the educational needs of the gifted has to be addressed within the inclusive framework. Gagné (2009) suggests that, in education systems that follow this inclusive philosophy, every teacher should be regarded as a teacher of the gifted. For this reason, Davison (1996) argues for all teachers to be taught how to meet the needs of gifted students, since these students spend most of their class

time in a regular classroom. This implies that, in planning for "the future that we want", training in gifted education should be mandatory for all pre-service teachers. This view is also consistent with the wider approach to inclusive education, which locates special education theory within a functionalist paradigm. This functionalist paradigm is concerned with learners who experience learning breakdowns, as well as those who evidence gifted behaviour and for whom either enrichment or acceleration could be used to ensure that the gifted learner is not neglected.

SOME THOUGHTS ON THE DESIGN OF TRAINING PROGRAMMES FOR TEACHERS OF GIFTED LEARNERS

Admittedly, there are various views as to what should go into a programme for training the teachers of gifted students. However, studies concerned with the essential competencies of teachers of the gifted are relatively consistent in their assessment of which competencies should be found in educators working with gifted students (Cross & Dobbs, 1987; Hansen & Feldhusen, 1994). Some of the critical concepts that need to be considered include a change in beliefs and attitudes, the nature and identification of gifted students, a differentiated curriculum and assessment. Each of these competencies will now be discussed.

Beliefs and attitudes

Lewis and Milton (2005) and Plunkett (2000) have highlighted the importance of beliefs and a positive attitude as a starting point in addressing the needs of the gifted. While the relationship between attitude and behaviour is complex and not always consistent, it is generally agreed that attitude is one variable that influences a person's behaviour or behavioural intent, perceptions and judgment (Bohner & Wänke, 2002). Research shows that, in many developing countries, there are hostile and negative stereotypes that shape teachers' attitudes and expectations regarding gifted students – attitudes and expectations that become barriers to the process of learning and belie the egalitarian ideals that form the philosophical foundation of many schools. Therefore, if the negative attitude of pre-service teachers about gifted students is not challenged, they will retain this attitude in professional practice.

Lewis and Milton (2005) agree with Plunkett (2000) that teachers' and pre-service teachers' beliefs and attitudes have a significant impact on their classroom practice. In a study of the characteristics of effective teachers of gifted students, significant factors identified included passion for their subject matter, positive relationships and a capacity to relate new learning to students' interests (Watters, 2010).

Similar studies have shown that teachers who participate in gifted education programmes have a more positive attitude than those who do not avail themselves of such opportunities (Lassig, 2009; Plunkett, 2000).

A study by Geake and Gross (2008) shows that a teacher's unconscious negative attitude can be reduced through professional development courses in which teachers become more familiar with the characteristics of gifted students and their learning needs. According to Gross (2004), teachers should be trained in research and exposed to research findings that contradict many of the misconceptions held regarding gifted education. This may assist in dispelling the myths and misconceptions about giftedness and gifted children. Enhanced knowledge, understanding and skills, and a related increase in confidence, may reduce unfavourable attitudes.

Change of attitude is not only important for pre-service teacher training, but also in the in-service training stage. For example, Davis and Rimm (2004) recognise the significance of attitudes towards the gifted when developing programmes. They recommended that the first question to be asked when devising a programme for gifted learners should be: "What is our attitude towards gifted children?" (Davis & Rimm, 2004:55). This is important in developing a successful programme, because schools must identify what they know and believe about gifted children and their education. In particular, they should be explicit about whether their teachers are interested in and supportive of gifted education. Schools need to know why they are providing a particular programme, what they are aiming to accomplish, and whether they are willing to be responsible and accountable for the plan of action (Davis & Rimm, 2004). A negative attitude and prejudice can cause discriminatory behaviour, particularly when it exists within a group, for example, a group of teachers (Bohner & Wänke, 2002). If teachers develop positive attitudes towards giftedness, they are more likely to be supportive of gifted education, and effective in identifying and catering for gifted students.

The nature and identification of giftedness

Besides teacher attitude, another major concern that pre-service teachers have is a lack of understanding of the nature of giftedness, stereotypical views of the rarity of gifted students and hence a lack of awareness of the prevalence of children who need enhanced or enriched educational experiences beyond what is normally provided in classrooms (Watters, 2010). One of the commonly voiced concerns

regarding gifted education is that traditional methods of identifying gifted children are culturally biased and, more importantly, that traditional conceptions of giftedness are narrow and skewed towards certain cultures (Gottfredson, 2004). Pre-service teachers should therefore be exposed to more diverse methods of identifying gifted students. Equity requires more diverse and more sensitive means of finding those unrecognised, potentially gifted students who have yet to reveal their true capabilities.

Reflecting a broader trend in gifted education, both Ford (2011) and Richert (2003) advocate a multidimensional view of giftedness and corresponding multimodal ways of identifying it. Those who support a multidimensional approach present their broader conceptions as being more democratic, as they are more inclusive than the traditional intellectual approach. In short, Gottfredson (2004) argues that if our tools for identifying giftedness do not produce racial balance, we should modify them until they do.

Differentiated curriculum

Another major concern in gifted education is that, in practice, planning for differentiation poses substantial challenges to teachers. In order to cater for the diverse needs of gifted students, the most common approach that teachers can implement is to create opportunities for gifted students to realise their potential through a differentiated curriculum. According to Maker (1975), differentiation requires the modification of four primary areas of curriculum development: content (what we teach), process (how we teach), product (what we expect the students to do or show) and the learning environment (where we teach/our class culture). Teachers can differentiate the curriculum by removing mastered material from the existing curriculum, providing new content, and extending the curriculum with enrichment activities (Ashman & Elkins, 2009). Differentiation requires recognising students' varied background knowledge, language and learning interests. According to Harris and Hemming (2008), varied and practical teaching strategies facilitate diverse ways to assist gifted students to achieve learning outcomes. The skills

necessary to plan and implement a differentiated curriculum can also be developed in pre-service programmes. Pre-service teachers themselves need to develop skills in higher-order thinking and creative thinking to develop content that is more abstract and engaging for students who seek complexity and challenge.

Assessment

Effective pedagogy requires assessment, which provides the critical links between what is valued as learning, ways of learning, ways of identifying needs and improvement (Pendergast & Bahr, 2010). Following this view, Ashman and Elkins (2009) emphasise the need for pre-service teachers, teachers and other professionals to identify what gifted students know (assessment) and how they learn in relation to effective teaching. Monitoring student engagement and performance through assessment strategies supports gifted students to scaffold academic skills and learning processes. Yet pre-service teachers are often unprepared to assess students' understanding (Callahan, Cooper & Glascock, 2003). This may also be overcome with teacher education training that promotes effective communication and collaboration in the classroom, including the provision of a variety of assessment strategies to improve teaching and learning.

CONCLUSION

This paper argued that mathematically gifted students are the hope for the future in the 21st-century knowledge economy. Currently, they are found in mainstream classrooms that follow inclusive education practices. In these classrooms, they are not receiving adequate support, as teachers are not trained in how to cater for the needs of gifted students. This is detrimental to our efforts to produce skilled people. The paper then argued that all teachers undergoing pre-service training should receive training in educating gifted learners. This training should involve changing teachers' beliefs and attitudes towards gifted education, the nature and identification of gifted students, the differentiated curriculum and assessment.

REFERENCES

Ainscow, M., 2007, 'Teaching for diversity: the next big challenge', in Connelly, M., He, M.F. and Phillion, J. (eds), *The handbook of curriculum and instruction*, Sage, Thousand Oaks, CA.

Ashman, A. & Elkins, J., 2009, *Education for inclusion and diversity,* Pearson Education Australia, Frenchs Forest.

Bohner, G. & Wänke, M., 2002, *Attitudes and attitude change*, Psychology Press, Hove.

Callahan, C., Cooper, C. & Glascock, R., 2003, 'Preparing teachers to enhance talent: the position of national education organisations', viewed 16 August 2016, from http://www.eric.ed.gov/PDFS/ED477882.pdf.

Clark, B., 2002, *Growing up gifted: developing the potential of children at home and at school,* Merrill Prentice Hall, Upper Saddle River, NJ.

Cross, J.A. & Dobbs, C., 1987, 'Goals of a teacher training program for teachers of the gifted', *Roeper Review 9, 170–171.*

Davis, G. & Rimm, S., 2004*, Education of the gifted and talented,* 5th ed., Allyn and Bacon, Boston, MA.

Davison, J., 1996, 'Meeting state mandates for gifted and talented: Iowa teacher preparation programs', *Roeper Review 19, 41–43*.

Department of Basic Education, 2013, 'Investigation into the implementation of Mathematics, Science and Technology. A report to the Minister of Basic Education by a special task team set up to investigate MST', viewed from www.education.gov.za/LinkClick.aspx?fileticket=rMWDa1cHh3I%3D&tabid.

Department of Science and Technology, 2008, 'Review of mathematical sciences research at South African higher education institutions: International Review Panel Report, viewed from http://evaluation.nrf.ac.za/Content/Documents/review_msr_report.pdf.

Diezmann, C. & Watters, J.J., 2002, 'Summing up the education of mathematically gifted students', proceedings of the 25th Annual Conference of the Mathematics Education Research Group of Australasia, pp. 219–226, Auckland.

Ford, D., 2011, *Multicultural gifted education*, 2nd ed., Prufrock Press, Waco, TX.

Friedman, H.S. & Martin, L.R., 2011, *The longevity project: surprising discoveries for health and long life from the landmark eight-decade study*, Hudson Street Press, New York, NY.

Gagné, F., 2009, 'Building gifts into talents: brief overview of the DMGT 2.0', viewed 1 August 2016, from: http://www.giftedconference2009.org/presenter_files/gagne_p12_therealnature.pdf.

Gagné, F., 2010, 'Motivation within the DMGT 2.0 framework', *High Ability Studies* 21, 81–99.

Gagné, F., 2015, 'From genes to talent: the DMGT/CMTD perspective', *Revlsta de Educaclon* 368:12–37.

Gauteng Department of Education, 2010, *Gauteng Mathematics, Science and Technology Education Improvement Strategy 2009–2014*, Gauteng Department of Education, Johannesburg.

Geake, J.G. & Gross, M.U.M., 2008, 'Teachers' negative affect toward academically gifted students: An evolutionary psychology study', *Gifted Child Quarterly* 58, 217–231.

Gottfredson, L.S.i 2004, 'Intelligence: Is it the epidemiologists' elusive "fundamental cause" of social class inequalities in health?' *Journal of Personality and Social Psychology* 86, 174–199.

Gross, M.U.M., 2004, *Exceptionally gifted children,* 2nd ed., Routledge-Falmer, London.

Hansen, J.B. & Feldhusen, J.F., 1994, 'Comparison of trained and untrained teachers of gifted students', *Gifted Child Quarterly* 38, 115–121.

Harris, A.M. & Hemming, B.C., 2008, 'Preservice teachers' understandings of and preparedness for gifted and talented education', *Australasian Journal of Gifted Education* 17(1), 5–18.

Lassig, C., 2009, 'Teachers' attitudes towards the gifted: the importance of professional development and school culture', *Australasian Journal of Gifted Education* 18(2), 32–42.

Lewis, E. & Milton, M., 2005, 'Attitudes of teachers before and after professional development', *Australasian Journal of Gifted Education* 14(1), 5–14.

Lubinski, D., Benbow, C.P. & Kell, H.J., 2014, 'Life paths and accomplishments of mathematically precocious males and females four decades later', *Psychological Science* 25(12), 2217–2232.

MacGillivray, H., 2000, 'Submission to the Australian science capability review', viewed 25 July 2016, from http://www.industry.gov.au/science/review/ChanceSubmissions/ReviewSubs/sub60AMSCmaths.doc.

Maker, J., 1975, 'Training teachers for the gifted and talented: a comparison of models', viewed 16 August 2016, from http://www.eric.ed.gov/PDFS/ED119453.pdf.

National Planning Commission (NPC), 2011, 'Diagnostic overview: Department of the Presidency', viewed 16 August 2016, from http://www.education.gov.za/LinkClick.aspx?fileticket=fhxWfqooNWg%3D&tabid=889.

Oswald, M. & De Villiers, J.M., 2013, 'Including the gifted learner: perceptions of South African teachers and principals', *South African Journal of Education* 33, 1–21.

Pendergast, D. & Bahr, N., 2010, *Teaching middle years: rethinking curriculum, pedagogy and assessment,* 2nd ed., Allen & Unwin, Crow's Nest.

Plunkett, M., 2000, 'Impacting on teacher attitudes toward gifted students', *Australasian Journal of Gifted Education* 9(2), 33–42.

Renzulli, J., 2012, 'Re-examining the role of gifted education and talent development for the 21st century: a four-part theoretical approach', *Gifted Child Quarterly* 56(3), 150–159.

Richert, E.S., 2003, 'Excellence with justice in identification and programming', in N. Colangelo & G.A. Davis (eds.), *Handbook of gifted education,* 3rd ed., Allyn & Bacon, Boston, MA.

Smith, A., 2004, *Making mathematics count: the report of Prof Adrian Smith's inquiry into Post-14 Mathematics education*, The Stationery Office Limited, London.

Van der Westhuizen, C. & Maree, J.G., 2006, 'Some thoughts on the training of teachers of gifted learners', *Gifted Education International* 21:201–217.

Watters, J.J., 2010, 'Career decision making among gifted students: the mediation of teachers', *Gifted Education Quarterly* 54(3), 222–238.

LEARNING ORAL COMMUNICATION SKILLS IN A TEACHER PROFESSIONAL DEVELOPMENT PROGRAMME THROUGH OPEN AND DISTANCE LEARNING IN TANZANIA

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ABSTRACT

This paper explores the issues related to the learning of oral communication skills (OCS) in the English language through distance learning in an era where the information revolution is affecting the delivery and practice of language learning through open and distance learning (ODL). The study is modelled after Kurniasih's study of language skills and learning (Kurniasih, 2011), and uses both quantitative and qualitative approaches. The sample for the study comprises 102 participants (100 students and two tutors) from the Diploma in Primary Teacher Education programme, presented by the Open University of Tanzania. The data was collected through questionnaires and interviews. The findings indicate that the student teachers share positive perceptions of learning OCS through ODL, primarily because of the nature of ODL. The study can assist the development of teaching OCS in the English language.

Keywords: *Oral communication skills, open and distance learning, teacher professional development, English language, language learning.*

INTRODUCTION

Teacher professional development is defined as any formal or informal activity aimed at enhancing the knowledge and skills of teachers by means of orientation, training and support (Coetzer, 2007). This development can take place in the form of initial training, induction courses or in-service training.

According to the Suzan (2000), teacher professional development is significant in deepening teachers' knowledge of the subjects that they teach, sharpening their teaching skills in the classroom, helping them keep up with developments in individual fields and in education in general, helping them generate and contribute to new professional knowledge, and increasing their ability to monitor learners' work. In addition, teacher professional development helps to change teachers' teaching methods, which impacts on students' learning (Borko & Putman, 1996). A study on the perception and practices of teachers in teacher professional development in Tanzania by Komba and Nkumbi (2008) showed that 67.6% of teachers perceived teacher professional development as a means of improving teachers professionally, academically and technically.

Bearing in mind the significance of teacher professional development, this study aims to explore the issues related to the learning of oral communication skills (OCS) in the English language through distance learning in an era where the information revolution is affecting the delivery and practice of language learning through open and distance learning (ODL) at the Open University of Tanzania (OUT).

OPEN AND DISTANCE LEARNING AND TEACHER PROFESSIONAL DEVELOPMENT

ODL refers to the provision of flexible educational opportunities in terms of access and multiple modes of knowledge acquisition, which permits learning with no barriers of age, gender and time (Santhi, Mohayidini & Chun, 2015). As far as professional development is concerned, the ODL mode is a tool for human capital development, specifically for in-service teachers who want to upgrade their knowledge and skills in higher education and education agencies in both developing and developed countries (Maila & Pitsoe, 2013).

ODL is also useful in developing the knowledge of teachers in remote and rural areas by helping them access opportunities for academic advancement. The ODL mode is therefore complementary to the conventional teaching and learning system as it addresses challenges of cost, access and quality of education. It provides access to education for the marginalised.

DIPLOMA IN PRIMARY TEACHER EDUCATION AND ENGLISH LANGUAGE LEARNING AT OPEN UNIVERSITY OF TANZANIA

The Diploma in Primary Teacher Education (DPTE) is a two-year programme offered by OUT in collaboration with the United Kingdom Open University (UKOU) and Teacher Education for Sub-Saharan Africa (TESSA). The programme was launched in 2008/09 in response to the urgent need for quality teachers in Tanzania. The programme is offered in three streams: science, social science and languages.

The languages stream is the focus of this study. In this stream, students enrolled for the programme practise and develop communication skills through ODL. As a result of the information revolution in recent years, OUT adopted a policy for the integration of new technology in the teaching and learning process.

The incorporation of information technology in language teaching through ODL is thus expected to change students' perceptions of learning OCS through ODL, as showcased in the study of Rodrigues and Vethamani (2015) regarding the impact of online learning in the development of OCS. Their study collected students' feedback on the effectiveness of the online learning programme, English Proficiency in Conversation (EPiC). The study's purpose was to assess how the programme influenced the speaking performance of students in both the EPiC group and the non-EPiC group. The study found that the EPiC group of students performed better than the non-EPiC group of students in terms of improved speaking grades, vocabulary and listening skills.

It is against this backdrop that the present study aims to explore the current perceptions and challenges faced by OUT student teachers in learning OCS through ODL in the context of the information revolution.

AIM OF THE STUDY

The study aimed to examine student teachers' perceptions of learning OCS through ODL, and the challenges they face in learning OCS through ODL in the information revolution era.

Objectives

The objectives of the study were as follows:

- To identify the perceptions of student teachers enrolled for the DPTE regarding learning OCS through ODL.

- To explore the challenges faced by student teachers enrolled for the DPTE in learning OCS through ODL in the information revolution era.

LITERATURE REVIEW

The concept of OCS

Rahman (2010) defines communication as a dynamic interactive process that involves the effective transmission of facts, ideas, thoughts, feelings and values. According to Alam and Uddin (2013), communication can happen orally or in writing. Byrne (1986) argues that "communication is a two-way process between the speaker and the listener and involves the productive skills of speaking and the receptive skills of understanding". Communication is therefore the process of verbally transmitting information and ideas from one individual or group to another.

OCS include the mix of the verbal, interpersonal and physical strategies needed to interact confidently and effectively with a range of audiences (Griffith Institute of Higher Education, 2004). According to Alam and Uddin (2013), this implies speaking and listening to oral language. Carter and Nunan (2001) propose that speaking is a linguistic activity that consists of pronunciation (sound), morphology and lexis (words and their parts), grammar and syntax (structure), semantic discourse (conversation and utterances), pragmatics (the use of language and associated rules) and fluency (ease of speech, confidence, coherence and speed). Speaking is thus all about verbal responses.

According to Kurniasih (2011), there are several activities for learning language-speaking skills. These include songs, chants and poems, games, peer work activities and oral reports or discussions on materials read. These activities can encourage new learners of a language to listen to and experience the language in diverse ways, encouraging the sharing of ideas, as well as the ability to ask questions or give information.

Listening is an active process of constructing meaning. When listening, a listener needs active mental involvement (Staab, 1992). In developing OCS, listening constitutes the first step (Alam & Uddin, 2013). Kurniasih (2011) argues that no one can say a word before having listened to it. In this regard, the teacher must take into account that listening is a critical skill in communication, because one can respond accurately to a communication stimulus only after listening to it accurately. In this way, listening represents half of the communication process as a person gains

access to most of the information through listening. Learners spend more than half of their time in the classroom listening.

Both of these skills must therefore be practised satisfactorily for successful oral communication. Alam and Uddin's study revealed that students improved their OCS because they were given opportunities to practise language skills in a structured environment (Alam & Uddin, 2013). The authors therefore concluded that the teaching of skills needs to be planned, strategised, practised and assessed; preferably in an authentic setting (Chan, 2011). Similarly, Rahman's study concluded that the task-based approach to language learning has merit (Rahman, 2010). This study revealed that such skills were limited by technology in the past and might not have been accommodated by the present ODL language-teaching technology.

Learning communication skills

Four language skills are involved in learning any language: listening, speaking, reading and writing (Carter & Nunan, 2001). Figure 1 illustrates the process.

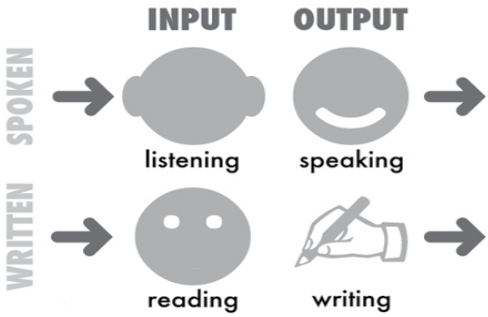

Figure 1: Language skills and learning (adapted from Kurniasih, 2011)

As shown in Figure 1, successful language learning involves listening and reading, which leads to language output in the form of speaking and writing skills. Listening and speaking are considered spoken or oral communication language skills, whereas reading and writing are considered written communication language skills.

Eisenhart (1990) mentions five components to focus on during the teaching of OCS. These are the development of listening and speaking skills, the teaching of a variety

of spoken texts, the creation of a rich language-learning environment, the teaching and extending of vocabulary and conceptual knowledge, and the promotion of the auditory memory of the students.

Developing listening and speaking skills

Eisenhart (1990) argues that the teacher has to develop a set of pre-skills or rules before proceeding with the formal instruction of oral language. These are rules for listening and rules for speaking. For instance, when learning listening skills, a learner has to be taught how to be a good listener. The teacher has to encourage conversation and attentive listening, and create natural learning charts to demonstrate what good listening is. When it comes to speaking skills, learners should be provided with opportunities to engage with others in a conversational style, taught rules that govern social interaction, and use natural charts to capture the mannerisms associated with effective speaking, such as non-verbal behaviour. Non-verbal behaviour may include intonation, use of voice, volume (which depends on the situation and needs), pronunciation, proximity, eye contact and pauses.

Teaching a variety of spoken texts

Eisenhart (1990) asserts that spoken texts include oral reports, questioning and interviews, storytelling and anecdotes, arguments, and formal or informal pair and small group work and debates. The work of the teacher is to show learners how to use these texts for the effective learning of oral communication skills.

Creating a rich language-learning environment

Supporting and nurturing the learning environment is key if communication styles are to be valued, accepted and accommodated (Eisenhart, 1990). Strategies for developing speaking and learning skills have to promote authentic learning.

Teaching and extending vocabulary and conceptual knowledge

Vocabulary is the knowledge of words and word meanings (Kamil & Hiebert, 2005). It refers to the kind of words that students must know. Vocabulary is the term used to describe the collection of words in a given language and understood in speaking, listening, reading and writing (NRTAC, 2010). A student has to be introduced to the familiar words or concepts before new vocabulary is introduced.

Promoting auditory memory

Auditory memory involves the process of attending to, listening to, processing, storing and recalling information. It refers to a student's ability to assimilate information presented orally, to process that information, store it and recall what has been heard.

Conclusion

This literature review has indicated all the skills that are important in communication, and has alluded to different strategies that can be used to enable teaching. Even so, teaching in the ODL mode is conducted by someone who is away from the learner. By definition, the learner and the teacher are not in the same classroom and are separated by some geographic distance (Ghosh, Nath, Agarwal & Nath, 2012). Following this physical separation of the institution, the learners and the teacher in the ODL mode, the teaching of OCS is likely to be problematic, despite the progress made by technology to mitigate the constraints imposed by physical separation. This study therefore aims to examine the challenges faced by students who have opted for the language stream in the DPTE programme at OUT.

METHODS

This study uses a mixed methods approach. A quantitative method was used to collect data on students' perception of learning OCS and the associated challenges brought about by the ODL mode. A qualitative method was used to capture in-depth information from the tutors in the DPTE programme.

The study was conducted at eight OUT regional centres: Temeke, Kinondoni, Ilala, Njombe, Iringa, Shinyanga, Morogoro and Dodoma. Purposive sampling was used in selecting the OUT regional centres and the subject tutors who were involved in teaching the OCS-related modules. Simple random sampling was used in selecting the participants (student teachers). The sample included 100 students and two tutors. However, only 67 students returned the questionnaire.

For the data-collection process, the study used both questionnaires and a structured interview. The questionnaires were administered to the student teachers and the tutors were interviewed. The questionnaire consisted of five-point Likert scale-type responses. The scale ranged from "strongly agree", represented by 5, to "strongly disagree", represented by 1. Participants were requested to indicate their level of agreement.

The questionnaire was used to collect data regarding students' demographics, perceptions and challenges in learning OCS in the English language through ODL. The semi-structured interview was administered to the tutors to obtain information about their perceptions of teaching OCS in the English language through ODL, and the challenges they encountered in this process. The alpha reliability of the questionnaire was 0.79, which was in the acceptable range. Data from the questionnaire was analysed using the Statistical Package for Social Science (SPSS) version 19. Content analysis was used to process the interview data.

FINDINGS

Table 1: Demographic characteristics

Variables	Categories	Frequency of responses	
		N	%
Sex	Male	23	34.3
	Female	44	65.7
Regional centres	Temeke	9	13.4
	Kinondoni	12	17.9
	Ilala	2	3.0
	Morogoro	9	13.4
	Shinyanga	9	13.4
	Njombe	10	14.9
	Dodoma	7	10.4
	Iringa	9	13.4
Type of school where the student teachers are teaching	Private primary school	1	1.5
	Public primary school	65	97.5
	Private English-medium school	1	1.5

The data from Table 1 indicates that the sample predominantly comprised females (65.7%). The participants were drawn from eight regional centres of OUT, of which

Kinondoni (17.9%) supplied the largest pool of participants. The findings showed that almost all respondents (97.5%) taught at public primary schools.

Students' perceptions on the development of OCS in the English language through the ODL mode

The perceptions of student teachers on the development of OCS in the English language through the ODL mode were processed separately from those of the tutors. The perceptions of the student teachers are represented in Table 2 and those of the tutors in Table 3.

Table 2: Mean (M) and standard deviation (SD) of students' perceptions of learning OCS in the English language through an ODL delivery mode

Statements of the perception	M	SD
OCS can be acquired individually through self-study	3.13	1.27
There is accuracy in learning OCS individually	2.31	1.10
OCS are individually learned and acquired easily	2.92	1.20
Individual demonstration is important in learning OCS	1.67	0.89
Individual practice on pronunciation and persuasion are crucial in learning OCS	1.49	0.84
Average	**2.26**	**1.04**

Scale: 5 = Strongly agree, 4 = Agree, 3 = I don't know, 2 = Disagree, 1 = Strongly disagree

The findings indicated that the highest level of agreement occurred on the item "OCS can be acquired individually through self-study" with a mean of 3.1 and a standard deviation of 1.2. The statement that "OCS can be learned individually and acquired easily" produced a mean of 2.9 and a standard deviation of 1.2. Generally, the descriptive results shown in Table 2 regarding the students' perceptions of the development of OCS in the English language through ODL demonstrated the low levels of agreement of students. The mean for the statements ranged from 3.1 to 1.4, where the average mean was 2.26 and the standard deviation was 1.04.

Table 3: Mean (M) and standard deviation (SD) of tutors' perception of students' learning of OCS in the English language through ODL

Statement of the perception	M	SD
OCS are effectively learned in the presence of a tutor during discussion	1.47	0.61
Tutor directives are significant in learning OCS	1.52	0.58
Tutors' immediate feedback is crucial in learning OCS	1.49	0.84
Tutor assistance and rewards are significant in learning OCS	1.47	0.61
Tutors' recognition of students' needs and their ability to guide helps in learning OCS	1.52	0.58
Average	**1.44**	**0.64**

Scale: 5 = Strongly agree, 4 = Agree, 3 = I don't know, 2 = Disagree, 1 = Strongly disagree

The findings in Table 3 indicated that tutors had the same level of agreement on the following statements: "OCS are effectively learned in the presence of a tutor during discussion" (mean of 1.47 and standard deviation of 0.61) and "Tutor assistance and rewards are significant in learning OCS" (mean of 1.47 and standard deviation of 0.61). Participants indicated similar perceptions with the statements "Tutor directives are significant in learning OCS" (mean of 1.52 and standard deviation of 0.58) and "Tutors' recognition of students' needs and their ability to guide helps in learning OCS" (mean of 1.52 and standard deviation of 0.58).

As shown in Table 3, the means ranged from 1.52 to 1.47. The findings indicated that tutors' perceptions on the development of OCS through ODL are similar to some issues in Table 2, which summarises the findings from student teachers on the same issues. The average mean of the results in Table 2 (M = 2.26) is higher than the average mean of the results in Table 3 (M = 1.44).

Subject tutors were interviewed on their perceptions of teaching OCS in the English language through ODL. They emphasised the importance of the availability of a tutor in teaching and helping student teachers develop their OCS through ODL.

The tutors indicated the following:

Tutor 1:

"In learning OCS, the presence of a tutor is very important, because a tutor has to guide and direct students, and demonstrate the pronunciation of an English word."

Tutor 2:

"Immediate feedback from the tutor is essential to what is learned in any language skill, including OCS."

Table 4: Mean (M) and standard deviation (SD) of the perceptions of the challenges of learning OCS through ODL

Statements on the challenges	***M**	**SD**
Time for practicing OCS is limited	2.34	1.08
Synchronous feedback is limited in learning OCS	2.34	1.08
No guidance on clarity on the pronunciation of words in learning OCS	2.02	0.96
Limited chance for students to make judgments on what they learn in the process of learning OCS	2.13	1.16
OCS learning through ODL is passive	2.12	1.11
Average	**2.18**	**1.08**

Scale: 5 = Strongly agree, 4 = Agree, 3 = I don't know, 2 = Disagree, 1 = Strongly disagree

The findings from Table 4 indicate that the following statements were perceived in equal rank: "Time for practicing OCS is limited" (mean of 2.34 and standard deviation of 1.08) and "Synchronous feedback is limited in learning OCS" (mean of 2.34 and standard deviation of 1.08). Students had high perceptions on the statement "Limited chance for students to make judgments on what they learn in the process of learning OCS" (mean of 2.12 and standard deviation of 1.16). Generally, student teachers perceived minimal challenges in learning OCS through ODL, with the average mean being 2.18 and the standard deviation being 1.08. Furthermore, tutors commented on the challenges they faced when teaching English language to distance learners.

They indicated the following:

Tutor 1:

> *"There is limited time in meeting students when needs arise, for instance, when I mark students' annual examination papers or main timed test papers… I observe and find some of the things that a student needs to be told or taught for authentic learning of OCS… Students are scattered all over."*

Tutor 2:

> *"Since the national and official language in Tanzania is Kiswahili, most learners use Kiswahili in everyday communication. Consequently, learning English becomes difficult. The students make many grammatical mistakes in examinations. Learners tend to thinki in Kiswahili and explain in English, as observed in face-to-face interaction sessions."*

DISCUSSION

Students' perceptions of the development of OCS through in the English language ODL

The findings of this study indicate that students recognise the importance of individual efforts for the development of OCS in the English language through ODL. They realise that this is more important than tutor assistance due to the nature of ODL as a mode of delivery. According to Santhi et al. (2015), the ODL mode provides flexibility to the students regarding their choice of educational endeavours that can occur anywhere, anytime and in any way. As a result, the individual student becomes self-directed. This means that the student is empowered to take increasingly greater responsibility for various decisions associated with the learning endeavour (Hiemstra, 1994). Moreover, the findings seems to support the view that, when studying through ODL, information and communication technology (ICT) plays a vital role in meeting the requirements and expectations of students on a large scale. ICTs in teaching and learning are significant in creating greater information access, better communication, synchronous and asynchronous learning, increased cooperation and collaboration, cost-effectiveness and pedagogical improvement (Sanga, Sife & Lwoga, 2007). A study by Yunus, Lubis and Lin (2009) shows that a high percentage of students agreed that it is beneficial to use ICTs to learn English (92.4%). In addition, 89.4% claimed that using ICTs improves English language skills.

In ODL, ICT is integrated in terms of electronic learning through educational technologies (Sanga et al, 2007). These educational technologies include computers, video conferencing, audio CDs and DVDs (Nyandara, 2012), all of which facilitate the learning of OCS in ODL through self-study.

According to Nihuka and Voogt (2011), a student who studies through ODL can interact with an instructor through ICTs. This implies that the ODL mode promotes learner autonomy, empowers students and motivates self-directedness. The students take responsibility for their learning.

As far as the ODL mode is concerned, tutors highlight the importance of feedback in the development of language skills. These results are similar to the findings of Mikre (2010:111), who considers feedback essential in improving learning, since learners will be in a position to review both correct and incorrect performance. However, Black and William (2004) found that feedback in the form of incomplete comments had a negative impact on students' learning. For instance, comments, grades or scores may not tell students how to improve in a certain area of learning. Therefore, this indicated that immediate feedback through face-to-face interaction is significant in education through both the contact and ODL mode. This leads to authentic learning.

Challenges distance learners encounter in developing OCS in the English language through ODL

Even though learners reported minimal challenges in learning OCS in the English language through ODL, their tutors stated otherwise. The tutors cited the lack of English language practice due to the common usage of Kiswahili to present a problem. There are two contrasting contexts for language learning: the university and the home. This is supported by Hurley (2003), who argues that this is a consequence of the many language identities and alternatives embedded in the day-to-day communication functions of the student, as well as the existence of environmental challenges. However, the findings regarding the challenge of limited interactions with students from tutors align with the findings of Attri (2012), who contends that, in the ODL mode, students lack feedback or contact with the tutor; this means that there are limited support services. Other challenges distance students may encounter include insecurity about learning due to the financial cost and disruptions of family life.

The findings revealed that the autonomy and self-directedness developed by learning through ODL empowered the learners who studied the English language to overcome challenges in their learning, while other general challenges remained constant for both ODL and contact students.

CONCLUSION

The development of OCS in the English language through ODL is possible because of the flexible nature of the ODL mode and the autonomy learners develop. Despite the challenges experienced by learners, the ODL mode is still viewed as positive and assists them in becoming competent in their teaching.

REFERENCES

Alam, Q. & Uddin, A.B., 2013, 'Improving English oral communication skills of Pakistani public school's students', *International Journal of English Language Teaching* 1(2), 17–36.

Attri, A.K., 2012, 'Distance education: problems and solutions', *International Journal of Behavioral Social and Movement Sciences* 1(4), 42–58.

Borko, H. & Putnam R.T., 1996, 'Learning to teach', in D.C. Berliner & R.C. Calfee (eds.), *Handbook of educational psychology,* pp. 673–708, Macmillan, New York, NY.

Black, P. & William, D., 2004, 'Teacher developing assessment for learning: impact on student achievement', *Assessment in Education: Principles Policy and Practice* 11(1), 49–65.

Byrne, D., 1986, *Teaching oral English,* 2nd ed., Longman, Harlow.

Carter, R. & Nunan, D. (eds), 2001, *Cambridge guide to teaching English to speakers of other languages,* Cambridge University Press, Cambridge.

Chan, V., 2011, 'Teaching oral communication in undergraduate science: are we doing enough and doing it right?' *Journal of Learning Design* 4(3), 71–79, viewed October 2015, from http://files.eric.ed.gov/fulltext/EJ940652.pdf.

Coetzer, A., 2007, 'Employee learning of their working place as learning environment', *Journal of Workplace Learning* 1(1), 1–11.

Eisenhart, C., 1990, 'Oral language development: the foundation for literacy', PhD thesis, University of Virginia.

Ghosh, S., Nath, S., Agarwal, S. & Nath, A., 2010, 'Open and distance learning (ODL) education system – past, present and future: a systematic study of an alternative education system', *Journal of Global Research in Computer Science* 3(4).

Graffith Institute of Higher Education, 2004, 'Oral communication toolkit Griffith University', viewed June 2015, from http://www.griffith.edu.au/centre/gihelgriffith_graduate.

Harwell, S.H., 2003, *Teacher professional development: it's not an event, it's a process*, CORD, Waco, TX.

Hurley, J.L., 2003, *Meeting the needs of second language learners: an educator's guide*, Association for Supervision and Curriculum Development (ASCD), Alexandria, VA.

Hiemstra, R., 1994, 'Self-directed learning', in T. Husen & T.N. Postlethwaite (eds), *The international encyclopaedia of education,* 2nd ed., Pergamon Press, Oxford.

Iacob, I., 2009, 'The effectiveness of computer-assisted classes for English as a second language', *Annals Computer Science Series* 7(1), 141–148.

Kamil, M. & Hiebert, E.H., 2005, 'The teaching and learning of vocabulary: perspectives and persistence issues', in E.H. Hiebert (ed.), *Teaching and learning of vocabulary,* pp. 1–23, Lawrence Erlbaum, Mahwah, NJ.

Komba, W.L. & Nkumbi, E., 2008, 'Teachers professional development in Tanzania: perceptions and practices', *Journal of International Cooperation in Education* 11(3), 67–83.

Kurniasih, E., 2011, 'Teaching the four language skills in primary EFL classroom: some considerations', *Journal of English Teaching* 1(1), 70–81.

Maila, M.W & Pitsoe, V.J., 2013, Rethinking continuing professional teacher development within the open distance learning framework', *International Journal of Technology and Inclusive Education* 1(1), 17–23.

Mikre, F., 2010, 'The role of assessment in curriculum practice and enhancement of learning', *Ethiopian Journal of Education* 5(2).

Mizell, H., 2010, *Why professional development matters?,* Learning Forward, Oxford.

Nihuka, K.A. & Voogt, J., 2011, 'E-learning course design in teacher design teams: experience of the Open University of Tanzania', *International Journal of Learning Technology* 6(2).

National Reading Technical Assistance Centre (NRTAC), 2010, *A review of the current research on vocabulary instruction: a research synthesis,* US Department of Education.

Nyandara, Z.I., 2012, 'Challenges and opportunities of technology based instruction in open and distance learning: a comparative study of Tanzania and China', *Proceedings and Report of the 5th UbuntuNet Alliance Annual Conference*, 2012, pp 130–145, viewed from https://www.ubuntunet.net/sites/default/files/nyandaraz.pdf.

Rahman, M.M., 2010, 'Teaching oral communication skills: a task-based approach', *ESP World* 9(27).

Rodrigues, P.D. & Vethamani, M.E., 2015, 'The impact of online learning in the development of speaking skills', *Journal of Interdisciplinary Research in Education* 5(1), 43–67.

Sanga, C., Sife, A.S. & Lwoga, E.T., 2007, 'New technologies for teaching and learning: challenges for higher learning institutions in developing countries', *International Journal of Education and Development Using ICT* 3(2), 57–67.

Santhi, R., Mohayidini, M.G. & Chun, L.S., 2015, 'Access to higher education via ODL: addressing attrition to maximize university sustainability', *American Journal of Economics* 5(2), 208–216.

Suzan, S., 2000, *Briefing for the National Commission on Mathematics and Science Teaching of 21st Century*, pp. 19 & 23, Washington, DC.

Shohel, M.M.C., 2010, 'Open and distance learning for teacher professional development: the English in action (EIA) model for the global south', The Open University United Kingdom.

Smith, J.A., 1975, *Creative teaching of the language arts in the elementary school*, Allyn & Bacon, Boston, MA.

Staab, C., 1992, *Oral language for today's classroom*, Pipping Publishing, Markham, Ontario.

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2002, *Open and distance learning trends, policy and strategy considerations,* UNESCO, New York, NY.

Yunus, M., Lubis, M.A. and Lin, C.P., 2009, 'Language learning via ICT: use, challenges and issues', National University of Malaysia.

Zuheer, K.M.M., 2008, 'The effects of using a program based on cooperative learning strategy on developing some oral communication skills of students', Master's dissertation, Sana'a University.

UTILISING LARGE-SCALE ASSESSMENT RESULTS TO IMPROVE ADDITIONAL LANGUAGE TEACHING AND LEARNING: CHALLENGES AND OPPORTUNITIES

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ABSTRACT

The introduction of annual assessments in South African schools from 2011 represents yet another attempt to remedy the low learner performance in literacy and numeracy. The education authorities have embarked on the annual practice of testing learners in Grade 1 to Grade 6 and Grade 9 for the twin purpose of measuring the performance of the education system and providing diagnostic information to teachers to guide and inform their teaching. The results have shown that there are no significant improvements in literacy in English language. In this paper, I present a review of the Annual National Assessment (ANA) reports and other relevant literature with a view to establishing the extent to which the intent of providing diagnostic information to guide teachers and provide steps to improve literacy figures has actually been met. I further discuss both the challenges and opportunities of utilising annual assessments as a vehicle for improving English language teaching and learning in the classroom. I conclude by providing suggestions on how English language learning and teaching can be enhanced through this national testing regime.

Keywords: *English language teaching and learning, literacy, large-scale assessment, Annual National Assessment, Curriculum Assessment Policy Statement*

INTRODUCTION

The paper begins with global concerns regarding literacy and numeracy, followed by an overview of literacy concerns in Africa and a discussion of South Africa and the Annual National Assessment (ANA). Next, the methodology and findings of the study are presented, followed by a discussion on the language challenges faced by teachers in an attempt to use the results of the ANA to improve teaching and learning.

GLOBAL CONCERNS REGARDING LITERACY AND NUMERACY

According to the International Reading Association (IRA) and the National Association for the Education of Young Children (NAEY), literacy is one of the most important academic skills and is deemed a significant predictor of success in life (IRA & NAEY, 1998). Every individual needs to be literate and numerate, as these basic skills form part of our daily lives; from interpersonal communication to simple tasks like following signs and instructions. Traditionally, literacy is referred to as the skills of reading and writing, but today our understanding of literacy encompasses much more than that. Consequently, our understanding of what is required of teachers of literacy needs to accommodate this shift in paradigm. According to an education programme carried out in the United States, the American Federation of Teachers (AFT), the National Council on Measurement in Education (NCME) and the National Education Association (NEA) jointly defined seven standards for teacher competence in the educational assessment of students (AFT, NCME & NEA, 1990). These standards state that teachers should be skilled in choosing and developing assessment methods appropriate for instructional decisions. Stiggins (1990), who proposed seven competencies that teachers should possess in order to be considered "assessment literate", developed a revised version of this standard.

After 20 years, Brookhart (2011) argued that Stiggins's standards do not adequately address the current education context of teachers with regard to recent conceptions of formative assessment knowledge, skills and the effects of accountability and standards-based reform on teachers' classroom practices. This limitation was addressed by proposing an extended set of assessment knowledge and skills that teachers require. Gotch and French (2014) note that assessment literacy includes using multiple high-quality assessments that are aligned with accurately defined achievement targets. From this perspective, literacy includes the capacity to read, understand and critically appreciate various forms of communication, including

spoken language, print, broadcast media and digital media. In the same way, we now think of numeracy as not just the ability to use numbers, but also the wider ability to use mathematics to solve problems and meet the demands of day-to-day living in complex social settings. For all these reasons, teachers of all post-primary subjects have an important role to play in developing and consolidating students' ability to use literacy and numeracy.

LITERACY CONCERNS IN AFRICA

South Africa, like other post-colonial emerging economies, has its challenges with the development of literacy (Abadzi, 2008), and needs to respond to what has been called a crisis in literacy teaching for almost a decade. In recent years, the key focus of the transformation programme for the post-apartheid schooling sector in South Africa has moved towards assessment as a key driver for improving teaching and learning in schools (Kanjee & Sayed, 2013). The problem in South African schools has been observed despite the relatively large investment made into education when compared with neighbouring countries: increased inputs, which do not seem to match the observed learning outcomes (Chisholm & Wilderman, 2013). According to Moloi and Chetty (2010), both regional and international benchmarking studies continue to show that the level and quality of learning outcomes in South African schools tend to be lower than those of countries that invest significantly less in their schooling sector. The ANA in South Africa was therefore planned as a measure that could potentially increase awareness of the challenges of teaching and learning literacy (and numeracy) in South Africa.

SOUTH AFRICA AND ANNUAL ASSESSMENTS

The ANA is a series of standardised annual examinations, which represents one of the largest education initiatives undertaken in the country, with the primary aim of improving learning through effective teaching. The ANA consists of the testing of all Grade 1 to Grade 6 and Grade 9 learners in languages and mathematics. This testing involves approximately six million learners in all the public schools in the country (Kanjee & Moloi, 2014). National assessment surveys were first implemented in 1996 on representative samples of schools and learners in Grade 3, Grade 6 and Grade 9 (Kanjee, 2009).

The ANA was piloted in its current design in 2010 as a national strategy to monitor the level and quality of basic education with a view to ensuring that every child receives a basic education of a high quality, irrespective of the school they attend.

The ANA was introduced due to the repeated findings that South African learners were underperforming in relation to the financial and resource inputs that the state was investing in education (Chisholm & Wildeman, 2013). Therefore, a presidential injunction was issued to conduct the ANA and monitor performance, with the target set at 60% of learners in Grade 3, Grade 6 and Grade 9 achieving acceptable levels of literacy and numeracy by 2014 (Republic of South Africa, 2011a). According to the plan, the ANA is expected to improve learning in four key ways: exposing teachers to best practices in assessment, targeting interventions to the schools that need them most, giving schools the opportunity to pride themselves on their own improvement, and giving parents better information on the education of their children (Republic of South Africa, 2012a:49).

Despite the cycles of the ANA that had been completed, there had been limited research and information regarding the extent to which the objectives of the ANA were being addressed in schools, or the challenges and opportunities that teachers were encountering in its use to improve teaching and learning. The purpose of the ANA, as indicated in the reports, provides a glimpse of what should be expected from its outcome.

A summary of the purpose of ANA is listed below:

- Measure performance of the education system:
  - Overview of improvements and/or decline in different areas of the education system
  - "In-house" data to compare with international assessment data
- Provide diagnostic information to the teacher:
  - Clearer picture of the nature of the problems in the system
  - Information to teachers regarding what the learners are actually failing
- Guide and inform teaching and learning:
  - Identification of problem areas should provide insights into the contents that require new teaching strategies
  - Opportunities to plan and prepare accordingly

(Republic of South Africa,
2011a; 2012a; 2012b; 2012c; 2013a; 2013b; 2013c; 2014)

PROBLEM STATEMENT AND RATIONALE

Although current debates concerning the value of the ANA and its impact on improving teaching and learning continue, and accepting the idea that the ANA should serve as a catalyst for spearheading reform in the classroom, the critical challenge of assessment results shows that there are no significant improvements in the literacy figures. However, instances of Grade 5 learners reading at Grade 1 level still remain.

There are many limitations to the ANA, as identified by the Department of Basic Education (DBE) and other stakeholders. However, a lot can be learned from these assessments in terms of areas of difficulty for second-language and multilingual learners. Having assessment results that reflect global annual improvements and/or compare schools within a district or province and/or compare one province with another potentially provides valuable feedback. However, these assessments should be learner-centred and provide assessment feedback based specifically on the sections of the curriculum that certain groups of learners are struggling with and why. Special attention should be paid to the language of instruction, as well as teaching and learning strategies and the support that is required to facilitate learning and ultimately improve learner achievement. The assessment results should be able to provide teachers with information regarding the area of the curriculum students are struggling with, and thus provide an opportunity for the development of appropriate and practical in-service training that is aimed at providing teachers with the tools to better teach these content areas. Popham (2009) argues that usable information from the ANA can have a positive effect on classroom practices and consequently improve teaching and learning.

From this point of view, this paper investigates key challenges and opportunities for language teachers as they strive to use the ANA's results to improve learning and teaching in South African schools, focusing on the following questions:

- In what ways have the results of the ANA served as a catalyst for improving literacy?
- How should the assessments facilitate learning and improvement?
- What purposes should the reports on the assessments serve?

METHODS

The data analysis used in the study consisted of the systematic review of the reports on the ANA of 2011, 2012, 2013 and 2014 (Republic of South Africa, 2011; 2012; 2013; 2014). It also included the Diagnostic Report and Framework for Improvement for First Additional Language. The diagnostic analysis for Grade 4 to Grade 6 was compared for the years in question. The recommendations for the national interventions, the language framework, as well as the proposed strategies for strengthening the teaching and learning of English First Additional Language (EFAL), were analysed and compared. Other documents reviewed included the following:

- Review of the Language Component of the Curriculum and Assessment Policy Statement (CAPS)
- Analysis of guidelines for the teaching and learning of language (English)

These findings for the reviews indicated above were subsequently compared to selected literature, focusing on the implementation of the recommendations for the improvement of learner performance, particularly in literacy.

RESULTS AND DISCUSSION

The analysis of the reports on the ANA and the diagnostic report, with a focus on EFAL components, are very revealing (see Tables 1). It is commendable that, in the full reports, the DBE is upfront about the shortcomings and the logistical challenges encountered annually. Some of these are as follows:

- Better logistics in the distribution of ANA materials to schools
- The late arrival of the required materials in the right languages to schools in the 2011 school year
- More rigorous quality assurance measures in the verification of the ANA
- Standardisation
- Better data collection procedures

(Republic of South Africa, 2011)

It is also commendable that the DBE goes into detail in the diagnostic reports about the challenges the learners are experiencing. The results of this review study have show that the contents of these reports are predictable. While intervention strategies are in place to address the identified learners' gap in language learning, there is no evidence to suggest that the proposed interventions are being adequately implemented. Focusing on what it is that learners need to improve on is an excellent strategy, provided that the teachers are experienced in teaching these language contents and are themselves suitable models of the target outcome.

If learners are consistently weak in an area of learning, one probably needs to take a closer look at the teaching methods and put systems in place to support teachers who are faced with the challenges of teaching in an additional language in multilingual contexts.

The reports revealed the following:

- Schools, districts and provinces are provided with feedback from an item-level diagnostic analysis of what learners were able or to demonstrate (or unable to demonstrate) in the tests in terms of requisite knowledge and skills at each grade level.
- The DBE has put a comprehensive plan in place that includes detailed curriculum interventions, step-by-step guidance to teachers on how to mediate in the identified challenge areas, as well as pedagogic guidelines on how to teach specific concepts in the curriculum.

A slight shift is needed in this top-down approach, which is used to disseminate the results. Plans need to be collaboratively developed, with teachers in the affected areas working alongside specialists in the field. The teachers are most likely experts in their contexts and could detail the actual challenges they face in their schools and could indicate the specific support that would benefit them.

Table 1: Diagnostic summary of assessment results

Year	Grade 4	Grade 5	Grade 6	Grade 9
2013	• Lack of understanding of events in the story • An inability to understand characters in the story • An inability to interpret the information given in an advert • Poor understanding and use of different part of speech • Inability to rewrite sentences in a different tense • Lack of understanding of meta-language	• Lack of understanding of events in the story • An inability to interpret the characters in a story or identify the lesson of a story • Inability to write a summary • Poor understanding and use of different part of speech • Inability to rewrite sentences in a different tense • Lack of understanding of meta-language	• Lack of understanding of events in the story • An inability to interpret the characters in a story, make inferences and give an opinion • Lack of familiarity with different figures of speech and insufficient vocabulary to comprehend their meaning • Insufficient vocabulary to understand the question or the text • Inability to write a summary	• Lack of understanding of events in the story • Inability to recognise either the author's purpose or the narrator of the story • Inability to interpret characters in a story, make inferences and give an opinion providing reasons and explanations • Lack of familiarity with different parts of speech • Insufficient vocabulary to comprehend meaning

Year	Grade 4	Grade 5	Grade 6	Grade 9
2013	• Inability to punctuate a sentence and add capitalisation • Poor knowledge of spelling rules • Insufficient vocabulary to understand either the question or the text • Very poor grammar and spelling • Minimal vocabulary, inability to write complete sentences • Inability to construct meaningful sentences to form a logical story	• Inability to punctuate a sentence and add capitalisation • Poor grammar and spelling • Inability to construct meaningful sentences to form a logical paragraph • Failure to write on a given topic • Failure to write a recount in a logical and sequential way		• Inability to identify the topic sentence of a paragraph, and distinguish the main points from the supporting details • Inability to identify the source of an information text • Poor understanding and use of different parts of speech • Inability to rewrite sentences in a different tense • Lack of understanding of meta-language • Lack of editing skills • Inability to convert active to passive voice in sentences or direct speech to indirect or reported speech • Lack of familiarity with modals • Weak writing of story and diary entry

Year	Grade 4	Grade 5	Grade 6	Grade 9
2014	• Sourcing information from a given text • Inability to provide synonyms of given words • Inability to write sentences from one tense to another • Story writing based on mind maps – learners could not follow guided questions	• Inability to provide logical reasons for answers given for true or false questions • Inability to place commas correctly and use capital letters for proper nouns in the middle of a sentence • Finding a main idea in an information text • Lack of understanding of the text • Lack of understanding of what a rhyme is • Inability to change verbs into simple present tense • Inability to use adjectives in the superlative degree	• Lack of active vocabulary for the appropriate grade • Inability to respond to open-ended questions that require a motivation • Limited knowledge of literature features • Inability to identify the main character in a story • Poor understanding of different figures of speech • Inability to transform sentences into the negative form • Inability to provide examples of antonyms and synonyms of given words • Inability to identify parts of speech	• Weaknesses were observed with parts of speech: textual editing, grammar, spelling and punctuation • Inability to use active and passive voice • Inability to use direct and indirect speech • Identification of the topic sentence in a main clause

Furthermore, a review of literature has revealed that teachers say they do not know how to use the ANA reports. Although they agree that the information from the ANA can assist them to improve their learning, there is very little knowledge on how to go about it. There are no plans in place at their schools for the use of ANA data. A significant proportion also indicated that they received little or no support from the school district on how to use the ANA results to address the following:

- Reading
- Fluency
- Comprehension
- Spoken language difficulties
- Written language difficulties

CAPS GUIDELINES AND TEACHING AND LEARNING

The Curriculum and Assessment Policy Statement is a detailed document, which emphasises that assessment should not just be of learners or of the learning, but should incorporate assessment for the purpose of learning. Using assessment to facilitate learning is critical because then assessment is no longer seen as punitive or judgmental, but rather as a process to identify areas where further learning should occur and in what format.

CAPS identifies a six-point framework that should be used:

- Clarifying, understanding and sharing learning intentions, learning objectives and criteria for assessment with the learners
- Managing effective classroom discussions, tasks and activities that elicit evidence of learning
- Providing feedback that moves learners forward
- Activating learners as learning resources for each other (peer assessment)
- Activating learners as owners of their own learning (self-assessment)
- Improving further teaching and learning

(Republic of South Africa, 2012a; 2012c)

Interestingly, some teachers are not aware of the six-point framework. It was found from the studies reviewed (Chisholm & Wildeman, 2013; Kanjee & Moloi, 2014; Spaull, 2015) that many of the teachers were not aware of what they actually needed to do in real terms. They found the administrative paperwork overwhelming and saw

this as an offshoot of the assessment requirements (e.g. continuous assessment). For teachers, the benefits of all these assessments are not altogether clear, and some felt they needed more training to do their jobs effectively.

The overall consequence is that teaching and learning in the classroom is business as usual for the majority. Therefore, the cycle of poor performance in literacy and language continues.

WHERE DO WE GO FROM HERE?

There is no doubt that the ANA, as is the case with other large-scale assessments, has its shortcomings, but it also has value for different groups if used appropriately. Diagnostic information on language achievement or literacy could be one of the tools for addressing the challenges posed by learning an additional language in a multilingual context. Additionally, such information could be used to determine levels of home language competence, as well as to determine the systemic barriers, such as gaps in teacher education and a decline in reading culture in a digital age. This information, however, has to be used appropriately. Reports that sit on shelves in libraries and the offices of school principals will not facilitate the change in literacy levels that are required.

Teacher training institutions need to be more proactive in leading a change in approach to the language teaching content and pedagogy for trainee teachers. I believe a different kind of analysis can be conducted from the ANA data. An example is secondary error analysis that could reveal the areas that teacher training should be focused on.

For the multitude of teachers already in the system, in-service training could focus on these problem areas, and workshops should be engaging, directed and contextually appropriate. Workshops should also not be treated as information sessions, but as hands-on engagement sessions that involve manageable numbers of teacher participants (a maximum of 20).

Research has shown that there is a link between fluency and comprehension, and through the integrated language system, we know that challenges with one aspect of language learning more often than not leads to associated challenges in other areas. It is therefore critical that a systemic approach is used to combat the low level of literacy across the board. Table 1 shows the compounded nature of language challenges if unresolved in the Foundation Phase.

Interestingly, during the 2015 ANA, teachers' unions refused to cooperate with the DBE and went further to threaten not to participate in the ANA. Some of the issues they raised were that there was not enough time to adequately remediate because the tests were written annually, and that there was a need for a more intensive programme of teacher development to properly address the shortcomings identified through the assessments (Republic of South Africa, 2016). One could say that this action by the teachers' unions is a move in the right direction because there is now a process in place for the assessments to be redesigned.

CONCLUSION

There are many opportunities for research into the practical use of the ANA results, not just for literacy and language, but for numeracy and mathematics as well. We need active conversations on the subject if we are to break the cycle. Part of this is further research that involves the further interviewing of teachers for their perspectives on these issues. The move by the teachers' unions in 2015 is a clear indication that teachers themselves see a need to step away from using the assessments as merely a judgment of what learning has taken place (or not), to actually using the assessments as a tool for the purpose of learning. With the latter, assessment becomes an integral part of the teaching and learning process. Results are not simply statistics, but real information that could form the basis for systemic evaluations, the development of support strategies and the in-service training of teachers. The results could also be pointers to the nature of the interventions required by both teachers and learners, and at what levels.

REFERENCES

Abadzi, H., 2008, 'Efficient learning for the poor: new insights into literacy acquisition for children', *International Review of Education* 54, 581–604.

American Federation of Teachers (AFT), National Council on Measurement in Education (NCME) & National Education Association (NEA), 1990, *Standards for teacher competence in educational assessment of students*, American Federation of Teachers, Washington, DC.

Brookhart, S.M., 2011, 'Educational assessment knowledge and skills for teachers', *Educational Measurement: Issues and Practice* 30(1), 3–12.

Chisholm, L. & Wildeman, R., 2013, 'The politics of testing in South Africa'. *Journal of Curriculum Studies* 45(1), 89–100.

Gotch, C.M. & French, B.F., 2014, 'A systematic review of assessment literacy measures', *Educational Measurement: Issues and Practice* 33(2), 14–18.

International Reading Association (IRA) & National Association for the Education of Young Children (NAEYC), 1998, 'Learning to read and write: developmentally appropriate practices for young children: a joint position statement of the International Reading Association and the National Association for the Education of Young Children', *Young Children* 53, 30–46.

Kanjee, A., 2009, Enhancing teacher assessment practices in South African schools: evaluation of the assessment resource banks', *Education as Change* 13(1), 67–83.

Kanjee, A. & Moloi, M.Q., 2014, 'South African teachers' use of national assessment data', *South African Journal of Childhood Education* 4(2), 90–113.

Kanjee, A. & Sayed, Y., 2013, 'Assessment policy in post-apartheid South Africa: challenges for improving education quality and learning', *Assessment in Education: Principles, Policy and Practice* 20(4), 442–469.

Moloi, M.Q. & Chetty, M., 2010, *The SACMEQ III Project in South Africa. A study of the conditions of schooling and the quality of education*, Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) Educational Policy Research Series, Department of Basic Education, Pretoria.

Popham, W.J., 2009, 'Assessment literacy for teachers: faddish or fundamental?', *Theory into Practice* 48(1), 4–1.

Republic of South Africa, 2011a, *Report on Annual National Assessment of 2011*, Department of Basic Education, Pretoria.

Republic of South Africa, 2012a, *Action plan to 2014: towards the realisation of schooling 2025* (full version), Department of Basic Education, Pretoria.

Republic of South Africa, 2012b, *Annual National Assessments 2012: a guideline for the interpretation and use of ANA results*, Department of Basic Education, Pretoria.

Republic of South Africa, 2012c, *National Protocol for Assessment: Grade R–12*, Department of Basic Education, Pretoria.

Republic of South Africa, 2013a, *Report on the Annual National Assessment of 2013: Grade 1 –6 and 9*, Department of Basic Education, Pretoria.

Republic of South Africa, 2013b, *Annual National Assessments: 2013 diagnostic report and 2014 framework for improvement*, Department of Basic Education, Pretoria.

Republic of South Africa, 2013c, *The state of our education system. National Report 2012: the state of literacy teaching and learning in the foundation phase*, National Education Evaluation and Development Unit, Department of Basic Education, Pretoria.

Republic of South Africa, 2016, *Proposals on the redesign of the Annual National Assessments for 2016 and beyond* (draft version), Department of Basic Education, Pretoria.

Spaull, N., 2015, *The limitations of the Annual National Assessments (ANAs). What can and can't we say?* (presentation, June 2015), Umalusi & CEPD, Pretoria.

Stiggins, R.J., 1999, 'Are you assessment literate?', *High School Magazine* 6(5), 20–23.

FIELD REPORTS

ENABLING CONDITIONS FOR THE SUCCESSFUL INTEGRATION OF OPEN EDUCATIONAL RESOURCES FOR PROFESSIONAL DEVELOPMENT IN A DEVELOPING CONTEXT INSTITUTION

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ABSTRACT

There is evidence in literature to support the fact that the availability of enabling conditions is a critical requirement for Open Educational Resources to be successfully institutionalised. Several initiatives have been undertaken collaboratively in different countries to aid this process. In this field note, the researchers share findings from an investigation into the enabling conditions for the successful integration of OER for the professional development of lecturers at the Open University of Tanzania (OUT). Data was collected from a sample of 23 lecturers (from seven academic departments), who participated in the institutional situational analysis workshop. The study used a questionnaire that included close-ended (structured) (Cronbach's alpha = 0.7) and open-ended questions adapted by OER Africa. Findings suggest that there are several opportunities at the institution, despite the prevalent challenges. The authors therefore provide some recommendations, which should be helpful to other institutions that experience similar challenges.

INTRODUCTION

According to UNESCO (2016), Open Educational Resources (OER) are any type of educational materials that are in the public domain or which are introduced with an open license. The materials range from textbooks to curricula, syllabi, lecture notes, assignments, tests, projects and audio, video and animation, which anyone can legally and freely copy, use, adapt and re-share.

OER are used in Open and Distance Learning (ODL) as a strategy to address challenges in relation to the professional development of teachers, tutors and lecturers by providing access to high-quality resources (Atkins, Brown & Hammond, 2007; Thakrar, Zinn & Wolfenden, 2009). In the context of Teacher Education in Sub-Saharan Africa (TESSA), OER are reported to be used for professional development, as a strategy to ensure a well-prepared, engaged and committed corps of primary school teachers in sufficient numbers (Thakrar et al., 2009; Anamuah-Mensah, Buckler, Moon, Ricketts, Sankale, Wolfenden & Pontefract, 2008). Examples of collaborative initiatives in this regard include Bringing Educational Resources to Teachers in Africa (BERTA), by the South Africa Institute for Distance Education (Saide) and the Open University of Catalonia (UOC), funded by the International Council for Distance Education (ICDE) (Mallinson & Mays, 2014), Research on Open and Educational Resources for Development (ROER4D), and the OpenupEd programme of the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

In this field note, the researchers share their findings from an investigation into the enabling conditions for the successful integration of OER for the professional development of lecturers at the Open University of Tanzania (OUT), based on a study previously reported on by Nihuka and Mallinson (2016). Data was collected from a sample of 23 lecturers (from seven academic departments), who participated in an institutional situational analysis workshop using a questionnaire that included close-ended (structured) (Cronbach's alpha = 0.7) and open-ended questions adapted by OER Africa. Findings suggest that there are several opportunities available at the institution, despite the prevalent challenges. The authors therefore provide some recommendations, which should be helpful to other institutions that experience similar challenges.

CRITICAL REQUIREMENTS FOR THE SUCCESSFUL INTEGRATION OF OER IN EDUCATION FOR PROFESSIONAL DEVELOPMENT

Research reports from the collaborative African initiatives mentioned in the previous section have shared experiences of successes and challenges in efforts to integrate OER in the education sector. Despite the potential of OER, the availability of enabling conditions is a critical requirement for its successful integration in education (Karunanayaka and Naidu, 2013; Unisa, 2014). These conditions include the following:

- The availability of an institutional OER policy to guide OER practices and operations at the institution – either as a stand-alone policy or as a relevant section incorporated into an existing information and communication technology (ICT) policy (Unisa, 2014)
- The willingness of both institutional leadership and lecturers to accommodate OER integration within their operations and practices (Karunanayaka & Naidu, 2013; Thakrar et al., 2009)
- The availability of expertise among lecturers in relation to all aspects of OER use, production and integration (Karunanayaka & Naidu, 2013; Unisa, 2014)
- The availability of relevant ICT infrastructure and experienced technical staff (Karunanayaka & Naidu, 2013)
- The availability of institutional support (with regard to both funding and the provision of incentives) and collaboration with other institutions within and/or outside the country (Thakrar et al., 2009)
- The availability of quality assurance structures – general or specific to OER – and copyright clearance good practice to ultimately ensure the provision of quality education (Unisa, 2014)

Many of these enabling conditions were considered as criteria in the selection of OUT as one of four institutional partners for the collaborative OUT/OER Africa participatory action research project (OER Africa, 2013).

BACKGROUND

Systematic efforts to integrate ICT in education at OUT can be traced as far back as 2004 (Mbwette, 2008; Bakari, 2009). Such efforts included the formulation of an institutional ICT policy, an ICT master plan and an e-learning implementation strategy (OUT, 2009a; 2009b; 2009c). These have recently been reviewed to accommodate new developments within the University (OUT 2015a; 2015b; 2015c).

According to the ICT policy, the University is committed to transforming paper-based learning course delivery to blended learning course delivery by installing a Local Area Network (LAN), improving ICT infrastructure and access, training lecturers on basic pedagogical skills related to e-learning course design and development and training students on basic technology skills. Furthermore, the policy stipulates the ambition of the University to motivate lecturers to use open source e-learning platforms such as the Moodle learning management system (LMS), and to improve access to the internet (to enhance communication, interactions and sharing of information) and learning technologies such as computers.

To date, several achievements have been realised, as stipulated in the University's ICT policy ambitions. Evidence indicates that the achievements include the improvement of ICT infrastructure, including the installation of a LAN at the University and connecting all regional centers to the headquarters in Dar es Salaam through a virtual private network (VPN) (Mbwette, 2008; Bakari, 2009). Also, access to technologies such as computers and the internet by lecturers and students have improved substantially at the headquarters and in all regional centers since the installation of computer laboratories with internet connectivity, including Wi-Fi (Mbwette, 2008).

In terms of capacity, the University has managed to improve the technology competence of lecturers, with over 55 lecturers having been trained in pedagogical skills related to the design and development of e-learning courses for delivery using the Moodle LMS, both at headquarters and in all regional centres. In addition, over 21 000 students have been trained in basic technology skills (Bakari, 2009). As a result of the developed capacity, the University now has a customised Moodle LMS, which is currently being used by lecturers and students to facilitate access to courses, learning resources and real-time or virtual interactions between them.

Furthermore, the University encourages lecturers and students to harness the freely available OERs from renowned institutions such as the Massachusetts Institute of Technology (MIT), African Virtual University (AVU), TESSA and UNESCO, which can be accessed through links on the University's website and which are in addition to locally developed OERs.

RESEARCH DESIGN AND DATA ANALYSIS

The study used a planning evaluation research design, which was conducted during the OER Institutional Analysis Workshop, held on Monday, 24 November 2014, at

OUT. According to Guskey (2000), planning evaluation is an appropriate design, because it takes place prior to the implementation of an innovation and allows for a careful analysis of the context and a determination of opportunities and challenges for proper planning.

The study used the instrument that was adapted by OER Africa from Baer and Norris (2014) for the Institutional Analysis Workshop. A total of 23 lecturers from seven faculties (who participated in the Institutional Analysis Workshop) participated in the study.

The adapted instrument comprised three parts: background (department/faculty and names of team members: page 1), open-ended questions (pages 2–4), and close-ended (structured) questions (pages 5–7).

With the open-ended questions, participants were required to provide explanations or descriptions of specific issues related to the study. With the close-ended (structured) questions, participants were required to tick an option on a 5-point Likert scale (i.e. strongly agree, agree, neutral, disagree and strongly disagree) against statements that best described a specific phenomenon. This section had an average reliability Cronbach's alpha value of 0.7.

FINDINGS

Findings from the study are discussed below:

Lecturers' willingness to use OER

The first research question explored lecturers' perceived willingness to use OER for their professional development. Findings from structured questionnaires indicated that all 23 lecturers (100%) were willing to use OER for their professional development. Furthermore, findings from the open-ended questions indicated that lecturers were willing to use OER because "*using OER increases the resource pool and ensures availability of adequate, teaching and learning resources, which improves teaching and learning practices"*. Also, lecturers were willing to use OER because "*currently there are a lot of freely available online and OER materials for use in education".*

Lecturers' expertise in terms of OER

The next research question investigated lecturers' expertise in terms of the use of OER in education. Findings indicated that 20 (78.2%) of the 23 lecturers reported

that they had expertise on how to design and develop resources for publication as OER. This contradicted other findings from the open-ended questions that none of the lecturers know what OER are, where and how to find OER, how to evaluate OER, how to adapt OER and copyright issues related to OER. The participants' responses could mean that they are confident of being able to design and develop learning materials in general, rather than understanding that there are particular considerations when doing so for OER publishing.

Institutional policy to support OER

The third research question sought to determine specific institutional policies that are available to support OER. Findings from the structured questions indicated that the majority of lecturers in this study (20 lecturers – equivalent to 78.2%) affirmed that there are institutional policies in place to support the use of OER. Responses from the open-ended questions identified the following specific structures that relate to OER that are available at the institution: an ICT policy and operational procedures, an ICT master plan, an ICT implementation strategy and a study materials policy and operational procedures. However, the findings from both instruments indicated that, as yet, there was no specific policy, operational procedures or guidelines on OER.

Leadership commitment to OER

OUT's leadership commitment to OER mainstreaming for the professional development of lecturers – as perceived by respondents – was also explored during the study. Findings from the study indicated that all 23 respondents (equivalent to 100%) affirmed the commitment of OUT's leadership to OER. In support of this response, the majority of respondents (19 respondents – equivalent to 79.6%) affirmed that the leadership at OUT encourages the sharing of educational resources and acknowledges collaboration as an effective approach to developing OER. Findings from the open-ended questions indicated that "*currently, the University leadership is working in partnership with external institutions to introduce and support OER-related activities".* However, findings indicated that the leadership lacks effective institutional structures – 3 responses (13%) – and that it does not yet provide incentives to lecturers who use OER.

Infrastructure to support to OER

Another research question dealt with OER-related infrastructure that is available to support OER mainstreaming in the institution.

Findings on OER-related infrastructure that is available to support OER mainstreaming at the institution indicated that lecturers and students enjoyed readily available access to the internet (16 responses – 69.5%). Furthermore, the University has plagiarism software (19 responses – 79.6%), a functional platform (15 responses – 65.2%) and relevant technical staff to support OER development (17 responses – 73.9%). There are also adequate computers available (18 responses – 78.2%).

Quality assurance and control mechanisms

The kinds of quality assurance and control mechanisms that are available at the institution to support the use of OER were also investigated. Findings indicated that the University has a quality assurance and control unit (12 responses – 52.2%) and guidelines (15 responses – 65.2%). It was also revealed that feedback from stakeholders is fed back into quality improvement processes (19 responses – 82.6%). However, findings indicated major challenges with the following: the knowledge of staff on copyright issues (11 responses – 47.8%) and the availability of clearance procedures of third-party copyright of learning resources (8 responses – 34.8%).

CONCLUDING REMARKS

OER has the potential to advance the delivery of education by increasing the availability of relevant learning materials, reducing the cost of accessing educational materials, and stimulating the active engagement of teaching staff and students in creating learning resources (OER Africa, n.d). However, institutionalising OER can be challenging. Based on the findings of this study, the authors make the following recommendations:

First, institutions that plan to institutionalise OER need to consider developing a policy to guide OER practices and operations. This should be aligned to all other related policies and, most importantly, to the quality assurance and control practices of institutions in order to ensure ongoing adherence to policies. In addition, it is necessary to design, develop and implement OER that can be used for the professional development of lecturers in order to promote lecturers' expertise and knowledge in searching for, evaluating, adapting, remixing and publishing OER with appropriate licenses in the context of OUT.

In addition, OERs can also be used to orientate students in terms of relevant 21st-century skills with respect to the effective use of digital resources for learning in ODL.

REFERENCES

Anamuah-Mensah, J., Buckler, A., Moon, B., Ricketts, K., Sankale, J., Wolfenden, F. & Pontefract, C., 2008, 'Building an effective OER environment for teacher education in sub-Saharan Africa: the TESSA experience', viewed from http://oeruniversitas.com/images/6/6a/PID_402.pdf.

Atkins, D.E., Brown, J.S. & Hammond, A.L., 2007, 'A review of the open educational resources (OER) movement: achievements, challenges, and new opportunities', report to the William and Flora Hewlett Foundation, viewed from http://www.hewlett.org/uploads/files/ReviewoftheOERMovement.pdf.

Baer, L. & Norris, D., 2014, Analytics: moving from great promise to tangible success workbook, SAHELA pre-conference workshop, Pretoria, South Africa.

Bakari, J.K., 2009, ICT at the Open University of Tanzania: achievements, challenges and future prospects, report presented during Rolling Strategic Plan Review at Golden Tulip Hotel, 17–18 April 2009, Dar es Salaam, Tanzania.

Guskey, T.R., 2000, *Evaluating professional development,* Corwin, Thousand Oaks, CA, viewed from http://rt3region7.ncdpi.wikispaces.net/file/view/Eval%20PD%20Article-Guskey.pdf/461738692/Eval%20PD%20Article-Guskey.pdf.

Karunanayaka, S. & Naidu, S., 2013, 'Capacity building of academic staff in the integration of ICT and OER in teacher education programmes at the Open University of Sri-Lanka', viewed from http://oasis.col.org/bitstream/handle/11599/1845/2013_Karunanayaka%26Naidu_CapacityBuildingAcademicStaff.pdf.

Mallinson, B.J. & Mays, T., 2014, 'Collating and modelling OERs to train teacher educators in quality ODeL on the African continent', presentation at the 4th ACDE Conference, Zimbabwe, viewed from http://www.slideshare.net/Brenda6/mallinson-oer-for-teacher-educators.

Mbwette, T.S.A., 2008, 'The Open University of Tanzania and e-learning', *The Guardian*, 2 February 2008, viewed on 14 February 2008, from http://www.ippmedia.com/en.

Moon, B. & Wolfenden, F., 2007, 'The TESSA OER experience: building sustainable models of production and user implementation, OpenLearn: researching open content in education', *Proceedings of the OpenLearn2007 Conference,* 30 October 2007, The Open University, Milton-Keynes.

Nihuka, K.A. & Mallinson, B.J., 2016, 'Towards integration of open educational resources for professional development of lecturers at the Open University of Tanzania', *Journal of Adult Education Tanzania* 20(1), 1–20.

OER Africa, n.d., 'Understanding OER', viewed from http://www.oerafrica.org/understanding-oer.

OER Africa, 2013, 'Participatory action research agenda', viewed from http://www.oerafrica.org/current-work.

Open University of Tanzania (OUT), 2009a, 'Institutional information and communication technology policy', viewed from http://www.out.ac.tz.

Open University of Tanzania (OUT), 2009b, 'Institutional information and communication technology master plan', viewed from http://www.out.ac.tz.

Open University of Tanzania (OUT), 2009c, 'Institutional e-learning implementation strategy', viewed from http://www.out.ac.tz.

Open University of Tanzania (OUT), 2015a, 'Institutional information and communication technology policy', viewed from http://www.out.ac.tz.

Open University of Tanzania (OUT), 2015b, 'Institutional information and communication technology master plan', viewed from http://www.out.ac.tz.

Open University of Tanzania (OUT), 2015c, 'Institutional e-learning implementation strategy', viewed from http://www.out.ac.tz.

Teacher Education in Sub-Saharan Africa (TESSA), 2016, 'TESSA', viewed from http://www.tessafrica.net/.

Thakrar, J., Zinn, D. & Wolfenden, F., 2009, 'Harnessing open educational resources to the challenges of teacher education in sub-Saharan Africa', *The International Review of Research in Open and Distributed Learning* 10(4), viewed from http://www.irrodl.org/index.php/irrodl/article/viewArticle/705/1319.

United Nations Educational, Scientific and Cultural Organisation (UNESCO), 2016, 'What are open educational resources (OERs)?', viewed from http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/what-are-open-educational-resources-oers/.

University of South Africa (Unisa), 2014, 'Baseline study on open educational resources (OER)', viewed from http://www.unisa.ac.za/contents/unisaopen/docs/2014%20Baseline%20Study%20on%20Open%20Educational%20Resources%20(OER).pdf.

THE ACTIVE PEDAGOGY FOR ALL TEACHERS THROUGH TESSA OER

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ABSTRACT

One major observation about teaching in many West African schools is that there is no direct link between what is taught. Queries are therefore raised about this reality. Teachers at GSTS Baal (*Groupe Scolaire Tierno Sylemani Baal*), a private school (primary and secondary) on the outskirts of Guédiawaye in Dakar (Senegal), have shown the need to develop professionally as they find the means to achieve this goal. This paper backs the necessity to equip teachers with tools that drive them to look for open resources and active pedagogy to enhance their teaching methods.

THE CONTEXT

Bringing down the illiteracy rate has remained a challenge in West Africa on account of a multitude of factors, ranging from socio-economic and cultural factors to the inadequacy of educational policies in making a significant impact on the existing systems. It even extends to the nature of the school curriculum, which does little to encourage student engagement and success. One of the key aspects of the curriculum that can significantly improve both student engagement and outcomes is teachers' sound pedagogical choices to ensure that the learning process is more attractive and meaningful for learners. However, a large proportion of teachers in French Sub-Saharan Africa do not have access to professional development. For instance, only 27% of teachers benefitted from a training session held in Chad, and only 36–37% of teachers in Madagascar and Togo benefitted from such a session (Tilak, 2009, cited in Lauwerier & Akkari, 2015). In Senegal, more than half the country's primary school teachers are not trained (Unesco-ISU, 2014:19, cited in Lauwerier & Akkari, 2015). These samples of statistics show that many teachers are still totally inexperienced in matters of active teaching. This dilemma is the focus of the present report, which discusses the benefits of the active teaching/active pedagogy project undertaken by GSTS Baal using open educational resources from Teacher Education in Sub-Saharan Africa (TESSA OER). This report analyses the success of TESSA's resources in making learning active and helping to keep pupils engaged and focused when they are in school.

THE PROJECT: TESSA ACTIVE TEACHING

A key experiment of a holistic teaching-learning process has been undertaken by TESSA OER using active teaching. The kind of pedagogy used by TESSA aims to involve learners in what they are learning by providing challenging learning activities. TESSA groups primary school subjects into five domains that reflect the skills and competencies pupils should acquire in primary school: life skills, numeracy, literacy, sciences, and social studies and arts. Literature was made real and vivid, and sciences became more meaningful, relevant and practical for problem-solving and creativity.

Each domain is structured as follows (TESSA, 2017a):

LITERACY MODULE AREA			
Module	**1: Reading and writing for a range of purposes**	**2: Using community voices in your classroom**	**3: Promoting communication in an additional language**
Section 1	Supporting and assessing reading and writing	Investigating stories	Providing natural contexts for language practice
Section 2	Stimulating interest in reading stories	Ways to collect and perform stories	Ways to achieve fluency and accuracy
Section 3	Ways of reading and responding to information texts	Using local games for learning	Creating opportunities for communication
Section 4	Ways of presenting your point of view	Using stories and poetry	Ways to build on home-language knowledge
Section 5	Ways of becoming a critical reader and writer	Turning oral stories, poems and games into books	Supporting additional language learning

TESSA's resources draw the teaching-learning situation from learners' immediate environment or the local community. Lesson titles in the sample resources embody activities that support the purpose of literacy in society. The design of the lessons is guided by foregrounding the link between notions learned and the possible competencies required. Another key component of relevance in the teaching-learning process is the participation of learners. When learners work on the sections outlined above in class, they are gaining life skills at the same time. Section 2, for example, enables pupils to develop fluency and accuracy because they are required to collect stories from the community and perform them in class. Matching the contents to real-life situations remains a crucial element to assist pupils in developing a range of competencies. That is why the training of teachers is a prerequisite for the implementation of this type of pedagogy in their classrooms.

TESSA OER assists teachers to relate educational theories to the more concrete day-to-day world. Teachers who are trained with TESSA primary school OER at GSTS Baal (from primary to secondary school) develop confidence and explore their class practices in innovative ways. Most of them are inspired and start creating their own teaching strategies to achieve a learner-centered pedagogy. These teaching experiences are shared on the wiki (TESSA, 2017b) so that other teachers can assess, use or adapt them. Texts, pictures and videos are shared on a regular basis. This process enables teachers to collectively find solutions to issues that emanate from their practices and learn as a community. The teacher training aspect of TESSA OER aims to develop a set of pedagogical and reflective competencies to facilitate the professional development of teachers. Chief among these is the ability to evaluate one's own teaching practices.

THE BENEFITS

Teachers assess their own teaching strategies

Training offered to teachers in the project involves a careful process of familiarising teachers with a range of teaching methods. Its main objective is to enable teachers to devise experiences whereby pupils construct their own knowledge and skills in a stepwise process as recommended by Blake and Pope (2008). It was found that pupils' motivation became intrinsic as soon as their teachers adopted methods of teaching with less lectures. Teachers themselves questioned their own teaching methods and the impact of their teaching on pupils' understanding. A critical self-evaluation of one's own teaching naturally leads to an ongoing interest in

improvement through professional development. Teachers at GSTS Baal are a tangible example of how teachers continually attempted to understand how pupils really learn and how this learning process can be enhanced.

Prior to this workshop, many teachers had never received initial or in-service teacher training. Furthermore, most of them had never asked themselves whether pupils always benefitted from or enjoyed learning in their classes, though they were aware of their pedagogical shortcomings. During and after the 2014 workshop for using TESSA primary school OER, they began to make a significant shift in their practice as they started questioning their teaching methods. They realised that pupils were not sufficiently motivated to engage interactively with their teaching methods. Although adopting a researcher stance was not an easy process, it allowed them to become more creative.

Working collaboratively

A number of relevant ideas and practices emerged from the workshop. These included the need to work collaboratively on issues that cut across different contexts. Pooling together teachers across phases and levels proved to be successful throughout the training session, as participants realised that each of them came with different, yet relevant, teaching methods. This enabled a shared assessment of methods and approaches. Working across phases also gave teachers the opportunity to find solutions to their immediate pedagogical challenges. Difficulties encountered by teachers and learners during the teaching-learning process led the way to discussions about the quality of education and how this could be researched. The wiki facilitated the discussions by means of an online platform for interactive teacher-led sessions to take place.

There is strong evidence to suggest that teachers who participated in the workshop became more creative and equipped to adapt the curriculum to the contextual realities and learners' needs. Teachers realised that using TESSA methodology enhances the existing curriculum. Although the existing curriculum may not be designed according to competencies-based approaches, active methods enabled leaners to acquire many competencies. To allow the learners to feel that they are learning something valuable, activities have to be selected with hypotheses formulation, manipulation and conclusion drawing in mind. This practice is not typically seen among teachers in primary and secondary schools in the West African context. However, even in the context of the currently available curriculum,

well-trained teachers can bring about some solutions to adjust the curriculum to fit the new trends in education in line with the needs of the learners. This was one of the main aims of the training workshops. For example, a TESSA inductive strategy allowed pupils to carry out field investigations among their family members and in their communities. With learner-centered teaching, teachers found that pupils could remember and reconstruct a particular experiment, speak about its benefits and demonstrate relevant skills.

Using some of the resources in TESSA OER, the GSTS Baal workshop invited teachers to reflect on and assess their own style of teaching. Teachers realised that different strategies could be used to teach the same content more effectively using active pedagogy. After both TESSA workshops, participants became confident and shared constructive experiences concerning lesson preparation with secondary school teachers who did not have the opportunity to participate in the workshop.

Developing new skills

Since teachers produced OER on a wiki as an outcome of their understanding of active pedagogy, distance learning through the wiki became a means of disseminating the good experience to GSTS Baal teachers. Resources such as videos, podcasts and audio with clear instructions may help pupils to strengthen their understanding of concepts and ideas.

TESSA resources provide teachers with some creative ideas to alleviate the problems associated with the lack of laboratories in schools in West Africa. For example, a lesson on germination became a hands-on experience where a teacher asked his pupils to sow a seed and make notes on the germination process a month before the class took place.

TESSA workshops served as a great opportunity for all participating teachers to learn from each other. Physics teachers understood that they must use skills developed in mathematics, and secondary teachers and university lecturers worked together with primary school teachers and found that sharing experiences contributed to assisting them in rethinking the kind of pedagogy to use in classrooms. This can be an open door for teachers to conduct continual research on how to improve the teaching-learning process in primary, secondary and high schools, as well as at university. For example, GSTS Baal primary school teachers discovered that they had been teaching equations in primary school. By being aware of the progression

of teaching equations through the child's school career, primary school teachers can improve the teaching of this concept, knowing that it will be built upon at a later stage.

RECOMMENDATIONS

In the light of this project, and to contribute to quality education for Africa, we recommend the following:

- Continuous research must be conducted on both teachers' and learners' styles, as well as the teaching materials in use.
- All teachers must be trained in active teaching according to the reality of the milieu and with regard to the globalisation of education.
- Africa must develop a relevant bank of OER as a solution to the lack of teaching material and laboratories, and promote collaborative work between teachers, regardless of phases. Distance learning is an important tool to be developed in the framework of Education for All.
- More input from parents and the community is required to support the teaching-learning process.
- Evaluation methods have to be improved.

CONCLUDING REMARKS

The case study of GSTS Baal shows that teaching can be improved when teachers engage in collaborative endeavours and assess their own teaching. Active teaching has had a positive impact on both teachers and learners. This workshop was an invitation to develop an awareness of the possibilities for collaborative work and research about teachers' practices and pupils' learning styles in private or state schools. TESSA's approaches equipped teachers to provide a holistic education that prepares students for life. This approach can enhance teaching across all levels of the education system.

REFERENCES

Astin, A.W., 1985, *Achieving educational excellence*, Jossey-Bass, San Francisco, CA.

Blake, B. & Pope, T., 2008, 'Developing psychology: incorporating Piaget's and Vygotsky's theories in classrooms', *Journal of Cross-disciplinary Perspectives in Education* 1(1), 59–67.

Teacher Education in sub-Saharan Africa (TESSA), 2017a, 'Primary curriculum framework', Open Learn Create, viewed from http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=81683.

Teacher Education in sub-Saharan Africa (TESSA), 2017b, TESSA OER wiki, viewed from http://gstsbaal.pbworks.com/w/page/92674995/Salle%20des%20enseignants.

Tilak, J.B.G., 2009, 'Basic education and development in Sub-Saharan Africa', *Journal of International Cooperation in Education* 12(1), 5–17. Cited in Lauwerier, T. & Akkari, A., 2015, *Les enseignants et la qualité de l'éducation de base en Afrique Subsaharienne*, Unesco, Geneva, viewed on 10 December 2016, from http://unesdoc.unesco.org/images/0023/002327/232733f.pdf#page=2&zoom=auto,-107,827.

UNESCO-ISU, 2014, 'Recherche enseignants formés pour garantir le droit de chaque enfant à l'enseignement primaire', UNESCO-ISU, Montréal. Cited in Lauwerier, T. & Akkari, A., 2015, *Les enseignants et la qualité de l'éducation de base en Afrique Subsaharienne*, Unesco, Geneva, viewed on 10 December 2016, from http://unesdoc.unesco.org/images/0023/002327/232733f.pdf#page=2&zoom=auto,-107,827.

CHALLENGES FACING TEACHERS USING TEACHER EDUCATION IN SUB-SAHARAN AFRICA (TESSA) PRINT MATERIALS IN SELECTED SECONDARY SCHOOLS IN TANZANIA

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INTRODUCTION

Education is one of the key priority sectors specified in the Tanzania Development Vision 2025. It is considered to be an agent of change that is envisaged to transform the country into a middle-income economy (URT, 2011). Tanzania faces a critical shortage of science teachers in secondary schools. According to the Ministry of Education, Science and Technology (URT, 2016:89), there is an incredible deficit of teachers in Mathematics (7 291), Biology (5 181), Chemistry (5 373) and Physics (6 873). It follows, therefore, that the teaching of science subjects in Tanzania is wanting, implying a heavy load for these teachers, with some schools having none of these teachers at all.

The critical shortage of teachers in secondary schools can be attributed to the small number of qualified science teachers in schools that are able to produce students to enter teacher education, hence the limited number of science teacher graduates from colleges and universities. Another reason is the rapid expansion of secondary education following the implementation of the Secondary Education Development Plan (SEDP) I and II, consequently resulting in a mismatch between the number of teachers and the demand for science teachers in schools. There has also been a high attrition rate of teachers with a science background (URT, 2014). Finally, the teaching and learning environment in which science is taught is not favourable, partly due to a shortage of teachers, but also due to a lack of science laboratories and a lack of student interest in science subjects. The culmination of these factors has resulted in a limited number of science graduates at teacher education colleges and universities. The Teacher Education in Sub-Saharan Africa (TESSA) secondary science project is one of the interventions that aims to address this problem.

TESSA SECONDARY SCIENCE PROJECT

The TESSA secondary science project was launched in five countries in 2010. It involved five participating institutions: Dar es Salaam University College of Education (Tanzania), Makerere University (Uganda), Egerton University (Kenya), University of Zambia (Zambia) and University of Education, Winneba (Ghana). The Open University of the United Kingdom coordinated the project.

The selection of the content was based on shared views from participating countries, reflecting the secondary science curriculum, focusing on common topics across member countries. The development stage included brainstorming and writing at different levels, reviews by the team, subject experts and classroom teachers, and versioning and customisation by individual countries for relevance and applicability.

The outcomes included the creation of open educational resources (OER) to support teachers of pupil-centred pedagogies in teaching science in secondary schools, the development of 15 units on five themes in different scientific contexts, increasing awareness of participatory pedagogies that teachers could use in other science teaching contexts and lessons emerging from extending the TESSA approach to secondary education.

OER DEVELOPMENT

OER is now a popular means to offer education through the distance mode by offering easily accessible reference material for teachers and learners in diverse learning environment (Atkins, Brown and Hammond, 2007).

The TESSA material provides one module for each subject namely, Biology, Chemistry and Physics, focusing on the following five pedagogical themes: probing children's understanding and learning, making science practical, science lived (relevant and real), problem solving (creativity and innovation in science), and dealing with challenging ideas in science. TESSA developed this material under the Creative and Commons Attribution – Non-commercial-Share Alike 4.0 License, which makes the material openly accessible online. In addition to web-based access, TESSA materials are also available on CD and in print for circulation among member institutions. These options made it possible for the material to reach teachers in selected schools. The materials are accompanied by clearly selected case studies, activities and resources, customized to the national curriculum context.

PURPOSE OF THE STUDY

The study explored the teachers' use of TESSA secondary science materials in classroom teaching and learning. It sought to establish the extent to which teachers in selected secondary schools were able to use the materials in teaching secondary school science subjects.

The following five key questions guided the study:

- What were teachers' views on the covered topics?
- How did teachers perceive the suggested teaching approaches?
- What areas needed improvement?
- Did teachers access online TESSA materials?
- What were the major challenges teachers faced?

METHODOLOGY OF THE STUDY

The study employed a qualitative research approach, where interviews and observations were used as the main data-collection techniques. Three secondary schools in a typical rural setting in the Bukoba district were purposively selected for the study. A content analysis was performed to identify thematic areas and capture teachers' and students' activities during the lessons. Both teachers and students were informed of the purpose of the study.

RESULTS

The findings of the study summarise the use of TESSA science materials and the challenges faced by secondary school teachers in selected schools.

Advantages

The study revealed that teachers were happy with the coverage of the material and the good linkage between the practical and theory components of the subjects. The use of the materials also enabled teachers to gauge students' understanding of the content in different topics. The approach used also enabled teachers to support students' learning through case studies and activities, and made the learners learn independently through experimentation (Osaki, 2007). Teachers felt that the web-based materials would enable them to access the materials if they had computers at their schools. Teachers commended the TESSA materials, particularly in respect of the guidance provided on practical issues and the enhancement of students' interest in science subjects. Furthermore, teachers commended TESSA for bridging the gaps brought about by book shortages, and for enabling students to learn on their own in the absence of teachers.

Challenges

The study revealed that only two out of seven participating teachers accessed the materials on the internet. Limitations related to funds and unreliable internet connectivity were experienced. Other teachers had limited familiarity with the internet, which posed a major barrier. Teachers were hopeful that printed copies, video copies for practical work, and soft copies on CD or a flash device for schools would provide suitable alternative means to access the materials.

CONCLUSION

This study assessed the impact of the TESSA material in selected Tanzanian schools and revealed that teachers used the print material received and found it useful.

REFERENCES

Atkins, D.E., Brown, J.S. & Hammond, A.L., 2007, 'A review of the open educational resources (OER) movement: achievements, challenges and new opportunities, report to the William and Flora Hewlett Foundation', viewed from http://creativecommons.org/licenses/by/3.0/us/.

Kibga, E., 2012, 'Strengthening science practical work for secondary school teachers in Tanzania: development and trial of in-service training materials', PhD thesis, Dodoma University, Tanzania.

United Republic of Tanzania (URT), 2011, *The National Strategy for Growth and Reduction of Poverty II (NSGRP)*, URT, Dar es Salaam.

United Republic of Tanzania (URT), 2014, Ministry of Education and Vocational Training, Dar es Salaam.

United Republic of Tanzania (URT), 2016, *National Basic Education Statistics in Tanzania 2012–2016*, URT, Dar es Salaam.

Osaki, K.M., 2007, 'Science and mathematics teacher preparation in Tanzania: lessons from teacher improvement project in Tanzania 1965–2006, *NUE Journal of International Education Cooperation* 2(1), 51–64.

THE IMPLEMENTATION OF SCIENTIFIC INQUIRY SKILLS IN PRIMARY TEACHER TRAINING COLLEGES IN KENYA

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ABSTRACT

This report investigates the implementation of scientific inquiry skills in a primary teacher training college, as a possible solution to transforming science education in primary classrooms. The current practice is that primary science tutors prepare pre-primary science teachers who do not have the prerequisite skills. According to this report, scientific inquiry skills are required for extensive and diverse learner-centred interactions and hands-on activities that centre on the application of science to improve a learner's scientific literacy. The study sought to identify the scientific inquiry skills that primary science tutors need to develop in pre-service primary science teachers. Five scientific inquiry skills were targeted: observation, questioning, experimentation, investigation and critical thinking. A qualitative approach and a case study design were used. Data was collected using semi-structured face-to-face interviews, classroom observation, focus group discussion and document analysis. The findings revealed inadequate utilisation of scientific inquiry skills in the pre-service science classroom, due to inadequate exposure of primary science tutors to such scientific inquiry skills in the Initial Teacher Education curriculum. This report suggests that there is a need to integrate and utilise, adequate scientific inquiry skills in the Initial Teacher Education curriculum, in order to adequately prepare primary science tutors. It is also necessary to integrate scientific inquiry skills in the in-service retraining of primary science tutors and in the induction course for those entering primary teacher preparation colleges.

Keywords: *Scientific inquiry skills, scientific literacy, primary science tutors, pre-service primary science teachers, initial teacher education.*

INTRODUCTION

The need to realise good learning outcomes by developing scientific literacy in pre-service primary science teachers cannot be ignored. However, the teaching of "right" facts prevents many teachers in sub-Saharan Africa from using approaches that develop important inquiry skills (Vavrus, Mathew & Barlett, 2011). This results in insufficient comprehension of the learned science concepts.

According to Mwangi (2011), there is inadequate understanding of the knowledge and skills of primary teacher education tutors with regard to pedagogical knowledge and skills, hence the need for research on primary teacher education tutors' classroom teaching practices. Furthermore, UNESCO's Technical Paper 2 of 2005 states that, there is a need for innovative experiments and investigation regarding learning and teaching the science curriculum.

The Kenya Vision 2030 aims at transforming Kenya into a newly industrialised middle-income country by 2030 (Government of Kenya, 2007). Investing in science education is critical and necessitates the preparation of primary science tutors who can actively engage pre-service primary science teachers in learner-centred approaches by implementing scientific inquiry skills.

According to Ng'asike (2012), primary science tutors are public university graduates who are trained as secondary school science teachers. The majority lack appropriate skills for the science instruction of pre-service primary teachers, since their training in the Initial Teacher Education curriculum was intended for secondary school teaching.

This report argues that a primary science tutor education curriculum that is embedded in the Initial Teacher Education programme and places special emphasis on the implementation of scientific inquiry skills would ensure that these skills are put into practice during the preparation of pre-service primary science teachers. Therefore, the research question posed by the author was: "What scientific inquiry skills do primary science tutors impart to pre-service primary science teachers during science lessons, and to what extent do these skills agree with the expected scientific inquiry skills teachers need in order to facilitate learners' learning?"

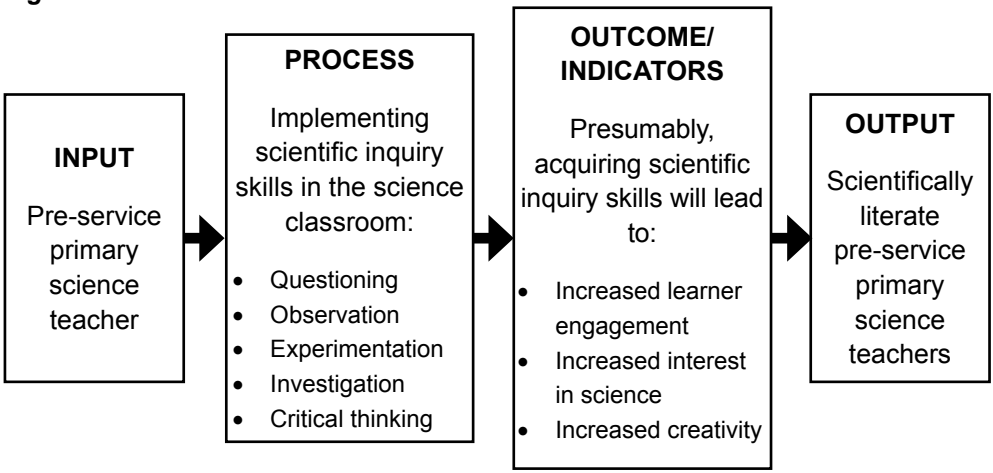
LITERATURE REVIEW

Scientific inquiry learning starts with the know-how of observation, which is acknowledged as an essential basic skill in primary science (Johnston, 2005; Boo, 2006). According to Doherty (2011), experiments provide active hands-on, minds-on learning that facilitates scientific thinking in learners other than memorising facts. Inquiry-oriented investigations actively involve students in learning, raising their interest in science and developing critical thinking skills (Hackling, Goodrum & Rennie, 2001). In addition, implementing investigative pedagogical approaches enhances active learning and not the passive receipt of knowledge (Ng'asike, 2012).

An inquiry-based classroom promotes critical thinking skills, which empowers students to become self-determining and lifelong learners (Belleau & Otero, 2013). Although science educators continue to state the need for teaching science as inquiry, classroom practices have shown little proof of realizing this (Bybee, 2010). Furthermore, in Kenya, pre-service primary science teachers do not have sufficient conceptual understanding of science process skills (Chebalengula, Mumba & Mbewe, 2011). However, few studies, if any, discuss the implementation of scientific inquiry skills by primary science tutors in teacher training colleges. This is the significance of this study.

CONCEPTUAL FRAMEWORK

Figure 1



Source: Author

According to Kiggins (2007), teacher-learner engagement can enhance learner motivation – and therefore active participation in their lessons. In Figure 1, the pre-service primary science teachers are the "input" that the primary teacher training college takes through the "process", which is the implementation of scientific inquiry skills. This would result in increased active learner engagement, which promotes interest in science and creativity; hence, scientifically literate pre-service primary science teachers would be regarded as the "output".

METHOD

A qualitative approach and a case study design were used. The instruments used were a semi-structured face-to-face interview with a science tutor, two classroom observations of the primary science tutor during the science lessons with 74 pre-service primary science teachers, a focus group discussion with 6 pre-service primary science teachers and document analysis of the Primary Teacher Education Ministry of Education (MOE) science syllabus and science tutor's schemes of work. The data was consequently transcribed and coded. The codes were clearly read to come up with categories, which were later organised into themes.

RESULTS

This report revealed that observation was found to be the most used scientific inquiry skill during the science lessons, especially during tutor demonstrations. The primary science tutor utilised more closed-ended questions than open-ended questions. There was no probing to facilitate an in-depth understanding of the concepts and active learning.

Experimentation was not a common scientific inquiry skill and only a few experiments were listed as a learning activity. In addition, classroom observation revealed that there was no evidence of experiments being done. Investigation was not a regular scientific inquiry skill used during the science lessons and the pre-service primary science teachers perceived it as an unnecessary scientific inquiry skill for teaching science in a primary classroom. Further analysis of the schemes of work showed that the science tutor had not included investigation as learning and teaching activity.

Minimal development of critical thinking in the preparation of pre-service primary science teachers was revealed. Classroom observation revealed that critical

thinking was rarely utilized, and only through a few open-ended questions that were posed. The scheme of work analysis showed that most of the questions listed elicited only factual information about the science concepts taught. Nonetheless, the analysis of the MOE's Primary Teacher Education science syllabus revealed that pre-service primary science teachers should be taught to develop critical thinking and creativity in addressing emerging issues in science.

DISCUSSION OF FINDINGS

Key findings revealed that the recommended scientific inquiry skills, which are the "'process" in the conceptual framework (see Figure 1) and are supposed to be imparted by the teacher, were not adequately implemented in preparation for achieving the "output" of the conceptual framework, in other words, scientifically literate pre-service primary science teachers.

It was established that more use was made of closed-ended questions than open-ended questions. Open-ended questions should be prepared that they elicit various opinions from the learners and stimulate the exploration of various options before making a decision (Morgan & Saxton, 2006).

Classroom observation further revealed that the participant pre-service primary science teachers were mainly engaged in observation during tutor demonstrations. In addition, exposure to only a few experiments was found to be a contributing factor to the inadequate utilisation of observation, which provides a powerful tool for acquiring insight into situations (Cohen, Manion & Morrison, 2007).

Investigation was found to be rare, which denies pre-service primary science teachers exposure to the analysis and interpretation of hands-on, minds-on activities. The use of investigations would expose them to thinking and reasoning critically to evaluate scientific concepts and so develop their scientific literacy skills (Hackling, et al., 2001).

Critical thinking was found to be used minimally in the preparation of pre-service primary science teachers. The use of critical thinking elicits meaningful science learning when it is well utilised in the preparation of pre-service primary science teachers (Murcia, 2005). Furthermore, if teachers are trained to acquire critical thinking skills, they would be able to question the scientific claims made by others.

CONCLUSION

This report attested to the fact that there is minimal implementation of scientific inquiry skills, like experimentation, investigation and critical thinking in the pre-service training of science teachers. In addition, there was little evidence of effort being made to implement the skills of observation and questioning.

Based on the findings, it was determined that the Initial Teacher Education curriculum may be adequate in terms of ensuring that primary science tutors have the essential science pedagogical content knowledge and adequate skills necessary for practice. However, in light of this report, there is a need to establish an initial primary science tutor's curriculum that includes scientific inquiry skills in the Initial Teacher Education Programme. These skills should also be implemented in the in-service re-training of existing primary science tutors, as well as in an induction course for those entering primary teacher preparation colleges.

REFERENCES

Belleau, S.N., & Otero, V.K., 2013, 'Critical classroom structures for empowering students to participate in science discourse', *AIP Conference Proceedings*, 1513, 11(2013), 11–14.

Bóo, M., 2006, 'Science in the early years', in W. Harlen (ed.), *ASE guide to primary science education,* pp.124–132, Association for Science Education, Hatfield.

Bybee, R., 2010, *The teaching of science: 21st century perspectives*, NSTA Press, Arlington, VA.

Chebalengula, V., Mumba, F. & Mbewe, S., 2011, 'How pre-service teachers understand and perform science process skills', *Eurasia Journal of Mathematics, Science and Technology Education* 8(3), 167–176.

Cohen, L., Manion, L., & Morrison, K., 2007, *Research methods in education*, Routledge, London and New York, NY.

Doherty, D., 2011, 'Teaching experimental methods: a framework for hands-on modules', *Journal of Political Science Education* 7(2), 163–172, doi: 10.1080/15512169.2011.564909.

Government of Kenya, 2007, *Kenya Vision 2030. A globally competitive and prosperous Kenya,* Ministry of Planning, Nairobi.

Hackling, M.W., Goodrum, D. & Rennie, L., 2001, 'The state of science in Australian secondary schools', *Australian Science Teachers Journal* 47(4), 6–17.

Johnston, J., 2005, *Early explorations in science,* 2nd ed., Open University Press, Buckingham.

Kiggins, J., 2007, 'The underpinning knowledge basis of the alternative teacher education model', *The International Journal of Learning* 14 (1), 221–228, viewed from http://ro.ouw.edu.au/edupapers/50.

Morgan, N. & Saxton, J., 2006, *Asking better questions*, Pembroke Publishers, Markham, ON.

Murcia, K., 2005, 'Science for the 21st century: teaching for scientific literacy in the primary classroom', ResearchGate.

Mwangi S.K., 2011, 'Towards context-based learning as a model for pre-service primary teacher education in Kenya: a case of Meru and Egoji teachers colleges', Ph.D. thesis, Kenya University.

Ng'asike, J., 2012, 'Training of science teachers for early childhood and primary grades in Kenya', *New Zealand Journal of Teachers' Work* 9(1), 36–49.

UNESCO. (2005), Guidelines and recommendations for reorienting teacher education to address sustainability.

UNESCO. (2005). Technical Paper No. 2, UNESCO, Paris.

Vavrus, F., Mathew, T. & Barlett, L., 2011, *Ensuring quality by attending to inquiry: learner-centered pedagogy in Sub-Saharan Africa,* UNESCO, Addis Ababa.

BOOK REVIEW

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Assuring institutional quality in open and distance learning (ODL) in the developing context

Aluko, Folake Ruth, Letseka, Moeketsi and Victor, Pitsoe (eds), 2016.

USA: Nova Science Publishers

US $160, 190 pp., 12 chapters

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Unless open distance learning practitioners (ODL) deliberately give attention through research to quality issues, distance education may continue to be compromised, or at least questioned, in terms of its quality. This trend would be counterproductive and all investment that is being made by governments to expand access through this mode of delivery would amount to nothing.

This book, edited by Folake Ruth Aluko from the University of Pretoria, Letseka Moeketsi and Victor Pitsoe (from the University of South Africa) and containing contributions from 12 authors – all of whom are currently active in the field – explores burning issues around the need to ensure institutional quality in ODL, especially in a developing context. This becomes imperative in view of the persistent concerns about quality among stakeholders, and the need to expand work in the context of ODL quality assurance and its management, which has just started to evolve. However, this is compounded with the need to expand higher education opportunity, in accordance with the United Nations Sustainable Development Goals, which have particular significance for the developing contexts of Africa, the continent from which the work is conceived.

Alan Tait, in his preface to the book, laments the conflicting discourses of what excellence is in higher education in general. He observes in particular that there is another dimension of excellence, which concerns universities with a different mission, and usually those with a primary or significant commitment to open and distance education. Therefore, he advocates that our discussions of quality

should not accede to normative and a-contextual definitions of what is “best”, but should rather include definitions of excellence that recognise inclusion, access and widening participation.

Therefore, this book is very important as it helps ODL providers (who are on the increase not only in South Africa but also in the sub-Saharan African region as a whole) to reflect on quality issues.

The book contains twelve chapters. These are made up of subthemes ranging from understanding ODL as second chance, the meaning of quality in ODL, theorising quality in ODL practices, assuring quality management and administrative services in ODL, to quality access to ODL. Other chapters explore programme design in ODL, quality student support in ODL, quality ODL research, programme evaluation as a tool for ensuring quality in ODL, and the example of managing the quality of an ODL module.

Chapter 1 aptly argues that ODL is now a common mode of delivery, and focusing on quality is critical for various reasons. That not enough attention has been paid to quality assurance in ODL in developing countries might not be very accurate, as some quality assurance has always been implemented. The major shift though, has been the adoption of more explicit and rigorous approaches to quality assurance. A client-satisfaction notion of quality given on p. 2 of the book seems very appropriate for ODL. This first chapter does well to foreground the purpose of pursuing the quality theme in ODL in this publication. This chapter is well written and well structured.

Chapter 2 deals with key elements of quality in ODL and tries to cast definitions of quality within an ODL context. It draws from various theories, including TQM. Whilst it is accepted that there are theoretical ideas that have withstood the test of time, the authors should also have supported their work with more recent references. The chapter links quality to throughput rates, which I believe is a very important concept. The content of the chapter is great, but the argument and structure of the chapter need to be better streamlined and strengthened. There has to be a more logical flow of ideas in the chapter, all converging on one argument.

In **Chapter 3**, the argument that quality is contextual and is often conflated with concepts like efficiency, effectiveness and equity cannot be contested. It is important for scholars in the field of quality assurance to clear this confusion and generate clearer understanding of the concept of quality, for both practical and

theoretical purposes. Whilst the authors introduce a sound scholarly flavour in the debate, the chapter tends to remain very much in the philosophical realm of the cited theories at the expense of teasing out quality and quality assurance per se, and how these theories should help us understand these processes in an ODL context. Nonetheless, this is a very useful chapter indeed, particularly in terms of viewing quality assurance from a different perspective than what is common.

Chapter 4 deals with terms that are related to quality assurance, such as quality management and quality control. It is important for practitioners to understand and distinguish between these terms. In the chapter, the distinction between quality assurance as a proactive process is not clearly distinguished enough from quality control, which is a reactive process. Unfortunately, this kind of book (due to the wide range of issues confronting the theme in a developing context) is often unable to do necessary justice to important topics. This challenge can also be found in Chapter 5.

Chapter 5 deals with the macro-political legacies of apartheid, and their implications for educational provision in the country. The core of the argument is that higher education has been the preserve of the elite. The curriculum, the high fees, the language and the location act as barriers that working class children have to deal with in order to access higher education. All this contributes to the dialectical structural condition of an ever-widening gap between the rich and the poor. This is a powerful educational argument at the centre of the discourse on inequality and inequity challenges in current South Africa. The chapter could, however, have taken the debate further to closely link these problems to matters of quality provision of ODL. For instance, by pointing out that even in instances where poor people take advantage of cheaper ODL programmes, if the quality is poor, they remain marginalised as they fail to acquire competitive knowledge and skills. In addition, the argument that distance education is an alternative to addressing the dearth of human resource skills, can help ensure employability, and is a means to reduce inequality can only hold if quality distance education is provided, if access is further enhanced, and if throughput rates are raised. Overall, the chapter pursues a very legitimate argument on quality as transformation, but this argument also has a very strong political spin that requires scholarly unpacking.

In **Chapter 6**, the author discusses the need to expand access in higher education in order to accommodate people from previously disadvantaged groups. Whilst this is true, there is a tension here that needs teasing out. On one hand is the need to

expand access in order to address the legacy of apartheid, and this entails enrolling many students from previously disadvantaged home backgrounds. On the other hand, is the importance of ensuring that this disadvantaged group experiences success. Some of the claims also highlighted by the author seem contentious. Nonetheless, the chapter aptly captures the challenges that are faced in the higher education system, at systemic level. The argument of the chapter, that openness of ODL in SA is in fact not open enough to serve the majority of the poor people due to the social and economic structural problems that have largely remained unresolved in the society, is a very seminal argument. Since the book is on quality, the argument, which speaks more to policy of provision than quality issues, can also be easily linked to issues of quality.

Chapter 7 is a very useful chapter that brings out not only conceptual clarity on key aspects of higher education delivery like programme and course design, but also how these aspects should be coherently planned in distance education. This planning aspect is a critical quality aspect in ODL. The guidelines given in the chapter on course and programme design are extremely handy to ODL practitioners, so is the discussion on the epistemological underpinnings of such design. The chapter brings home the important point that when thinking about a curriculum, providers should not only think of the content to be transmitted, they should also consider how the curriculum will be taught. This is a point that many ODL practitioners often miss. This is a well-written chapter that clearly links theory of learning to practical design issues.

Chapter 8 deals with the all-important aspect of student support in ODL. The argument that "... student support is deeply implicated in the politics of the elite culture" p. 134 needs to be pursued and clarified further, otherwise the reader does not see how this is so. However, the chapter makes an important point that student support services constitute an essential component of delivery that determines student retention and success in distance education. It deals with an immensely critical aspect of distance education delivery – student support. It would be useful if the chapter ended with practice-oriented recommendations for ODL practitioners, though the author implied these here and there in the chapter.

Chapter 9 highlights the quality benefits of programme evaluation in ODL, a very important aspect of ODL delivery. It draws from principles of TQM and tries to show how application of these principles might improve quality delivery of ODL. It is a useful idea to use a systems approach to understanding ODL. One of the

benefits of programme evaluation is that it enhances regular programme renewal that ensures that programmes offered remain relevant to the needs of the students and of the market. The last statement of the chapter, cited from ADEA, captures this idea, though the aspect needs to be emphasised more because many institutions, ODL and contact alike, often run out-dated programmes. The next edition of the book could further illustrate how TQM principles can be applied in practice in ODL. Often, practitioners need this kind of illustration of theory.

Chapter 10 starts by acknowledging the contested nature of quality, and the implications of different understandings of the term. For instance, it links the notion of quality as excellence to elitist notions of educational provision. This reflection on implications of perceptions of quality is very important in education. The question however, is how do we understand and implement such notions of quality without being elitist? The author does well by highlighting that, in spite of the elusive nature of the concept, quality remains the hallmark of educational provision. The author aptly captures the two broad conceptions of quality as applied in education, the subjective and the objective notions of quality. The chapter also considers the notion of value-addition as another conception of quality. This is very good, but perhaps we should also explore and suggest how we can measure it.

I particularly like the conclusion the author draws from debates on quality, linking quality to the capacity of an institution to behave according to set targets. This is a very pragmatic approach to operationalising quality, which circumvents the

problem of conceptual complexity. This is an excellent chapter that is well-written, well-structured and that deals with pertinent quality issues. The argument of the chapter is clear and intelligently draws from theory. It sheds useful hints on how to apply theoretical notions of quality to practice in ODL, using UNISA as a case.

In **Chapter 11**, the author deals with quality assurance of a module so that students can derive maximum learning gains out of it. This is obviously a critical aspect in ODL. The author tried to use principles of ethical law, utilitarianism, universalism, distributive justice and personal liberty as a framework for showing how the quality of a module can be managed. This was good. However, the author would have done even better to effectively show how the principles of the framework can be applied in practice.

Chapter 12 summarises the book. Overall, the themes dealt with in the publication are pertinent to the South African context, and indeed to the wider sub-Saharan African region. In order to make the book more accessible to practitioners, I recommend that the book be published as an OER. Though the book has not claimed to cover all important aspects in detail, I am looking forward to the inclusion in future of a dedicated chapter to online learning, and how best ODL students can be supported through ICTs. This is in view of the prevalence of educational technologies.

I applaud the authors of this seminal piece of work for compiling such a publication, which has a very strong contextual focus.

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Unpublished theses or dissertations:
Squelch. J. 1991. Teacher training for multicultural education in a multicultural society. MEd dissertation. Pretoria: University of South Africa.

Anonymous newspaper references:
Citizen 1996. Education for all, 22 March.

Electronic references (no author):
Violence and discipline problems in US schools 2001. Available at http://www.nces.ed.gov/pubs98/violence/9803000l.htm. Accessed 2 March 2005.

Electronic references (published under author's name):
Wilson, J. 2000. The blame culture. British Educational Research Journal, 26. Available at EBSCO Host: Academic Search Premier. Accessed 20 April 2005.

Personal communications:
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Submission of manuscripts for publication

Manuscripts and covering letters must be submitted electronically by email to Dr Folake Ruth Aluko (ruth.aluko@up.ac.za). The deadline for submission is **31 October 2017**.

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