Developing staff for the implementation of problem-based learning: Experiences from Botswana

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Abstract
Educational transformation in higher education places new demands on academics, especially in terms of shifting from traditional methods of teaching and learning to the application of innovative methods. Whereas outcomes-based education leans towards a philosophy, problem-based learning (PBL) offers a structured methodology in which teaching and learning can occur in a systematic, yet innovative manner. One cannot simply expose academics to the theoretical concepts of PBL and then expect them to apply the methods. Academics need rigorous training and development in the practice of PBL. This article describes a workshop aimed at training academics in Nursing Education regarding the application of PBL. The medical model (often termed the hypothetico-deductive method of problem-solving) was used to: analyse clinical scenarios; generate and modify hypotheses; and search for information as learners would. Evaluation and reflection of the programme showed that participants benefited from the exposure to PBL, and were confident about implementing it in the classroom.

INTRODUCTION
Problem-based learning originated at McMaster University in 1969 when the emphasis of the undergraduate medical curriculum was shifted from individual disciplines such as Biochemistry, Anatomy and Physiology, and focussed towards an integrated approach involving learners in problem solving and independent learning (Bligh 1995; Campbell 1970). Subsequent to McMaster University introducing PBL there have been numerous reports in the literature on the implementation of PBL, which bears testament to the increasing proliferation of the curriculum. Indeed, PBL has had a profound influence on the thinking and practice in medical education over the past 30 to 40 years, and in the opinion of Barrows and Tamblyn (1980) PBL is tailor-made for medicine. The PBL approach has often been deemed as more effective than traditional methods of teaching and learning with respect to the acquisition of basic knowledge and clinical skills (Colliver 2000).

McMaster University School of Nursing was also instrumental in the pioneering of PBL in the field of Nursing Education (Baker 2000), and this model for PBL has
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been adopted within Nursing Education in various parts of the world, such as Australia, China, the United Kingdom and South Africa (Creedy and Hand 1994; Andrews and Jones 1996; Dana 1997; Yuan, Kunaviktikul, Klunklin and Williams 2008). At the time of this study, there was limited evidence of the application of PBL in Nursing Education in Botswana (the country context of this study).

A few decades ago implementing PBL was found to be so challenging that academics who were interested in PBL were daunted by the complexities and obstacles posed and were thus unable to introduce it into their teaching and learning environment (Wolff 1979). Although PBL has become more widespread since then, its implementation can still be fraught with difficulties, as attested to in the literature. One of these difficulties pertains to a lack of tutor competence. Houlden, Collier, Frid, John and Pross (2001) report that tutors in their study made several mistakes such as: delivering a didactic presentation, thus stifling group discussion; rushing though PBL cases in an attempt to finish early and an inability to manage the group effectively, resulting in dysfunctional group dynamics.

Due to the specialized structure and methodology of PBL, simple exposure to the theoretical principles may not be enough to provide prospective and novice PBL tutors with a strong enough grasp of the intricacies involved when tutoring. This means that a hands-on staff development approach is essential when it comes to training and developing academics. By discussing the process of a one-day programme for academics in Nursing Education at the University of Botswana, this article provides a precise methodology for the development of academic staff in the application of PBL in the classroom. There is a dearth of studies which focus on the development of academics for PBL in Botswana and therefore, the study described in this article addresses this shortcoming.

THE DEFINITION AND EPISTEMOLOGICAL POSITION OF PROBLEM-BASED LEARNING

Barrows (1986) defines PBL as an educational method that uses problems in the instructional sequence for achieving certain objectives. That is, learning that results from the understanding and resolution of a problem. The PBL curriculum differs from other problem-centered methods in that the problem is presented first, before any relevant learning has taken place (Baker 2000). By taking on a problem as a basis for learning the learner not only acquires an integrated body of knowledge related to the problem, but also develops problem-solving skills (Colliver 2000; Walton and Matthews 1989).

PBL is regarded as a constructivist approach to learning due to learners’ active engagement in their learning, and their construction of meaning based on previous knowledge and experiences (Ertmer and Newby 1993). In a PBL environment, learning is facilitated so that learners can construct their own meaning of knowledge and therefore, the role of the tutor is that of facilitator of learning rather than dispenser of information (Boshuizen, Van de Vleuten, Schmidt and Michiels-Bongaerts 1997).
Therefore, a learner-centered learning environment is created, and self-directed learning is promoted (Schmidt, Dauphinee and Patel 1987).

The construction of meaning occurs through the structured problem-solving process, described by Barrows (1985), of problem analysis, hypothesis generation, identification of learning issues, data gathering, feedback and problem resolution. Through engagement with problems and the problem-solving process, learners will be actively engaged in reconstructing their existing beliefs by restructuring their cognitive maps and this will lead to higher levels of understanding or deep learning (Mackinnon and Scarff-Seatter 1997). During this process, an important part of the PBL protocol is to provide stimuli for learning not only in the form of a problem but in the form of pertinent questions posed by the tutor. The cognitive dissonance, which is created when the tutor challenges learners by asking probing questions, ignites a meta-cognitive process which enables learners to establish what they know and what they do not know. This is the crux of PBL. Without the identification of gaps in their knowledge and the subsequent generation of appropriate learning issues which become the foci of independent study, knowledge construction and production will not be possible.

A caveat of the facilitation process in PBL is that if the tutor is not successful at facilitating, learners can become confused about what they should learn and this could be detrimental to their construction of knowledge. When academics become PBL tutors they need to make the paradigm shift from teacher to facilitator and this can be a difficult process. This is partly because they do not know for certain what their role as facilitator entails, especially in terms of what they should do with their content expertise. They are discouraged from disseminating content as they would in a traditional lecture and are under the impression that they have to relinquish that knowledge. Many are unaware that when they make the paradigm shift, they do not have to give up their conceptual (content) knowledge but need to use it in a different way, by contextualizing it, to help learners construct meaning. For the successful implementation of PBL, both conceptual and contextual knowledge is important and prospective tutors need to be trained and developed in the application of both, in order to become effective facilitators of learning.

PROBLEM-BASED LEARNING IN THE CONTEXT OF MEDICAL EDUCATION

In the McMaster Medical model for PBL, the learning process is kick-started with a problem in the form of a comprehensive clinical scenario enriched with information in the form of: laboratory data; history summaries; physical examination summaries and other relevant supporting evidence. During the unfolding of the clinical scenario additional information about the problem is illuminated page-by-page and clinical details are given in a piecemeal fashion, thus allowing learners to construct a progressive understanding of the problem. Pertinent questions are asked at strategic points in the scenario in order to determine gaps in the learners’ knowledge. These are then identified as learning issues and become the foci for self-directed learning.
Brainstorming around the possible diagnosis ensues and hypotheses are generated, and continuously modified, based on history summaries, laboratory and clinical data and basic science information. Once there is agreement about a diagnosis, therapeutic strategies are discussed (Barrows 1985; Stein, Neill and Houston 1990; Windish 2000; Maleh, Burday, Collier and Polster 2000).

This general problem-solving process in medicine (which underpins the McMaster Medical model) has often been described as the ‘clinical reasoning process’ and has been labeled the hypothetico-deductive method as it represents deductive reasoning (Barrows and Tamblyn 1980, 19). Clinical reasoning is an essential skill for a physician during the evaluation and management of a patient’s medical problem (Barrows and Tamblyn 1980). This is why, in PBL, the learner is exposed to, and expected to develop clinical reasoning skills in preparation for future professional practice (Windish 2000).

**PROBLEM-BASED LEARNING IN NURSING EDUCATION**

The need for PBL in Nursing Education becomes apparent when one considers that in order to be able to deliver high quality health care in a complex, challenging, transforming healthcare environment nurses need to have problem-solving abilities and higher order thinking skills (Baker 2000). According to Fero, Witsberger, Wesmiller, Zullo and Hoffman (2009), about 25 per cent of newly hired nurses have difficulties in critical thinking abilities, problem recognition and initiating relevant nursing interventions. Fero et al. (2009) suggest that innovative educational strategies (such as PBL) could enhance complex thinking skills in nurses enabling them to become more effective in the practice of nursing.

When Yuan and co-workers (2008) conducted an empirical study of the effect of PBL on the critical thinking skills of learners in Nursing, they found that learners in the PBL group demonstrated higher critical thinking skills, self-directed learning skills and co-operative learning skills than those in the lecture group. Learners in the PBL group were required to solve a clinical problem using the hypothetico-deductive method for PBL, and in the process acquired better problem-solving skills than the learners in the lecture group.

The hypothetico-deductive method for PBL in Nursing is similar to the Medical model discussed previously. In the first session, learners are presented with a scenario which requires nursing interventions with learners assuming the role of qualified nurses in charge of a clinical area. As new information is given at strategic points in the scenario, learners identify cues to formulate hypotheses and identify learning issues for self-study. In the next session, learners meet to share knowledge which they have gathered. They also test and modify the hypotheses. Once the most likely hypothesis is identified, learners embark on an action plan for the management of the patient’s problem. The role of the tutor in the entire process is that of facilitator of learning (Andrews and Jones 1996).
DEVELOPING STAFF FOR IMPLEMENTING PROBLEM-BASED LEARNING

It cannot be denied that staff development programmes are needed in order to support tutors in defining their primary tasks and roles as tutors within a PBL context (Bowman and Hughes 2005; Hattingh and Killen 2003). In order for PBL to be successfully implemented, tutors need to be trained how to: 1) create clear boundaries regarding tutor roles, 2) model professional behaviour and 3) keep the group focussed on meeting their learning objectives (Bowman and Hughes 2005).

A further challenge for tutors is the need to step out of their role as sole bearers of knowledge, and shift the responsibility of learning to the learners. In describing a study which involved the training of pre-service teachers in the application of PBL principles, Hattingh and Killen (2003) complain about the difficulty faced when training educators to make the adjustment from dispensers of content to facilitators of learning. Research shows that the competence of the tutor as a facilitator is key to the success of PBL, especially in terms of stimulating active learning and promoting self-directed and collaborative learning (Henk and Dolmans 2006). It is unlikely that these competencies would come naturally to the novice tutor, making training and development essential for the inculcation of these competencies.

A case in point is the introduction of PBL at the Walter Sisulu University (former University of Transkei-Unitra) in 1993, which saw most of the academics involved in PBL treading on unfamiliar terrain as they lacked the knowledge and skills regarding the facilitation of learning using PBL principles. These academics (including this author who was employed there at the time) were the recipients of a crash familiarization course in the form of a workshop where a clinical problem was presented and discussed in the same format that was to be applied with the learners. This workshop was preceded by seminars on the principles of PBL (Hassan 1996). This approach provided the framework for the method of developing academics for PBL described in this article.

In some PBL staff development programmes reported in the literature, triggers rather than clinical problems are used. These triggers are simple descriptions of a clinical situation which requires a nursing intervention (Murray and Savin-Baden 2000). The staff development programme described in this article adopts a different approach in that a clinical scenario, which was applied in the training of learners in a medical programme at the Walter Sisulu University, was used to train and develop academics in Nursing Education. The rationale behind this is that in practice clinicians and nurses manage clinical problems as a team, albeit from different angles, therefore exposing them to the same clinical scenarios while they are still learners would hold them in better stead to work together more effectively and efficiently.

THE STUDY

This article reports on a one-day staff development programme implemented to train and develop academics in Nursing Education in the principles and application of PBL.
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Context of the study

The study was conducted at the University of Botswana (UB) in Gaborone. There are seven faculties at UB namely the Faculty of: Humanities; Science; Engineering and Technology; Business; Social Science; Education and Health Sciences. At the time of undertaking this study, there were approximately 700 academic staff and 15 000 students at the University. The staff development programme described in this article attracted 30 participants from the then Department of Nursing, now the School of Nursing under the recently formed Faculty of Health Sciences. The School of Nursing offers a Bachelor of Nursing Science (BNS) Degree and a Master of Nursing Science Degree (University of Botswana 2008).

Botswana is regarded as an under-developed country and the resources at UB are often perceived to be inadequate. Limited budgets, large classes, an inferior infrastructure and inadequate facilities for effective teaching and learning characterize the higher educational landscape. Previous to this study, attempts at applying innovative methods of teaching and learning, such as PBL, at UB have been limited. The majority of participants who attended the staff development programme had no prior exposure to, or experience, in PBL.

Modus operandi of the staff development programme

Since academic staff at UB often complained that they lack time to attend staff development programmes, it was decided that a one-day workshop would increase the likelihood of attendance. The staff development programme borrowed elements from the McMaster Medical model for PBL notwithstanding that it was academics in Nursing Education who were being trained, since there are many overlaps between the McMaster Medical and McMaster Nursing models for PBL. Nevertheless, the work-shop was customised to meet the needs of participants, as academics, who work within the context of Nursing Education.

The main objective of the workshop was to inculcate the relevant knowledge and skills needed to implement PBL within their teaching and learning contexts. The workshop programme is shown in Table 1.

Table 1: Workshop programme for training and developing academic staff in PBL

<table>
<thead>
<tr>
<th>Workshop sessions</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Session 1</td>
<td>Principles of PBL</td>
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</table>
| Session 2         | PBL implementation:  
|                   | Stage 1: Exposure to the clinical problem, generation of hypotheses and identification of learning issues.  
|                   | Stage 2: Self-study involving the research of learning issues.  
|                   | Stage 3: Plenary: feedback, discussion and closure of the case study. |
| Session 3         | Evaluation of the workshop and closure |

At the outset of the workshop, it was considered expedient to discuss the principles which underpin PBL, and therefore, the following hallmarks were discussed:
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- Self-directed learning.
- Problem-solving or the clinical reasoning process.
- Critical and creative thinking.
- Vertical and horizontal integration.
- The spiral curriculum.
- The facilitation of learning.
- The contextualization of content.
- The relevance of learner's prior knowledge.

The challenge for the author, as the facilitator, was to demonstrate how these hallmarks would be applied during the following session of the workshop, which involved exposing participants to the actual PBL process. In readiness for experiencing PBL, the 30 participants were assigned to five small groups, with six members in each group. The author was the primary facilitator for the large group (30 participants) and each small group was required to choose a secondary facilitator whose role was to manage group dynamics and ensure that the learning issues were addressed. It was requested of each group to choose a representative who was to give feedback to the large group during the plenary session.

Participants were exposed to PBL in the same way that their learners would encounter it. Learning was contextualized since information was presented to participants in the manner in which learners would experience it in their future professional lives. It was explained to the participants that in spite of the fact that they were learners in the workshop, they were also expected to pay attention to the facilitation techniques used by the author, as the primary facilitator. That is, they were expected to see themselves in the dual role of learner and PBL tutor; moving back and forth to appreciate and understand the tasks and functions of each role player. The participants were also informed that they would encounter the PBL process in three stages (see Table 1). During the first stage they were expected to generate learning issues and hypothesise upon the diagnosis for the patient presented in the case study. During the second stage they were required to research information which would address the learning issues and narrow down the list of hypotheses. During the final stage they were required to provide feedback regarding the information they had assimilated, reach a conclusive diagnosis and wrap up the case study.

At the start of the PBL process, participants were required to approach the clinical scenario cold (that is, they had not seen it before), and the scenario was given to them one page at a time. The clinical problem that was selected was a case of diabetes mellitus. The first page described a scenario in which a patient presents with certain symptoms. The scenario opened as follows: ‘Ntombekaya is a 53-year old woman with a history of diabetes. She complains of experiencing difficulty when walking. She says she can’t feel the ground under her feet. She describes it as walking on cotton wool’. The questions that followed were: 1) ‘What are your hypotheses
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regarding the cause of this patient’s problems?’ and 2) ‘What further information would you like to have to test your hypotheses?’

In response to these questions participants were expected to present their hypotheses regarding the possible diagnosis and to request for additional information to test their hypotheses. Every hypothesis generated had to be substantiated with a rationale. The following hypotheses were derived and written on a white board as part of the practice of PBL:

• Stress.
• Diabetes.
• A neurological disorder.
• Multiple sclerosis.
• The patient was bewitched (a victim of black magic).

The additional information requested by participants pertained to a history summary such as: loss of weight; presence of thirst and frequency of urination, as well as the results of a neurological examination. When the requested information was supplied, participants were asked if they wanted to modify their list of hypotheses based on the new information as well as what additional information they needed. As part of the PBL protocol, participants were first asked what information they needed to modify their hypotheses before any relevant information was supplied. By using clinical evidence, in the form of laboratory data and physical examination summaries, participants worked towards making a diagnosis through deductive reasoning: by eliminating; adding and re-ranking hypotheses. This procedure formed part of the clinical reasoning process or hypothetico-deductive method.

As the discussion on the clinical problem progressed, and through focussed questioning by the facilitator, learning issues were generated based on what the participants knew or did not know. For example, when questioning revealed that participants’ knowledge about the mechanism of diabetes neuropathy was limited, that concept became a learning issue to be addressed through self-directed learning. ‘Types of diabetes’ would normally have been identified as a learning issue as it is related to the clinical problem, but since participants were able to explain the concept, it did not constitute a learning issue. As the discussion progressed learning issues were recorded on a white board and examples are given as follows:

• Structure, synthesis and mechanism of action of insulin.
• Carbohydrate metabolism.
• Causes and complications of diabetes.
• Diabetes neuropathy.

During the second stage of the PBL process participants were required to search for information on the learning issues in a self-directed manner. They were provided with resources such as relevant textbooks, journal articles and access to the internet.
Due to time constraints each group was asked to tackle a learning issue, instead of all participants researching all the learning issues as would normally be the case if learners were involved. The intention was to afford participants the opportunity of experiencing self-directed learning within the context of PBL and this was achieved without an overbearing focus on their knowledge of the relevant content.

The third stage was a plenary session where participants gave feedback on the learning issues to the large group and discussion around pertinent and controversial issues ensued. The plenary exercise gave the opportunity for the integration of content (being the basic sciences and clinical knowledge) in a vertical and horizontal manner since learning issues explored were applied to the clinical problem. This stage saw a jigsaw of information being assembled into a complete picture resulting in the resolution of the problem (a diagnosis was finalised as diabetes mellitus with neuropathy as a complication). Participants were encouraged to present feedback visually, through the use of diagrams and flow charts, so that the rest of the group could follow the discussion easily. Once again, participants were expected to model best practice that would eventually be emulated by their learners.

The author (as the primary facilitator) probed participants for a deeper understanding of concepts by asking participants to explain their answers and their thinking, thus promoting deep learning. In this way participants were exposed to the questioning style that is normally adopted during the PBL process, and were encouraged to aspire towards that method of probing for further understanding before stepping in to clarify poorly understood concepts. Participants found that although the facilitator did not readily disseminate information or explain concepts, except when an impasse in the discussion was reached, they had learnt a lot about the clinical problem in question. The PBL process was concluded with a summary of the clinical problem and a discussion of the treatment plan for the patient.

Reflection and evaluation of the workshop

As a form of quality assurance, self-administered questionnaires containing four open-ended items were applied to evaluate the workshop. These items focused on the quality of facilitation, organization and content of the workshop. In general, the PBL approach towards Nursing Education was enthusiastically received. Participants enjoyed the session on the principles of PBL as well as working through the PBL case study. They felt that the workshop was ‘an eye-opener’ as they had learnt a lot and they ‘were able to see how information could be generated and integrated’. They felt that PBL not only ‘uplifts the spirit of being a teacher’ but that it ‘can stimulate learners’ as well. There was acknowledgement that in order to be a successful PBL tutor, one would need to do a lot of preparation so as to be able to handle pertinent questions and comments from learners. Given that a complete shift to PBL might be difficult, they suggested that PBL be integrated with the old (traditional) curriculum in a way that would complement each other.

That participants had a positive response towards PBL augured well for the workshop (in this author’s experience, it is not easy to get academics to accept
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novel methods of teaching and learning). After the workshop many participants felt confident about their ability to apply PBL in their classrooms. This is probably because they were placed in the position of being learners themselves while participating in the PBL process. The practical nature of the workshop helped provide potential PBL tutors with the tools and confidence to implement a curriculum as sophisticated and complex as PBL.

Some participants admitted that they had attended PBL seminars in the past but were not able to apply what they had been exposed to in those seminars because of the narrow focus on the theory of PBL, at the expense of practical exposure. Similar experiences by academics have been reported in the literature. In a study conducted by Murray and Savin-Baden (2000), for example, it was found that even though staff were orientated to PBL during a number of introductory sessions, they still expressed the need for a structured staff development programme.

Participants acknowledged that there are benefits to PBL, but anticipated that its implementation could involve a lot of preparation. While many were excited about PBL and were eager to attempt this approach, they lamented that implementation might be challenging when dealing with large numbers of learners and limited resources.

DISCUSSION

PBL tutors must be capable of learning, and not just teaching (Knowles 1980). Therefore, in this workshop, it was deemed important to provide opportunities for participants to engage in self-directed learning in order to better position them to inculcate this skill in their learners. Personal experience has shown that some academics do not fully appreciate what self-directed learning involves, and are under the misconception that learners should be expected to look up and learn information by themselves with only limited guidance from the facilitator or lecturer.

Participants acknowledged that they were on a steep learning curve and some even voiced concerns about the changing role from teacher to facilitator. A few felt that even after the workshop they did not have the confidence to facilitate learning in a multidisciplinary, integrated context. The case study used in the workshop demonstrated that in order to be an expert facilitator one is required to have an integrated perspective of the content in disciplines such as Biochemistry, Physiology and Anatomy as well as the ability to link that basic science knowledge to the clinical data provided. This integration needs to be achieved while concomitantly using directive questioning approaches to guide learners in generating relevant learning issues and hypotheses. Muller and de Kock (2001) assert that in aiming to implement cross-curricula, holistic and relevant learning, there is a dilemma of developing facilitators who can achieve this demanding level of educational knowledge and teaching skills.

There are different styles of facilitation and a tutor can pose as a content expert or as a non-expert who focuses more on the PBL process. De Grave, Dolmans and van de Vleuten (1999) discovered that a tutor who stresses the learning process during
a PBL tutorial is perceived by students as being more effective than an expert tutor who simply stresses content.

Similarly, tutors who are adept at managing group dynamics have been perceived as being more highly skilled than those who are not. Dolmans, Wolhagen, Scherpbier and van de Vleuten (2001) found that the performance of facilitators with good group dynamic skills were rated higher by learners than tutors who lacked these skills, irrespective of the quality of a group’s performance. Dolmans et al. (2001) argue that tutors with weak group dynamic skills would lack the competence to deal with unproductive groups and improve co-operation within the group.

There is a gap in the literature on whether or not expert tutors with good group dynamic skills are better favoured over non-expert tutors. In this author’s estimation, derived from experience as a PBL tutor at the Walter Sisulu University and St. Georges University of London, being skilled in managing small group dynamics in conjunction with content expertise is rated more highly by learners than simply being able to handle group dynamics. Therefore, Bligh’s (1995) argument about facilitators not having to be content specialists does not necessarily apply to all PBL contexts. Personal experience has shown that it is useful for facilitators to understand the discussions of the group and to guide learners or the learners could easily be misled. Tutors should familiarize themselves with the relevant content by engaging in self-directed learning. In any case, tutors should be exemplars of self-directed learning (Neufeld and Barrows 1974) if they are to inculcate that skill in learners. The staff development workshop described in this article prioritized the inculcation of self-directed learning for these reasons.

It is common practice in PBL for tutors to be guided by pre-determined learning issues when steering learners towards identification of learning issues appropriate to the clinical problem. These learning issues are not made explicit to the learner at the outset of the learning process, as the onus is on the learner to identify gaps in their knowledge, which then becomes the focus for self-directed learning. A frequently experienced problem in PBL is that learners can become disorientated and unsure of the depth and relevance of knowledge required for the clinical case study if the tutor is unable to provide appropriate guidance through focussed questions. This negative experience could diminish the potential benefits of PBL. The responsibility lies with the tutor to provide the necessary guidance so as not to leave the learner feeling lost and frustrated. Staff development programmes should adequately prepare tutors for this role.

CONCLUSION

This article gave an account of how academics in the School of Nursing at the University of Botswana were trained and developed in the implementation of PBL. While this staff development initiative is a good starting point for training academics in the application of PBL, further strategies need to be in place for their continuous development. In this regard, recommendations for additional support include: follow-
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up staff development workshops on PBL; regular meetings for tutors; design and delivery of on-line courses for tutors; peer observations of tutors for developmental and quality assurance purposes as well as learner evaluation of tutor performance.

It is envisaged that the implications of this staff development initiative for higher education in general, will be manifold. The knowledge and skills base of facilitators will be improved as they learn precisely how to apply novel methods of teaching and learning. Academics will be required to work as members of a team across departments and faculties as this is necessary for the vertical and horizontal integration of knowledge that PBL requires. Higher education will have a more competent academic workforce and this will render education more interesting and meaningful. The building of capacity among academics, in the application of PBL, will expedite a paradigm shift in teaching and learning. The shift to PBL will transcend traditional methods and will encourage learners to become more self-directed and to take more responsibility for their learning. In terms of curriculum development, traditional courses and programmes will need to be re-structured and co-ordinated in line with the integrated, multidisciplinary, problem-focused nature of PBL. For example, case studies will have to be designed. Curriculum transformation will improve the quality of programmes being offered. In spite of the benefits of adopting PBL, however, some academics and learners who are resistant to educational transformation might oppose PBL as its introduction implies radical change.

On a final note, supporting and developing academics in the implementation of PBL will ensure that they are given the necessary tools to inculcate in learners higher order skills, which will enable them to function more effectively in the 21st century.

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