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Research Article

Identification of possible strategies for implementing PBL at INES-Ruhengeri: A preliminary study

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ABSTRACT: This research aimed at investigating the relationship between mediating role of emotional intelligence with early maladaptive schemas and copying style. Correlation method was adopted and all of the participants were among the students of Islamic Azad University-Islamshahr Branch. From the pool of 22300 students, 380 participants were chosen by stratified sampling method according to the Morgan Table. The questionnaire of Shering Emotional Intelligence, Yang's schemas questionnaire (short form), Yang and Yang avoidance questionnaire and Yang Compensation questionnaire were administered and analyzed. The results gained from data analyses utilizing multiple regression statistical method and line analyses showed that this method had appropriate fitting with the available data. The findings revealed that emotional intelligence had a mediating role in relationship with early maladaptive schemas and students' copying style. The early maladaptive schemas had a direct and significant impact on emotional intelligence. The researcher may come to this conclusion that the students who use early maladaptive schemas have less emotional intelligence. There was a positive relationship between early maladaptive schemas and students' copying style. Furthermore, the early maladaptive schemas had a direct and significant impact on students' copying style.

Key words: PBL, Education, Strategies, Strengths, Opportunities, Challenges

Introduction

Since 2009, after a thorough analysis of its strength, Weaknesses and opportunities in the region, INES-Ruhengeri has decided to change its orientation to Applied Science University. Three main justifications for shifting from a traditional university to an Institute of Applied Sciences may be retained:

(1) Rwanda's ambition to develop basing on knowledge-based economy: Rwanda is a country with people as the only abundant resource therefore being the only one on which development policy must be based. In the vision 2020, this was recognized by founding the development efforts on creating a knowledge-based economy. To create a knowledge-based economy for sustainable development requires universities and Higher Learning Institutions in Rwanda to address the issue of creation of needed competences, and this cannot be done in the traditional academic setting (MIFOTRA, 2013).

(2) Creating the basis for becoming a regional service hub: In its document entitled Rwanda Economic Update: Leveraging Regional integration, the World Bank (2012) argues that Rwanda appears to have a natural comparative advance in services, including tourism, and can serve as a gateway between the Anglophone East Africa and Francophone Central Africa. But in order to use this opportunity to become a more service-oriented economy, Rwanda would need to develop over time, the right skills mix in its population, and support agglomeration of services in Rwanda. INES believes that this

(3) skills mix can only be developed through competence-based learning and that the orientation of Applied Science is one of appropriate approaches competence-based education.

(4) The shift in focus and pressure from quantitative expansion to relevance and quality of educational services provided by Tertiary Education Institutions. For instance one of the priorities for the Ministry of Education for the horizon 2013-2018 was set to be "*Improved relevance of education and training to the labor market, including secondary education, demand-driven TVET and higher education*" (MINEDUC, 2013).

Considering the reasons presented above, Problem Based Learning (PBL) is certainly the most suitable teaching and learning approach. Indeed PBL is based on the idea of small group collaborative learning with students being actively responsible for their own learning process and for the meaningful construction of knowledge (Heidi & Christine, 2014). This provides to students not only problem solving skills that are needed in their professional life, but also lifelong learning competences which make them marketable at the labor market.

INES leaders are aware of the benefits of PBL for the achievement of their educational ambitions. But one cannot fail to note that despite various trainings on the matter and verbal encouragements of the top leaders, PBL is still not

officially adopted and/or systematically practiced at INES. Besides, up to this date, no explicit strategic moves were adopted to ensure consistent and systematic implementation of PBL approach. It is therefore judicious to ask oneself the following question:

What should be done to make sure that PBL is systematically and consistently used in INES teaching and learning approach?

This paper presents results from the first step of an action research (Elliot, 1991; Feldman & Minstrell, 2000) intended to bring empirical answers to the above question. It is focused at developing a set of possible strategies that can better enhance implementation of PBL in INES context. In later stages the strategies will be validated by the entire INES community and narrowed to a small number of priorities to be tried out by the academic leaders.

Theoretical framework

PBL as a learning methodology was first introduced in university curriculum by McMaster University in 1969 (Alan, 2008). Problem based learning may be defined as "the learning that results from the process of working towards the understanding and resolution of a problem" (Terry & Sarah, 2012). In PBL the following six steps are made (Terry, 2005):

- First students are presented with a problem;
- Students discuss the problem in a small group PBL tutorial. They clarify the facts of the case. They define what the problem is. They brainstorm ideas based on the prior knowledge. They identify what they need to learn to work on the problem, what they do not know (learning issues). They reason through the problem. They specify an action plan for working on the problem;
- Students engage in independent study on their learning issues outside the tutorial. This can include: library, databases, the web, resource people and observations;
- They come back to the PBL tutorial(s) sharing information, peer teaching and working together on the problem;
- They present their solution to the problem;
- They review what they have learned from working on the problem. All who participated in the process engage in self, peer and tutor review of the PBL process and reflections on each person's contribution to that process.

Problem based learning finds its underlying principles in the constructivism as a paradigm for teaching and learning. According to Savery and Duffy (1998), constructivism is a philosophical view of how we come to understand and know. The authors identify and present three "primary" propositions that may characterize that philosophical view (Savery & Duffy, 1998):

1) *Understanding is in our interactions with the environment*: What we understand is a function of the content, the context, the activity of the learner, and, perhaps more importantly, the goals of the learner.
2) *Cognitive conflict or puzzlement is the stimulus for learning and determines the organization and nature of what is learned*: Citing Dewey (1938), the authors argue that it is the problematic that leads to and is the organizer of learning. But they also add that it is the goal of the learner that is central in considering what is learned.
3) *Knowledge evolves through social negotiation and through the evaluation of the viability of individual understanding*: Collaborative groups are important because we can test our own understanding and examine the understanding of others as a mechanism of enriching, interweaving and expanding our understanding of particular issues and phenomena.

Drawing from constructivism, Heidi and Christine (2012) identified three main underlying pedagogical rationales that PBL is based upon, namely:

i) The learning as a student-centered and active process: In PBL curriculum, students not only learn in small group but also they have to be actively in charge of their own learning process. This is done by fulfilling different roles such as secretary, chair etc. They are also responsible of setting their learning goals and make sure that these learning goals are pursued and achieved. For instance, instead of being taught different discrete subjects in class, students will be identifying the knowledge they need while progressing in the solving of the problem at hand and either search these knowledge themselves in library or request the support of the lecturer.
ii) Constructed and contextualized process: According to Heidi and Christine (2012), PBL is founded on the constructivist approach to education. Constructivism relies on the belief that students understand better the topic when they are given opportunity to construct knowledge themselves rather than just transferring the knowledge to them passively. The importance of the social and contextual factors is also to be emphasized in the PBL approach (Gijselaers, 1996) cited by Heidi and Christine (2012). It is therefore recommended that the problems to be given to students not be fictions but real life related problems.
iii) Collaborative process: PBL is also strongly based on the idea of integrated and collaborative learning, where students cooperate in small groups (Heidi &Christine, 2012).

Terry and Sarah (2012), in their book discussing the new approaches to PBL, presented a framework made of six dimensions of the PBL process in higher education. Those dimensions are:

1) PBL problem design: Problems should be relevant, motivating, challenging, interesting, multifaceted and up to date.
2) PBL tutorials in small teams: Terry and Sarah (2012) propose three practice principles around which tutorials can be enhanced: (1) creating more democratic social relations, (2) co-constructing knowledge through co-elaboration and (3) adopting the principle of shared control.
3) PBL compatible assessments: To Terry and Sarah (2012) assessments need to be designed in such a way that they align with:

- Learning outcomes;
- The development of student capabilities; and
- The problem based learning process

4) PBL curriculum development: An integrated PBL curriculum needs to be elaborated in such a way that all the curriculum activities (lectures, seminars, conferences, resources, laboratory practicals etc.) are aligned with the problem solving process in which students are engaged.
5) Developing knowledge and capabilities: With PBL, students will learn to learn by constructing together their knowledge fit for solving the problem at hand. Through PBL students are also going to develop their capabilities in terms of transferable skills needed for future professional life.
6) Philosophy of PBL: Terry and Sarah (2012) present a set of underlying philosophical questions that are useful for educators to explore as they engage in PBL. Those include:

- What is the purpose of higher education?
- What is learning?
- What does it mean to practice as a professional?
- What ethical issues do we want our students to address?
- How can higher education promote critical and creative thinking?
- What is the nature of problem based learning in curricula?
- What new approaches, forms, and alliances are needed in PBL initiatives today?
- How can PBL be re-energized and re-invented?

Norman and Henk (1992) citing Borrows (1984) described four basic goals to PBL as follow:
The primary goal is to foster clinical reasoning or a problem solving skills, while the second goal of PBL is to enhance acquisition, retention and use of knowledge. The third and fourth goals as pointed out by Norman and Henk (1992) are about the reduction of the gap between the basic and clinical sciences which are taught in circumstances separated by both time and place in the conventional curriculum and enhancement of self- directed learning. The merit of this last goal lies in the increase of the students' life-long learning behavior and abilities.
According to Savery (2015) problem based learning is similar to project based learning and to case based learning. The case based learning and project based learning will differ from problem based learning in the fact that they tend to diminish the learners role in setting the goal and the outcome of the problem (Savery, 2015). Another distinction to be made is between PBL and Inquiry Based Learning. According to Savery (2015), a priori, there is no big difference between the two learning approaches. Indeed inquiry based learning is also an approach "beginning with a question, followed by investigating solutions, creating new knowledge as information is gathered and understood, discussing discoveries and experiences and reflecting on new found knowledge. The major difference between PBL and Inquiry Based Approach is the role of the tutor. In PBL the tutor simply supports the process and expects learners to make their thinking clear but he/she does not provide any information about the problem; while in Inquiry Based Learning, the tutor is at the same time a facilitator of learning and a provider of information.
Concerning problems that are likely to be sources of learning, Douady (1991) set the following four conditions. Firstly, the statement, that is, the context and questions of the problem, has to have meaning for the pupils/students. Secondly, the pupils/students cannot solve the problem completely for diverse reasons such as the procedure considered is too long, it causes errors, or it has to be used outside of its known field of validity; this condition concerns especially constraints that have to be included in the problems. Thirdly, the knowledge aimed at by the learning – content or method – is made up by tools adapted to the problem; and fourthly, the problem can be formulated in at least two different settings. This fourth condition concerns representations in which the problem has to be interpreted or translated from one representation to another in order to promote understanding. For example, a problem given in words is interpreted in graphical representation or a problem given in graphical representation is translated into symbolical representation. This representation or translation demonstrates a process of student's development of understanding (Habineza, 2011).

Methodology

This research adopts action research as an overall strategy to bring an answer to the research question. An action research strategy can be described as an interactive research approach in which, step by step, results can be obtained, discussed, reflected upon. Koshy (2005) defined action research as being about working towards practical outcomes, and also about new forms of understanding, since action without understanding is blind, just as theory without action is meaningless.

This research aims at proposing empirically tested strategies and tools that can be used to enhance implementation of PBL in INES curricula.
Therefore the Action Research strategy seems the most appropriate for this research for several reasons. First Action Research strategy allows reflecting on the results and planning for further action as a continuous process. Second, basing on this progressive reflection, Action Research strategy permits to effectively conduct a research in unknown terrain like it is the case in this research. Third, the strategy has been identified as the most effective research strategy for research in education (Eileen, 2000).

It is hence believed that the strategy permits the researchers to explore step by step the factors impeding implementation of the PBL at INES and come up with strategic priorities for enhancement of PBL implementation.
Besides, for each phase of the research, a data collection technique adapted to the phase will be used.
For the first phase a brainstorming technique and documentary technique was used. Participants in that brainstorming were purposively selected. Those include the Deans of three Faculties found at INES (Faculty of Fundamental Applied Science, Faculty of Education and Faculty of Economics, Social Sciences and Management) plus seven (7) students' representatives from those Faculties. The selection criterion for students was their experience with problem oriented learning. The brainstorming focused on analyzing the strengths, Weaknesses, Opportunities and Challenges (SWOC) with regards to introduction of PBL in INES curricula. Before proceeding to the SWOC analysis, a presentation of what is PBL and how it is implemented in various universities and tertiary education institution was made. To collect information of SWOC and strategic actions, participants were first asked to identify examples of PBL applied at INES, in order to serve as references in the discussion. After setting the reference,

participants then answered the following questions:

- What are the strengths that INES can base on in further enhancing implementation of PBL?
- What opportunities outside of INES and which can foster the implementation of PBL?
- What Challenges both within INES boundaries and outside?
- List at least three strategic actions that you think INES should do in order to enhance PBL in its programs.

With the collected information another meeting by the researchers was held. In that meeting a qualitative analysis of the collected information was made. The aim was to streamline the formulated strategies and cross check the proposed actions in reference to the already identified strengths, opportunities and challenges.

PBL at INES: Strengths, Opportunities and Challenges

The following strengths, weaknesses, opportunities and challenges were identified using a brainstorming technique.

a) *Strengths of INES with regard to PBL implementation*:

Participants were asked to list out what they perceive as strengths that INES can base on in further enhancing implementation of PBL. A list of strengths were presented, then synthesized and summarized. This paragraph presents the strengths agreed upon after summarizing and synthesizing. In total thirteen strengths were identified: The table 1 below indicates in synoptic view, the list of identified strengths and explanation of how those strengths can contribute to further enhancement of PBL implementation.

Table 1: List of strengths of INES in regard to implementation of PBL

Strengths	Contribution
The leadership will to see the applied Science orientation in practice	The leadership will is needed for policy making and also strategic orientation and enforcement.
Existence of tutorial assistants in some Departments	Implementing PBL needs tutorial assistance to supervise students' tutorials during problem solving process.
Existence of adequate infrastructure (Library, laboratory, fiber optic internet etc.)	Infrastructures constitute the basis for practical application needed to study, understand and develop viable solutions to some problems presented to students.
Systematization of field visits which provide a framework for the identification of problems to be used	This strength not only contributes by setting the framework through which problems are identified, but also it help to create the stakeholder collaboration culture that is needed in enhancing PBL implementation.
Enough documentation for guiding academic management (example handbook for students learning)	The various guiding documents help academic staff in PBL implementation endeavor. They also set foundation for harmonization of practices.
Many young teaching staff which make training and change possible	Participants asserted that having many young staffs is beneficial for INES as young staffs are flexible and they learn quickly.
Existence of trained staff in PBL	This means that INES has already a set of knowledge in the domain of PBL and practice oriented teaching that it can capitalize on to further train other staff.
Availability of good working climate	Working climate is important for staff motivation which is needed in order to introduce change.
Increase of practice in various modules	This sets precedence to introduction of PBL because students are already used to working in groups
INES reputation i.e. the way it is perceived by stakeholders	Since implementation of PBL requires working with stakeholders, the reputation of INES in front of stakeholders is important as it is the basis for trust between INES and them and this would further enhance collaboration.
Strong partnership with other national and international universities	This set the basis for benchmarking and/or experience sharing.
INES philosophy of shifting from paper to people	It has been argued in literature about PBL that implementation of PBL have to rely on strong philosophical foundations (Terry & Sarah, 2012), therefore the philosophy of shifting from paper to people is an important element in PBL implementation.
Existence of various projects implemented at INES	Through the various projects that are implemented at INES, problems can be identified and their solving can be facilitated by the projects' funds.

Source: Data collected by researchers

b) *Opportunities with regard to implementing PBL*:

A number of opportunities for the implementation of PBL were identified by participants. For instance, on one hand, the fact that PBL is not applied in any other private university was seen to be an opportunity as it would make the introduction of PBL a very important competitive advantage. On the other hand, Rwanda's level of socio-economic development and its future ambitions generate a number of challenges which needs

to be addressed; therefore providing potential problems to be proposed to students. Also, and in relation to Rwanda's development level and ambition, are the existence of innovative development programs such as vision 2050, EDPRS II etc. Advanced information technology in Rwanda (Smart phones, computers, internet etc.) is another opportunity identified in the same angle.
Other identified opportunities include the existence of professional companies willing to work with INES, the current needs of the labor market and political will of the Rwandan government for enhancing professional oriented education.

c) *Challenges related to the implementation of PBL*:

Challenges of INES in relation to the implementation of PBL were also identified, discussed and summarized. Those challenges can be grouped in three categories i.e. challenges from students, challenges from the internal environment of INES and challenges from the external environment of INES.

Challenges related to students were found to include lack of presentation skills, higher number of students in classroom, many students who likely do not know what they exactly want and lack of concentration of students and commitment. Challenges related to the internal environment of INES include:

1) Lack of enough funds yet PBL requires much capitals
2) Poor communication between INES and its surrounding community
3) Staff turnover (those who are trained and/or experienced end up leaving the institution)
4) Trust issues from professionals
5) PBL is not officially adopted.
6) Personal belief: Some people limit themselves (low self-confidence)
7) Lack of teachers mastering the instruction language (English)

In the external environment the biggest challenge was about lack of effective cooperation with companies regarding training of students professionally.

Proposed possible strategies

Participants were asked to take a look back to the strengths, opportunities and challenges identified and use them to propose strategic actions that can be taken to enhance PBL implementation. From the ideas generated the following goals were drawn:

a) The curricula are adapted to the PBL requirements

Among the actions proposed by participants there were:

i. Official adoption of PBL,
ii. Increase the number of tasks for students learning,
iii. Developing students presentation skills,
iv. Involvement of professionals and,
v. Systematization of teaching in English.

According to the participants, those actions should be included in the current curricula in order to create a conducive environment for effective implementation of PBL. Three strategies were suggested for the further enhancement of PBL in INES curricula. Those are:

- Systematize PBL application in a progressive way. This can be done by starting with case based learning in level 1 (At least one case in each program). Then Project based in level II, III & IV (At least two projects in each program for all those three levels). Then a full PBL in level V (at least one problem in each program).
- Supporting the English clubs initiative by reserving special budget for them from the INES-SU contributions.
- Systemization of oral presentation of group works (at least one group work necessitating oral presentation of each module taught).
- Collect information about the needs and expectations of students in order to cater for them and/all tailor the advices and career guidance to them.

b) Teaching, learning and assessment are aligned to PBL and/or its variants' requirements

Strategies proposed to achieve this goal include:

- Organizing clusters of teaching and learning in order to design relevant and interesting problems that can be used;
- Appointment of better performing students to tutor their junior (students in level 2 tutor students in level 1 while students in level 4 tutor students in level 2).
- Invite professionals to provide online tutorials
- Align the policies and daily practices to PBL requirement: Instead of monitoring lecturers teaching performance focusing only on the number of hours spent in class, the monitoring should also and basically focus on the learning activities successfully carried out.
- Include the contribution in PBL in the different MoUs that INES has signed and is signing with various professional organizations.

c) Staff experience and competences are enhanced and sustained

In order to achieve this goal, participants proposed to elaborate continuous training of academic staff in PBL. A more specific strategy suggested was to organize monthly Teaching and Learning Day per Faculty where the Dean would select one lecturer to prepare and make a presentation on one aspect of PBL. The presentation would allow participants to share their respective experience and trigger a debate on how to implement PBL in the Faculty.

Discussion of results

Results presented here are complementing INES overall strategic orientation by proposing more tangible actions for the implementation of INES orientation of Applied Science. Indeed, INES strategic plan 2012-2017 sets increasing academic excellence through the orientation of Applied Science as a priority for improving academic management. Ensuring further and systematized implementation of PBL, having proved to be the most effective when it comes to imparting professional oriented education (Ali, 2016; Elaine & Karen, 2016) is hence a must to put in practice that priority.

Besides, the proposed strategies are not diverging from strategies proposed by other universities; they rather adopt the same approach and reasoning. Among the proposed strategic actions there is enhancing the capacity of staff, which is according to Savin-Baden (2001) cited by Coral (2008) one of the keys to successful PBL implementation. In his paper on implementing PBL in a science Faculty, the author presented the process adopted by the University of Western Australia as being made of initiation consisting in discussion about initiating PBL, followed by meetings with first year unit coordinators to hear their views on, and gauge their understanding of, PBL. The next step was to target unit coordinators interested in experiencing the advantages which PBL could bring to their students' learning and to their own teaching. Staff training and development, problem design and construction, group facilitation, assistance with assessment, attendance in tutorials and workshops and the presentation of guest lectures were among the support offered to unit coordinators (Coral, 2008). From the outset it was critical that unit coordinators view the likelihood of success as a strong possibility. It is therefore clear that the process adopted by the University of Western Australia to introduce PBL is quite similar to the process proposed. Such a process is interesting since because it is approach introduction of PBL as learning in itself and therefore it should be conducted step by step (Tommi, 2007).

Conclusion

In this paper proposition of possible strategic actions were presented as a first step of an action research intended to bring empirical solution to the issue of implementing PBL in INES context. The ultimate objective of this is to develop a set of priorities that can be proposed to INES academic managers for a better enhancement of implementation of such an indispensable learning approach.

The paper argue that in order for PBL to be enhanced, (1) INES curricula needs to be adapted to PBL, (2) the teaching, learning and assessment practices are to be aligned to PBL and/or its variants' requirements, and (3) staff experience and competences are to be sustained. Specific strategies such as organizing clusters of teaching and learning, allowing best performing students to tutor their juniors and organizing monthly teaching and learning Day would better enhance the implementation of PBL.

However one must note that the proposed strategies as well as the identified strengths, opportunities and challenges, though they were developed by representatives of Faculties and students are not generalizable. Hence the identified strategies only constitute the starting point for a continued action research which would end with validated and empirical strategic priorities.

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