University of Hertfordshire UH

The Learning and Teaching Institute

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Blended Learning in Practice

Incorporating **The Blended Learning Unit** a Centre for Excellence in Teaching and Learning

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Editorial


Phil Porter

A very warm welcome to the latest edition of Blended Learning in Practice. As you may have guessed from the palm tree and sunshine on our cover image, this is a very special edition of the journal, as it celebrates the University of Hertfordshire's (UH) ongoing and thriving collaborative relationship with Intercollege, Nicosia, Cyprus. Since 2010 Intercollege have been running franchised UH programmes at Undergraduate and Postgraduate level and eight UH programmes are currently being taught there. Colleagues at Intercollege have also participated in our Continuing Professional Academic Development (CPAD) programme and the CPAD graduation ceremony took place via a video link from Nicosia in the Western Auditorium earlier this year. It was a very special evening for all concerned, as can be seen from the many smiling faces in the photograph below!

I am therefore delighted that three of our colleagues from Intercollege have written articles for this special edition of Blended Learning in Practice. Zoi Konsoula and Vanthoula Andreou-Zannoupa both present papers on the topic of problem-based learning (PBL). PBL offers a powerful means to encourage group work and collaboration amongst our students, while also promoting acquisition of a rich variety of research skills thus providing educators with an invaluable tool to address the important research-informed teaching agenda.

Intercollege's Environmental Management B.Sc. Programme Tutor, Marios Valiantis describes his experiences of using the UH Learning and Teaching Institute's curriculum design toolkit (available online at http://prezi.com/cibiptp5pa3d/curriculum-design-toolkit/). The toolkit identifies principles of good practice in a variety of areas related to teaching in Higher Education and offers a diagnostic to help staff evaluate their current practice along with tips to enhance provision in response to any identified weaknesses. Marios considers the 'Assessment for Learning', and 'Principles of Good Practice in Higher Education' strands of the toolkit.

Editorial

Deputy Head of the Learning and Teaching Institute, Helen Barefoot and Director of Technology Enhanced Learning at Kings College London, Professor Mark Russell, then take us on an audio-visual guided tour of the toolkit, covering topics such as Research-Informed Teaching, Assessment for Learning, Inclusive Teaching, Sustainability, and Internationalisation. Helen and Mark provide detailed step-by-step guidance on how to use the toolkit, which is designed to be used by all educators in Higher Education, but will be of particular interest to UH staff as we seek to fully engage with our recently published Graduate Attributes.

Finally, in our regular 'student voice' section, Intercollege students Maria Mavromoustakou and Stathis Theophilou discuss their experience of studying on the franchised University of Hertfordshire Environmental Management B.Sc. programme. We hope that you enjoy this special edition of Blended Learning in Practice and, as ever, we warmly welcome feedback and ideas and submissions for future editions. Please therefore don't hesitate to contact me using the email address below.

Dr Philip Porter
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Colleagues at Intercollege, Nicosia having just been awarded their Postgraduate Certificates in Learning and Teaching in Higher Education during our annual CPAD graduation ceremony.

Contributor Profiles

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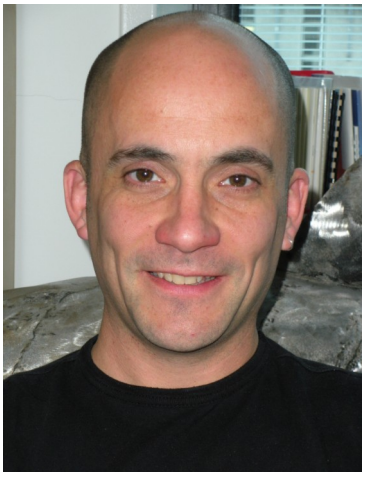

Along with being the editor of Blended Learning in Practice, Phil Porter is a Senior Lecturer in Physical Geography at the University of Hertfordshire in the School of Life Sciences and has been active in glaciological research since 1993. After completing a PhD (Leeds) in borehole instrumentation of fast flowing glaciers, Phil took up lectureships at Manchester and Leeds and joined the University of Hertfordshire in 2003. His current research interests concern the response of the cryosphere to environmental change. Phil is also a LTI teacher taking a lead on 'research informed teaching' and is currently preparing a Higher Education Academy (HEA) funded field expedition to the Swiss Alps where he will be working with UH students and Swiss scientists on a project to engage our students with research fieldwork techniques in geography and environmental science.

Mark Russell

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Mark Russell is the Director of Technology Enhanced Learning and Head of the Centre for Technology Enhanced Learning at King's College London. His main areas of interest are: assessment for learning; just in time teaching; technology-enhanced learning and curriculum design. Mark previously directed the JISC funded projects; Effecting Sustainable Change in Assessment Practice and Experience (ESCAPE) and Integrating Technology-Enhanced Assessment Methods (iTEAM). Mark won the Times Higher Education Supplement e-tutor of the year (2003), is a UK National Teaching Fellow (2005) and became Professor of Learning and Assessment in Higher Education in 2011.

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Helen Barefoot

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Helen Barefoot graduated from the University of Hertfordshire in 1998 and went on to complete a PhD at Cambridge University. She returned to Hertfordshire in 2001 as a lecturer in human physiology, specialising in the teaching of Neuroscience. Helen is currently the Deputy Head of the Learning and Teaching Institute (LTI) and continues to teach Neuroscience within the School of Life Sciences. Helen leads the continuing professional development (CPD) programme for academic staff and her current research interests focus on learning, teaching and assessment activities which enhance the student learning experience.

Vanthoula Andreou-Zannoupa

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Vanthoula holds degrees in Nursing from the Cyprus University of Technology and Psychology from the University of Reading. After completing her MA in Careers Guidance from Reading she took up a lectureship in the Department of Nursing, University of Nicosia. She is currently working towards a PhD in Post-Traumatic Stress Disorder in Intensice Care Unit patients. In this issue of Blended Learning in Practice Vanthoula discusses the application of problem based learning in nursing programmes.

Contributor Profiles

Dr Marios Valiantis

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Dr Marios Valiantis is currently the director of the Centre for Green Development at the University of Nicosia. He is also the head of the Academic Program for the franchised UH Environmental Management BSc programme. Marios holds a PhD in the area of atmospheric pollution gained from Imperial College London, where he addressed the contribution of UK traffic pollution to the failure to meet minimum air quality standards. Marios also holds a MSc in Environmental Management from Louisiana State University, a MBA and a BSc in Management and Information Systems from the University of New Orleans (USA). Prior to his current position, Marios held the position of the Director of Energy and Environment at the AEA Group (Atomic Energy Authority) in Oxford. In this edition of the Blended Learning in Practice, Marios discusses his experiences of using the University of Herfordshire Learning and Teaching Institute (LTI) curriculum design toolkits, focusing on assessment for learning and principles of good practice in Higher Education.

Dr Zoi Konsoula

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Dr Zoi Konsoula is co-ordinator of the pre-medical programme at Intercollege. She holds a PhD in Biochemistry/ Biotechnology from Aristotle University of Thessaloniki where she addressed the development of new methods of enzymic hydrolysis of starch. During her post-doctoral research she studied the biological function of antioxidants in various food products. She also holds a BSc and MSc in Chemical Engineering also gained from Aristotle University of Thessaloniki.Zoi has taught general chemistry and physical chemistry in the Technological Institute of Thessaloniki. She has participated in a number of research projects and she has over 10 years of experience in the field of biochemistry, food cleansing and technology. She is also a certified chemical engineer and member of the Panhellenic Association of Chemical Engineers and the Technical Chamber of Greece.In this edition of Blended Learning in Practice Zoi evaluates Problem-Based Learning (PBL) as an educational approach and considers its application to chemistry courses at Intercollege, Nicosia.

Rationale, description and effectiveness of PBL curricula

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Abstract

Problem-based learning is a teaching and learning approach that encourages students to participate in their own learning by researching real-life problem cases, in small groups, and thus acquiring knowledge. Therefore, PBL constitutes a transition from the traditional teacher-directed instruction to student-centered learning, where the tutor facilitates the learning process. Research findings indicate that PBL fosters the development of transferable skills and self-directed learning. There is also evidence that PBL is favorably received by the majority of students and educators. However, PBL students are less successful in standardized knowledge examinations in comparison to traditional curriculum students, since PBL approaches generally cover about 80% of the conventional curricula. Furthermore, PBL is a resource-intensive approach, which calls for careful planning and commitment on the part of educators. PBL practitioners underline the additional effort required for developing suitable problems and assessment processes within a PBL environment, on top of establishing appropriate facilitation strategies. In this paper the benefits and the challenges associated with the PBL instruction in general are considered, with specific reference to application in chemistry courses.

Introduction

Problem-based learning (PBL) is increasingly being adopted in the curricula of many institutions as a strategy for developing self-directed learning and promoting acquisition of higher-order thinking, problem-solving, and collaboration skills (L.C. Chan, 2009; Chen, 2011; Hung, 2009; Lin, Huang et al., 2009). It is also expected to give students more motivation and feelings of accomplishment (Lin et al., 2009). Therefore, PBL is deemed the most innovative instructional method conceived and implemented in education (Hung, 2009).

However, the term PBL has not been defined definitively and is therefore used to designate various forms of learning (Michel et al., 2002). This has led to a debate about its merits as an instructional method (Dochy et al., 2003; Hung, 2009; Michel et al., 2002). More specifically, skeptics wonder whether PBL students acquire knowledge and skills in a more effective way than those who receive conventional instruction (Dochy et al., 2003; Hung, 2009). Moreover, others point out that getting PBL to achieve its educational objectives poses various challenges and thus its implementation requires careful planning (L.C. Chan, 2009).

The purpose of this article is to discuss the nature and development of PBL, followed by a review of the literature on its effectiveness, implementation issues, and application in a general chemistry course.

The nature and development of PBL

Rationales for PBL as an instructional method have been provided by many authors based on various learning theories (Albanese & Mitchell, 1993; Z.C.Y. Chan, 2011; Gwee, 2008; Gwee, 2009). However, the contextual learning theory has been advocated as the main theoretical underpinning for PBL (Gwee, 2008; Gwee, 2009). More specifically, PBL "is grounded in the belief that learning is most effective when students are actively involved and learn in the context in which knowledge is to be used" (Gwee, 2008, p.16).

Characteristics of PBL

Defining what constitutes PBL is a contentious task (Albanese & Mitchell, 1993). However, it is accepted that PBL's most distinct characteristic is its problem-centered content structure, in which the problem is encountered first in the learning process (Albanese & Mitchell, 1993; Clouston, 2005; Gwee, 2008; Hung, 2009). In particular, "the problem, or a series of problems, is where learning starts and, in going about solving those problems, the learner seeks the knowledge of disciplines, facts and procedures that are needed to solve problems" (Biggs & Tang, 2007, p.152). In other words, PBL could be described as an instructional method in which students learn through facilitated problem solving (Gallardo et al., 2011; Rogal & Snider, 2008).

- Researchers have identified the following core characteristics of PBL:
- Complex, real world situations are the organizing focus for learning.
- Students work in teams to confront the problem and develop solutions.
- Students gain new information through self-directed learning.

Tutors act as facilitators (Duch et al., 2001; Weissinger, 2004).

A carefully arranged sequence of steps shape the PBL approach (Fig.1) (Nilson, 2010; Pastirik, 2006; Rogal & Snider, 2008). PBL tutorials usually consist of at least two sessions with an intervening self-study period (Gwee, 2009). During the first session students are presented with the problem and they are given the opportunity to clarify concepts by asking questions, before attempting to analyze the problem by applying their prior knowledge. Subsequently, students progress onto generating a hypothesis, identifying their knowledge deficits, and formulating learning goals. Next, students engage in independent study. When the group reconvenes students reanalyze, evaluate, integrate, and then apply the new knowledge acquired to resolve the problem (Gwee, 2008; Gwee, 2009; Nilson, 2010; Pastirik, 2006; Rogal & Snider, 2008). application in a general chemistry course.

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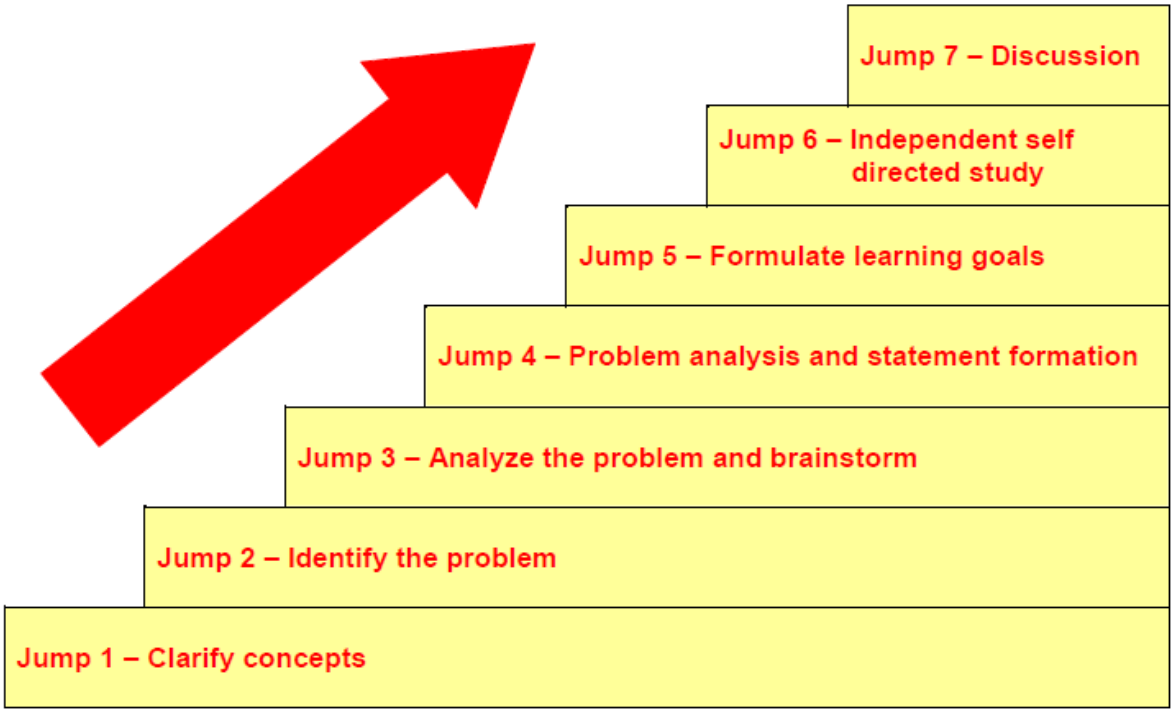


Figure 1. *The 7-jump model of PBL (adapted from Rogal and Snider, 2008).*

Development of PBL

PBL was originally implemented in response to medical students' dissatisfaction with the lecture format, the increasing demand for bridging the gap between theory and practice, and the explosion in medical information and technology (Gwee, 2008; Hung, 2009; Rogal & Snider, 2008; Savin-Baden & Howell Major, 2004; Tan, 2004a). McMaster University is acknowledged with introducing PBL to education, while Donald Woods of McMaster has been credited for inventing the term (Savin-Baden & Howell Major, 2004). Soon after McMaster began its PBL curriculum in 1969, the medical schools at the University of Limburg in Maastricht and University of Newcastle in Australia adapted the McMaster model of PBL and developed their own spheres of influence (Savin-Baden & Howell Major, 2004). Nowadays PBL has spread widely across the globe and beyond the original confines of medicine into many other disciplines (Albanese & Mitchell, 1993; Gwee, 2009; Hung, 2009; Savin-Baden & Howell Major, 2004).

However, various factors, such as the institution, the tutors, the discipline or the subject, have a significant effect on the mode of PBL instruction (Savin-Baden & Howell Major, 2004). Furthermore, researchers concede that PBL is less suitable for covering certain areas and that offering only one way of learning through PBL may disadvantage some students, (Azer, 2009a; L.C. Chan, 2009; Gwee, 2009; Hwang & Kim, 2006; Michel et al., 2002). Therefore, rather than adopting the traditional McMaster model, many institutions have adapted it to their circumstances (Savin-Baden & Howell Major, 2004). In particular, Savin-Baden and Howell Major (2004) have identified the following curricula modes:

Single module approach: PBL is implemented in one or two modules in the last year of the program.

PBL on a shoestring: PBL is used in a few modules throughout the curriculum (Fig. 2a).

The funnel approach: Students are funneled away from a more familiar lecture-based approach towards PBL (Fig. 2b).

The foundational approach: Some knowledge is necessarily foundational and therefore it needs to be taught to the students before they can begin solving problems (Fig. 2c).

The two-strand approach: PBL modules are designed to build on each other but also to draw from the modules in the mixed approach strand (Fig. 2d).

Patchwork PBL: The whole curriculum is designed using PBL however, the modules run concurrently. Consequently students undertake two or three problems simultaneously in different but not necessarily related subject areas (Fig. 2e).

The integrated approach: Students encounter one problem at a time. All the problems presented are sequential and are linked both to one another and across disciplinary boundaries (Fig. 2f).

Year 1	PBL	Lecture-based	Lecture-based	PBL	Lecture-based
Year 2	Lecture-based	PBL	Lecture-based	PBL	Lecture-based
Year 3	Lecture-based	Lecture-based	Lecture-based	PBL	PBL

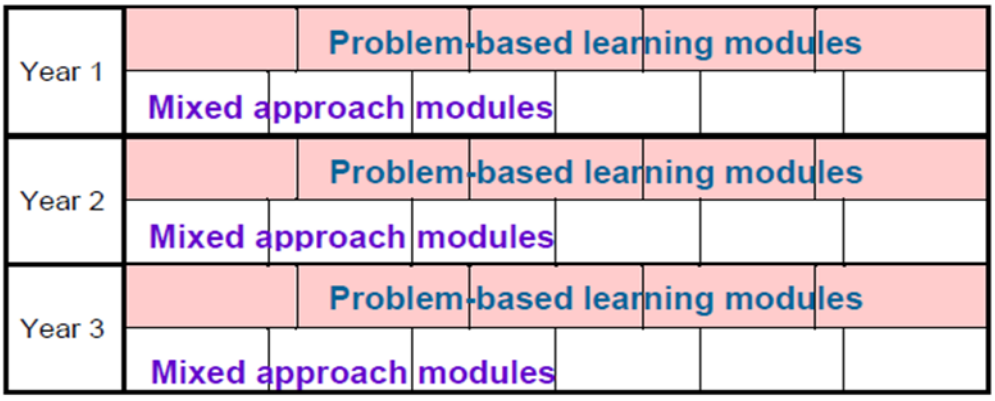
(a) PBL on a shoestring

Year 1	Lecture-based learning
Year 2	Problem-solving learning
Year 3	Problem-based learning

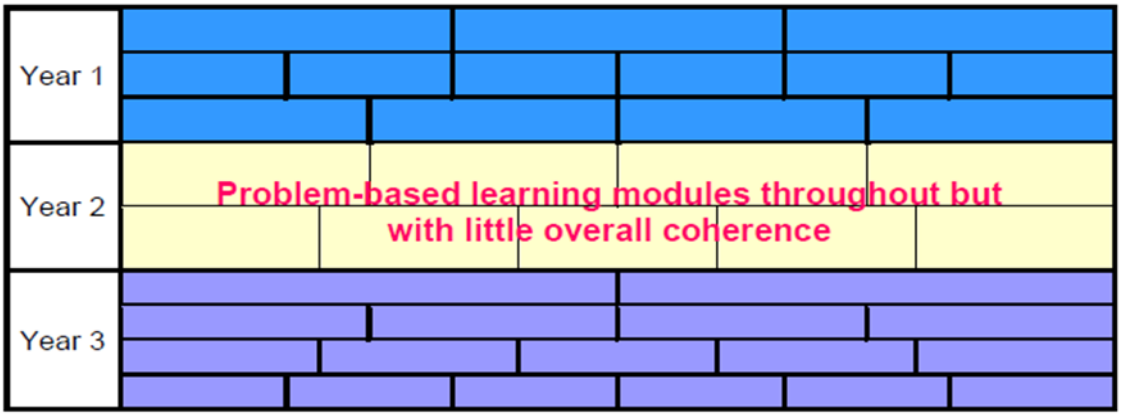
(b) The funnel approach

Year 1	Lecture-based learning
Year 2	Problem-based learning
Year 3	Problem-based learning

(c) The foundational approach



(d) The two -strand approach



(e) Patchwork PBL

Year 1	Problem 1	Problem 2	Problem 3	
Year 2	Problem 4	Problem 5	Problem 6	
Year 3	Problem 7	Problem 8	Problem 9	Problem 10

(f) The integrated approach

Figure 2. *Curricula modes of PBL (adapted from Savin-Baden and Howell Major,*

Expected educational outcomes of PBL and their alignment to actual outcomes

PBL represents a major shift in educational paradigm to problem-based and student-centered learning. Although PBL has endured the test of time, recently the return on educational investment in PBL has been questioned, giving rise to concerns among some educators about the value and benefits of PBL (Gwee, 2004). More specifically, the major question that arises is whether there are any documented differences in student outcomes when PBL is used (Albanese & Mitchell, 1993).

Basic knowledge acquisition and transferable skills development

PBL is set to promote the training of competent professionals by enhancing the problem-solving skills of students. As a result, PBL has also to ensure enhanced knowledge acquisition (Gwee, 2004). Research findings, however, indicate that traditional curriculum students perform better on knowledge acquisition when compared with students who have experienced PBL (Albanese & Mitchell, 1993; Chou & Chin, 2009; Gwee, 2009; Hung, 2009; Hwang & Kim, 2006; Michel et al., 2002). Although PBL appears not to improve the knowledge base, many authors stress the fact that research is mostly based on medical students who are already high achievers and consequently cannot be expected to go much higher whatever innovative curriculum they may be subjected to (Albanese & Mitchell, 1993; Gwee, 2009; Hwang & Kim, 2006).

Many authors also emphasize that PBL enhances depth of learning but not breadth (Albanese & Mitchell, 1993; Dochy et al., 2003) since PBL approaches cover approximately 80% of the conventional curricula and students in PBL groups identify about 61% of the learning objectives deemed essential by faculty (Albanese & Mitchell, 1993). Albanese and Mitchell (1993) admit that “to attempt to cover all content that students encounter in medical school through the problems they engage in solving may not be efficient or achievable” (p.73). Also, Biggs and Tang (2007) claim that content coverage is less important as long as students learn the skills for seeking out the required knowledge, as the occasion demands. More specifically, in a PBL program students find out how to build a knowledge base on what they already know.

This development of knowledge acquisition skills is considered crucial for the subsequent introduction of learners into the workforce (Biggs & Tang, 2007). Furthermore, studies have shown that the limited material learned through PBL appears to be retained to a greater extent than does the more ample material discovered through conventional instruction (Albanese & Mitchell, 1993).

Learning in small groups creates opportunities for students to practice and develop transferable skills (Gwee, 2004). In particular, "PBL is expected to help students learn how to analyze, evaluate, integrate and apply information through their active involvement in learning together in small groups" (Gwee, 2004, p.123). The literature review indicates that students in PBL perform better than conventional students on clinical examinations (Albanese & Mitchell, 1993; Gwee, 2009; Hung, 2009; Hwang & Kim, 2006; Michel et al., 2002). Furthermore, Albanese and Mitchell (1993) reported that clinical ratings of graduates and undergraduates by faculty supervisors were more positive for students in the PBL curriculum. This finding is considered by Albanese and Mitchell (1993) as "the strongest evidence in support of PBL, since high clinical ratings would not be expected if PBL students or residents had deficits in their diagnostic acumen" (p.67).

It must be noted that comparison among studies is difficult due to differences in target sample, subject matter and physical environment in which the PBL was implemented (Albanese & Mitchell, 1993; Hung, 2009; Hwang & Kim, 2006). Therefore, while acknowledging some of its shortcomings, PBL's pedagogical strength still makes a strong case for reflection and retention in education (Gwee, 2004).

Students' and faculty's perception of PBL

According to PBL advocates, this instructional method offers a learning experience that is more enjoyable than sitting through lectures in a conventional curriculum (Albanese & Mitchell, 1993). Studies suggest that the majority of students feel more satisfied with PBL approaches (Albanese & Mitchell, 1993; Gallardo et al., 2011; Hwang & Kim, 2006; Michel et al., 2002). More specifically, students suggest that PBL helps them to understand and memorize the knowledge more effec

tively and enhances their abilities of self-directed learning, critical thinking, problem-solving and group working (Yuan *et al*., 2008). Moreover, quantitative studies have shown that approximately 70-83% of students who initially did not wish to participate in PBL changed their minds after they experienced it. On the other hand, there are indications that 4-20% of the students will not thrive in a PBL environment. Furthermore, approximately 15% of the learners will not elect a PBL option even after having had personal experience with PBL. Those who decline the PBL track for the conventional track usually rate PBL as less favorable regarding enjoyment and learning potential in comparison to the lecture-based curriculum (Albanese & Mitchell, 1993). It is apparent, therefore, that the increased attrition reported in PBL programs is correlated with the different learning styles developed by learners. The students' dispositions determine the choice of educational experiences and in turn their academic performance (Kolb, 1981). Finally, it is often reported that first-year students express frustration with the lack of guidance and the complexity of the problems (Hwang & Kim, 2006; Nilson, 2010; Varnava & Webb, 2009).

Albanese and Mitchell (1993) claim that faculty's satisfaction with any curricular innovation is essential to its continuance. Some authors fear that tutors used to a more didactic approach to teaching may find it difficult to adapt to PBL (Biggs & Tang, 2007; Varnava & Webb, 2009). Nevertheless, PBL is favorably received by many educators, mainly due to the promotion of tutor-student contact (Albanese & Mitchell, 1993). Moreover, while more dedicated blocks of time may be necessary for faculty and tutor contact in PBL (Albanese & Mitchell, 1993; Gallardo et al., 2011), its benefits appear to overcome any dissatisfaction it may engender (Albanese & Mitchell, 1993; Michel *et al*., 2002).

The challenges of PBL implementation

Prior to the implementation of PBL a wide range of issues need to be considered, aside from the evaluation of its outcomes (Albanese & Mitchell, 1993). The practical conversion from a traditional to a PBL curriculum can be a daunting task owing to administrative and logistic considerations, the lack of resources and the need for a significant change in the mindsets of students and teachers (Gwee, 2009; Tan, 2004b).

Cost implications of PBL

There are many factors to consider in assessing cost, such as staff time commitment, cost of instructional materials, necessary physical supports (e.g. rooms), technological resources, and training opportunities (Albanese & Mitchell, 1993; Cavanaugh, 2001; L.C. Chan, 2009; Chou & Chin, 2009; Gwee, 2009). Research findings indicate that PBL cost in terms of faculty effort appear to be no greater than those of conventional curriculum for class sizes of up to 100 (Albanese & Mitchell, 1993; Chou & Chin, 2009). However, for larger classes there are serious concerns about the economic viability of PBL (Albanese & Mitchell, 1993). However, in the literature there are several reports on strategies that can be employed to adopt a small-class PBL technique to a large-class situation. Instructors are advised to find help in the face of peer tutors or graduates, add more structure to the PBL teaching style so groups are less likely to get sidetracked, use more mini-lectures, adapt a “floating facilitator” model, or use an online course website (Pastirik, 2006; Rogal & Snider, 2008; Shipman & Duch, 2001). Finally, rooms for small-group meetings and adequate library resources to support learning are also reported as PBL’s major costs (Albanese & Mitchell, 1993; Chou & Chin, 2009).

The challenges of problem design

The core of PBL is the use of problems, thus the selection of appropriate problems is crucial for students to go beyond a superficial understanding of the important concepts and principles (Albanese & Mitchell, 1993; Duch, 2001; Hung, 2009). For this reason PBL problems need to be well written (L.C. Chan, 2009; Tan, 2004b). As a result, many practitioners of the PBL have addressed the issue of problem design and have conceded that a good PBL problem should:

- engage student interest and motivate self-directed learning (Biggs & Tang, 2007; Duch, 2001; Sockalingam *et al.,* 2011),
- relate the subject matter to the real world and raise options that promote discussion (Biggs & Tang, 2007; L.C. Chan, 2009; Duch, 2001; Feather & Fry, 2009; Sockalingam *et al.,* 2011),
- be complex enough in order to promote collaborative work (L.C. Chan, 2009; Duch, 2001; Sockalingam *et al.,* 2011),
- activate and incorporate previous knowledge (Biggs & Tang, 2007),
- meet the course learning objectives (Biggs & Tang, 2007; Feather & Fry, 2009).
-

It is also strongly advised to develop a PBL committee for reviewing and revising the designed problems (Lin *et al.,* 2009; Savin-Baden & Howell Major, 2004).
In practice, however, writing PBL problems may be time consuming, challenging and frustrating (Duch, 2001). Not providing a statement or question at the end of the problem, making the problem too narrow so that students try to solve it in a simplistic way or producing over-complex problems are common mistakes made by inexperienced tutors (Savin-Baden & Howell Major, 2004). Therefore, appropriate tutor training and faculty development programs are required.

The role of the facilitator

There has been considerable discussion about the role of educators in PBL (Savin -Baden & Howell Major, 2004). Instead of directly teaching content knowledge to students, PBL tutors facilitate the student learning process by observing the students, stimulating discussion among team members, raising thought-provoking questions, encouraging collaborative work and providing feedback at appropriate instances (Clouston, 2005; Savin-Baden & Howell Major, 2004; Sockalingam *et al.,* 2011). However, for many tutors engaged in PBL the transition from tutor to facilitator demands revising their assumptions about what it means to be a teacher in higher education (Savin-Baden & Howell Major, 2004) and relinquishing power and control (Albanese & Mitchell, 1993; Chou & Chin, 2009; Ho, 2004; Savin-Baden & Howell Major, 2004).

Research into PBL facilitation shows that the success of PBL tutorials is often determined by the commitment and tutoring skills of the tutor (Gwee, 2009; Lin *et al*., 2009; Savin-Baden & Howell Major, 2004). More specifically, according to student feedback some of the causes of an unsatisfactory PBL tutorial are inappropriate tutoring or poor tutor-student interactions (Lin et al., 2009). In addition, many authors suggest that different pedagogical expertise is required for tutors and thus they should not be involved in PBL until they are familiarized with their roles in the PBL environment (Ates & Eryilmaz, 2010; Savin-Baden & Howell Major, 2004). For this reason, institutions intending to implement PBL must pay attention to the selection and training of tutors (Ates & Eryilmaz, 2010; Azer, 2009b, Gwee, 2009; Ho, 2004; Lin *et al.,* 2009; Savin-Baden & Howell Major, 2004; Turan *et al.,* 2009).

Numerous papers have also considered whether PBL facilitators need to be content experts (Savin-Baden & Howell Major, 2004). Some PBL proponents claim that non-expert tutors may be more facilitative of student-centered learning (Albanese & Mitchell, 1993). On the other hand, Tan (2004b) pointed out that non-content experts are unable to assist students in appreciating the depth of inquiry unique to the discipline. Furthermore, according to Tan (2004b), employing non-expert tutors is the surest way to prepare a generation of superficial learners. In addition, research findings indicate that students usually rate expert tutors as more effective (Albanese & Mitchell, 1993; Ates & Eryilmaz, 2010; Azer, 2009b; Gwee, 2008; Savin-Baden & Howell Major, 2004; Takahashi, 2008), since they tend to be more directive in their management of the small-group interactions (Albanese & Mitchell, 1993; Ates & Eryilmaz, 2010; Azer, 2009b; Savin-Baden & Howell Major, 2004). More specifically, tutors with subject-matter expertise appear more capable in assisting students to identify relevant learning issues and correct gaps in knowledge or errors in processing (Albanese & Mitchell, 1993; Ates & Eryilmaz, 2010; Azer, 2009b; Gwee, 2008; Savin-Baden & Howell Major, 2004; Takahashi, 2008). It has been shown that expert tutors can exercise some control over the learning that occurs in PBL and thus lead students to mastering the important content and addressing all significant learning objectives (Albanese & Mitchell, 1993).

Many authors also believe that novice students with little experience of the approach would probably benefit from directive tutors who are knowledge experts. However, as student competence and knowledge increases, the tutor's leadership style should also change (Albanese & Mitchell, 1993; Savin-Baden & Howell Major, 2004).

Student assessment in PBL

"Moving to a student-centered, cooperative-learning format of instruction requires rethinking how to assess student learning in such an environment" (Duch, 2001, p.95). Although testing content knowledge through multiple choice and short-answer tests are common ways of student assessment, if PBL instructors are expecting to test their students' critical thinking skills, they need to contemplate non-standard testing practices (Duch, 2001; Gwee, 2004; Ho, 2004; Michel *et al.,* 2002; Savin-Baden & Howell Major, 2004). Therefore, some educators choose to build assessment of critical thinking skills into the content exams by designing questions that go beyond simple knowledge or comprehension into the higher levels of thinking (Duch, 2001; Gwee, 2009).

Process skills are also not easily assessed in a traditional testing format (L.C. Chan, 2009; Duch, 2001; Gwee, 2009). However, findings indicate that self, peer and tutor ratings on specific items relating to participation, preparation, critical thinking, communication and group skills serve as useful assessment procedures (L.C. Chan, 2009; Gwee, 2009). These practices are founded on the belief that students should learn to evaluate the work of their peers in addition to their own (Bidokht & Assareh, 2011; Savin-Baden & Howell Major, 2004).

Using PBL in chemistry

The author of this paper, after four years of teaching experience, has come to the realization that students consider chemistry introductory courses frustrating because they view the material as difficult, boring and irrelevant to their lives. Thus, pedagogical interventions are most critically needed in introductory chemistry courses so that students with limited high school backgrounds but a desire to succeed can achieve their educational goals (Coppola & Jacobs, 2001).

Nowadays, two misconceptions are held by chemistry instructors. Firstly, increased content knowledge is considered the primary goal for students' achievement. Secondly, students are expected to learn from lectures, textbooks, and laboratory manuals (Abraham, 2005; Cracolice, 2005; Forster, 2009; Francisco et al., 1998). However, this approach to chemistry teaching has proven unpopular and irrelevant in the eyes of students and does not promote higher-order cognitive skills (Holbrook, 2005). More specifically, students have the tendency to memorize the required knowledge only for a short period of time. Also students are usually grade driven and tend to focus merely on the information necessary for passing the exam. Furthermore, in common with reports from many other chemistry instructors, the experience at Intercollege, Nicosia, Cyprus is that students complete lab experiments without a rich understanding of the underlying concepts, since they simply follow the step-by-step process outlined in a manual (Bretz, 2005; Cooper, 2005; Saribas & Bayram, 2009). In addition, students tend to store solved problems in memory and solve problems "by analogy", which involves matching the new problem to those stored in memory (Bunce, 2005; Cooper, 2005). In other words, there is plenty of evidence that the traditional methods used for teaching chemistry are not as effective as they might be (Cooper, 2005). Consequently, it would seem appropriate that chemistry education should strive to facilitate the development of students' critical thinking through suitable instructional approaches that emphasize problem-solving, inquiry-based laboratory activities and the rejection of science as a body of facts that must be memorized (Cooper, 2005; Qing *et al.*, 2010; Saribas & Bayram, 2009).

The situation is more complex for a "general chemistry" instructor. More specifically, more information has been incorporated in general chemistry courses due to the expansion of the number of students taking these courses from mostly chemical majors to a host of students from a wide range of disciplines (Groh, 2001). Therefore, defining essential topics and balancing between breadth and depth of coverage become issues difficult to reconcile (Groh, 2001). Moreover, the experience at Intercollege is that memorizing a large body of chemical facts and informa

tion has proven counterproductive. On the contrary, according to the views of Groh (2001) the learning outcomes of a general chemistry course should include the ability to (1) acquire a deeper understanding of chemistry's fundamental principles; (2) explain the observable properties and behavior of matter by understanding its behavior at the atomic and molecular level; (3) identify chemistry in the real world and its role in other disciplines; (4) think critically and solve problems; and (5) learn independently. These learning outcomes could be achieved by adopting a PBL instruction (Groh, 2001).

The author's attempts to relate chemistry to everyday applications have proven to be fruitful, since situational interest was enhanced and students exhibited a greater appreciation of the course. For example, in accordance with the suggestions of Holbrook (2005), evaluating the purification method of drinking water for an emerging city could lead to a deeper understanding of the properties of chlorine and chlorine containing compounds. Lantz and Walczak (1996) presented a mining company dilemma in order to introduce the difference between pyrometallurgy and hydrometallurgy and help students determine the spontaneity of an electrochemical reaction at various temperatures. Furthermore, the exploration of a shipwreck off the North Queensland coast by scuba divers, the restoration of archeologically significant metal artifacts and the identification of fuel sources for an emerging city are a few examples of case studies that have been developed by chemistry instructors in order to teach aspects of gas laws, redox reactions, electrochemistry, electrolysis and combustion of fossil fuels (Belt *et al.,* 2005; King *et al.,* 2008). It has also been found that engagement in active learning activities has increased the long-term memory of Intercollege chemistry students. These observations advocate the need for a change in the teaching approach used.

Although, using real-world situations in PBL allows students to comprehend the abstract theories in a more concrete and meaningful context, many real-world situations involving chemistry are rather complex and comprise concepts that are beyond the scope of an introductory course (Groh, 2001). Consequently, the author fears that without any guidance in generating learning issues, freshmen may be sidetracked by trivialities or overwhelmed by complexity (Groh, 2001). Based on her experience, the author believes that freshmen lack the knowledge and maturity to embark on a purely self-directed learning activity. Furthermore, as suggested by Groh (2001), some concepts that have not lent themselves well to problems could be dealt with through lectures. Therefore, a more directed form of PBL in conjunction with lectures and other activities has been adopted at Intercollege in order to give first-year students a powerful learning experience in general chemistry as suggested by Groh (2001).

Research data suggest that multiple modes of learning promote cognitive skills necessary for mastering chemistry (Francisco *et al*., 1998). The combination of PBL problems, lecture and other activities contains components that appeal to a range of learning styles (Groh, 2001). Furthermore, Groh (2001) reports that such a directed PBL format enabled students to meet the instructor's expectations and make connections between what they were learning in chemistry and their other classes. Therefore, the author anticipates that introducing concepts through appropriately designed real-world problems will motivate students' learning. However, it is her belief that a teaching approach in which PBL is combined with a number of lectures is more suitable to first-year students.

Conclusions

Many authors describe PBL as the learning resulting from the process of working toward the resolution of a problem (Gwee, 2004). The acquisition of knowledge, skills, and behavioral change towards learning are the fundamental goals of the teaching approach (Rogal & Snider, 2008). A diversity of PBL curricula modes is nowadays available (Albanese & Mitchell, 1993; Savin-Baden & Howell Major, (2004) due to the tendency of individual institutions to adapt PBL to their needs

(Savin-Baden & Howell Major, 2004). However, it remains unclear to the author which format is most suitable to each discipline.

Among the most attractive features of PBL are the increased level of student and tutor satisfaction toward the approach (Michel *et al.,* 2002; Rogal & Snider, 2008) in addition to the ease with which it can be modified to suit different contexts (Rogal & Snider, 2008). Furthermore, PBL students develop higher transferable skills and exhibit increased professional acumen (Albanese & Mitchell, 1993; Gwee, 2009; Hung, 2009; Hwang & Kim, 2006). However, research indicates that PBL does not improve knowledge base to the extent that is expected considering the commitment of resources (Albanese & Mitchell, 1993; Gwee, 2004; Michel et al., 2002; Rogal & Snider, 2008). However, PBL learners appear to recall more of the acquired knowledge due to the prolonged elaboration during the PBL process (Dochy *et al.,* 2003).

Even though PBL is supported by several educational theories, problems may be encountered in practice. Thus, according to research findings it is imperative for all parties concerned to have a clear understanding of its principles, strengths, and limitations before implementing PBL (Albanese & Mitchell, 1993; Ates & Eryilmaz, 2010; Gwee, 2008; Gwee, 2009). The cost of putting into operation a PBL curriculum represents one of its major limitations (Albanese & Mitchell, 1993; Cavanaugh, 2001; Gwee, 2009). As a result, while PBL may be a feasible choice for some schools, it could be an expensive innovation for others (Albanese & Mitchell, 1993). Moreover, since the effectiveness of the PBL curriculum depends on the problems employed, special attention and dedication is required when designing PBL problems (L.C. Chan, 2009; Duch, 2001; Hung, 2009; Tan, 2004b). Finally, given that tutors constitute important elements in the success of PBL tutorials (Azer, 2009b; Turan *et al.,* 2009), training programs are vital in assisting educators to comprehend their revised role and alter their state of mind regarding instruction and assessment in the PBL environment (Albanese & Mitchell, 1993; Ates & Eryilmaz, 2010; Gwee, 2009).

The author of this article, bearing in mind the recommendations of Albanese and Mitchell (1993), underlines the importance of undertaking more research on the benefits and challenges associated with the PBL instruction, as well as on the required preparation and planning preceding its implementation. Furthermore, it is her belief that PBL should not be considered a panacea. In contrast, educators should be open to the possibility of blending the PBL approach with traditional instructional methods when necessary, in order to facilitate student learning.

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The University of Hertfordshire's Curriculum Design Toolkit.

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Introduction

The University of Hertfordshire's Blended Learning Unit and Learning and Teaching Institute have designed a Curriculum Design Toolkit to help staff take a considered look at their current curricula in terms of their learning, teaching, assessment and the learning environments that they provide.

This article provides background information on the toolkit as well as guidance on accessing the resources. The toolkit is split into eight strands, each of which represents a relevant challenge within Higher Education teaching which has received prominence over the last five years. The toolkit is based on the ethos and design of Chickering and Gamson's "Seven Principles for Good Practice in Undergraduate Education" (1987).

Background information:

In 1985, with support from the American Association for Higher Education (AAHE), Arthur Chickering and Zelda Gamson gathered a small task force of 12 scholars to develop a set of principles for good practice to help teaching staff in Higher Education Institutions consider and develop their practice. The intent to develop a set of develop a set of principles that were "accessible, understandable, practical and widely applicable" was motivated by concerns that research reports and literature reviews failed to reach staff members. There was an overriding desire by Chickering and Gamson to present a succinct and memorable set of principles that all staff could apply, rather than long lists of recommendations or generalised theories,. In 1987 Chickering and Gamson published their "Seven principles for good practice in undergraduate education" with an emphasis on *how* we do things rather than *what* we teach.

To help staff access the principles, Chickering and Gamson developed self-assessment inventories for Faculty (staff) and Institutions. The inventories contain accessing statements about the principles to which the staff can answer "Very often, Often, Occasionally, Rarely or Never". The inventories were designed to "help staff members (Faculty), departments, colleges and universities, examine individual behaviours and institutional policies and practices" (Chickering and Gamson,1989). The intent was to use the principles and inventories to improve practice and not as a basis for individual judgement about performance or summative evaluation.

Curriculum Design Toolkit:

Learning from, and including the work of Chickering and Gamson, the University of Hertfordshire's Curriculum Design Toolkit contains eight strands. Each strand contains a number of interrelating documents and components. These components are:

Research/informed Principles for Good Practice,
Accessing statements,
Self-diagnostic tool,
Consideration of features and consequences of practice
Hints and tips to help improve practice.

An overview of the toolkit, its various strands and associated components is given here (http://prezi.com/cibiptp5pa3d/curriculum-design-toolkit/). The overview is provided via the presentation software Prezi. Prezi's zooming functionality provides an opportunity for the viewer to gain both a wide scale overview (zoom-out) as well as focused explorations on specific strands and the components within each strand (zoom-in).

In this paper there are various links to video files with audio commentary that can be accessed by clicking on the following camcorder icon.

When opening Prezi, the toolkit will load allowing all eight strands to be visible. As a viewer you can then zoom in and focus on different elements to suit your interests. By clicking on an object it will zoom into view and you can further explore the images/text/video or web links. To zoom back out you can use the magnifier on the side of the screen or you can return 'home'. (The materials are all also available via the University of Hertfordshire's Learning and Teaching Institute's web site in Word and Excel documents).

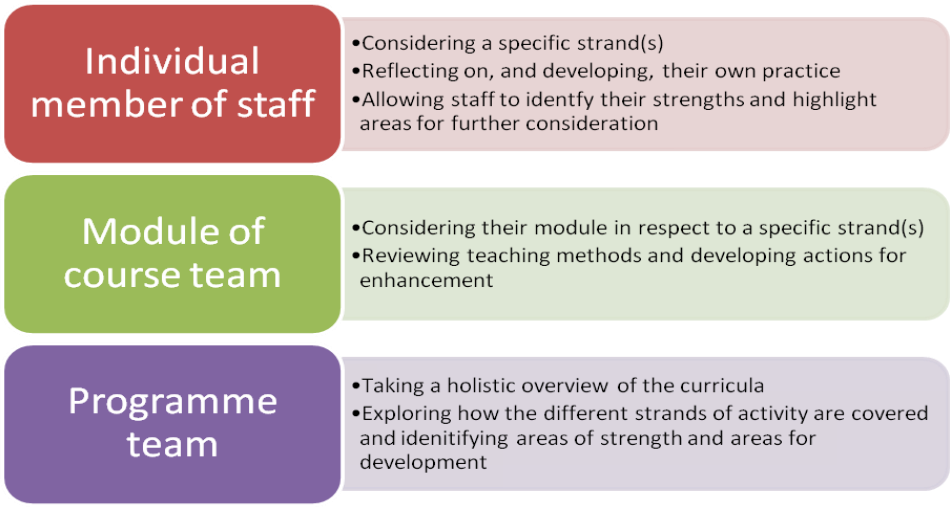

Figure 1. *Ways in which staff may use the toolkit*

We offer no diktat on use but hope staff find the toolkit useful through exploration and application relevant to their needs.

Principles for Good Practice:

For each strand of the toolkit between five and eight Principles for Good Practice have been indentified either directly from the literature (e.g. Chickering and Gamson) or developed following the review of pedagogic literature; consideration of relevant legislation and/or guidance from experts. Following the example of Chickering and Gamson we wanted to ensure that the Principles were applicable across all disciplines and within different teaching and learning situations. We have tried to ensure that the language is to-the-point and jargon-free, and that the materials are easily accessible.

The eight strands of the toolkit are:

1. Good practice for Higher Education *(Adapted from Chickering and Gamson, 1987)*
2. Assessment for Learning
3. Research Informed Teaching
4. Inclusive Teaching
5. Employability
6. International Engagement
7. Sustainability
8. Enterprise Education

Taking as an example the Assessment for Learning strand we will guide you through the different elements of the toolkit.

Assessment for Learning Principles:

The Assessment for Learning principles have been developed by considering the large body of research on assessment within Higher Education which identifies the significant influence of assessment on student study behaviours and their approaches to learning (Biggs, 2003; Ramsden, 1994; Rowntree, 1977; Snyder, 1970). The Assessment for Learning principles synthesise some of the guidance making it easily accessible, applicable and memorable.

Clicking on the red Assessment for Learning image within the toolkit will cause Prezi to zoom into the principles (see figure 2).

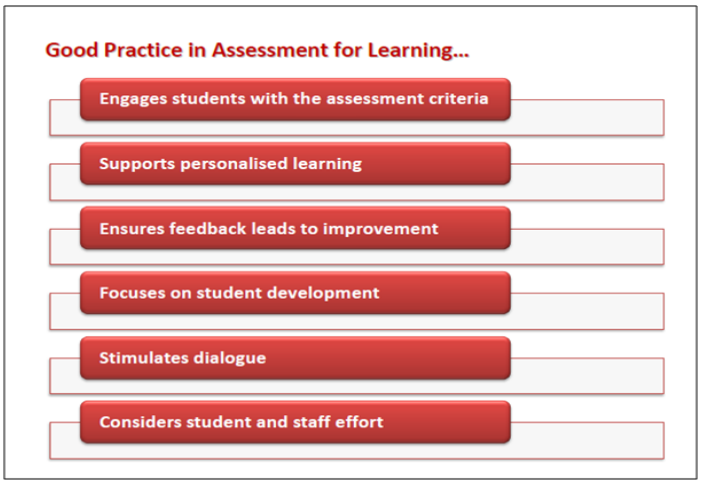

Figure 2. *Principles for Good Practice in Assessment for Learning*

Accessing the Principles:

Each principle has five underpinning statements to enable consideration of the principle and its application in academic practice. Chickering and Gamson's Faculty Inventory has ten accessing statements per principle but within the UH toolkit we have included only five for each principle recognising the time constraints on busy staff members. Further, the accessing statements are not intended as a definitive list but act to offer examples and stimulate dialogue.

The Assessment for Learning principles specifically draw on the work of; Gibbs & Simpson (2004); Nicol's work on feedback (2007); the National Union of Students' guidance on Feedback (2010); and the Assessment Standards Manifesto as developed by the Weston-Manor-Group (2007). All the accessing statements relate to the guidance provided within these referenced articles. Clicking on the first small icon to the right of a principle, will bring the underpinning statements into view. Considering the first principle, you can see the accessing statements in figure 3. By reading the statements and identifying when, and how, you consider assessment criteria with your students, will enable you (and/or your module/ programme team) to consider any gaps in your current practice and may stimulate some thoughts as to aspects that you may like to improve. In our experience, the statements provide useful conversation starters and enable staff to engage in dialogue with each other (and with students) about their current activities.

Curriculum Design Toolkit:

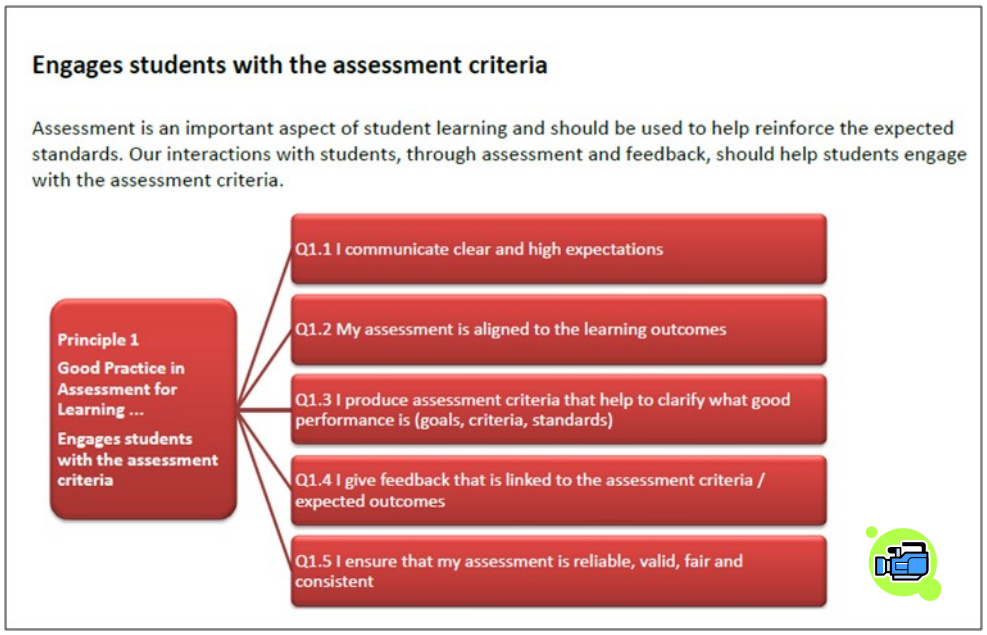

Figure 3: *Accessing statements underpinning the first Assessment for Learning principle.*

Diagnostic tool:

Each of the principles and the statements are available within a diagnostic spreadsheet (accessed via the spanner symbol in Prezi) to provide a slightly more objective review of practice. The spreadsheet enables you to indicate whether you believe you meet each of the statements 'Very often, Often, Occasionally, Rarely or Never'. There is also an opportunity to indicate if the statement isn't relevant to your particular experience. Using radio buttons you can select how your practice relates to each of the statements (figure 4).

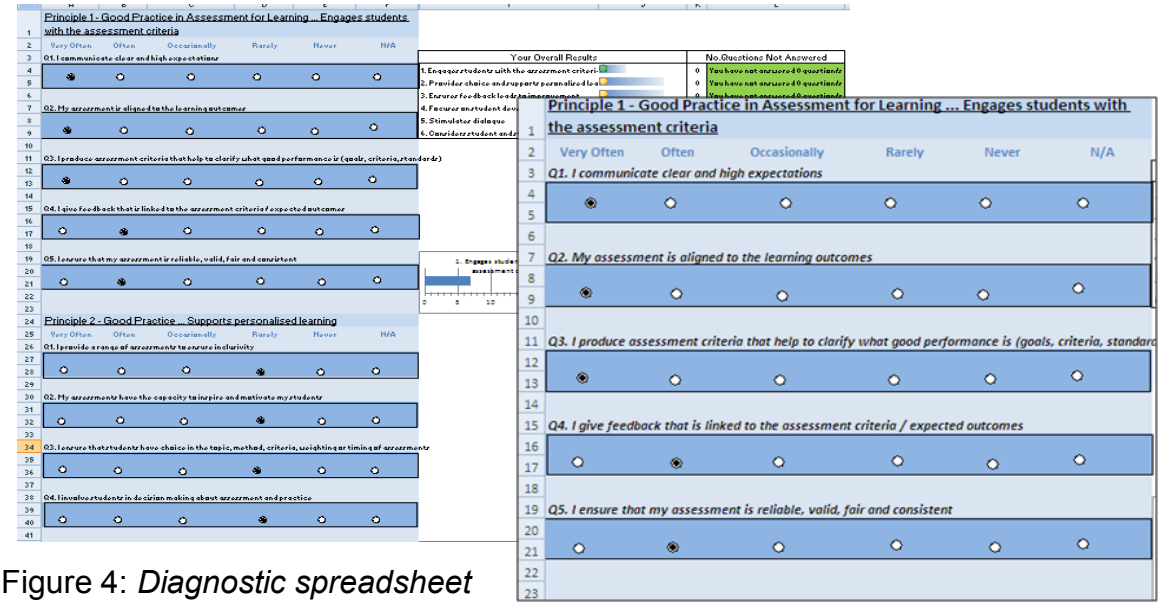

Figure 4: *Diagnostic spreadsheet*

As you work through the statements associated with each principle, the spreadsheet provides you with an indication of how you are doing on each principle via a traffic light system (figure 5) thus helping you to identify areas of most need on which to focus your efforts.

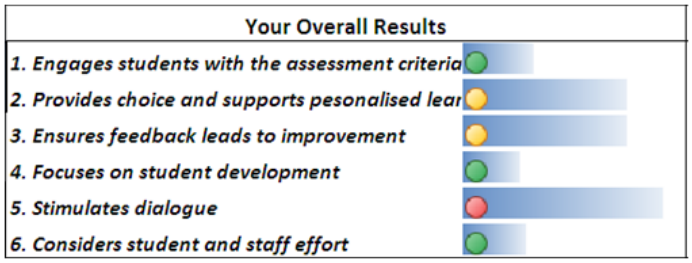

Figure 5: *Traffic light indication of results*

Features and Consequences: Each strand of the toolkit contains "Features and Consequences" which are accessed by clicking on the red, yellow and green icon (the middle of three small images to the right of each principle in the Prezi link). These resources have been designed in consultation with students to enable consideration of diagnostic results in the context of what your actual practice may be like (features) and the consequences of this practice for the student (consequences). The text is presented within three columns (red, yellow and

green) and the text above the midline indicates the features of practice and the text below the line suggests the consequences for the students (figure 6).

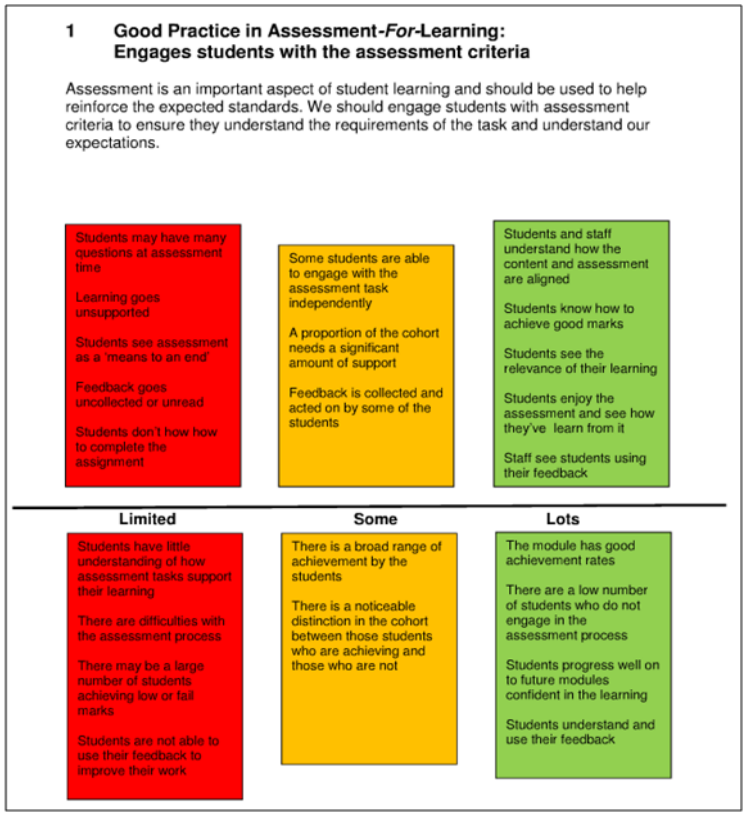

Figure 6: *Features and Consequences associated with Assessment for Learning principle 1.*

Hints and Tips:

The final resource within each strand is the 'Hints and Tips' which provide examples of how the principles are being applied in practice and enable you to consider ideas which may be relevant for your teaching. The hints and tips are drawn largely from the University of Hertfordshire although we have provided examples from other Institutions or web resources where appropriate. To view the hints and tips associated with a principle, click on the third icon to the right of the principle and the tips will zoom into view (figure 7). In some cases the tips are video clips and Prezi will link directly to the clip within YouTube.

Figure 7: Hints and Tips for Assessment for Learning principle 1.

Conclusion:

Through the toolkit you should be able to review your current practice and consider how to enhance your teaching and assessment and ultimately student learning. While there is a structured pathway through each strand of the toolkit, you may use the diagnostic to give an objective overview of your practice or you may choose to use the principles and statements to stimulate dialogue; it is entirely up to you. We hope you find the toolkit useful and explore it in the best way to suit you.

The toolkit is a developing resource and we welcome feedback on use, as well as examples and tips from your own practice which we can add to relevant strands.

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THE APPLICATION OF PROBLEM-BASED LEARNING IN EDUCATING FUTURE NURSES

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***ABSTRACT**: Problem-based learning is a student-centered approach where learning is encouraged through the study of realistic and usually complex problems. This paper considers its use and effectiveness in higher education, and specifically in nursing programmes. Particular focus is given to contemporary combinations of problem-based learning with information technology in simulation suites and virtual reality environments. Recommendations as to how these techniques could be incorporated into the nursing programme at the University of Nicosia are presented, including extending and enhancing the use of the current simulation suite and introducing a newly designed course into the programme that will cultivate the necessary skills for a successful future career within the health services.*

Introduction

Problem-based learning (PBL) is a curriculum development and a delivery system that recognizes the need to develop problem solving skills as well as the necessity of helping students acquire the necessary knowledge and skills. To date, it is considered by many researchers to be the most innovative instructional method (Hung *et al*., 2008). The development of PBL is generally credited to the work of medical educators at McMasters University Medical School in the 1970s. At around the same time, other medical schools in a number of countries were in the process of developing problem-based learning curricula (Barrows, 1996).

PBL was originally initiated and developed in response to medical students' poor clinical performance, which resulted from the memorization of fragmented biological knowledge rather than the development of clinical problem-solving and life-long learning skills (Hung *et al*., 2008).

According to Boud and Feletti (1998), defining PBL is not straight forward. PBL is an approach to structuring the curriculum which involves confronting students with problems from practice which provides a stimulus for learning. However, there are many possible forms that a curriculum and process for teaching and learning might take and still be compatible with this definition. One could look at PBL as a means of developing learning for capability rather than learning for the sake of acquiring knowledge. This approach is then consistent with adult learning principles and takes account of the need for courses not only to teach well, but more importantly to lay the foundations for a lifetime of continuing education, both formal and informal (Engel, 1985).

- PBL has the following distinct characteristics which may be identified and utilized in designing a curriculum.
- Use of real world problems. Problems are relevant and contextual. It is in the process of struggling with actual problem that students learn the content and develop critical thinking skills.
- Reliance on problems to drive the curriculum. The problems do not test skills; they assist in the development of the skills themselves.
- The problems are truly ill-structured. It is not intended for there to be only one optimal solution, and as new information is gathered in a reiterative process, perception of the problem and thus the solution, changes.
- PBL is learner-centered. Learners are progressively given more responsibility for their education and become increasingly independent of the teacher for their education.
- PBL produces independent, life-long learners. These are students who will continue to learn on their own in life and in their careers.

PBL can be looked at as a combination of cognitive and social constructivist theories, as developed by Piaget and Vygotsky respectively (Park, 2000). It is therefore based on the assumptions that knowledge is individually constructed and cannot be transmitted, there are necessarily multiple perspectives related to every phenomenon, meaning and thinking are distributed among the community in which we exist and knowledge is indexed by relevant contexts (Hung *et al.,* 2008). Furthermore, PBL is based on theories of situated learning, which assume that the most effective learning takes place when it is embedded in real life tasks.

The PBL process normally involves students being split into small groups and together encountering and reasoning through the problem. They attempt to define the problem, identify its limits and boundaries, and set learning goals by determining what they already know together with what hypotheses they can formulate. In better understanding the complexity of the problem, they might assign specific tasks to each member of the group, who are then responsible for collecting, studying resources and reporting back to the group. Students share their learning with the group and keep revisiting the problem as they integrate all newly acquired information to achieve the original learning goals.

Even though PBL is considered to be an efficient teaching approach, it has also faced criticism. Firstly, it has been argued that students cannot really know what is important for them to learn, especially in areas where they have no prior experience. It is the duty of the educator then, as facilitator, to carefully assess and account for the prior knowledge that students bring to the classroom. Secondly, it has been suggested that adopting a PBL approach in class could lead to less time to cover the material compared to a conventional lecture-based course. This highlights the difficulties in implementing PBL in practice; it needs careful planning and it involves a lot of work for the teacher. It can be particularly difficult at first, when the teacher needs to adopt the role of facilitator, encouraging students to ask the right questions rather than just offering them the solutions (Hmelo-Silver and Barrows, 2006). As a consequence, the success of PBL also depends on effective staff development in assuming the role of facilitators within these new settings.

The authors identified a series of research papers that assessed the effectiveness of PBL in nursing students, mainly though a PBL evaluation questionnaire. The best features of PBL were considered to be group participation, self-directed learning, interacting with various individuals, and recognizing how to apply critical thinking skills. Students who experienced PBL were found to have higher scores than those who attended lecture courses in evaluation questionnaires as long as two years after the completion of their studies (Tiwari *et al*., 2006).

The training and education of student nurses is a fine example of a discipline that could benefit to a great extent from the incorporation of PBL approaches. Nurses are continuously involved in handling serious and sometimes life threatening situations. These are situations that need excellent decision making and interpersonal skills. The nurse should be in a position to carefully assess the situation, take the right decisions at the right time, and be able to cooperate effectively with both their colleagues and the patient. This review aims to investigate the extent to which PBL is employed in nursing courses and presents evidence to support the assertion that PBL develops the nursing students' critical thinking. In addition, it will look at possible combinations of PBL with innovative teaching approaches that further enhance the learning experience for nursing students.

Problem-based learning in nursing education

Yuan *et al*. (2007) have systematically reviewed the literature and presented the available evidence for developing nursing students' critical thinking through PBL. In particular the addressed research questions were:

- What is the effect of PBL on nursing students' critical thinking?
- Does the available evidence provide information for developing nursing students' critical thinking through PBL?

The authors identified a series of research papers that assessed the effectiveness of PBL in nursing students, mainly though a PBL evaluation questionnaire. The best features of PBL were considered to be group participation, self-directed learning, interacting with various individuals, and recognizing how to apply critical thinking skills. Students who experienced PBL were found to have higher scores than those who attended lecture courses in evaluation questionnaires as long as two years after the completion of their studies (Tiwari *et al*., 2006).

It was found that students who followed a curriculum that included PBL, perceived that they had developed stronger thinking and problem-solving skills, more effective communication skills, and a greater sense of personal responsibility than did students who received traditional type lectures, and their perceptions showed that the curriculum encouraged critical thinking. In addition, the problem-solving skills embedded within PBL were perceived to be closely linked to intellectual processes and critical thinking. These intellectual process consist of identifying and analyzing the problem, assessing the need for further information and knowledge, considering the alternative explanations or solutions, as well as implementation and evaluation. Critical thinking involves the ability to identify problems, to reason and to make decisions about what is important and what alternative solutions may be possible.

Nonetheless, the authors have also identified studies that display mixed findings towards the educational effectiveness of PBL. Choi (2004) for example, indicated that PBL improved the students' meta-cognition and problem solving process but not their critical thinking skills. Possible explanations offered for this included the need for students to develop an awareness of the behavioral and environmental influences on higher order thinking skills, before developing critical thinking. These influences need to be evaluated both by students and teachers, and addressed during teaching and learning activities. Furthermore, PBL as an instructional approach was often used in only one course, while the rest of the courses maintained traditional teaching formats.

This meant that possible improvements were difficult to detect, hence yielding the mixed findings observed. Finally, the authors also highlight the problem of defining critical thinking and the availability of standardized tests to measure this in educational settings. As a result, the different validity and reliability of instruments could potentially influence the outcome measure. Hence, it is concluded that there is a need for further research to be conducted to clarify the effects of PBL on critical thinking development within the nursing educational context.

Applin *et al*. (2011) compared the competencies between problem-based learning and non-problem-based educated graduate nurses. The authors employed a 'Graduate Competence Questionnaire' to measure the following standards of practice identified by the professional association: professional responsibility, knowledge based practice, ethical practice and provision of service to the public. The questionnaires were completed by graduate nurses (6 months after graduating) that either had (PBL nurses) or hadn't Non-PBL nurses [NPBL]) had experience of PBL.

Both PBL and NPBL nurses have rated themselves similarly on the entry-to-practice competencies. This suggests that graduates identify themselves as competent to practice regardless of curriculum structure or teaching methods employed during their basic education. Similar numbers of PBL and NPBL graduates supported the view that clinical practice had a stronger influence than classroom time in preparing them to meet the competencies to practice as graduate nurses. In this study (Applin *et al*., 2011) the PBL graduates emphasized that the PBL learning process enhanced their critical thinking skills through small-group discussions, dialogue on and debate of nursing issues, and the use of research skills such as finding and summarizing information to address specific nursing issues. The PBL graduates have further indicated that clinical practice, skill competency, and evidence-based practice were essential components of graduate nurse competency. Although the NPBL group rated themselves as having met the entry-to-practice competencies, less than 10% of the group commented on critical thinking as an important aspect of practice.

Even though the authors do admit that a postal survey implies the use of a sample of convenience and that the reliability and validity of the instruments used should be rigorously established, they reach the conclusion that PBL graduates have identified the skills and abilities of critical thinking, self-directed learning, evidence-based practice and teamwork that they have acquired through the PBL process as key in enabling them to meet the entry-to-practice competencies. On the other hand, NPBL nurses did not clearly identify if or how the structure and process of their nursing programs contributed to them meeting the entry-to-practice competencies. Hence, one could conclude that PBL does indeed enhance the learning experience, but that it is clear that additional studies are required to support the findings of this study.

Murphy *et al*. (2011) have reviewed the literature on PBL and looked at the possible merger with another active-learning strategy, namely the use of simulation. The use of simulation as a teaching method is not a new phenomenon, and in the nursing education this has emerged as a means of promoting experiential learning in various contexts. Simulation is a technique that promotes a safe, controlled environment that is free from the normal stimuli of the clinical environment. It also incorporates several different modalities such as role players, task trainers, virtual haptic devices, and mid- to high- fidelity manikins (Woolley and Jarvis, 2007).

Woolley and Jarvis (2007) have looked at merging PBL and simulation for a final-year unit of learning within a baccalaureate nursing program. Firstly, a focus group study developed evidence-based yet clinically relevant problems for the PBL tutorials. Identifying practice deficits of the newly qualified nurses informed the content of the unit of learning relevant to the practice. This content was presented to the students through a format of a series of patient problems. The problem was then enacted in corresponding simulations. The authors report that the merge of the two pedagogical methods has fostered approaches that differ from those of traditional strategies, thereby nurturing knowledge exploration and transformation. Moreover, this merger has cultivated an awareness of creative thinking, critical analysis, and decision-making abilities from extrapolating and relating the theoretical and practical knowledge acquired.

PBL and simulation are therefore synchronized to ensure a student-centered curriculum that supports the underlying pedagogical concepts and addresses health care demands.

The employment of PBL in conjunction with other learning and teaching strategies has been looked at by Nelson *et al*. (2004). The authors have designed a virtual reality package as a learning resource within adult pre-registration nursing education. As the UK government's priorities are to provide more flexible career pathways, to increase the practical skills level, and adaptability of education to the needs of the National Health Service (Department of Health, 1999), the use of virtual reality could be a possible solution, as it entails the use of advanced technology to produce simulated environments that users perceive as comparable to real world objects and events. According to Nelson *et al*. (2004), this innovative strategy provides opportunities for the learner to explore and question emerging issues, thus promoting problem-based learning, self direction, critical thought and decision making skills. Nelson *et al*. (2004) describe the creation of a virtual community which consisted of a variety of virtual homes and amenities, including a school, public houses and care homes. Students were introduced to the virtual community through written scenarios that provide information on families and individuals, their personal characteristics and lifestyles. This design was found to encourage students to consider issues such as social and environmental factors and their impact upon health.

Initial feedback from students has suggested that the virtual community was stimulating and different to other teaching methods. Students considered they were able to "view patient care holistically" and had improved their confidence in problem solving and decision making skills. A major advantage was the ability for the student to learn by trial and error in a controlled environment, something that would not have been possible in a real-life situation. Possible disadvantages include the assumption that the students possess the necessary IT skills to use effectively the software, the possible distractions due to the use of online media and the interactions within a virtual world and the lack of face to face communication and interaction.

The authors conclude that the virtual community brought PBL to life with an innovative stimulus not previously seen in traditional teaching paradigms. Students now critically question and draw their own conclusions about what they have seen in the virtual community and they can reflect upon prior learning, analyze and synthesize contextual information, acquire further knowledge and assimilate into their existing knowledge base.

Discussion and concluding remarks

Having reviewed the research articles on PBL in nursing education, one can certainly appreciate the need to involve innovative ways of teaching into the curriculum in an attempt to enhance the learning experience for the students. PBL can offer an effective learning structure in the professional development of nurses in the workplace. It can support the development of critical thinking, clinical judgment, knowledge acquisition and enhanced clinical practice behaviors, such as communication and interactive skills. Unfortunately, both Yuan *et al*. (2007) and Applin *et al*. (2011) have concluded that more research is needed in the area to reach firm conclusions on the relative merits of using PBL in nursing education. Most nursing programmes offer a mixture of PBL courses and traditional lecture courses. However, it is very difficult to devise an instrument that has the validity and reliability to measure accurately the effectiveness of PBL and this represents the major obstacles in understanding the full extent to which this teaching approach improves the quality and enhances the skills and competencies of new graduate nurses.

Nonetheless, this has not stopped the proposal and application of a mixture of teaching techniques that have combined a PBL approach together with simulation or a virtual reality environment. This is perhaps the way forward, as information technology advances and offers new possibilities that a few years ago seemed simply impossible.

Many nursing schools now have simulation suites equipped with state of the art manikins that can mimic a plethora of different medical scenarios, while the use of a virtual community environment within the classroom certainly opens up the door to a new teaching approach where students can explore, collect information, form hypotheses and take decisions without of course having to face the consequences of their mistakes, had they been in a real-life situation.

This is I believe where the future of nursing education lies. Having been a lecturer of nursing at the University of Nicosia for the past year, I have seen that the vast majority of the courses are run in the traditional way, with students taking notes and the teacher presenting the key ideas and concepts. The future nurses, however, need not only to have the necessary medical knowledge, but perhaps most importantly to possess the necessary skills that will enable them to successfully handle any situation that might arise at the workplace. These skills range from critical thinking, to team working, interpersonal and leadership skills; and these are the kind of skills that could be developed through a combined PBL and simulation approach.

The University of Nicosia has a modern simulation suite, where students are usually trained in different scenarios and what actions they are expected to take. Introducing the key elements of PBL within the simulation suite could greatly enhance the learning experience for the students. This could be achieved with the introduction of a new course where students will be divided into groups and given descriptions of the problem and asked to discuss, research and decide upon what is best to do. The major difference is that the teacher or lecturer would now act as a facilitator, making sure that the students gradually develop their critical thinking skills and the ability to ask the right questions in order to resolve the problem.

The teacher should not provide the answers or solutions, and the students shouldn't be trained to solve specific situations. Instead, they should develop the right attitude and acquire those skills that would ensure that whatever the situation, however difficult it is, and irrespective of whether they have faced something similar before, they would know how to approach it, where they should look for extra information, and how they could liaise with their colleagues and other medical personnel to effectively resolve the problem. In essence, this is the beauty in employing problem-based learning in nursing education together with the goods that information technology has to offer. The more preparation and exposure the student had during his or her training, the more well prepared he or she would be to enter the workplace and apply what he or she has learnt into real life situations.

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Evaluation of my practice using curriculum design diagnostic tools

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Introduction

Five strands of the University of Hertfordshire (UH) Learning and Teaching Institute's (LTI) curriculum design toolkit have been designed to support five key Strategic Drivers (Student Experience, Learning and Teaching, Employability and Entrepreneurship, Research, Innovation and Enterprise and International Engagement) of the University of Hertfordshire's Strategic Plan (2010-2015). These toolkit strands are as follows:

Assessment for Learning
Chickering and Gamson
Employability
Internationalisation
Research-Informed Teaching

The toolkit as a whole has been designed to assist educators in designing their curricula, helping educators to take into consideration their learning, teaching, assessment and the learning environment they provide. In this short piece I present an evaluation of my own practice, teaching the UH B.Sc. Environmental Management programme at Intercollege, Nicosia.

The Assessment for Learning toolkit strand

The first toolkit strand that I used is 'Assessment for Learning'. I used this strand because I strongly support that the view that the way an assessment is designed will reflect and influence student learning. This toolkit strand has been designed in a very simple form. It consists of 6 categories and 30 questions. The questions are very simple and they allow educators to critically evaluate their curricula. More specifically, the questions help tutors understand whether or not the curriculum they are using meets Principles of Good Practice that are Associated with the As

sessment for Learning. According to the answers given by the educator, the toolkit, which is based on a traffic light system, will provide one of three different colours for each of the principles. When using the Assessment for Learning toolkit strand I achieved green in four principles and amber in 2 principles as shown in figure 1 below:

Your Overall Results		No.Questions Not Answered	
1. Engages students with the assessment criteria		0	You have not answered 0 question/s
2. Provides choice and supports pesonalised learn		0	You have not answered 0 question/s
3. Ensures feedback leads to improvement		0	You have not answered 0 question/s
4. Focuses on student development		0	You have not answered 0 question/s
5. Stimulates dialogue		0	You have not answered 0 question/s
6. Considers student and staff effort		0	You have not answered 0 question/s

Figure 1. *Output from the diagnostic tool within the Assessment for Learning strand of the LTI curriculum design toolkit.*

Good practice-engages students with the assessment criteria - GREEN

This good practice principle suggests that students should be engaged by their tutors in the assessment criteria. Being involved in identifying, developing and engaging with the assessment criteria is useful to student learning (Rust *et al*. 2003). In all the modules I teach I always try to involve my students in the assessment criteria. The involvement of the students starts from the very first session when I go over the module guides and discuss with them about their assignments, their weight towards the final grade, their deadlines and the criteria they will be assessed against. During their first assessment I ask the students for feedback so that I can check whether the students are comfortable with the criteria or whether any revisions are needed prior to the next assessment. In addition, I always ensure that my assessment covers the learning outcomes of the module.

Good practice - Supports personalized learning - AMBER

According to Trigwell et al (2003), teaching and assessment methods should encourage a student-focused approach and should support the personalization of learning. This is an area that I still need to improve. I need to appreciate the relevance of motivation that is not intrinsic (Lin et al. 2001) and adapt my teaching to appeal to students with different types of motivation. This can be achieved by using different assessment styles. The overall aim would be to achieve inclusivity. It may also be useful to have a session with the students at the start of the year where I could ask them to measure their preferred learning styles and then choose related teaching and assessment methods in order to incorporate personalized learning. Furthermore, as the University of Hertfordshire's *Strategic Driver on Teaching and Learning* suggests, I should be more flexible in designing my assessments.

Good practice - ensures feedback leads to improvement - AMBER

As a tutor I support the view that an assessment is 'good' as long as it is followed by constructive feedback. For this reason I always try to ensure that my students receive both personalized and prompt feedback after each assessment (Chickering and Gamson, 1987) and the feedback I receive from my students for doing this is very positive. What I believe I could improve is to find a way to incorporate further activities into my teaching that would allow my students to act on their feedback. One way of doing this would be to include a few formative assessments to provide the opportunity for my students to reflect upon their feedback and improve in the summative assessments. Achieving this would require correct scheduling of both the formative and summative assessments in the curriculum to allow sufficient time for the improvement to be made.

Good practice focuses on student development - **GREEN**

There is a good deal of evidence suggesting that students focus their learning on those areas of the curriculum that they will be assessed on. It is, therefore, very important to align assessments with the module and programme learning outcomes. As a teacher I always try to ensure that my assessment practices are designed to help students learn rather than hinder learning (Brown and Knight, 1994, Brown et al., 2005). I tend to ask questions that stimulate deep thinking and make students think analytically. I also try to avoid asking questions that need a lot of memorization because I strongly believe that memorizing facts does not necessarily help student learning.

Furthermore, I monitor my students' development throughout the course by regularly checking their grades and performance throughout the semester. As a module leader and Head of the Department, I hold regular meetings with each student individually to discuss their development and progress, to ask if they have any particular learning difficulties and to flag and address any issues before they become problems.

Good practice - stimulates dialogue - **GREEN**

McKeachie et al (1986) argue that if teachers provide time for well planned, interactive and focused discussions with students it will improve students' critical thinking. Based on this and supported by my recent experience from the University of Hertfordshire Continuing Professional Academic Development (CPAD) training, when designing the curriculum I make sure that I will have a focused and dedicated discussion with my student after the completion of each assessment. This discussion initiates a dialogue between me and the students, which in turn helps improve both student development and my development as a teacher.

Another form of discussion that I tend to promote with my students is a discussion on the assessments. As I mentioned in point 1, I tend to discuss the assessments with my students in order to receive their feedback and to engage them in the de-

sign of the assessment criteria. I strongly believe that having a dialogue with them and receiving their feedback will help improve the specific module.

Good practice - considers student and staff effort - **GREEN**

When designing a module guide I follow the Definitive Module Document on the time allocation of workshops, lectures, private study time etc. This is crucial because there must be a balance in both the work load and assessment load of both students and teachers. To ensure this, I always try to involve my students in this process and try to make any necessary changes when the students provide feedback that some assessments were not correctly placed in the curriculum. I try to allow both time and effort on challenging and difficult learning tasks and try to prepare assessments for my students that are manageable. I also ensure that all the relevant information of the assessments (style, content to be covered, percentage contribution towards final grade, etc) is provided in the module guide and is constantly available online.

The Chickering and Gamson toolkit strand

The second toolkit strand that I used is the 'Chickering and Gamson' strand. This strand is designed to help staff diagnose whether the curricula they are using put into practice the *Seven Principles of Good Practice in Undergraduate Education* (Chickering and Gamson, 1987, 1999). Like the previous toolkit strand, this strand has been designed in a very simple form. It consists of 7 categories and 35 questions. The questions accessible and help tutors diagnose their curriculum against the principles and revise if and when necessary. This toolkit strand is also based on the traffic-light system colours. When using the Chickering and Gamson toolkit strand I achieved green in four principles and amber in 2 principles as shown below in figure 2.

Your Overall Results	No.Questions Not Answered	
1. Encourage students-staff contact	0	You have not answered 0 question/s
2. Cooperation among students	0	You have not answered 0 question/s
3. Active learning	0	You have not answered 0 question/s
4. Give prompt feedback	0	You have not answered 0 question/s
5. Emphasises time on task	0	You have not answered 0 question/s
6. Communicate high expectations	0	You have not answered 0 question/s
7. Respects diverse talents and ways of learning	0	You have not answered 0 question/s

Figure 2. *Output from the diagnostic tool of the Chickering and Gamson strand of the LTI curriculum design toolkit.*

Good practice encourages contact between staff and students - GREEN

In my role as the Head of the Environmental Management, having regular meetings with all the students studying on the programme (and not only the ones that I am their tutor) is a top priority for me. I am a strong supporter of frequent staff-student contact as this ensures that students are heard and the tutors are aware of student concerns and ideas about the different modules, about their progress, and about any other problems that they may have. Staff-student meetings are also very helpful because students can see their staff as mentors and feel comfortable in discussing career progression and opportunities issues. As a tutor I tend to have a very good relationship with all my students. My students often drop by to visit me in my office not only to discuss any issues but also to say hi and let me know how they are doing. I am also involved with student affairs committees that deal with issues related to students extracurricular activities and I tend to attend events sponsored by student groups. All this involvement encourages contact between me and my students.

Good practice develops reciprocity and cooperation among students - AMBER

More than a decade ago, during my studies for the Masters in Business Administration (MBA), I had to be part of teams of students doing case studies for every single module. The whole MBA programme was structured around cooperation between students and the regular evaluation of one another's work. Thinking criti-

Although I always ask my students to form groups in the class and give them some topics for discussions, or I assign them group projects with group presentations, I believe that I could develop cooperation among my students a lot more. One of my goals to achieve this is through a 5-day residential field trip that I have initiated with my first year students. During that trip I will encourage my students to work as a team and introduce them to the concept of evaluating each other's work.

Good practice encourages active learning - AMBER

I am a strong supporter of active learning (Chickering and Gamson, 1987) and I have always encouraged it inside the class. My plan now, is to try to encourage active learning outside the class as well. As I mentioned above, I will be taking my students to various field trips (a necessity for the UH Environmental Management program) which will be ideal for encouraging active learning. Through the fieldtrips students will be able to put what they learn in class (the various different theories) into practice.

Good practice gives prompt feedback - GREEN

Once students have an assessment, they are anxious to receive feedback on their performance. This is part of the learning process. Students look for timely, prompt, constructive feedback that should be detailed and fair (Brown and Knight, 1994, Brown et al., 2005). I normally return corrected assignments in the next lecture and I always ask each student to have an appointment with me to discuss their performance. By doing that I found out that students can still remember the questions and they are more willing to discuss their mistakes and ask questions on the topics they cannot understand.

Good practice emphasizes time on task - GREEN

Throughout my entire time as a student I benefited from my time-management skills. Because of this, I always try to emphasize the importance of this skill to my students. I strongly believe that students could benefit a lot in both their

academic and personal lives if they practice and learn time-management and universities should invest in supporting students to develop these skills. As a tutor I always allocate realistic time frames on tasks and activities that need to be completed by students and try to emphasize the importance of meeting deadlines. I also stress the importance of attending classes to my students, underlying the consequences of not adhering to these rules.

Good practice communicates high expectations - GREEN

I believe that as a tutor you must first have high expectations from yourself before you communicate high expectations to students. By communicating high expectations to your students you assist the students to perform to their maximum potential. I tend to tell them to aim high and to have goals in their lives. At the beginning of every course, when I go over the module guide with my students, I always tell them that I expect them to work hard for my class and I make clear my expectations both orally and in writing. I put the bar high from the very beginning to help students set challenging goals for their own learning. I explain to them that having high expectations of themselves will help them be successful through their entire life.

Good practice respects diverse talents and ways of learning - GREEN

Being an effective teacher today requires us to understand that students have different learning styles and therefore trying to find individual approaches that may work with different students (Crozier 1997). As a teacher myself I recognize that my students have different ways of learning and I try my best to encourage a student-focused approach to teaching (Trigwell et al., 1999). To accomplish this, use a range different methods of teaching and assessment (Crozier, 1997, Brown et al., 1994, 2005). Prior to any of my lectures, I always provide my students with a copy of the lecture notes (PowerPoint slides). I do this because I would like my students to pay attention and participate in the lecture rather than worrying about writing the content down from the slides. I always make use of images and diagrams and use video clips from YouTube (or video clips that I created myself) because students find this useful and stimulating. I also encourage my students to engage in discussions (Chickering and Gamson, 1987).

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STUDENT VOICE: FROM CYPUS!

The student experience: studying on a UH franchised degree programme.

Intercollege students Maria Mavromoustakou and Stathis Theophilou are studying on the franchised University of Hertfordshire BSc Environmental Management Programme.

In our regular 'student voice' section of Blended Learning in Practice, Maria and Stathis share their experience of studying on a franchised University of Hertfordshire programme in their second language and explain why studying Environmental Management is important to them and to the wider community in Cyprus. Maria and Stathis also appear on our front cover and we are very grateful to them for their multiple contributions to this special issue of Blended Learning in Practice!

Working as a Placement student for the Learning and Teaching Institute.

Hello my name is Adriano Marinelli and I'm a marketing student from the Business school at the University of Hertfordshire. I'm currently working on a placement year for the Learning and Teaching Institute. My main role is to contribute to the marketing activity, engage in consultation, meet with students, offer ideas for learning, teaching and assessment and provide some technology support for LTI activities. I'm also responsible for helping to organise the annual International Blended Learning conference, in partnership with JISC.

I'm thoroughly enjoying my time at the University. I've been involved in a large variety of tasks and giving the responsibility so many key tasks in a few projects throughout the year. This has allowed me to develop and improve on many different skills. I feel the staff members surrounding me have all been very supportive and helpful. This placement experience with give me the fundamental push needed not only to complete my studies to a higher quality, but to also help me prepare for future employment. I also helped produce the journal you are reading, so I hope you have enjoyed this special edition of Blended Learning in Practice.

Best wishes,

Adriano.

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