

# **PORTRAITS OF PBL: THE DIFFERENTIAL IMPACT OF ASSESSMENT ON STUDENTS' APPROACHES TO LEARNING IN PSYCHOLOGY, COMPUTER ENGINEERING, AND PHYSIOTHERAPY**

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## **ABSTRACT**

The present study is part of a comprehensive research project with the general aims of comparing how problem-based learning is realised in three different professional educational programmes. The specific aims of this study are to describe the impact of assessment on students' approaches to learning in the three programmes. The PBL programmes are a Master's programme in Psychology, Master's programme in Computer Engineering, and a Bachelor's programme in Physiotherapy. Data were gathered through semi-structured interviews, which were transcribed and analysed qualitatively. The results reveal both an idiosyncratic and a common pattern of categories describing the students' approaches to learning. The idiosyncratic categories *Confronting of perspectives*, *Reaching consensus*, and *Clinical reasoning* appear to reflect fragments of the kinds of knowledge that are valued and sought-after within Psychology, Computer Engineering and Physiotherapy, respectively. The categories *Reflecting*, *Memorising* and *Tactical planning* appear across all three programmes, portraying deep as well as surface and strategic approaches to learning.

**Key words:** problem-based learning, comparative study, student's perspective, assessment, approaches to learning, qualitative analysis

## INTRODUCTION

The impact of the learning context on student learning is an area of research that has attracted many researchers in higher education during the last three decades. When we talk about context of learning, we mean both the overt context defined as the teaching and assessment procedures and the specific subject being taught and researched in an academic department (Ramsden, 1984/1997), as well as the attitudes, activities and cognitive style prevailing in a particular discipline (Becher, 1989). Not least the negative effects of the learning context have been shown; it is well-known that students may often respond to a hidden curriculum whose intentions sometimes may run counter to those of the teaching staff (Snyder, 1968). One of the most important factors in directing students' approach to learning is the perceived assessment requirements (Becker, Geer & Hughes, 1968; Miller & Parlett, 1974). Ramsden (1984/1997) summarises the research findings regarding the influence of assessment on students' learning, pointing to some key features: Assessments comprising an overwhelming amount of curricular material or utilising inappropriate assessment questions and techniques push the students into surface approaches to learning, which often lead to an incomplete understanding of the subject matter. The influence of assessment on approaches to learning is not only exerted by the form of assessment *per se*, the students' anticipations of the examination and marking also influences how they go about their learning activities.

A lesson that was learnt from research on student learning in higher education in recent decades is that great efforts are needed to block surface approaches and to enhance deep approaches to learning. To accomplish the enhancement of deep approaches, a greater flexibility and variety in learning tasks and in forms of teaching has been suggested and believed to be beneficial to students in all subject areas (Ramsden, 1984/1997). According to Marton & Booth (1997), building up of a structure of relevance and introducing a pattern of dimensions of variation from the point of view of learning are two crucial aspects in enhancing student learning. A structure of relevance is what the learner experiences as the aims and intentions of the learning. Introducing a pattern of dimensions of variation means that the content should be apparent to the students, not in a fixed or taken-for-granted way, but in a variety of ways to which the students can link their ways of understanding.

The early research on the impact of assessment on approaches to learning was conducted among different subject domains within what today would be called a context of traditional higher education. In recent years, developments in higher education have brought about a variety of student-centred approaches, such as problem-based learning, enquiry-based learning, work-based learning and many other approaches, which all could be described as representing a shift from the traditional perspective of higher education, focusing on the teacher and the teaching methods, to a perspective that gives priority to the students' learning (Boud & Feletti, 1991/1999; Boud et al, 2000). In a general sense, the figure-ground reversal between teaching and learning means that the student's role changes in terms of increased responsibility for active commitment in his/her studies and learning (Dahlgren, 1999). This means that students enrolling in such programmes encounter a learning context which, in many aspects, looks different to traditional university studies. The impact of the altered learning context and especially the impact of assessment in student-centred programmes on students' study strategies and approaches to learning is still largely unexplored and is thus the issue dealt with in this paper.

### **The context of problem based learning**

PBL was first implemented in medical education at McMaster University in Canada about thirty years ago (Barrows & Tamblyn, 1980; Barrows, 1985, 1988). The rationale for the approach was based on research on how experts went about their clinical reasoning. Drawing on the results of this research, Barrows and Tamblyn claimed that learning through problem solving was more effective and suitable than traditional teaching for medical practitioners who are engaged in clinical reasoning in their daily work with patients. Research into student learning at that time was thus not the main incentive for the launch of PBL. In hindsight, we can however, trace in PBL some of the key features recommended for the improvement of student learning that emerged as a result of the research in recent decades. In the following, the characteristic features of PBL will be described and analysed.

PBL aims at creating a context for learning that enhances intrinsic motivation to learn as well as independent and self-directed learning (Albanese & Mitchell, 1993; Boud & Feletti, 1991/1999). The starting points for learning are scenarios based on real-life situations. Working with scenarios is considered to provide a meaningful context for the concepts and principles that relate to future professional work. The intention is to make the students associate the scenarios with real-life situations and thus help them clarify their preconceptions and prejudices and formulate their learning needs in relation to the aim of the course. The connection to a real-life situation and a future profession could be seen here as an element enhancing the formation of a structure of relevance to the learner, in the words of Marton & Booth (1997). Another core feature, which is seen as important for enhancing motivation, is that the students themselves formulate their learning needs according to how they have problematised the scenarios. Thirdly, small group tutorials are commonly used as the basic working form. The rationale for this is to create opportunities for students to verbalise their knowledge and to become aware of their learning needs. This could also be seen, using the terminology of Marton & Booth (*ibid.*), as an element introducing a pattern of dimensions of variation, since students get the opportunity to become aware of their different conceptions in the group and to learn from each other. The verbalising of knowledge is seen as important for the development of meta-cognitive skills in the students, to develop an ability to scrutinise and evaluate their own ways of thinking and learning. (Kjellgren et al., 1993; Boud & Feletti, 1991/1999)

A question to be addressed is whether PBL would mean the same thing when implemented in different contexts. The results from our own research on PBL indicate that different academic cultures tend to shape PBL according to their own needs and traditions and to their inherent perspective of learning. One of the main findings concerns the students' experiences of formulating and delimiting the learning task (Abrandt Dahlgren & Dahlgren, submitted). The Physiotherapy students and the Psychology students shared an uncertainty as regards the criteria for when reading was sufficient. Such uncertainty was not found among the Computer Engineering students. A comparison of the same three programmes with regard to how students make use of goal documents in their learning process (Abrandt Dahlgren, 2000), provides some possible explanations of these

differences. The Computer Engineering students differed from the others regarding how the course objectives were used in the learning process. Typically, course objectives were highly detailed and content-specific, clearly defining a mandatory body of knowledge, which the students are supposed to achieve. The students did not understand the meaning of these objectives at the onset of the course and were mainly able to use them as a retroactive checklist for assessing what they had learnt at the end of the course. In the Psychology and Physiotherapy programmes, the objectives were more overarching and less specific. The Physiotherapy students experienced difficulties in relating to the course objectives and, instead, relied on peers and tutors in order to know what to study. The typical way of using the course objectives among the Psychology students was to negotiate with each other to define the meaning of the objectives. These negotiations were integrated with the work in the tutorials.

A multi-site qualitative study by Savin-Baden (1996), comparing how PBL was realised in four British universities with four different departments and professional groups, lends support to the idea that different academic cultures shape PBL differently. Another finding in this study, regarding students' approaches to learning, was that students across the sites predominantly adopted what was labelled a strategic pedagogy. This meant that the students adopted methods of learning, which were adjusted to the form of assessment implemented and ensured that they passed the examination. They also adjusted to the particular form of problem solving required by the staff and to the staff's notions of the nature of knowledge (Savin-Baden, *ibid.*).

### **The aims of the study**

Previous articles on PBL from the student's perspective in this series focus on curricular aims and students' study strategies in general as well as on how the students experience the meaning of problem-based learning and studies within problem-based programmes. The results of these studies provide a varying picture of what context of learning the students experience in the different PBL programmes and how this impacts on their study strategies. The aim of this particular study is to describe the impact of assessment on students' approaches to learning in the three programmes.

### **The context of this inquiry**

The study was conducted in three PBL programmes at Linköping University; a Master's programme in Psychology (200 credit points), a Master's programme in Computer Engineering (180 credit points), and a Bachelor's programme in Physiotherapy (100 credit points). (In Sweden, one credit point corresponds to one week of full-time studies. Hence, a full academic year comprises 40 credit points.) The programmes are all problem-based from the start and, according to the programme descriptions, they comprise all the key features of PBL as described above. The Psychology programme and the Computer Engineering programme were implemented in 1995. The Physiotherapy programme was introduced in 1986, when all the study programmes at the Faculty of Health Sciences were launched as the first full-scale PBL implementation in Scandinavia. All three programmes include tutorial groups as the basic working form. Lectures, resource events – i.e. sessions where students may use their teachers as resources by posing any questions they wish – and different kinds of skills, training sessions or laboratory work are also included in all three programmes. The idea of tutors as indirect facilitators rather than being directive has been generally adopted but the extent of tutor training varies between the programmes. There is also some variation as regards how the syllabus is organised and how assessments are carried out between the programmes. The syllabus of the Psychology programme is organised in five overarching parts, each comprising from 7 to 56 weeks over the five years. Assessments normally occur at the end of each block and at the end of each semester, respectively. The Computer Engineering programme is organised in a number of interdisciplinary themes, each comprising from 2 to 10 weeks over the four years. Each theme has its separate assessment, carried out during allocated assessment periods, six per semester. The Physiotherapy programme at the time of the data collection (it has since then been extended to comprise three years) was organised in six overarching themes, each comprising from 10 to 20 weeks of the two and a half year programme. Assessments occur at the end of each semester. All three programmes apply a variety of assessment forms, oral as well as written examinations, with both individual and group assessments.

## **MATERIALS AND METHOD**

### **The empirical study**

The participating subjects were randomly chosen, and altogether 58 students agreed to participate in the study; 20 Physiotherapy students, 20 Psychology students and 18 Computer Engineering students. Data were gathered through semi-structured interviews, which were tape-recorded and later transcribed verbatim. The interviews lasted approximately 45 minutes. The transcripts were analysed qualitatively using a phenomenographic approach (Marton, 1981, 1994, 1995; Marton & Booth, 1997).

### **The phenomenographic approach**

Phenomenography focuses on the varying ways in which people experience or conceive of phenomena in the surrounding world, in particular in the field of learning and understanding in educational settings. Experiences or conceptions of phenomena are described in phenomenography as a non-dualistic and internal person-world relationship. Non-dualistic means that people act in relation to the world as experienced, we cannot conceive of a world which is independent of our descriptions or of us as describers (Marton, 1995, p. 173). The internal person-world relationship means that both subject and object constitute each other, i.e. neither the subject nor the object would be the same without the relation between them. In this way, the subject and object are not independent, they form a unity that reflects both the experienced phenomenon and the experiencing subject.

Human experience is also framed by the object of attention, what we discern as figural in the situation and what constitutes the ground in which the figure is embedded. The individual not only conceives of different aspects or parts of isolated phenomena, as in this study which concerns the assessment *per se*, but also organises and relates what is conceived to constitute a whole. The rationale for using the phenomenographic approach in this study is, hence, that students' descriptions of their approaches to learning when preparing for assessment would also mirror the educational programme of which the assessment is a part.

## RESULTS

The answers to the question 'How do you prepare yourself for the exam?' reveals a pattern of categories that is idiosyncratic for the three programmes, namely, the three categories *A. Confrontation of perspective*, which is typically frequent among the Psychology students, *B. Reaching consensus*, which is typical of the Engineering students and *C. Clinical reasoning*, which is characteristic of the Physiotherapy students. There is also a common variation within the three programmes which is described in the three following categories *D. Reflecting*, *E. Memorising* and *F. Tactical planning*. The distribution of subjects over the categories is shown in table 1.

Table 1. Distribution of subjects over the category system

Approaches to learning	CE	PS	PT
A. Confrontation of perspectives	0	7	0
B. Consensus	10	0	1
C. Clinical reasoning	0	1	10
D. Reflecting	1	7	5
E. Memorising	1	2	2
F. Tactical planning	3	2	1
Non-categorised	3	1	1
Total	18	20	20

### A. Confrontation of perspectives

The psychology students describe how they strive to learn about alternative interpretations of the phenomena being studied. The interaction with their peers is important to them in order to achieve this understanding. The typical feature of these descriptions is the confrontation of perspectives as the approach to learning. Arrangements such as extra group meetings to hold discussions or finding a student colleague to study together with are common. Anders, one of the students, describes this: 'We decide on what topic to study together, then we chose some theories to discuss in the group to see if they differ in any ways'. Lotta adds to the notion of confronting perspectives by stating 'I try to discuss with others, to talk about what we have been reading. We try to see it from different angles and see

connections between theories within a certain field, see their origin and how they could be used today, for instance’.

### **B. Reaching consensus**

The typical feature of this category is that the Engineering students help each other to reach a consensus about how to understand and solve standard problems that are essential to the course. The tutorial group plays an important role in the preparations for the exam. The students utilise each other as resources for working through the problem and they appear to take a collective responsibility for the learning task. Pelle, one of the computer engineering students, describes what this strategy could be like; 'We often sit together and try to sort out the difficulties in some tricky problems, and we often check the course objectives and go through all the objectives to discuss exactly what they say and what they really mean. You kind of check, that everyone knows this'. Another computer engineering student, Niklas, adds to this; 'We often work together in the group, there is a lot of cooperation. But you have to keep track of, like, do I know this myself or is it we who know together'.

### **C. Clinical reasoning**

The central theme in the physiotherapy students' descriptions of their preparations for the exam is how concepts, theories and skills are contextualised into a clinical situation where a patient is present. This means that the students, individually or in groups, prepare themselves by reasoning through fictive patient cases. The students go through the patient cases they have been working with in the tutorial groups during the semester, but the typical strategy is also to construct new cases and reason about these.

Erica, one of the third year students, gives her account of this; 'I usually go through and repeat what we have been studying, and I try to figure out what it would be like to get a patient. It depends on what kind of assessment it is, but if it is going to be patient cases, you try to think through that. But also when I read about different diseases or different treatments, I try to imagine a specific patient and think through what to do for that particular patient'. Lotta adds to this: '..sometimes I just make up some cases within this particular area, and then I try to sort them out for myself, I question myself to get the theoretical understanding'. Lena describes a similar strategy: 'I try to imagine, what I could expect to find if I were to examine a

patient like this, with this particular diagnosis, I try to picture what it would be like to meet this patient'.

#### **D. Reflecting**

The characteristic feature of the reflecting approach is that the students describe their approaches to learning without referring to any assessment. Typical of the descriptions are a focus on understanding of the content the students have been studying and the ambition to get a grasp of the course as a whole. Some students describe how they reflect on their learning while studying, like the psychology student Maria, 'I usually sit down and try to think it through; what this course was actually about. I check my notes from the tutorials, what literature I have read. Pia, describes her reflective approach to learning in the psychology programme as 'I kind of listen to my mind when I go through things and I try to remember what I have read, what was good and not so good. If I have studied different theories, I try to critique them to myself'.

There are also descriptions of a reflective approach to learning within the computer engineering programme, where the students describe how they concentrate on their own understanding of central themes in the course. They test their understanding by solving problems where they try to apply their knowledge. Tim gives his perspective of this strategy: 'When I study for an exam, I just try to get the knowledge..and if the exam is in maths or physics, I try to solve problems that are on a little more difficult level..and then I notice if I haven't grasped it, and I have to study more'.

Typical of the descriptions of the reflective approach within the physiotherapy student group is that students describe how they go through what they have been studying during the semester. Thereafter, they return to the questions that they once posed in the tutorial group and reflect on what they have learnt about these questions. They try to answer the questions and check their understanding by returning to the literature.. Thomas describes this strategy; 'I don't care so much about what the others do, I try to go through what I have been doing during the semester, and if there are some questions about something, I go back and check where I got it from, so I kind of know that I have understood it the right way'.

Monika adds: 'We've been discussing together in the group, what happens actually when you do this, how does it work and why..that has been the great thing for me'

### **E. Memorising**

In this category, the typical feature is that the study strategies are directed towards rote learning by memorising text, rather than thinking about the content or trying to understand it. A common trait is descriptions of how the students arrange the content as a series of parts that could be learnt separately. Maria, an Engineering student, describes this as: 'I rehearse different parts one at the time. I kind of make up a schedule for how to go through most of it'. Lisa, a Physiotherapy student, gives her account of how she prepares for the exam by taking notes to make the learning task more limited. She also describes how she then memorises her notes: 'You take all the notes that you have and try to cram them, literally. If you have a bunch of notes, it is easier than reading a textbook'. Within this category, there are also expressions that indicate that students have difficulties in knowing what to concentrate their studies on. Susan, a psychology student, exemplifies this by stating: 'After a period, when I just feel anxious and stirred up and keep thinking that I haven't learnt anything, I just decide that I will study a particular book and consider that as the most important'

### **F. Tactical planning**

The typical feature of this category is that the students concentrate on studying what they believe they will be assessed on. Similarly, in the computer engineering group, the characteristics of this strategy are that individual preparation and strategic relationships to the course objectives are central. These students describe how they draw up a strategic schedule where they leave out parts of the course that they calculate on not having the time to learn, or that they figure will not appear in the assessment.

Maria, one of the computer engineering students, describes this as: 'Usually, I draw up a schedule a week before the exam for what to learn. Often, if I don't have time to learn a certain part, I skip it and instead concentrate on what I know..and I study 10 hours per day and try to go to bed in good time the night before the exam'. Nils gives his version of a similar strategy in the computer engineering programme: 'I try to pinpoint from the objectives what to concentrate on..Sometimes you don't have the time to learn everything, you have to be kind of tactical and concentrate

on solving standard problems, you don't have the time when you're studying for the exams to try to understand how to solve the problem, it takes too much time'. Anna, one of the first year physiotherapy students, describes this strategy: 'well, you read your notes and assessments from previous years..you take those questions and try to find knowledge'.

## DISCUSSION

The analysis provides a description of the total variation in approaches to learning among all three programmes. The results also show characteristic similarities between the answers within each group, which tell us something about the kinds of knowledge required and valued in the different programmes.

The *Reaching consensus* category, which is idiosyncratic to the Computer Engineering students, reflects a notion of a body of knowledge that is indisputable and that students need to learn in order to solve problems. The *Confrontation of perspectives* category, which is predominant among the Psychology students, indicates a less distinct notion about what constitutes the body of knowledge and, instead, places emphasis on knowledge being perspective dependent. Thus, students are required to learn to reflect on the consequences of the application of different perspectives. The *Clinical reasoning* category, which dominated among the Physiotherapy students, points to a pragmatic notion of knowledge that clearly bring professional practice to the fore, where practical solutions and actions are valued.

The common categories that appear across all three programmes, *Reflecting*, *Memorising* and *Tactical planning*, bear characteristic features that are similar to deep, surface and strategic approaches to learning that have been found in many studies of student learning (Marton, Hounsell & Entwistle, 1984/1997). What is also obvious from the results of this study is that the assessment does have a differential impact on the approaches to learning adopted by a majority of the students. The idiosyncratic categories *Confrontation of perspectives*, *Reaching consensus* and *Clinical reasoning* clearly illustrate this. That means that strategic approaches to learning would be the most common within all three programmes, if the notion of strategic approaches causes students to adapt to the kind of assessment that they are expecting and adjust their studying accordingly. The strategic approaches portrayed in the idiosyncratic categories, however, clearly reflect a focus on understanding rather than on memorising. If we consider the whole category system from this perspective, it is striking that deep approaches to learning appear to be the most common among the students in these three programmes.

Savin-Baden (2000) argues that the ways of conceiving of knowledge, learning and the learner affects the ways in which PBL is realised in practice. She describes this by outlining a number of conceptual models of PBL, on the one hand discrete but, according to Savin-Baden, often overlapping in practice.

The *Reaching consensus* category harmonises with a model that Savin-Baden (2000) labels 'PBL for Epistemological competence'. The characteristic feature of this model is that what counts as knowledge is determined in advance, and students are expected to know propositional knowledge in order to solve problems. PBL is thus a means for students to learn content.

*Confrontation of perspectives*, which was the dominating category among the Psychology students, instead suggests a resemblance with Savin-Baden's model of 'PBL for Critical Contestability', where knowledge is viewed as contingent, contextual and constructed. Here, learning is characterised as a flexible entity involving interrogations of frameworks. The *Clinical reasoning* category, finally, harmonises with a model of 'PBL for Professional Action' where Savin-Baden claims that the view of knowledge is practical and performative and that learning is focused on knowledge and skills for the workplace. This model has as its overarching concept the notion of "know-how".

The idiosyncratic categories revealed in this study, as well as the results of our previous research, support the notion that different epistemological frameworks within different knowledge domains will shape PBL differently.

Analyses of the kinds conducted in this study could contribute to the understanding of how perspectives of knowledge and learning in diverse academic cultures are communicated to the students through the formation of the educational practice. Knowledge about the nature and message of this communication could then constitute a basis for reflection about educational development within the programmes.

## REFERENCES

- Abrandt Dahlgren, M. (2000). Portraits of PBL: Course objectives and students' study strategies in computer engineering, psychology and physiotherapy. *Instructional Science*, 28:309–329.
- Albanese, M.A. & Mitchell, S. (1993). Problem-based learning. A review of literature on its outcomes and implementation issues. *Academic Medicine*, 68: 52–81.
- Barrows, H.S. & Tamblyn, R.M. (1980). *Problem-based learning: an approach to medical education*. New York: Springer Publishing Company.
- Barrows, H.S. (1985). *How to design a problem-based curriculum for the preclinical years*. New York: Springer Publishing Company.
- Barrows, H.S. (1988). *The tutorial process*. Springfield, Illinois: Southern Illinois University School of Medicine.
- Becher, T. (1989). *Academic tribes and territories. Intellectual enquiry and the cultures of disciplines*. Buckingham. SRHE and Open University Press.
- Boud, D. and Feletti, G., eds. (1999). *The challenge of problem-based learning*. (2nd edition). London: Kogan Page.
- Kjellgren K., Ahlner, J., Dahlgren, L.O. & Haglund, L., eds. (1993). *Problembaserad inläring – erfarenheter från Hälsouniversitetet* [Problem-based learning – experiences from the Faculty of Health Sciences] Lund: Studentlitteratur.
- Marton, F. (1995). Cognosco ergo sum. Reflections on reflections. *Nordisk pedagogik*, 15:165–180.
- Marton, F., Hounsell, D., & Entwistle, N. (1997) *The experience of learning*. Edinburgh: Scottish Academic Press.
- Marton, F., & Booth, S. (1997). *Learning and awareness*. Mahwah, N.J.: Erlbaum Associates.
- Savin-Baden, M. (1996). Problem-based learning: A catalyst for enabling and disabling disjunction prompting transitions in learner stances? Unpublished PhD thesis. University of London Institute of Education .
- Savin-Baden, M. (2000). Problem-based learning in higher education: Untold stories. Buckingham: SRHE & Open University Press.