

# WHY PROBLEM BASED LEARNING IN HIGHER EDUCATION

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## INTRODUCTION

It won't be overestimating to predict that at any higher education institution where teacher – centered methods are used, both the professors and the students are likely to have lots of complaints about the teaching activities they are involved in. Some of the complaints likely to be listed by professors could be highlighted as follows; lack of interest in students; inadequate attendance; inefficiency in doing assignment; previous knowledge forgotten soon; ineffective use of the knowledge given; lack of motivation and responsibility; excessive burden of teaching items; time restriction, etc. On the other hand, students are likely to complain about boring lectures; monotonously speaking lecturers; difficulties in taking notes; having to memorize lots of silly pieces of information; having to read all those meaningless course materials; having to sit, listen and take notes; exams, exams, exams full of irrelevant information which will never be used in life; etc. It is, of course, possible to add more on both of these sets of complaints, Neither professors nor students can be blamed for the discouraging atmosphere suffered from. The system is to be questioned, then. There must be something wrong with it. This study aims to search for a sensible response to this problem. Higher education is briefly analyzed from the points of teachers, students, and the outcomes such as knowledge, skills, and attitudes. Then, rather than teaching, learning activity is probed including the basic aspects of learning. The commonly used teaching methods are questioned, compared and contrasted. And Problem – Based Learning (PBL) is proposed in removing all the above mentioned complaints and improving effectiveness and efficiency in higher education.

### 1. THE OVERALL AIMS OF HIGHER EDUCATION

No matter how simple or how sophisticated, every higher education institution is supposed to have certain mission, aims and objectives. It is quite likely that the aims of each institution might differ from those of others depending upon the micro environmental factors. The common point shared by all higher education institutions, however, seems to include three basic “legs” in their overall aims-teaching, research, community service. Here are some examples taken from the aims of some universities underlining the mentioned “three legs”: “research and scholarship, teaching and learning and service outside the University;.. The University’s most distinctive feature is its ability to combine academic excellence... and particularly in research, with a commitment to the community at regional national and international levels, through continuing education... The University does not, however, see itself simply as an organization with a leading national role in teaching, research and scholarship. It plays an important part in the life of ...in many other ways... the nature of its academic portfolio and a location at the heart of its city and region, have enabled the University over the last decade to play a significant role in the regeneration of ... has a strong track record in the widening of access, continuing education, innovative teaching and the development of courses designed in particular to fit students for life and employment in the world outside... is a relatively small institution and consciously limits its areas of activity. The University’s clearly defined purpose in teaching is to supply...industry and commerce with a body of educated, well-trained, and able graduates...” (Duke, 1995;40-43)

The above mentioned set of examples have randomly been extracted from what each university has declared as their aims. The idea to be emphasized through these examples is that teaching, research and community service have been the unavoidable components of the aims of any

higher education institution. In other words, none of these three basic points can be neglected, they all have to be considered all together. Every institution has got to find the means of being able to manage its overall aims including all these three fundamental components." A virtual university must be a real university offering learning opportunities otherwise denied. It must be, above all, a network for lifelong learning which meets the new learning needs of a new century" (Davies, 1998 ;1) Teaching ought to be effective, research demand-led and the service is to be community-oriented. They all must be interrelated, interdependent and harmonious.

## **2.ANALYSING THE TEACHING-RELATED PARTIES**

### **2.1. Overview**

The term "teaching" has a rather wide range. Should the simple meaning given in any dictionary be considered? In such consideration, the term will roughly mean "to give" more precisely, "give students something". It would be too simple, when the term is taken in such a limited meaning. Such question as "How?", "What?", "Why?", "When?", "Where?" are likely to be unavoidable. Besides, the higher education institution cannot avoid such other question as "Who are the givers/teachers? ." "Are the students ready to receive / gain what they are given?" etc. when such questions are involved, it becomes quite clear that "teaching" is not a simple term. Effective teaching is a "complex, intellectually demanding, and socially challenging task- and effective teaching consists of a set of skills that can be acquired, improved and extended" (Brown and Atkins 1994;1). The terms to be underlined seem to be "intellectual" and "social", referring shortly to "knowledge" and "traditions, goals, and values" respectively.

### **2.2. Knowledge, Skills, Attitudes**

Further analysis of the simplest definition of "teaching" reveals that "something given" could be knowledge, skills, and attitudes from the broadest point of view. When each of these terms is probed into one by one, it becomes quite clear that "teaching" in higher education is rather a complex process. The knowledge to be given to higher education students, for example, seems to be different from the knowledge exposed to in every day-life. It is shortly termed as the difference between "learning percepts" and "learning precepts" (Laurillard, 1993:24)". The whole point about articulated knowledge is that being articulated it is known through exposition, argument, interpretation. It is known through reflection on experience and represents therefore a second-order experience of the world." The second-order level of experience in academic teaching is emphasized by Laurillard using the term "mediated". This of course does not mean that academic teaching should focus only on teaching decontextualized knowledge. What is meant through this example should be taken as the difference between experiential and academic learning which necessitate additional care while considering the term "knowledge". Besides, regarding that "something", a great number of other questions need to be considered, such as: what type, how much, to what extent? etc.

### **2.3. Students / Learners**

Another important part of the teaching activity is the "students: Are they ready to receive "that something" the teacher intends to give them? Do they need "that something?" Are they really willing to take it or are they able to take it? What type and how much do they need? How do they want to be given "that something?" Would they rather take it themselves than be given it? These are only some of the questions likely to be asked about the "indirect object" of the definition of "teaching". If such questions are not considered, effective teaching could not be reached. An intentional activity and an interactive process, teaching requires that the students learn what is intended; otherwise, it wouldn't be regarded successful. That's why the views underlining the terms "interaction" and "intention" tend to place higher values on this "indirect object", make some additions to the definition of "teaching". With the impacts of such views, it has been argued that the teacher is required to consider what the students need; that effective teaching is not solely dependant upon the

teachers but it involves the students as well; that teaching should provide opportunities for student to learn, that students should have the responsibility in the learning process . If the students learn what is intended, teaching is considered successful but not necessarily effective as effective teaching is “concerned not only with success but also with appropriate values” (Brown and Atkins 1994:5). In other words, valuing attitudes more than short term gains in knowledge seems to play an important role in effective teaching. The subject who is said to value certain attitudes is to be the students. All in all, undeniably, whether students are motivated and stimulated and thus willing to gain certain knowledge, skills or attitudes plays the crucial role in reaching effectiveness in teaching.

## 2.4. Teachers

The third side of the teaching activity is teachers who are supposed to “make student learning possible” (Laurillard, 1993:14). In order to carry out this task effectively, they are said to know something about student learning and about what makes it possible. Laurillard calls this task “mediating learning”. The extent to which teachers are likely to succeed in mediating learning, especially in academic learning seems to depend on how well they motivate the students. As academic learning is not just about acquiring knowledge and different from the acquisition of everyday knowledge, active engagement of the students becomes a must.

## 3. LEARNING

### 3.1 How Students Learn

While deciding on a teaching strategy, so as to mediate learning, teachers are to get an insight into the students’ view of the learning process. They must be well-informed about the activities that will result in learning. Called mathemagenic, such activities are said to contribute a lot to reach an effective teaching strategy. Laurillard focuses on five key aspects of learning as apprehending structure, integrating parts, acting on the world, using feedback and reflecting on goals. The activities students engage in are said to be at least complex enough to address all five if learning is to take place.

The first of the five aspects mentioned, apprehending structure, focuses on the ability to interpret correctly a complex discourse of words, symbols, diagrams and pictures. For the academic learning to take place, correct interpretation of all such things is claimed to be a must. Related with such interpretation, deep approach is favored. Deep approach is meant to look for meaning, process the text in a “holistic” way, preserve the original structure and hence preserve its intended meaning. The surface approach, on the other hand, focuses on key words or phrases and processing the text in an atomistic way, distorting the original structure and therefore changing its meaning. Problem solving skills are also related with this aspect. Including manipulating the internal relations “such as definitional relations, causal relations, forms of representation, mathematical relations, sign-signifier relations....” this method is said to focus on not the solution but the relations between the problem statement, the solution, and all the intervening steps. The second aspect, integrating parts is said to be “practicing the mapping between world and formalism, the ways of representing academic ideas and their interrelations. The third aspect, acting on the world (of descriptions) focuses on the awareness of the distinction between the academic knowledge and the experiential knowledge. The access to the knowledge can either be through theories or experiences. The fourth aspect, using feedback, underlines the importance of making the right connection between action and feedback. Laurillard, regarding this aspect, rightfully distinguishes intrinsic feedback from extrinsic feedback. The fifth aspect, reflecting on goals-action-feedback underlines the ability to interrelate goals, action and feedback, “with the direction provided by a goal”. Reflection is said not to be confined to the goal, but as an aspect of the learning process it must always attend to the goal as in “what the feedback means for the action in relation to the goal; what

the goal means for the action to be set up in the light of the feedback. Meanwhile, the way learners handle the goals of a learning situation seems to be emphasized.

### 3.2 Principles of Cognitive Learning

The behavioristic view in the conception of learning, which focused on conditioning, repetition, and associating certain actions with certain consequences, was replaced in the last quarter of the century by learning theories focusing on the learner as an active processor of information. A key figure in the emergence of the new approach, Ausubel, underlined importance of the learners' pre-existing knowledge. Norman emphasized three different tasks: "accretion" (requiring the student to add to the existing knowledge); "fine-tuning" (refining knowledge so as to be used more efficiently) and "restructuring" (altering previously acquired conceptions and making new links between existing patterns of knowledge) (Brown and Atkins, 1993; 150-151)

Schmidt (1993:422-433) summarizes the principles of cognitive learning as follows:

- 1) The prior knowledge people have regarding a subject is the most important determinant of the nature and amount of new information that can be processed.
- 2) Prior knowledge also needs to be activated by cues in the context of which information is being studied.
- 3) The way in which knowledge structured in memory makes it more or less accessible for use.
- 4) Storing information into memory and retrieving it can be greatly improved when, during learning, elaboration on the material takes place.
- 5) The ability to activate knowledge in the long-term memory and to make it available for use depends on contextual cues.
- 6) To be motivated to learn improves achievement.

## 4- TEACHING METHODS IN USE

A continuum of teaching methods was designed by Brown and Atkins, (1993; 5) showing the extremes of participation in the learning / teaching activity. According to this continuum, considering the dominant participation of the teacher, lecture takes the first place. It is followed by "small-group teaching", "research supervision", "lab work", "self-instructional system" and "private study" respectively.,

This continuum can be discussed considering the methods in three basic items as: "lecture", "small group studying" and "self-regulated studying"

### 4.1 Lectures

Lectures seem to have been the most common method of teaching in universities throughout the world. The reason is obvious-economy. The source of information is the lecturer. In this method known as the 'banking model' (Ventimiglia, 1995 ; 20), information is deposited into students; both form and content of course requirements are determined by teacher. "There is a widespread belief that lectures have limited effectiveness and there is

evidence that lectures encourage only surface learning, which involves acquiring facts and memorizing them, rather than deep learning, which involves greater understanding” (Evans and Abbott; 1995; 32). The effectiveness of lectures, on the other hand, could be raised to a higher level through stimulating students to become active learners, making use of small group discussions before and after the lecture. The more the students are involved in the lecture the more effective it is likely to get; this effectiveness is however, rather limited. Yet this model may be effective in teaching underlining methodologies and theories.

#### 4.2 Small Group Teaching, or Cooperative Learning,

Small group teaching, or cooperative learning, is said to be better than other methods at promoting intellectual skills including problem solving and at changing attitudes, and about as effective as other methods at presenting information and developing a student’s capacity to think (Brown and Atkins, 1994:57). The development of communication skills, the development of intellectual and professional competencies and the personal growth of students are said to be the three basic goals of this model. Some other highlights regarding cooperative learning in higher education are: ”...students work together to maximize each others achievement, tend also to promote positive relations and a process of acceptance among students...promotes interpersonal liking, attraction, thrust, a sense of being accepted... a more positive attitude toward school and learning than does either competitive or individualistic instruction...students work together to help each other learn, have positive general and school-related self-esteem, and feel worthwhile as persons and competent as students...increases student attendance and motivation...positively influences student motivation, self-efficacy, level of anxiety and sense of social cohesiveness...student perceptions indicate that cooperative leaning may make the university classroom more productive and intellectually stimulating (Furtwengler,1998:144). Some of the cooperative structures offered by Millis, Lyman, Davidson (1995:206-215) for higher education are: ”Think-Pair-Share and Variations ”,”roundtable ”, ”The Three-Step Interview ”,”Numbered Heads Together ”,”Pairs Check ”and” Send/Pass A Problem”.

#### 4.3 Self –Regulated Study

Self-regulated study is placed on the continuum of the teaching methods of the extreme end point where the student’s dominance is at the highest level in order to regulate his/her own study .The student is supposed to have gained certain skills and attitudes ,for example , the students prior knowledge and use of cognitive strategies play an important role in their actual learning while motivational beliefs about self-confidence, self-efficacy and attributions for learning contribute to satisfying questions about “why?”, cognitive strategies provide descriptions of “how?”. Self-schemas can be used to coordinate these two sets. Using the motivational strategies e.g. self handicapping, defensive pessimism, self affirmation, and attributional style, the student can avoid negative selves and raise his/her positive selves toward the task. Cognitive strategies, e.g. rehearsal, elaboration, and organizational ones are used to handle the task effectively. In addition to motivational and cognitive strategies; metacognitive knowledge and use of metacognitive strategies such as planning, monitoring and regulating can have an important influence on the achievement. Considering all these three basic points, self regulation can be defined briefly as the use of motivational, cognitive and metacognitive strategies.

### 5. WHY PROBLEM BASED LEARNING IN HIGHER EDUCATION

We'd better change the question a bit and search for the satisfactory responses to the following basic points. In other words, "what method of teaching can meet the following points to the most satisfactory level?"

\*The higher education has a three legged aim; teaching, research and community service. None of these three legs should be ignored.

\*Effective teaching aims at effective learning, i.e., not teaching but learning is to be emphasized.

\*The overall learning items are knowledge, skills, and attitudes.

\*For effective learning, student involvement is a must.

\*The role of teachers is to facilitate learning.

\*The basic aspects of learning are apprehending structure, integrating parts, acting on the world of descriptions, using feedback, and reflecting on goals–action-feedback.

\*Cognitive learning focuses on prior knowledge, activating the prior knowledge (Self-schema), awareness of the structure of knowledge, elaboration, contextual clues, and motivation.

\*The methods in use : lectures are ineffective and teacher dominated; cooperative learning (small group teaching.) facilitates student involvement and contributes to learning, self regulated study is pure learner dominant and improves motivational, cognitive and metacognitive strategies.

Before answering the question, " why PBL? ", we'd better summarize "how PBL works".

\*PBL is a student-centered teaching/learning method.

\*PBL comprises small group sessions, lectures, professional skills and case studies.

\*PBL tutorial sessions have seven steps

-clarifying the problem

-defining the problem

-analyzing the problem, hypothesis making as much different explanations as possible

-arranging the proposed hypothesis, reaching a coherent description

-formulating learning objectives

-self-study

-reporting the findings

-At the PBL sessions, scenarios are worked on.

-The scenarios are texts prepared based on the curriculum. They include curriculum-related problems aiming to raise certain curiosity expected to result in desire for deeper search.

-The content of the scenario is supported and richened through the other parts of the whole module.

The question "why PBL?" can be evaluated considering following points:

\*Emphasizing the utmost student involvement in teaching, PBL contributes to the quality of task-oriented learning. Besides, encouraging self-regulation, the method contributes to the effective use of motivational, cognitive, and metacognitive strategies

\*A student-centered method, PBL emphasizes effective learning.

\*In addition to the academic knowledge, skill improving and enhancing activities are carried through PBL and all benefits of co-operative learning are reflected on the attitudes

\*PBL makes the best use of all three basic methods lecture, small group teaching self regulation.

\*The role of teachers is to facilitate learning not to take the central seat.

\*It raises curiosity, wonder, questions, desires, and motivation through the problem.

\*The most considerable contribution of PBL is seen on the life long learning.

- \*Independent and critical thinking is encouraged.
- \*Problem-solving and conflict-managing skills are improved.
- \*Positive attitudes, e.g., self-efficacy, self-confidence, sense of responsibility are enhanced.

### **CONCLUSION**

The purpose of this study has been to search for the best possible means of teaching in higher education so as to reach the three legged aims. The three basic parties of the teaching activity i.e. teachers, students and outcomes have been discussed. Learning and the basic aspects of learning activity have been focused and learner involvement in this activity has been underlined. Furthermore, the commonly used methods i.e, lectures small group sessions and self regulated study have been compared in terms of learner involvement and hence activity effectiveness. As a result, Problem Based Learning method has been proposed as it seems to meet almost all the requirements for effective higher education. The basic attributions of this proposal have been itemized as follows; providing the utmost student involvement in the learning activity raising curiosity, desire to learn, and motivation in learners; making the best use of all three basic methods in use; establishing favourable attitudes through cooperative learning; encouraging use of motivational, cognitive and metacognitive strategies; and stimulating life-long learning.

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Sunum Sırasında (Olabilirse) Yansılar (1)

**Aims of higher education:** teaching, research, community, service  
**Teach:** impart knowledge or practical skill to; educate; instruct

## **Teachers teach something to students**

**Something:** (knowledge, skills, attitudes) what type, how much?

**Teach:** how, when, where, why

**Teachers:** subject, boss, authority, best, most informed?

**Students:** object? ready? need? interested? intended

## **How Students Learn**

### **Mathematic Activities**

#### ***Aspects of Learning***

- Apprehending structure
- Integrating parts
- Acting on the world (of descriptions)
- Using feedback
- Reflecting on goals-action-feedback

#### ***Principles of Cognitive Learning***

- Prior knowledge
- Activation
- Knowledge structured
- Elaboration
- Contextual cues
- Motivation

## **Teaching Methods In Use**

### ***Continuum of teaching methods***

Lecture-small group-research-lab-self instruction-private

Lecture-small group-self regulation

**Small group:** "think-pair-share", "Roundtable", "Three Step Interview", "Numbered Heads Together", "Send/Pass a Problem"

**Self-regulation:** motivational, cognitive, metacognitive

## Sunum Sırası Yansılar (2)

### **What method?**

- Three legged aims

- Effective teaching → effective learning
- Student involvement
- Teacher-facilitator

### **What is PBL?**

- Student-centered
- Small group session, lecturers, demonstrations, skills

### ***Small group session (steps)***

- Clarify the problem
- Define the problem
- Analyze, make hypotheses
- Arrange hypotheses
- Formulate learning objectives
- Self-study
- Report findings

### **Why PBL?**

- Student involvement, responsibility
- Effective learning
- Use of motivational, cognitive, metacognitive strategies
- Cooperative learning, attitudes, communication skills
- Use of lecture, small group teaching, self-study
- Self-regulation
- Life-long learners
- Problem-solving skills
- Conflict-managing skills
- Self-efficacy, self-confidence
- Sense of responsibility
- Independent and critical thinking