An Assessment of Project Based Learning (PBL) Environment Based on the Perceptions of Students: A Short Course Case Study on Circuit Design for VLSI*

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Project based learning has drawn attention as a considerably popular approach especially in engineering education. According to many researchers and academics, it gives profoundly beneficial results for engineering education as a result of the features it incorporates. Success of any application is closely related with how the application is perceived. This study assesses a Project Based Learning (PBL) environment designed as a short course based on student perceptions. The study was dealt with as a qualitative research methodology and designed as a case study. Data gathered as a result of the study was dissolved with descriptive analysis. As a result of the study it was determined that students believe that this approach has provided benefits for them in the issues of bringing in responsibility, increasing their motivation, learning deeply, learning by doing (experiencing), applying theoretical knowledge in practice, improving their problem solving skills, seeing real-world problems, being informed about their own learning styles, improving the feeling of self-confidence, performing time and project management effectively.

Keywords: Project Based Learning (PBL); short course; engineering education; circuit design for VLSI course

1. INTRODUCTION

ENGINEERS CONTINUOUSLY engage in projects and display an intensive effort to solve problems in projects throughout their whole career. According to Hiscocks, educators being entrusted in education of engineers started to use project based learning (PBL) as an educational tool (instrument) since projects are centrally located in the life of engineers [1]. Recently a very rapid increase has occurred in the interest of educational institutions orienting to PBL [2]. As a result of this intensive interest, the institutions providing engineering education have started to create their engineering formation curricula and course programs through and based on PBL.

The 'Project' is located at the center of PBL. It is possible to consider PBL as 'a model organizing learning around projects' in the general sense [3]. Blumenfeld et. al. defines PBL as 'a comprehensive approach to classroom teaching and learning that is designed to engage students in investigation of authentic problems' [4]. PBL is a learning approach that facilitates students' problem solving skills under natural conditions on an individual basis or in small groups [18]. According to another description the PBL approach is an approach which furnishes the students to explore the subjects in depth in real life, again in a group or individually during a certain period of time [8]. Furthermore PBL is an approach that focuses on learning by means of experiences and construction of ones own knowledge, experiences and information by understanding the subject matter relating to the problems, utilizing their expertise, knowledge and experiences to synthesize solutions to such real life problems through focused activity and research to arrive at the solutions whilst reinforcing their project management, research and information/problem analysis skills [19].

One comes across PBL implementations reported in the open literature most commonly at the course and system levels [20]. In the literature, there are many references to PBL strategies that are implemented successfully [21–25].

The aim of PBL in engineering education and formation is to ensure the participants (students) deal with engineering problems taken from real-life in a class environment and to help them understanding these problems [5–7]. It is also emphas-

ized in the literature that PBL provides many advantages and benefits for students. The benefits of PBL are as follows: it increases the motivation of students, helps in improvement of their knowledge and abilities and ensures they see real-world problems [8]. Moreover, PBL also helps improve the student's sense of responsibility and their individual learning skills [9]. In addition, another benefit afforded by PBL is that students taking engineering education get a chance to learn whilst enjoying the projects they undertake as part of their studies whilst improving their engineering skills through the application of their theoretical knowledge into practice [10].

We have recently experienced a rapid change in the provision of PBL with its added benefits and advantages. This rapid increase is noteworthy within engineering education, with lots of researchers revealing that PBL is very important in engineering education. However, when the related literature is investigated, one can also consider that the numbers of studies on Short Course based PBL, including the students' perception and assessment of Short Course based PBL, one sees that this is very limited. Assessment of PBL according to the perceptions of students is fundamentally important from the student centered learning point of view as well as its perceived value from the students' point of view.

In many institutions which deliver engineering education via distance education as well as the Short Course format, obtaining in-depth understanding and information about what exactly happens in these delivery modes coupled with their associated mechanisms, is very important. A study of this nature is expected to provide invaluable insights into these kinds of approaches and potentially providing focused and scientifically informed pointers for future investments in educational institutions.

Recently, especially in the UK, the numbers of courses, offered as short courses in the engineering area, have rapidly increased. The University of Westminster have for many years played a pioneering role in this area and has a wealth of experience in the design and delivery of a multitude of such courses, both at undergraduate and especially at postgraduate levels. Thus the investigation of this concept within an environment, where there are lots of courses designated as short courses, is an inevitable requirement. In this study, a detailed assessment of PBL, which was delivered as a short course at the University of Westminster, shall be undertaken.

1.1 Purpose of the study

One of the fundamental aims in learning is to help and equip students for a better learning process, so the perception of applications performed and evaluations of these applications by the students seem profoundly significant.

Therefore, the main purpose of this study is to investigate the students' perceptions, in terms of benefits, learner support and motivation, the PBL environment offered in a short course as well as discover students' general assessment and outlook on PBL. In order to reach the goals listed above, we shall seek to answer the questions listed below:

- How do the students perceive the impact of short course based PBL in terms of their benefits, motivation and support supplied?
- What are the students' general assessments/opinions of short course based PBL in terms of time management, project management, deep learning, advantages and disadvantages of PBL?

2. METHOD

The study is dealt with within the framework of a qualitative research methodology (paradigm). 'Qualitative research' is defined as research in which a qualitative process is followed-up orienting to introduction of perceptions and occasions in a realistic and integrated way in a natural environment [11]. Data concerning perceptions in qualitative research is related with the views of individuals that participated in the study about the process [11]. Qualitative research pays attention to displaying the nature of different (multiple) viewpoints [12].

In qualitative research, according to LeCompte and Goetz (1984), three main sorts of data may be collected, these are namely related to the 'environment', the 'process' and the 'perceptions' [11]. As explained in detail in our Purpose of Study section, the aim of the study focused on the students' perceptions of the course and its delivery. As a result, deploying qualitative research with its corresponding data was deemed to be the most appropriate way to proceed forward.

This research was designed as a *case study* in the hope that deep research performance opportunity shall be obtained in the natural environment. If any study to be held aims to reach answers of the questions 'how' and 'what' and to search facts in their natural environment, the most suitable research method is a case study [11, 13]. A case study is defined as a study that relies on in-depth descriptive data [26]. In a case study 'factors related to a case (media, individuals, processes etc.) are researched by an integral approach and one focuses on how they effect the related case and how they are affected by the related case' [11]. 'In a qualitative study the investigator is the primary instrument for gathering and analyzing data' [14]. 'Qualitative research assumes that the researcher is an integral part of the research process' [15]. In such studies, the researcher should be a participant and make observations in the real process which is tested [16]. In other words, the researcher takes an active role in the concerned process. Hence to maximize the insight and benefits, one of the authors delivered the short course under investigation and the other attended it as a participant along with the rest of the class.

2.1 Case and participants

In the study, the 'Circuit Design for VLSI' (Very Large Scale Integration) course, which was offered as part of the System On Chip Design for DSP and Communication Systems MSc. Program at the University of Westminster during the 2007–2008 academic year and designated as a PBL short course, has been selected as the vehicle (case) for this study. This course can be seen as a highly important sample situation within the engineering education area. Being a course with a PBL focus it will provide an important connection with the study mode and conditions.

The analysis unit of the study is composed of students. The study group of the research is composed of all students, who were enrolled for the graduate 'Circuit Design for VLSI' course at the Department of Electronics, Communication and Software Engineering at the University of Westminster during the 2007–2008 academic year and were willing to participate in this study.

The universe of the study is composed of all students registered to take courses in the 2007–2008 academic year. Any sampling was not taken in the study and it was carried out with the whole universe. The number of students taking the course was 8 and all students are included in the study as participants.

2.2 The course

The course Circuit Design for VLSI was developed by lecturers at the University of Westminster Department of Electronic, Communication and Software Engineering. The structure of the course is as follows: the course duration is for four weeks in total and is composed of two sections. In the first section, students and lecturers come together face-to-face in a one week intensive courses called a short course every day full time (9 am–6 pm) (for 5 days). At this stage, knowledge considered important is conveyed to the students relating to the course intensively. Knowledge related with topics they need to fulfill their projects is also given to students at this stage. The Short Course classes include fundamental knowledge that ensures students start their projects armed with the appropriate tools and knowhow needed. Students are granted Independent Learning Packages (ILP) at the end of the 5 days of intensive study. The ILP process continues for the following three weeks (which is the second section of course). The ILP for the Circuit Design for VLSI course was presented as a project study for the students, and they were expected to combine their knowledge they gained during these short classes with knowledge newly learned and to complete their projects in this level deploying the design and simulation tools in they were familiarized with in delivering their solutions. This three weeks period can be considered as a form of blended student centred distance education. Students configure their projects on their own and they dissolve all problems on their own during the project study. In other words, students are expected to put fundamental knowledge they take in short course classes into practice during the project study, combining it with new knowledge to complete their ILP projects with new knowledge they learn. The Lecturers (module teams) assume the position of a guide or an assistant indicating pointing to possible solutions to the problems the students face. All students and lecturers come together for at least three times during the period of three weeks to have a face to face consultation and air their proposed solutions and problems they are facing. These face to face sessions can be thought of as tutorials. Lecturers have the position of instructors for students in solving their problems in tutorials. Students can complete their projects by studying in any environment they want during the ILP process. After the project is completed, students submit their projects by turning them into reports. Evaluation of the course and project is composed of two stages including evaluation of student reports and oral advocacy (or viva voce exam). Following the submissions by students of their portfolios of solutions to the ILP their work is evaluated by the lecturers. If the work is deemed sufficient and appropriately detailed the students are invited to oral (viva voce) examinations in order to defend their work, demonstrating mastery of the subject material with an adequate level of subject authority as well as proving ownership of their submission. The student's success for the short course based module hence is composed of the total of the results they obtain from these two stages namely the written portfolio evaluation and oral exam examination.

3. DATA COLLECTION

Interview, observation and document analyses were used from qualitative data gathering techniques in the study. All three data gathering techniques were exploited to reach answers for each of the research questions poised in the study. In this way, effort was placed on carrying out data triangulation. Interviews were held with students face-to-face in the study. Interviews were held after the students completed the whole course. All interviews held with the students were recorded with sound recorders. As a result, everything said by interviewers have been kept under record and completely saved. Sound records obtained were put on paper (decoded). Interviews held in the study were carried out deploying 'an interview form' approach. The interview form was developed by exploiting studies in the literature and specialist opinions. The form was investigated by three different specialists in order to validate the form developed. The form was redeveloped according to the feedback which came from the specialists. All the data was transferred into a computer environment and a detailed breakdown of the interviews was obtained after the interviews were completed.

The obtained detailed breakdown was also investigated by two different specialists. In this way, clarity, scope of questions asked and accessibility of the required information from the questions were tested. As mentioned earlier on, interviews were realized with a total of 8 students.

Classes (short course classes), laboratory activities, tutorial/help session hours of students and all studies they performed in the laboratory during the ILP/project study period were observed. In the study, one of the researchers made observations by actively participating in the environment. In other words, one of the researchers took part in this study in the position of teacher for the course and the other as a student. Here, the researcher participating as a student taking the course had the chance of gaining a very useful insight into and sharing the difficulties the rest of the participants were experiencing during the week long course. This was also aimed at obtaining a greater number of data points relating to the process. For the observations realised in the study, an observation form was developed, which was put together with the aid of what is routinely done in the open literature as well as through consultation with experts in the field. Moreover, another technique of gathering data was through document analysis as was stated before. Curriculum, lecture notes, materials obtained from the literature concerning the subject, sound records of interviews held with students, interview breakdowns obtained from sound records were used as documents in the study.

Use of more than one data gathering method in case studies enriches the database of the research, ensures results to be obtained by the research to be held with a wider point of view and considerably increases the *validity* and *reliability* of the research [11]. Data gathering was held with multiple sources and triangulation was performed in order to increase the validity and reliability of the study. Another method for increasing the validity and reliability of the study was to take sound recordings of the interviews [17]. The researcher [11] kept a period of interaction with the 'case' as long as was possible, included all individuals participating in the study, continued to gather data until it reached to a 'saturation point', and performed data triangulation in order to ensure validity and reliability in the study. Then, the data obtained was dissolved with descriptive analysis.

In *descriptive analysis* data is analysed through four different stages [11]:

- *Form a framework for the descriptive analysis*: In this phase one creates a framework for data analysis, from the questions in the observation and interview forms as well as the research questions of the study. The appropriate themes were established according to the formed framework.
- *Processing of data according to the thematic framework*: At this phase the data has been processed according to the previously established framework. In other words the data gathered from the interviews and the observations were interpreted, arranged and documented. Once again in this phase the quotations to be directly used were identified.
- *Definition of findings*: In this phase the arranged findings were defined and where necessary supported by direct quotations.
- *Commentary of findings*: The defined findings, their explanations and interrelationships as well as conveying them in a meaningful sense were undertaken in this phase.

4. FINDINGS

As it was mentioned above, the data obtained with the qualitative data gathering technique was analyzed in the appropriate manner deploying qualitative research techniques. The data obtained in the study was dissolved with descriptive analysis. The evidence obtained was introduced and interpreted in parallel to research questions.

4.1 Students' perceptions of the benefits of the short course PBL environment

The most significant gains ensured by project based learning are as follows according to student perceptions: it helps them to identify real-life work, assist them in configuring knowledge at their own learning speed, and in improvement of their problem solving abilities. Opinions of students concerning the subject are as follows:

. . . reflects real-life work and is helpful in that regard . . . It also has the benefit of being able to learn at one's own pace . . .

. . . we tried to solve problems we experienced by ourselves. This was so difficult at the beginning but we felt that we had learned some knowledge especially in the last week . . . Most importantly we understood how theoretical knowledge of courses can be applied in practice . . .

. . . this was a very enjoyable process. Capability of studying in a way I desire is a very good thing . . . Moreover, I believe that we will work in this way after we start working life . . .

. . . we had to take the responsibility to complete the project. This study teaches me that it is required to have the sense of responsibility also in projects of real life . . .

A student expressed that this became a different experience for him/her and made him/her happier compared to the methods in the courses he/she received before. The comment of this student is as follows:

. . . There was a very different course structure compared to the courses I had taken during my undergraduate study. We had to learn everything and complete the project by ourselves, it was so beneficial in terms of seeing and understanding our own learning style . . . .

During the observations carried out in the course and laboratory environment, it was observed that the students had difficulty in understanding and solving a problem at the beginning. It was seen that they had difficulty in comprehending and configuring the solution to a problem and in the way of applying something they learned in class environment in the project. This situation changed by means of the assistance they have taken from the course lecturers especially in the tutorial hours and discussions they had about the subject with the lecturing team and each other. While it was expected that students might be anxious/excited about the completion of the project especially close to the submission deadline of the project, it was remarkable that almost all the students were quietly confidently and relaxed. This may be an indicator for the fact that this method ensured an increase in their self-confidence. Moreover, this is another remarkable point that they put in the work with enjoyment especially during the period when the project study started.

When the literature about PBL is examined, it is seen that a number of researchers determined and reported similar findings and results. The students think that PBL provided benefits for them in the issues of making them more responsible [9], applying their theoretical knowledge in practice [10], improving their problem solving skills [8], seeing the problems of the real-world and being informed about and discovering their own learning styles.

4.2 Students' perceptions of the motivation of a short course based PBL environment

The majority of students stated in the student interviews that PBL made a positive contribution to their motivation. Views of students stating that their motivation was positively affected about the subject are as follows:

> . . . in my opinion, project based learning, is a better alternative to the traditional method. It has many benefits, like the fact that what I learn is reinforce by applying my knowledge. There is motivation to develop a project oneself . . .

> . . . I have a personality that I usually try to learn something alone. Therefore, such a study ensured me to be motivated more comfortably . . . .

> . . . I am a student who does not like so much classical class environment. Attempting to learn by going to classes and continuously taking notes from words of lecturers is so difficult for me . . . I feel passive in the class environment. But, I obtained the possibility of studying in a method I desire. I continued my project in a speed I desire. Even I went to school in any time I desire . . .

Students who think that their motivation was not affected positively stated their opinion as follows:

> . . . I prefer the traditional method. . . . I do not enjoy in making research for hours and thinking over a topic for hours to learn something new . . . .

> . . . You should make planning of everything by your own. This case sometimes causes you slugging . . . .

It is possible to state that motivation of the students was positively affected as a result of the observations held. It is believed that particularly those who can self motivate can be more successful with such methods. It is worth mentioning that some students have difficulty in prioritizing their activities and getting their priorities right in completing their projects. This method will ensure students carrying out learning with this method to become autonomous and organised persons with a high sense of responsibility with high levels of motivation. Moreover, it was seen that the students were more interested in project study compare to face-to-face classes in the observations held.

Another benefit provided by PBL is that PBL affects motivation of students positively by making learning enjoyable and meaningful [8]. Fulfillment of learning with the students' own experiences has also affected their motivation in this study. The literature includes that teachers determined that a decline occurred in the number of students coming to school late and inversely correlated an increase occurred in the number of students coming to school within the PBL process [8].

4.3 Students' perceptions of the support supplied in the short course based PBL environment

The interviews held with the students gave prominence to two different dimensions in student perceptions related with the support provided. These dimensions: 1st is the support provided by the environment (technological, infrastructure related etc.), 2nd is the support provided by the lecturers. The student's perceptions about the program, computer infrastructure and laboratory environment they used in the study (project) as well as the opinions of students related with the issue are as follows:

> . . . the labs were well equipped and maintained as well. They normally worked well. However there were certain times when some equipment failed (like printers). Also the software worked most of the times but sometimes there were license issues, causing them to malfunction . . .

> . . . we had to study always in laboratory, laboratory hours sometimes put us into trouble in the issue of studying in any hour we want. Keeping laboratories open for 24 hours will be better for such studies. . . . We used chipwise during the project study, we could not study by downloading it in our personal computers since this is not a program easily found in the market . . . I prefer to study with a program more accessible and considered valuable in industrial institutions . . .

> . . . this project study was able to be performed in only one laboratory in the whole campus. More than one laboratory environment must be provided. . . . The program we used in the project (chipwise) was good for understanding the method of making low level designs and seeing the problems. However, it would be better to study with software used by industrial companies . . .

> . . . Also the software we used were very basic learning programs, rather than industry standard software.

They were very basic (e.g. chipwise) and did not adequately prepare me for the industry . . .

. . . We had to restart in case of a little problem in the software (chipwise); this caused waste of time and fatigue . . . Moreover, lowness of data storage capacity in computers also created a great problem and we had to delete tasks we completed before continuously . . .

As it is understood from above expressions, the students especially state that they would prefer to use the laboratory environment where they had to carry out their projects more actively. According to the students, the existence of only a single laboratory environment where they can carry out their project studies in the campus negatively affected them. It is also understood from student comments that they do not have a complaint about the structure of computers in the laboratory environment. Moreover, it is also understood that the students were not satisfied with the program they used during the project study. It is also seen that they think that they will not be able to exploit this program in working life. It was also seen in the observations carried out in the study that the students encountered troubles due to the computers and software and these troubles disrupted their learning process.

The students mention about lecturer support as the second dimension of the support provided for students. They state that the support generally provided by lecturers had a positive effect for them and they consider the support provided as sufficient. Opinions of some students about the issue are as follows:

. . . I believe that the support provided by lecturer is above average. We came together for at least two times in three weeks project period. This became sufficient . . .

. . . Their support was sufficiently adequate during the tutorial period. However, it was difficult to access lecturers in other times . . . you may feel in trouble when you cannot access lecturers . . . the process you try to access the lecturer also affects your motivation negatively . . .

. . . it was very difficult to schedule meetings. Tutors were very busy elsewhere and it was difficult to meet them . . .

It is understood from above opinions that the students perceive the support of lecturers positively. It is also seen in the observations that the students display similar behaviors. In other words, it is thought that they perceive the support provided generally sufficient with the exception of the laboratory environment and software used. It is seen here that the ability of carrying out their studies only in one laboratory provides them a benefit from another aspect. Possibility of studying only in one laboratory ensured them to communicate with their friends more. The students tried to solve any problem they encountered and made information exchange between each other by this

way. This case helped them to solve their problems more rapidly.

The students came together with the lecturers only for three times while carrying out their project studies on their own during this period of three weeks. It can be said that the students were actually in the position of a student of taking a course delivered through student centred blended distance education in such an implementation. Therefore, 'communication and interaction' becomes a profoundly significant issue. Creation of the possibility of interviewing the lecturers a bit more will ensure the students to be positively affected especially for those stating that they could not interview due to the workload of lecturers.

Any lecturer who wants to perform project based learning application definitely has to analyze and plan all equipment (hardware and software) to be used properly well in advance. Proper performance and solution of possible student problems in advance will be possible with advanced planning.

4.4 Students' general assessment of short course based PBL environment in terms of time and project management

When the studies related with project based learning are assessed, most of them emphasize that this approach is a method which helps improvement in the students' skills to use their time effectively and organizing their projects. As a result of the interviews held with the students, evaluations of the students related with time and project management were evidenced. Some data obtained from the interviews are as follows:

. . . there is a project we have to complete in a very short period. You compete with time, and you cannot complete the project unless you use time properly and organize your project well . . . I think such abilities are gained with experience . . .

. . . a great degree of task considerably falls to student unlike the traditional method. You have to take account of all kinds of negative situation and misfortune and make your planning accordingly. Therefore, I can say that this study ensures me to progress in the issue of planning time and knowing me better . . .

. . . I think that working life will also continue with such intensive studies and projects . . .I believe that my organization capability may progress before starting working life through such studies . . .

. . .It was a very good experience for me . . . I am sure I would use time more effectively if I participate in such a study in the future . . .

It is understood from above statements that the students think that project based learning would positively contribute to their ability of time and project management.

4.5 Students' general assessment of the short course based PBL environment in terms of deep learning

It is seen that a great majority of the students think that PBL will help them in the issue of

learning deeply. Opinions of some students are as follows:

> . . . you can have an idea about subjects only by listening to the lecturers in the class environment. However, you have to study by your own to completely understand and learn a subject. You already have to learn the subjects by your own with this method . . .

> . . . learning deeply is an issue resting with us. The project study ensured me to be sufficiently informed about the subjects included in the project . . .

> . . . You have to have full knowledge of many subjects in order to complete the project. And time is sometimes not sufficient to learn a number of subjects blow-by-blow but students should be given a greater time in such studies . . . a subject of project which draws attention of students may force them to learn more deeply . . .

It is understood from above statements that the students think that PBL application helps them in the issue of learning deeply. In such applications, the subject of the project is a factor helping them to progress in the subject more easily. If opinions and interests of students are taken into account especially while selecting the project subject, they would be provided opportunity to perform a deeper learning.

4.6 Students' general assessment of the short course based PBL environment in terms of advantages and disadvantages of PBL

The students usually declare positive opinions concerning courses designed as short courses and project based. Some student opinions are as follows:

> . . . first time I encounter with such an education style. I have never been included in such a course in my past education life . . . it was a very enjoyable course for me. . . . I think the most important advantage of the course is that it indicated to us the troubles and problems currently experienced in the field I am planning to work. By this way, I was informed about things I will encounter . . .

> . . . It gives me the opportunity of learning in my own speed and way I want . . . I have learned by doing and experiencing . . .

> . . . It provided me the opportunity of practical application in the field I am planning to work. I performed the project study in a very enjoyable way . . .

> . . . I cannot say that I learned many things during short classes but I obtained much information during ILP (project) study . . . The project study ensured me to always keep my motivation high . . .

> . . . I think such studies prepare me to working life . . . the troubles I experienced during the process brought me in a great experience . . . This ensured me to improve myself in many fields like planning and management . . .

> . . . this method caused me to gain a very good experience . . . this experience will help me in behaving with self-confidence in future project studies . . .

The students stated the disadvantages related with the study performed as follows:

> . . . it is possible that students may experience waste of time, search solutions for problems in wrong place and to disturb their motivation since they do not have such an experience in this method . . .

> . . . It is difficult to be successful with this method for individuals accustomed to learn with traditional learning approaches . . .

> . . . it might be very difficult to absorb everything taught to you in a one week course . . . and you do not take into attention the subjects not used in the project during the project since you only focus on completing it . . .

It is possible to say according to the comments of students that they give more prominence to advantages of this approach and they are satisfied with the study performed. The most important advantage the students gave prominence to is that this helps them to learn in their own speed, ensures they practice and gains them experience. However, such applications should be properly planned especially at the beginning stage and the students should be provided detailed descriptive information before starting the application. Students would concentrate better through this information and they would minimize time waste since they have been informed before starting the project. Although this was done, it has become clear after this study that issue needs to be addressed more deeply.

5. CONCLUSIONS

In this study the PBL environment designed in the form of a short course was assessed through perceptions of students attending the course. Consequently, it can be said that students perceived such an approach positively. According to the students' self understanding and perception, they determined that this approach helped them in becoming more responsible, increasing their motivation, enabling them to learn deeply and learn by doing, applying their theoretical knowledge into practice, improving their problem solving skills, seeing the problems of the real-world and being informed about their own learning styles, developing the feeling of self-confidence and gaining the ability of time and project management effectively. The students also thought that some problems might have been experienced in this process. Success of a student without a high level of responsibility and autonomy would be more difficult in case the process is not planned properly. Moreover, the environment in which students will study should be organized in such a way to enable them to study in any hour they want in such studies. Students also expect that the subject of the project selected and software used should have a nature to be used in the industry. In addition, lecturers should always be in the study environment and easily accessible to ensure such studies are successful.

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