



## The Influence of Blended Learning Environment on Self-Regulated and Self-Directed Learning Skills of Learners \*

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**Abstract:** The aim of this paper is to determine the influence of blended learning environments on self-regulated and self-directed learning skills of undergraduate students. The explanatory sequential mixed method was used. In total 167 students participated in the study. While sixty students taking "Programming Languages" course at Computer Education and Instructional Technologies Department constituted the experimental group, 102 undergraduates-65 of them from the same department (Control 1) and 42 from Electronic Engineering Department (Control 2) formed the control groups. Self-directed Learning Readiness Scale, Self-regulated Learning Scale and semi-structured interviews were used as data collection instruments. While the experimental group received blended instruction, control groups received traditional instruction for weeks. The findings of the study revealed that self-regulated and self-directed scores of experimental group differed significantly from the control groups` indicating that the use of blended instruction is more effective than traditional instruction in terms of developing self-regulated and self-directed learning skills. Students in the experimental group pointed out that the blended learning environment presented rich content, easy accessibility, effective guidance and motivation.

**Keywords:** *Blended learning, self-regulated learning, self-directed learning, Moodle, undergraduate students.*

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### Introduction

Blended learning is one of the frequent concepts which have been included in the studies that aim to make use of technology in recent educational activities. It is mainly described as the combination of traditional face-to-face teaching and online teaching (Garrison & Kanula, 2004; Osguthorpe & Graham, 2003; Williams, 2002). Blended learning includes not only learning environment, but also the collaborative use of different teaching methods to increase the learning outputs (Clark & Mayer, 2011). There have been many studies examining the difficulties that learners and teachers face during the courses given fully online in the literature (Muilenburg & Berge, 2005; Song, Singleton, Hill & Koh, 2004). Teachers may waste more time in these environments when compared to traditional face to face teaching. Conversely, blended learning provides better learning since it includes both traditional and internet-based teaching (Lilja, 2001; Tuckman, 2002).

The education programs which are developed by Ministry of National Education in Turkey have been designed according to the constructivist approach. This approach supports that information is constructed in the mind of the learner with the active participation of the learner during the teaching – learning process. Self-regulated and self-directed learning skills are also key words in constructivist approach and these concepts will be explained below.

Self-regulation is one of the crucial concepts covered in Bandura's social learning theory. According to Bandura (1977) people mostly regulate their behaviors on their own. Self-regulation is monitoring one's own behaviors, making judgements by comparing them with their own criteria and accommodating them appropriately, if needed (Senemoglu, 2005). As for Pintrich (2000) self-regulation is an active and constructive process where learners determine their learning objectives and regulate their cognitions, motivations and behaviors. In this process, individuals are regulated by their objectives and the context which they are in. In short, self-regulation is one's impact, guidance and control of their own behaviors (Senemoglu, 2005).

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Zimmerman's (1990) self-regulated model which is highly favored in education asserts that students with self-regulated learning skills can be defined as cognitively, motivationally and behaviorally active participants. His self-regulated learning model contains three basic features which are self-regulated strategies, self-evaluation towards the effectiveness of learning and independent motivational processes. This model postulates that learners should set individual goals towards their learning and they should develop strategies to reach those goals.

The self-directed learning is a process which requires individuals to determine their own learning needs and to choose appropriate learning strategies accordingly (Knowles, 1975). This process necessitates individuals to make decisions towards what to learn, which methods or materials to use and how to measure their success. It also includes determining objectives, finding relevant materials and evaluation of results. Therefore, it would be wise to infer that self-directed learning is related to one's own control of their learning and taking responsibilities.

As can be seen from the descriptions provided above definitions of self-regulated learning and self-directed learning resemble each other. Pilling-Cormick and Garrison (2007) state that there is a conceptual overlap between self-regulated learning and self-directed learning. As both of them include the same concepts related to external directive applications and internal monitoring processes. However, it is also pointed out that cognitive and constructive processes of learning are more emphasized in self-regulated learning. This situation causes an overlap in the research areas of these two concepts.

Another researcher who points to the correlation between self-directed learning and self-regulated learning concept is Long (2000). He says that self-regulation is an important part of self-direction (Long, 2000). Self-regulated learning also covers developing a self-system which consists of sub-processes like self-monitoring, self-teaching, self-reinforcement, self-planning, objective setting, self-selective strategies and self-evaluation as well as success, motivation, self-confidence and self-competence (Long, 2000). Therefore, success and quality in self-directed learning highly depends on the success in self-regulated learning process. From another perspective self-directed learning arose from autonomy and control principles and the followers of this type only benefit from the cognition and motivation elements.

Saks and Leijen (2014) state that despite the similarities between self-directed learning and self-regulated learning these concepts cannot substitute for one another. Their assumption is that self-directiveness is an umbrella term that also entails self-regulativeness. They describe self-directiveness as macro and self-regulativeness as micro skills. So, if and when a learner is a "self-directed" one that means that the learner is also self-regulated one. However, being a self-regulated does not mean that the learner is a self-directed one. Therefore, when an learning environment is designed to enhance learners' self-directed learning skills that would mean that their self-regulation skill will also be improved.

As a result of the increasing number of studies towards self-regulated learning and self-directed learning, researchers focus on studies that mingles these two concepts in e-learning. One of the aforementioned studies belong to Lee and Gibson (2003). According to them there are two important issues in the design which will be used to increase self-directed learning skills of learners in online environments. These are; increasing the sharing among students and making them take their own learning responsibilities.

In another study carried out by Liu (2009), an exemplary learning environment which supports self-directed learning and considers online learning environment in terms of pedagogical, psychological, social and technological aspects was designed. Liu (2009) remarked that satisfaction level of the learners towards this learning environment was quite high. Tsai (2011), in an experimental study with 4 groups, examined the effect of self-regulated learning and self-directed learning on success of learners. The findings of the study revealed that the group guided by their teacher to employ collaborative learning and self-regulated learning were more successful. The group which was taught according to traditional face-to-face teaching had the lower success. In a similar study by Tsai, Shen and Tsai (2011) with the success level of college students taught in blended learning environment with self-regulated learning support was higher than the success level of the students in the other groups.

Moreover, Denis (2003) remarks that traditional self-directed learning environments have a lot in common with e-learning environments. However, the researcher stresses out that especially the students in e-learning environments should be the ones who can learn better on their own. According to Denis (2003), the students in e-learning environments, with less face-to-face interaction on their work, need more guidance on regulating their own learning processes compared to the students in traditional learning environments. Thus, they become responsible for their own learning, analyze their own needs, determine their study methods and regulate their own learning processes.

Educational programs promoting self-regulated learning and self-directed learning have been found to be beneficial for students' learning (Boekaerts, Pintrich, & Zeider, 2000; Knowles, 1975; Pilling-Cormick & Garrison, 2007). Individuals need self-directed and self-regulated learning skills not only as students but also as learners at rapidly changing professional life. Today, learning is life long and the individuals have to determine their own learning needs and they have to plan and control their learning process. The number of studies which examine the effect of online learning environments on self-regulated learning or self-directed learning skills of learners should be increased (Zuolkernan, 2006). Based on the above literature the aim of this paper is to determine the effect of blended learning environment

on self-regulated and self-directed skills of students. Within in the light of this aim the following research questions are addressed:

- Is there a significant difference between the self-regulated and self-directed pre-test scores among the groups?
- Is there a significant difference between pre-test and post-test scores of each group in terms of self-regulated and self-directed learning scores?
- Is there a significant difference between the self-regulated and self-directed post-test scores among the groups?

## Methodology

### Research Design

In this study the explanatory sequential mixed method was used. This design has two sequential phases: First, collecting quantitative data and then qualitative data to help explain the quantitative data results. Researchers place priority on quantitative data but a small qualitative component follows the first phase (Creswell & Clark, 2017).

In the quantitative phase of this research the quasi-experimental non-equivalent pre-test post-test control group design was used. This is a between subject design in which participants have not been randomly assigned to the conditions. In education, intact/already established groups are used by researchers in many experimental situations, because of the availability of the participants in order to form artificial groups (Creswell, 2017).

In the second phase (qualitative part) semi-structured interviews with the students of experimental group were used. The pattern of this research can be seen in Table 1.

Table 1. Research Design

Groups	Learning Model	Pre-tests	Post-tests
Experimental	Blended	SRLS, SDLRS	SRLS, SDLRS, SSIF
Control 1	Face to face	SRLS, SDLRS	SRLS, SDLRS
Control 2	Face to face	SRLS, SDLRS	SRLS, SDLRS

SRLS: Self-Regulated Learning Scale

SDLRS: The Self-Directed Learning Readiness Scale

SSIF: Semi-Structured Interview Form

### Participants

One hundred and sixty-seven students taking the same programming languages course from two major state universities of Turkey were the participants of this research. These participants were selected with a purposive sampling method. The experimental group (n=60) was from the CEIT Department of University1 in which the blended learning environment has been applied. The first control group (Control 1, n=65) was from the Computer Education and Instructional Technologies (CEIT) Department of University2, the second control group (Control 2, n=42) was from the Electronic Engineering Department of University1.

### Data Collection Instruments

There were three data collection instruments in the study. The first of them was "The Self-Directed Learning Readiness Scale" developed by Fisher, King and Tague (2001), and adapted to Turkish by Sahin and Erden (2009). The second instrument was the "Self-Regulated Learning Scale" developed by Barnard, Lan, To, Paton and Lai (2009), and adapted to Turkish by Korkmaz and Kaya (2012). The last data collection instrument was the semi-structured interview form consisting of 7 open-ended questions developed by the researchers after taking two experts' opinion.

### Data Analysis

The quantitative data obtained from the study were analyzed via SPSS. So as to check whether there is normal distribution, Kolmogrov-Smirnov Test was used. It was found that the distribution of data were not normal therefore non-parametric statistics ( $p < .05$ ) were used such as Kruskal-Wallis Test, Wilcoxon Signed Ranks Test and Mann-Whitney U Test. Additionally, quantitative data collected were also presented in relation to qualitative data.

### Reliability and Validity

Internal reliability coefficient of "Self-Directed Learning Readiness Scale" was calculated .84 (Sahin & Erden, 2009). The same coefficient for this study was calculated .92 for pre-test and .91 for post-test. Internal reliability coefficient of "Self-Regulated Learning Scale" was calculated .95 (Korkmaz & Kaya, 2012). The same coefficient for this study was calculated .86 for pre-test and .88 for post-test.

A number of precautions were also taken in order to increase the validity and reliability of the qualitative part. Two separate expert opinions were taken to increase construct validity and the obtained data were reported naturally

without any comments to increase the internal validity. Besides, these data were presented systematically in accordance with the derived conclusions. Finally, in order to increase external validity all of the data were archived in case other researchers wish to have.

#### *Procedure*

At the beginning of the experiment Self-regulated Learning Scale and Self-directed Learning Readiness Scale were applied to all groups. The experiment lasted 10 weeks. In that period the control groups took programming languages course with traditional instruction and the experimental group students took that course in a blended learning environment. At the end of the course period, Self-regulated Learning Scale and Self-directed Learning Readiness Scale were applied to all participants as post-tests. Finally, qualitative data were collected from 5 volunteer students from experimental group with interviews.

#### *The Features of Learning Environments*

The blended learning environment at the Programming Languages course was designed for the students in experimental group. During the face-to-face stage, direct instruction and question and answer technique were used. In online part it was decided to use Moodle, which was developed in line with constructivist approach, as a learning management system (Dougiamas & Taylor, 2003). Access to this environment was provided over a web site. So, students were provided internet-based learning environment to support the face to face part of the course.

The design of learning environment was based on the principals cited in literature of self-regulated and self-directed learning. In this context, materials and activities offered for the course were grouped weekly according to their specialties. When learners log into the system they can access any of these materials at their convenience. They can make use of these materials according to their own learning speed since the materials are offered online. Various types of materials such as presentations, videos, tests, projects and forums were prepared for learners with differing learning styles. Database topics, for example, were covered in programming languages course were prepared with five learning objects (Polsani, 2006) by using Adobe Captivate. These objects were interactive video courses including evaluation questions and they are packed as compatible with SCORM (Sharable Content Object Reference Model). The learning objects which includes the learning content were designed independently from the technological environment. There were multiple-choice, true-false and open-ended practice questions at the end of each video. The students could also see their test scores on the screen at the end of each material. Therefore, they could evaluate their self-progress. The students were able to watch the videos as much as they wanted yet were only allowed to answered the questions for three times. Learners could see their own individual success report of all learning objects with a link named "Grades" in the learning environment.

In order to provide active participation of the learners into learning activities, project-based learning and communication opportunities were presented. Students were given a small project on working with the text files in programming language course. A similar project was done during the course in four weeks and the stages of the project were shared with the students in learning environment. Meanwhile they interacted with their friends and instructor with the help of communication opportunities such as forums offered in learning environment.

To summarize, the blended learning environment designed for programming languages course was based on learner-centered pedagogy. Learners were to actively participate at the learning process in this environment. They were able to negotiate with their friends and teachers. They could also monitor, evaluate and receive feedback on their learning. By this way learners could use cognitive skills and make evaluations towards learning process (Vovides, Sanchez-Alonso, Mitropoulou, & Nickmans, 2007).

In the traditional instruction used in the control groups, direct method and question-and-answer technique were applied in the theoretical hours of the course. The content of the course was the same as the experiment group and PowerPoint was used in the presentation of this content. In the practice hours of the course, the students worked in small groups on the same projects as in the experimental group. The support they needed to develop the projects was provided by the instructors during the course. The students in the control group were able to ask the questions about their projects at a specified time out of course. Group discussions and reflection activities were also included at the end of the classes.

Self-regulated learning is a micro-level concept that includes tasks presented by the teacher in the school setting. Self-directed learning is a macro-level concept that often involves designing and directing out-of-school learning for adults. The blended learning can provide a learning environment that covers the requirements of both concepts. For this reason, it was thought that the blended learning environment would be suitable for the experimental group.

### **Findings / Results**

The findings of this study were presented in two sub-sections since both quantitative and qualitative methods were used together in the study.

#### *Findings Regarding Quantitative Data*

Kruskal-Wallis Test was used to compare the self-regulated learning pre-test scores of the experimental and the control groups before the treatment. Findings regarding this analysis are shown in Table 2.

*Table 2. Comparison of Self-Regulated Pre-test Scores with Kruskal-Wallis Test*

	N	Mean Rank	Chi-square	P
Experimental	60	89.31	1.134	.567
Control 1	65	80.88		
Control 2	42	81.24		
Total	167			

The self-regulated learning pre-test scores of the experimental and the control groups did not differ significantly (Table 2). In other words, the groups were equal in terms of the self-regulated learning pre-test scores at the beginning of the term. Kruskal-Wallis Test results of self-directed learning pre-test scores of the experimental and the control groups are shown in Table 3.

*Table 3. Comparison of Self-Directed Learning Pre-test Scores with Kruskal-Wallis Test*

	n	Mean Rank	Chi-square	P
Experimental	60	94.06	4.134	.127
Control 1	65	79.41		
Control 2	42	76.74		
Total	167			

There was no significant difference between the self-directed learning pre-test scores of the experimental and the control groups. In other words, the groups were equal in terms of the self-directed learning pre-test scores at the beginning of the term. In Table 4, Wilcoxon Signed Ranks Test results of self-regulated learning pre-test and post-test scores for each group are shown.

*Table 4. Comparison of Self-Regulated Pre-test and Post-test Scores for each Group with Wilcoxon Signed Ranks Test*

	n	Z	p
Experimental	60	-5.613	<b>.000</b>
Control 1	65	-3.941	<b>.000</b>
Control 2	42	-1.660	.097

Table 4 reveals that the differences between the self-regulated learning pre-test and post-test scores of experimental and the first control group were found statistically significant. This difference indicates that self-regulated learning scores of the experimental and the first control group increased at the end of the course. On the other hand, self-regulated learning pre-test and post-test scores of the second control group were not found significantly different. In Table 5, Wilcoxon Signed Ranks Test results of self-directed learning pre-test and post-test scores for each group are shown.

*Table 5. Comparison of Self-Directed Pre-test and Post-test Scores for each Group Wilcoxon Signed Ranks Test*

	n	Z	p
Experimental	60	-4.172	<b>.000</b>
Control 1	65	-3.496	<b>.000</b>
Control 2	42	-2.192	<b>.028</b>

Table 5 reveals that the difference between the self-directed learning pre-test and post-test scores of the experimental, the first control group and the second control group were found statistically significant. In other words, self-directed learning scores of all groups increased at the end of the course. Kruskal-Wallis Test results of self-regulated learning post-test scores of the experimental and control groups are shown in Table 6.

*Table 6. Comparison of Self-Regulated Learning Post-test Scores with Kruskal-Wallis Test*

	n	Mean Rank	Chi-square	p
Experimental	60	101.38	12.315	<b>.002</b>
Control 1	65	75.86		
Control 2	42	71.76		
Total	167			

Statistically significant difference between the self-regulated learning post-test scores of the groups were found as can be seen at Table 6. Mann-Whitney U Test was applied in order to find out the sources of difference between groups. The results are shown in Table 7.

*Table 7. Comparison of Self-Regulated Learning Post-test Scores of Experimental and Control Groups with Mann-Whitney U Test*

Group 1	Group 2	p
Experimental	Control 1	<b>.004</b>
Experimental	Control 2	<b>.002</b>
Control 1	Control 2	.713

Table 7 shows that the difference between self-regulated learning post-test scores of the experimental group and two control groups was statistically significant. But the difference between self-regulated learning post-test scores of two control groups was not statistically significant. Kruskal-Wallis Test results of self-directed learning post-test scores of the experimental and the control groups are shown in Table 8.

*Table 8. Comparison of Self-Directed Learning Post-test Scores with Kruskal-Wallis Test*

	n	Mean Rank	Chi-square	p
Experimental	60	99.05	9.304	<b>.01</b>
Control 1	65	77.34		
Control 2	42	72.81		
Total	167			

In Table 8, statistically significant difference between the self-directed learning post-test scores of the groups were observed. Mann-Whitney U Test was applied in order to find out the source of the difference between groups. The results are shown in Table 9.

*Table 9. Comparison of Self-Directed Learning Post-test Scores of Experimental and Control Groups with Mann-Whitney U Test*

Group 1	Group 2	p
Experimental	Control 1	<b>.013</b>
Experimental	Control 2	<b>.007</b>
Control 1	Control 2	.655

Table 9 reveals that the difference between the self-directed learning post-test scores of the experimental group and the two control groups were found statistically significant. The difference between self-directed learning post-test scores of the two control groups was not statistically significant.

#### *Findings Regarding Qualitative Data*

Qualitative data were also collected in order to elaborate quantitative findings and to examine the obtained results in a detailed way. These data were obtained as a result of the semi-structured interviews with five learners from the experimental group. Seven open-ended questions were asked to the learners in these interviews. The first question was "Do you think the method used in this course enhanced your active participation when compared to other courses? Why?". When the answers given to this question were analyzed, it was seen that the learners believed that the design of the instruction encouraged them to actively participate in the activities. Some of the answers given to this question are provided below.

*...Besides, I think that the videos uploaded to website are very useful (S1).*

*Yes, I think so. I think it was very fruitful and it increased participation since it provides opportunities for doing research and commenting on topic from different perspectives (S2).*

*Yes, my participation to the course increased thanks to the Moodle platform. Because the accessibility of the course increased with this platform and it provided chances to follow and understand the course particularly students like me who face problems in attending to regular education (S4).*

The second question in the interview was "Did the learning environment help you develop learning strategies to be successful in the course? How?". Regarding with this question students remarked that the learning environment was helpful in developing their learning strategies. Some of the answers given are as follows:

*Learning environment helped us notice our learning level and style (S2).*

*Yes, I had flexible studying hours with the help of this platform. Thus, I could reach the relevant materials about the course anytime (S4).*

The third open-ended question in the interview was “Were you able to receive feedback on your performance? How?”. Learners’ comments on feedback opportunities of learning environment are given below.

*Yes it did. There was a mini test on how we could do performance evaluation at the end of each video and practice. We received feedback on our success (S2).*

*Yes, it helped much to receive feedback on our performance when we have problems about the topics covered and the projects we did with the help of learner forums and applications of this platform such as individual success report (S4)*

Example answers given to the fourth question “Did the learning environment increase your motivation when compared to other courses? How?” are given below.

*It definitely did. Other courses were mostly theoretical and it might be boring. My attention and motivation for the course increased as programming course provided both theoretical and practice-based applications as well as giving us studying atmosphere apart from the traditional classroom (S1).*

*Yes, it did. Because we gave effort in learning something new and we tried to learn by researching. This triggered our willingness to be successful and our motivation reached peak (S2).*

*Learning environment increased my motivation towards the course. It helped much to comprehend topic after I revised from presentations and I did the exercises. It also helped for the motivation towards new topics (S5).*

The fifth question of the interview was “When compared to other courses, did the learning environment facilitate making personal decisions towards your learning? (e.g. Method, use of time, your weaknesses etc.) Some of the answers given to this question are shown below.

*I tried to improve myself and work on my weaknesses by practices and applications not only in the class hours but also after the class with the help of learning environment (S1).*

*Having access to the presentations of the course, information about project and relevant applications anytime helped me to make individual decisions (S4).*

The sixth question of the interview was “Did the learning environment help you to get support from your friends and from instructor while overcoming the difficulties you face? How?” Some of the answers given to this question are shown below.

*Yes, questions at the end of the videos aided too much. I asked questions to my friends and to my instructor when I face with a problem so many times. Besides, we got diverse information from forum pages in the site (S1).*

*Yes, we had that opportunity. We could find solutions to the problems we faced by negotiating with individuals in class and with instructor. I liked it so much (S2).*

The seventh question of the interview was “Do you have suggestions to improve the learning environment designed for the course? Please explain.” Some of the suggestions from students given to this question are as follows:

*The involvement of qualified experts might be effective. Another suggestion is that learners might be given some extra topics to discuss in the learning environment and try to find solutions (S2).*

*The number of video recordings designed with Captivate might be increased as it was done in final weeks to make learning environment better. More quizzes and practice questions might be added just after the topics to make comprehensibility of the topics more permanent (S3)*

## Discussion

This paper aimed to identify the influence of blended learning environment on the self-regulated and self-directed learning skills of students. When the self-regulated and self-directed learning pre-test scores of the experimental and the control groups were compared no significant difference was found among groups. This finding is very important since non-equivalent intact groups were the participants of this study. The results indicated that the groups were similar in terms of these two variables before treatment.

When the pre-and post-test scores within each group were looked into it was seen that the difference between self-regulated learning pre-test and post-test scores of the experimental group and the control group1 were statistically significant but not with control group2. Self-regulated learning of students in this group had also improved though. However, this improvement was not enough to capture the level of significance. This could be due to the non-equivalent groups design and the differences in the parameters of the control groups such as the city, university, department and instructor differences of the control groups. On the other hand, the difference between self-directed learning pre-and post-test scores of each group was found to be statistically significant. It could be said that blended learning environment and traditional instruction increased self-regulated and self-directed learning skills of the learners. These findings show consistency with the literature pointing to the correlation between concepts of self-directed learning and self-regulated learning (Long, 2000). Also, providing an intended development in the individuals after a learning process is an expected result.

The post-test scores of all groups were compared in order to find out which method had the greatest influence on the learners' development. The difference between self-regulated learning scores of the experimental and the control groups was significant. The difference between self-regulated learning scores of two control groups was not significant. It could be said that the students in the blended learning environment progressed better in terms of improvement of their self-regulated learning skills than the students in the first and second control groups. The latter group also made a progress but this was not that much as in the former group of students. A similar result was also found in terms of improvement of self-directed learning skills. Based on these findings, it could be said that the students in the blended learning environment progressed more in terms of self-directed learning skills than the students in the first and second control groups. The progression in the control groups were not that much as in the former group of students. All these findings show consistency with the explanations by Lee and Gibson (2003). They advocate that online environments are more effective to improve self-directed learning skills of learners because it increases the sharing among students and makes them take their own learning responsibilities.

Consequently, the use of blended learning can be said to be more effective than traditional instruction in terms of developing the self-regulated and self-directed learning skills of the learners. The results of the qualitative data revealed and supported that the designed learning environment was effective in terms of improving the self-regulated and self-directed learning skills of the learners. The students pointed out that the rich content in the learning environment, the easy accessibility of the environment and the guidance to solving problems enhanced their participation to the course. Moreover, they remarked that the environment encouraged them to develop strategies to be successful in the course since the learning environment provided continuous and alternative feedback. They commented that the learning environment also increased their motivation. Blended learning environment designed according to the students' needs has many advantages compared to traditional learning environment. For example, students commented that the blended learning environment forced them to do research, made them have competence over the topic due to repetitive use of the course materials and made them take individual decisions towards learning process. Students also emphasized that they can get assistance from friends and instructor with the help of communication opportunities offered in blended learning environment. They also made some suggestions for improving the learning environment such as the involvement of different experts in the environment, providing more research projects and increasing the number of learning objects as well as their quizzes and practice questions.

Besides these advantages, there are challenges facing instructors involved in blended learning. For instance, one of the major problems of instructors is related to developing the materials and finding out methods which encourage learners to participate actively (Mayer & Moreno, 2002; Mayer, 2003). Therefore, designing a blended learning environment for an instructor should not be underestimated. Firstly, the one who design learning environment should be able to use technology effectively. Apart from this, the instructor should develop a variety of materials to meet individual differences. Finally, the instructor needs more time to give feedback to students as the number of asynchronous communication opportunities increase in the environment. As one can infer designing a blended learning environment requires more time and effort when compared to designing traditional learning environment. However, when the progress of the experimental group of students in terms self-regulated and self-directed learning skills is considered in this study, it is obvious that the effort was not wasted.

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