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Abstract

The purpose of this study is to determine the views of 2nd year students at a university who received the Programming course designed in accordance with the Web-based Problem Solving Method about the said method (WBPSM). The views of 11 students selected from among the 29 students who had taken the course on a voluntary basis were elicited concerning WBPSM. In this study, in which the qualitative research method was used, the semi-structured interview technique was used as the data collection instrument. The interview form, which consisted of 11 open-ended questions, was administered to the 11 students, who had taken the course. As a result of the analysis of the data obtained from the students, it was seen that the students had stated that WBPSM supported individual learning, raised interest in the course, ensured non-spatial learning, increased their self-confidence in learning on their own, gained them problem solving ability, enabled them to assume responsibility in learning, encouraged them investigate, saved time and that it was applicable for other courses, too.

Introduction

With the use of developing information technologies for educational purposes, we see that numerous new concepts related to education, teaching and learning have entered into educational terminology. Some of these concepts can be listed as web-based learning, online learning, distance learning, learning in electronic environment and mobile learning. Although many of these concepts are thought to bear the same meaning, they contain different meanings indeed (Urdan & Weggen, 2000). The type of learning that takes place via web by ensuring access to information independently of time and space is called Web-Based Education (WBE) (Horton, 2000). Web-based education can be performed synchronously or asynchronously. WBE can also be defined as the use of web as a tool to provide education to people who are away from an education environment. WBE is at the same time is a learning environment that is hypermedia-based, and forms a meaningful education environment encouraging and supporting education learning (Özarslan, Kubat, & Bay, 2007). Web-based learning environment is a process that focuses on learning rather than teaching, and is not bounded by restrictions such as physical space, time, age of participant, being dependent on a single source, inflexible programs and rendering only the teacher effective (Aktürk, Şahin, & Sünbül, 2008). In many studies conducted, web-based learning environments have been found to be successful and it has been argued that more effective learning could be achieved at a shorter time with WBE (Yiğit, Yıldırım, & Özden, 2000).

Online learning, which is a part of web-based learning, has begun to be a learning environment that has received a good deal of attention in recent years. Online learning is a form of learning that enables individuals to learn by themselves through internet technologies, contains educational materials supported by multi-media such as text, audio, video, graphics and animation, and provides individuals with freedom from time and space in accessing information. In online learning, since students are away from teaching environment, they can follow courses synchronously and asynchronously (Özkul & Ulukan, 2002; Morrison, 2003). Online learning is a product of the constructivist learning approach, it supports student-based learning rather than teacher-based one (Arkün & Aşkar, 2010). Online learning aims at enabling individuals to perform their own learning via the internet independently of time and space. Online learning provides learners with a flexible, interesting and interactive learning environment.

Rapidly changing nature of technology has brought about new challenges and problems. Major developments in the fields of transportation, communication and production require that individuals overcome difficult procedures like management, control and design. It was stated in a report prepared by The Commission on Pre-College Education in Mathematics, Science and Technology (National Science Board, 1983) that "The problems of the 21st century are not reading and writing and arithmetic problems only. The problems of the 21st century involve higher problem solving skills and scientific and technological literacy which contains intellectual tools

that allow us to understand the technological environment around us… Developing students' problem solving and critical thinking capacities in all fields is a fundamental objective (p. v)" and the importance of problem solving was emphasized.

The word problem brings to minds of many people mathematics problems that test whether or not a four-operations-based subject taught in a mathematics class has been understood (Heddens & Speer, 2000). In general, problem is defined as a question to which answers are sought or a difficulty that needs to be overcome whereas Morgan (1995) defines problem as frustration on the way to achieving a goal or a state of conflict encountered. Problem solving, on the other hand, can be defined as finding new ways of solution to solve a problem by going beyond simply implementing rules learned through previous experiences (Korkut, 2002). Problem solving is one of the important features that people should have. Problem solving involves not only mental skills but also certain skills, attitudes and values (Altun, 2009). Baykul (2010) defined the problem solving ability as understanding the essence of a problem when it is encountered, finding an appropriate strategy for solution and using it, arriving at results and using the results reached.

Problem-solving based learning is the approach of questioning learning, doing research, encouraging learning through problem solving and overcoming life problems by using the things learned in solving daily life problems (Duch, Groh, & Allen, 2001). The real purpose of problem-solving based learning is to concentrate on real life problems in learning (Yaman & Yalçın, 2005). Barrows and Tamblyn (1980), one of the pioneers of the problem-solving based learning approach, stated that problem-solving based learning is a different educational model that aims to gain individuals effective skills in problem solving through studies and experiences in different educational fields. According to Barrows and Tamblyn (1980), problem-solving based learning is an effective teaching method where individuals supervise themselves and arrive at conclusions by establishing interdisciplinary information communication through team work.

On the other hand, the most widely accepted process in the teaching of problem solving is Polya (1980)'s problem solving process. This process consists of four steps.

1. Understanding the problem: What is given, and what is demanded?
2. Identifying a strategy in connection with the solution:
    a. What is demanded to be found in the problem?
    b. What information has been provided?
    c. Have you solved a similar problem before?
    d. If you cannot solve this problem, can you solve a simpler problem similar to it?
    e. Can you use all the information you have in the solution you have planned?
    f. Can you guess the solution to the problem?
3. Implementation of the selected strategy: Here, an attempt is made to solve the problem based on the strategy planned. If failed, then return to the first or the second step.
4. Evaluation of problem solving process: The results obtained are evaluated, crosschecked and compared and contrasted with the result anticipated beforehand. Significance of the results is assessed by checking whether or not they conform to real life.

When the relevant literature is examined, it is seen that various studies have been conducted to investigate the effects of problem-solving based learning. In one of these studies, Kanlı and Emir (2009) found that education given to students with different characteristics using the problem solving method was more successful compared with the traditional method and that learning motivation in students was higher. In a study the conducted, Ülger and İmer (2013) concluded that problem-solving based teaching conducted in the field of visual arts teaching had a positive effect on students' creative thinking. Likewise, Yaman and Yalçın (2005) maintained that problem-solving based learning improved creative thinking and approaching the problem from a reverse angle, they claimed that people with a high level of creative thinking ability were good problem solves. Erdem (2005), on the other hand, stated that that problem-solving based learning provided individuals with a learning environment that was in their own control, that it was individual learning and that it led to organization of learning. Wood (2003) emphasized that problem-solving based learning was not only problem solving; rather, it enriched knowledge in problem solving steps through higher level mental activities.

Although one can see that numerous studies have been conducted to investigate the efficiency of problem-solving based learning, it can be said that the number of studies investigating the efficiency of problem-solving based learning in online environments is limited. In one of these studies, Reeves, Herrington and Oliver (2004) maintained that students trying to learn in online environments via problem solving could acquire skills such as a desire for scientific research, critical thinking approach and individual learning ability. Research, which is one

of the essential components of problem-solving based learning, and access necessary sources, is easier in online environments. Şendağ (2008) emphasized that problem-solving based online student-centered learning created a positive influence on students and stated that students considered themselves to be active, investigative and exploratory and that the process further increased students' higher order cognitive activities. In a study conducted by Altun (2009), on the other hand, students reported with regard to the online problem solving method that construction of problem scenarios on the basis of real life situations would be very effective in solving problems that they might encounter in their professional lives. Tekedere and Mahiroğlu (2012) applied problem-solving based learning method to students in a web-based environment in a first aid class and obtained results that could be deemed quite successful. According to the results they obtained, 69 % of the students emphasized that web-based learning was as effective as classical learning; 76 % stated that it encouraged research and 72 % said that they could recommend this learning model to their friends. In a study they conducted, Özdemir and Yalın (2007) concluded that problem-solving based learning environments in web environment allowed individuals to use their critical thinking skills more extensively. With this study, we, too, aimed to determine the views of the second year students at university who took the Programming course designed according to Web-Based Problem Solving Method (WBPSM) concerning the WBPSM.

Purpose of the Study

The purpose of this study was to determine the views of the 2nd year students at a university who took the Programming course designed according to the Web-Based Problem Solving Method (WBPSM). To this end, answers were sought to the research questions given below.

As far as the 2nd year university students who took the Programming course designed according to the Web Based Problem Solving (WBPSM) are concerned;

1. What are their views regarding the benefits of (WBPSM)?
2. What are their views regarding the skills that (WBPSM) developed?
3. What are their views regarding the effects of (WBPSM) on attitude towards the course and motivation?
4. What are their views regarding the means of communication with the instructor and interaction in (WBPSM)?
5. What are their views regarding the best likes aspects of (WBPSM)?
6. What are their view regarding the undesirable aspects of WBPSM)?
7. What are their views regarding the differences and similarities between WBPSM and the teaching methods of the other courses?
8. What are their views regarding the adaptability of WBPSM to the other courses?
9. What are their views regarding how WBPSM affects self-confidence in learning?
10. What are their views regarding the role WBPSM plays in learning?

What are their views regarding the confidence that WBPSM provided with respect to learning a Programming language?

Method

The qualitative research method was used in this study. Yıldırım and Şimşek (2004) define qualitative research as a kind of research where qualitative data collection instruments such as observation, one-to-one interview and written document analysis are used and intuitions and phenomena are attempted to be revealed in a realistic and holistic manner. Major characteristics of qualitative research involve being sensitive to natural environment, the researcher acting as a participant, approaching phenomena in a deductive manner, revealing personal perceptions and providing flexibility in the research design.

Data Collection

The research data were collected using a semi-structured interview form. The past experiences of the researchers and the views of the educational experts working in the field of educational sciences were made use of in the preparation of the interview form. Draft questions were presented to the attention of experts in the field, necessary changes were made on the basis of feedback from them and the final version of the interview form was thus prepared. The 12-question interview forms made ready for application were distributed to 11 students who had taken the Programming course prepared according to WBPSM and their views were taken in writing. Then, the interview forms collected from the students were redistributed to them in case they had information to

add or delete. While some students made necessary additions, others removed some information from the interview form. Including direct citations from individuals and arriving at conclusions based on them is important for validity (Aktürk, Şahin, & Sünbül, 2008). Therefore, reliability was intended to be ensured by incorporating some of the data from the research as they were (Wolcott, 1990).

Study Group

The study group of this research consisted of 11 students at a university who had taken the Programming course prepared according to the WBPSM. Demographic information about the working group is given in Table 1.

Table 1. Demographic information about the working group

Gender	f	%
Female	5	45
Male	6	55
Total	11	100

As can be seen from Table I, the study group consisted of 11 students, of whom 5 were female and 6 were male.

Data Analysis

The data obtained from the study were analyzed using the descriptive analysis technique. In descriptive analysis, the data obtained are summarized and interpreted on the basis of the themes previously determined. The data can be presented according to the themes as suggested by the research questions or they can be presented taking into consideration the questions or dimensions used in the process of observation (Yıldırım & Şimşek, 2004). Themes were created to analyze and compare various meanings in the responses which the students gave to the questions. In this way, an attempt was made to obtain more detailed and in-depth information from the qualitative analyses performed (Coolican, 1992).

Findings

In this part of the study, each theme was divided into categories in order to analyze the students' views regarding WBPSM and compare and contrast them. As a result of the analyses made, it was seen that some common categories appeared with regard to certain categories in the students' views about WBPSM. However, the views belonging to these common categories were given within their own themes so as not to spoil the integrity of the students' views concerning the research questions. Moreover, the frequencies and percentages of the views belonging to 11 students who participated in the study were shown in Tables while presenting the research findings.

Views about the Benefits of WBPSM

In the interview form, the students who had taken the Programming course prepared according to WBPSM were administered the question "What do you thinks the benefits of WBPSM are?" and the students' views concerning the benefits of WBPSM were given in Table 2.

Table 2. Views about the benefits of WBPSM

Category	f (% of Students*)	% Views
Supporting individual learning	9 (81,8)	33,4
Directing to research	7 (63,6)	25,9
Saving time	5 (45,5)	18,5
Increasing success	3 (27,3)	11,1
Raising interest in classes	2 (18,2)	7,4
Gaining problem solving skills	1 (9,1)	3,7
Total # of Views	27	100

*Total # of students = 11

Table 2 indicates that a large majority of the students stated that WBPSM supports individual learning (f=9) and directs to research (f=7). In addition, some of the students pointed out that WBPSM saves time (f=5) and increases success (f=3). The views of some students concerning the benefits of WBPSM are as follows; "*…I need to do research on the internet to be able to solve the problems our teacher assigned. In this way, I can learn by myself through research…", "…the problems forced us to concentrate on the subject needed to be learned in class. I realized that the subject needed to be learned to be able to solve the problems. In other words, in fact I was learning while I was solving problems...", "…we saved time which we spent going to and coming from campus..."*

Views about the Skills Developed by WBPSM

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "What skills do you think WBPSM developed?" and the students' views concerning the skills developed by WBPSM were given in Table 3.

Table 3. Views about the skills developed by WBPSM

Category	f (% of Students*)	% Views
Increases the skill of learning through research	9 (81,8)	36
Improves skills of internet and computer use	5 (45,5)	20
Ensures assuming responsibility in learning	4 (36,4)	16
Gains problem solving skill	4 (36,4)	16
Gains algorithm developing skill	1 (9,1)	4
Supports individual learning	1 (9,1)	4
Gains self-confidence in learning	1 (9,1)	4
Total # of Views	25	100

*Total # of students = 11

With regard to the skills developed by WBPSM in Table 3, a large majority of the students stated that WBPSM developed the learning through research skill (f=9). In addition, some of the students thought that WBPSM developed the skill of using the internet and computer (f=5), and gained the skills of assuming responsibility in learning (f=4) and solving problems (f=4). Some of the students expressed the following views concerning the skills developed by WBPSM; *"…we gained the skill of learning by ourselves using this online method...", "…it developed my problem solving skill. I think problem solving steps made our job easier while I was solving homework problems...", "…it gained the skills of doing online research, learning by ourselves, feeling of responsibility and most important of all being able to write program…"*

Views about the Effects of WBPSM on Attitude towards the Course and Motivation

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "How did WBPSM affect your attitude towards and your motivation to the course?" and the students' views about the effects of WBPSM on their attitudes towards and their motivation to the course were given in Table 4.

Table 4. Views about the effects of WBPSM on attitude towards the course and motivation

Category	f (% of Students*)	% Views
Raises interest in the course	11 (100,0)	45,8
Increases success	5 (45,5)	20,8
Gains self-confidence in learning	4 (36,4)	16,7
Ensures learning independently of space	3 (27,3)	12,5
Supports individual learning	1 (9,1)	4,2
Total # of Views	24	100

*Total # of students = 11

When Table 4 is examined, it is seen that a large majority of the students stated that WBPSM raised interest in the course (f=11). In addition, some of the students emphasized that WBPSM increased success (f=5), and gained self-confidence in learning (f=4). Views of some of the students with regard to the effects of WBPSM on attitude towards and motivation to the course are as follows; *"…I think WBPSM provided me with self-confidence in respect of classes. If only all classed could be conducted like that…", "…I can download videos*

and class notes on the internet, transfer them to smart phones and study them. Being able to access classes all the time makes me feel relaxed…", "…in the process of web based problem solving, each problem was like a different puzzle for us. It was exciting though somewhat difficult. I think I have been influenced positively…"

Views about the Means of Communication and Interaction with the Course Instructor in WBPSM

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "how was your communication and interaction with the course instructor in WBPSM?" and the students' views with regard to the means of communication and interaction with the course instructor were given in Table 5.

Table 5. Views about the means of communication and interaction with the course instructor in WBPSM

Category	f (% of Students*)	% Views
Communication and interaction was quite good	11 (100,0)	47,8
Remote control and support programs	5 (45,5)	21,8
Through e-learning system tools	4 (36,4)	17,4
Through social media tools	3 (27,3)	13,0
Total # of Views	23	100

*Total # of students = 11

With regard to the means of communication and interaction with the course instructor in WBPSM in Table 5, a large majority of the students stated that communication and interaction was quite good in WBPSM (f=11). In addition, some of the students said that they used remote control support programs as means of communication and interaction (f=5) and e-learning system tools (f=4) in WBPSM. Views of some students with regard to the means of communication and interaction with the course instructor are as follows; *"…we were in constant communication via both social media and Moodle. Our one-to-one interaction was perfect…", "…it was good that our instructor could reach our computer from a distance. It was as if we were receiving help in the laboratory at our school…", "…we could reach our instructor easily at many hours of the day (day and night) via Facebook…"*

Views Concerning the Best Liked Things about WBPSM

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "In general, what was it that you liked best about WBPSM and why did you like it?" and the students' views concerning the things they liked best about WBPSM were given in Table 6.

Table 6. Views concerning the best liked things about WBPSM

Category	f (% of Students*)	% Views
It allows online and unlimited access to course videos	9 (81,8)	36
It saves time	7 (63,6)	28
It raises success in classes	3 (27,3)	12
It encourages learning by research	2 (18,2)	8
It enables learning independently of space	2 (18,2)	8
It allows constant communication with the course instructor	1 (9,1)	4
It increases problem solving skill	1 (9,1)	4
Total # of Views	25	100

*Total # of students = 11

When Table 6 is examined, it is seen that a large majority of the students stated that the thing they liked best about WBPSM was online and unlimited access to videos (f=9) and it's saving time (f=7). In addition to this, some students reported that WBPSM increase success in classes (f=2) and ensured learning independently of space (f=2). Views of some of the students about what they liked best WBPSM are as follows; *"…not losing time going to and coming from school. Being able to watch course videos again and again…", "…I liked being able to watch videos related to the course many times whereas we could follow the class only* once*...", "…learning by research while I was doing homework was the thing I liked best…"*

Views Concerning Things that Were Not Liked about WBPSM

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "In general, what was it that you liked least about WBPSM and why did you not like it?" and the students' views concerning the situations that they did not like regarding WBPSM were given Table 7.

Table 7. Views concerning things that were not liked about WBPSM

Category	f (% of Students*)	% Views
Being deprived of social contacts	2 (18,2)	66,7
Needing the internet	1 (9,1)	33,3
Total # of Views	3	100

*Total # of students = 11

With regard to the situations that were not liked about WBPSM as shown in Table 7, a large majority of the students stated that there was not a thing they did not like about WBPSM. However, a very few number of students reported that they did not like being deprived of social contacts (f=2) and needing the internet (f=1). Views of some students concerning the things they did not like about WBPSM are as follows; *"…not being able to talk to someone loudly while solving problems assigned as homework…" "…not being able to meet friends as we did not go to school…"*

Views about the Differences and Similarities When the Teachings Methods of Other Courses and WBPSM Were Compared

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "What are the differences and similarities when you compare the teaching methods of other courses and WBPSM?" and the students' views about the differences and similarities between the teaching methods of other courses and WBPSM were given in Table 8.

Table 8. Views about the differences and similarities when the teachings methods of other courses and WBPSM were compared

Category (Difference: D, Similarity: S**)	f (% of Students*)	% Views
It ensures learning independently of space (D)	7 (63,6)	29,2
It directs to research (D)	5 (45,5)	20,8
It encourages thinking (D)	3 (27,3)	12,5
It supports individual learning (D)	2 (18,2)	8,3
It enables problem based learning (D)	2 (18,2)	8,3
It encourages problem based learning (D)	2 (18,2)	8,3
It enables active learning (D)	1 (9,1)	4,2
It allows course to be followed online (D)	1 (9,1)	4,2
Shortage of face-to-face communication (D)	1 (9,1)	4,2
Total # of Views	24	100

*Total # of students = 11

**No similarities were reported by the students.

When Table 8 is examined, it is seen that all of the students stated that WBPSM had not similarities to other courses and they focused on differences. What the students emphasized most was that WBPSM ensured learning independently of space unlike other courses (f=7). In addition to this, some of the students reported that WBPSM directed them to research (f=5) and encouraged them to think.

Views of some students concerning the differences and similarities between WBPSM and other courses are as follows; *"...they do not seem to have many similarities. While many courses are based on rote learning, thinking and decision making are more important in this course. When solving a problem, logic enters into play…" "…while we can learn whenever we want in one (WBPSM), the subject needs to be learned during the class hour in the others…", "…in the other courses, you debate about some course contents in other classes and you can learn their views and use for your own good but WBPSM lacks this opportunity..."*

Views about the Adaptability of WBPSM to Other Courses

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "Are the methods you have learned in this course also adaptable to other courses? How?" and the students' views about the adaptability of WBPSM to other courses were given in Table 9.

Table 9. Views about the adaptability of WBPSM to other courses

Category	f (% of Students*)	% Views
It can be adapted to other courses	8 (72,7)	53,3
It may work well in practical courses	3 (27,3)	20,0
Teachers are not qualified enough for this method	3 (27,3)	20,0
It increases course success	1 (9,1)	6,7
Total # of Views	15	100

*Total # of students = 11

With regard to the adaptability of WBPSM to other courses as shown in Table 9, a large majority of the students stated that WBPSM can be adapted to other courses (f=8), too. In addition, some students maintained that WBPSM could be adapted to practical courses successfully (f=3). Views of some students concerning the adaptability of WBPSM to other courses are as follows; *"…it would be great; all students including me would love it and I believe we could understand the courses better…", "…it may not be adapted to all courses. I think it would work well in practical courses…", "…it can be implemented in other courses, too but our instructors need to take a keen interest in technology…"*

Views about How WBPSM Affected Self-confidence in Learning

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "Did learning through WBPSM enable you to feel self-confident in learning? How?" and the students' views about how WBPSM affected their self-confidence in learning were given in Table 10.

Table 10. Views about how WBPSM affected self-confidence in learning

Category	f (% of Students*)	% Views
It helped me as it increased my self-confidence in learning	11 (100,0)	68,8
It helped as it encouraged research	3 (27,3)	18,8
It helped as it encouraged individual learning	1 (9,1)	6,2
It helped as it developed the problem solving skill	1 (9,1)	6,2
Total # of Views	16	100

* Total # of students = 11

When Table 10 is examined, it is seen that most of the students stated that WBPSM increased their self-confidence in learning (f=11). In addition, some of the students reported that WBPSM enabled them to feel self-confident as it encouraged them to research (f=3) and promoted individual learning (f=1).

Views of some of the students about how WBPSM affected self-confidence in learning are as follows; *"…yes, it provided self-confidence. Since I was able to write programs investigating on my own, my confidence in myself increased…", "…as we began to learn by ourselves, my self-confidence about doing well in the course increased. Now, I know that I can learn some things without depending on the school…*", *"…my achievements in examinations further increased my interest in this method and my self-confidence…*"

Views about the Function of WBPSM in Learning Process

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "What function did WBPSM play in your learning?" and the students' views about the function of WBPSM in learning process were given in Table 11.

Table 11. Views about the function of WBPSM in learning process

Category	f (% of Students*)	% Views
It enabled met o feel self-confident in learning	5 (45,5)	33,4
It increased problem solving skill	2 (18,2)	13,3
It increased course achievement	2 (18,2)	13,3
It encouraged individual learning	2 (18,2)	13,3
It provided me with experience about alternative learning methods	2 (18,2)	13,3
It encouraged research	1 (9,1)	6,7
It provided experience about distance learning	1 (9,1)	6,7
Total # of Views	15	100

* Total # of students = 11

With regard to the function of WBPSM in learning process as shown in Table 11, a large majority of the students stated that WBPSM provided them with self-confidence in learning (f=5). In addition, some students reported that WBPSM increased their problem solving skills (f=2) and course achievements (f=2). Views of some students about the function of WBPSM in learning process are as follows; *"…it provides me with more self-confidence. I believe that it prioritizes quality in learning...", "…I realized that research was more effective in learning…", "…I gained experience with regard to distance learning. I think it will be useful for my professional career..."*

Views about the contribution of WBPSM to Self-Confidence Regarding to Learning a Programming Language

In the interview form, the students who had taken the Programming course prepared according to WBPSM were asked "After you took the Programming course designed according to WBPSM, how confident did you feel about learning a programming language? (Provide the reasons)" and the students' views about the self-confidence which WBPSM provided about learning a programming language were given in Table 12.

Table 12. Views about the contribution of WBPSM to self-confidence regarding to learning a programming language

Category	f (% of Students*)	% Views
My self-confidence increased	11 (100,0)	100
Total # of Views	11	100

* Total # of students = 11

When Table 12 is examined, it is seen that a large majority of the students stated that WBPSM increased their self-confidence with regard to learning a programming language (f=11). Views of some students about the self-confidence which WBPSM provided about learning a programming language are as follows; *"…with this method, I began to see myself like a programmer. My desperation in the first semester has now disappeared. I can learn different programs now. I have the courage for that...", "…I have more self-confidence because my grades were better after WBPSM than before it...", "…as I witnessed my success, of course my self-confidence increased. It is a great pleasure to be able to overcome and solve problems…"*

Results and Discussion

As a result of the research findings that were evaluated, it was seen that the categories belonging to some themes were in support of one another. Therefore, the discussion of the study were conducted on the following five themes by combining the themes that supported one another and were repeated several times: WBPSM's supporting individual learning; WBPSM's developing inquiry learning skills; WBPSM's increasing interest in the course; WBPSM's providing learning independently of time and space and WBPSM's providing self-confidence in learning.

WBPSM's Supporting Individual Learning

With respect to this theme, a large majority of the students stated that WBPSM supported individual learning. Although individual learning is difficult for the learner, it is a much-liked and preferred form of learning as it provides permanent learning and increases success. In addition to this advantage, the students also mentioned

disadvantages that individual learning brought with it concerning socialization. In WBPSM, students can study individually, but they should communicate with their friends or instructors using e-mail or other means of communication. In this way, students will be prevented from feeling lonely and socialization will be ensured (Frank, Reich, & Humphreys 2003; Odabaşı, Çoklar, Kıyıcı, & Akdoğan, 2005). In a study they conducted to determine the experiences of students studying health sciences in the online problem-based learning environment, Valaitis, Sword, Jones and Hodges (2005) stated that the students seized an opportunity to learn at their own pace and in accordance with their own individual learning style. In a study conducted on university students, it was determined that web-based learning was more interactive compared with traditional learning practices and it provided the students with more control over their learning (Yazon, Mayer-Smith, & Redfield, 2002).

WBPSM's developing inquiry learning skills

This theme emphasizes that WBPSM directs students to constant research and investigation to be able to learn by themselves. Students need to know ways of obtaining information required to solve the problems given and use the information they have obtained in a result oriented manner through a right algorithm. Briefly, they need to learn how to learn. The way to achieve this is to adopt a learner centered approach that places interaction at the center of learning. Hannafin and Land (1997) think that problem based learning environments may guide students towards critical and creative thinking and that at the same time such learning environments support constructivist learning. Maintaining the same views, Wilkie and Burns (2003) stated that problem based learning, which is one of the prominent methods of constructivist approaches, guided students towards thinking, questioning and investigating.

WBPSM's Increasing Interest in the Course

In this theme, saving time spent on reaching the learning environment was regarded as one of the most important factors that increased interest in WBPSM. Moreover, unlimited access to course materials appeared as one of the prominent factors that increased interest. In a study they conducted, Allen and Seaman (2010) reported that web-based learning environments received 20 % more attention than face-to-face learning environments. Bulun, Gülnar and Güran (2004), too, stated that web-based learning environments were found interesting as they enabled students to learn at the time and space they liked and they provided independent learning. According to Gore (2000), stated that web-based learning seemed to be quite attractive as it supplied students with a flexible learning environment allowing them to learn at home or anywhere on earth without having to go to school thereby obviating the need to spend time in travelling to school.

WBPSM's Providing Learning Independently of Time and Space

One of the most important features of web-based learning is that it provides learning independently of time and space. Thanks to this fundamental characteristic of web-based learning, learners may obtain a more free learning opportunity. Tekedere and Mahiroğlu (2012) developed web-based educational software to allow First Aid course to be conducted on the web using a problem-solving based learning strategy. The primary goal of this software was to provide students, who did not always had an opportunity to reach and ask questions to instructors, and revise past units in problem-solving based learning practices, with unlimited and timeless access to educational materials prepared beforehand (Tekedere & Mahiroğlu, 2012). Likewise, Gore (2000), too, argued that web-based learning would be useful in term of equality of opportunity in education for those whose working hours coincided with learning hours, who could not go to the learning environment due to their physical disorders and who did not have the financial means to attend a formal education institution. In a study they conducted, Valaitis, Sword, Jones, Hodges (2005) reported that online problem-based learning provided students with flexibility in terms of time and space.

WBPSM's Providing Self-confidence in Learning

A large majority of the students stated that since WBPSM encouraged learning by research, this enabled them to feel self-confident in learning. Studies that were conducted revealed that problem-solving based student centered learning had a positive influence on students; students saw themselves in an active, investigative and exploratory role; it further increased students' higher order cognitive activities and affected students' self-

confidence in a positive way (Şendağ, 2008). Özdemir and Yalın (2007), on the other hand, concluded that problem-solving based learning in a web environment enabled individuals to use their critical thinking skills more extensively. Likewise, in a study conducted by Andrusyszyn, Iwasiw and Goldenberg (1999), it was stated that nursing students at the undergraduate level had greater opportunity for reflection and discussion in online learning environments.

Suggestions

In this study, where the views of students who had taken a Programming course designed according to WBPSM were determined, the students stated in general that WBPSM supported individual learning, developed inquiry learning skills, raised interest in the course, enabled students to feel self-confident and provided learning independently of time and space. The following suggestions were made regarding to instructional practices and future studies in accordance with these views obtained from the students.

- Since such methods require extensive use of technology and internet, it is necessary that computer use and internet access should be at an advanced level. Otherwise, students' studies will be insufficient.
- Before WBPSM is conducted, adequate information should be given to students about problem-solving based learning. Furthermore, what problem-solving based learning is, what its purposes and how it is important need to be discussed. In addition, audio visual materials about problem-solving based learning that students could access via web should be prepared.
- For the success of WBPSM constructed instruction, the target learners needs to be interested in conducting research, have individual study skills, are inclined to learn by themselves and possess metacognitive learning skills, all of which are very important.
- Students may experience technical problems during the implementation stages of WBPSM. In order to help overcome these problems, instructors should have students feel that they stand by them more than in face-to-face processes through e-learning programs and some other supportive software (remote control programs).
- Instructors who will use WBPSM in their classes should have adequate information about this method and in addition they should also have information and experience about internet and information technologies.
- One thing about which WBPSM receives much criticism is that students are deprived of socialization throughout this process. To this end, sin problem-solving based learning environments, students should be encouraged to effectively use e-chat environments, blogs, and social sharing programs so that they could share information and chat when necessary because sharing information, asking questions and cooperation are among the most important components of problem-solving based learning.
- Based on the principle of equality of opportunity in education, WBPSM is recommended to be applied in different courses and different educational levels with a view to contributing to distance learning programs that everyone can benefit.

Note

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