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The views of teacher candidates on the project management competencies

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Abstract

The aim of this research is to determine the views and knowledges of Physics, Chemistry, Biology and Mathematics teacher candidates who are studying non-thesis master's program at Instıtue of Science about the application of Project-based learning and its implementation in learning environment. In today's world, scientific knowledge is changing and being updated rapidly due to the developments in science and technology. In parallel to this development, Project-based learning approach could be used to teach ways of accessing knowledge instead of transferring knowledge. In order to determine the teacher candidates' views on project-based learning approach, a questionnaire consisting of 28 questions was prepared and teacher candidates were asked to answer the questions. In addition, the teacher candidates were asked to answer three open-ended questions to determine the difficulties encountered during the course, contributions of this course and to indicate the reasons for finding themselves sufficient or insufficient while managing a project related to their subject.

Key Words: Science and technology lesson, project-based learning

1. Introduction

In today's world, scientific knowledge is changing and being updated rapidly due to the developments in science and technology. Since there is a quick change in knowledge, the aim of education must be to teach students how to access information instead of just transferring information. Project-based learning (PBL) method can be used for this purpose. Project-based learning is an approach in which a student defines a problem in his daily life, solves this problem out of classroom environment in a planned way, reports the activities and presents the conclusion to his friends in class (Çepni, 2009). In another definition, Project-based learning is defined as an interdisciplinary approach which brings real life activities based on developing a proposal, dreaming, planning, fictionalising into classroom environment and finally puts them in project frame (Erdem 2002; Yıldız 2004). PBL is a teaching and learning model which is being applied in modern countries and was developed as an opposing idea to the teaching of curriculum seperately (Aytekin&Ayhan 2001). The characteristics of PBL are as follows:
1. Students decide what they will work on, 2. Students themselves design the solution process, 3. Students are responsible for gathering the information and managing them, 4. Students regularly share what they are doing with their friends and teachers, 5. The classroom atmosphere is designed to tolerate error and change, 6. Process is important for evaluation (Global School Net Foundation, 2000)

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For Erdem and Akkoyunlu (2002) education system is composed of three basic concepts, which are project, base, and learning. Project, which is the basis of PBL, is the total activities that are done by students individually or in a group freely to solve a problem related to acquiring a concept or skill. The basic characteristic in projects is that a student should decide freely how and in what order he will solve the given problem (Kubinova, Novotna ve Littler, 1998). When students focus on solutions for real problems, they do activities such as thinking, problem solving, creativity, reaching information, reblending, inquiring, negotiation and they work individually and as a group. Projects help students gain scientific research skills and have the opportunity lo learn by experiencing (Raghavan, Coken-Regev ve Strobel, 2001). In addition, projects make it possible to use alternative approaches according to students' individual differences, different learning styles, their intelligences, abilities or inabilities. Project provides guided learning and instead of individual learning it focuses on learning by relating for a defined purpose. For this purpose, in education the aim is not only organizing a project or obtaining a product but also realizing the process and creating a private learning environment. Therefore, the views of teacher candidates on using Project Based Learning model, which they are studying in Research Project course in field education and the difficulties they may face while using this model have been suject to this study.

2. Purpose

The purpose of this study was to determine the views of teacher candidates on using Project Based Learning method and possible difficulties they may come across while using the method. For this purpose, the following questions were tried to be answered in the study:

1. What do teacher candidates think about using PBL as a teaching method?
2. What are the possible difficulties that teacher candidates may face while using this method?
3. What is the contribution of Research Project in Field Education Course to teacher candidates?

3. Method

In this study, one of the quantitative models, Survey model, and qualitative methods are used together.Survey model is a data collection approach in which the researcher collects the data to describe the nature of a condition as it exists [Karasar,1999]. The sample of the study consisted of 71 teacher candidates who are studying non-thesis master's program at Institue of Science, Uludag University during 2010-2011 academic year. 16 of the teacher candidates were physics, 22 were mathematics, 16 were biology and 17 were chemistry teacher candidates. A fivefold-likert scale which consisted of 28 questions was used to determine the views of teacher candidates on using PBL as a teaching method and an instrument which consisted of three open-ended questions was used to determine the difficulties they may encounter while using the model and the contribution of Research Project in Field Education course to teacher candidates.

4. Finding And Discussion

While analyzing the data for the solution of the first problem, Factor analysis method was utilized. Factor analysis is a multivariate statistical method used to describe variability among variables that measure the same quality in terms of a much smaller number of factors and since it is based on the relations between data, it provides data more meaningfully and summarily (Büyüköztürk, 2002, Kim ve Mueller, 1978). The most common method in factor analysis is Principal Component Analysis method. In this study Varimax Rotated Principal Component Analysis was used and eventually 24 variables were gathered under eight factors:

1. Project Based Learning application 2. The effect of the course 3. The characteristics of group work
4. Insufficient background 5. The difficulties faced in application 6. The need for in-service training
7. The importance of prevocational training 8. Field knowledge

4.1. Factor Analysis Findings

The eligibility of the data for factor analysis can be examined with Kaiser-Mayer-Olkin (KMO) coefficient and Barlett Test. In Principal Component Analysis, the value of KMO was found as 0.694. KMO test shows if the distribution is adequate enough for factor analysis. The Barlett test result was 946.29 ($p<0.05$). That the KMO value is higher than 0.60 and the Barlett test result is meaningful means the data is suitable for factor analysis (Büyüköztürk, 2002). It is seen that the items in the scale were put under eight factors according to Varimax Rotated Principal Component Analysis. The variance that these eight factors explain related to the scale is 69.347% (Table-1), which is higher than the acceptable value 41% (Kline, 1994). In Varimax Rotation, the lower bound of load factor is accepted as 0.40 and above.

Table 1: The Eigenvalue of scale factors, The number of items in the factor, Factor variances, Increasing variance value when factor added

Factors	Eigenvalue	Number of items	% Variance	% Cumulative Variance
1	7.207	10	25.739	25.739
2	3.168	3	11.313	37.051
3	1.839	2	6.567	43.618
4	1.805	1	6.446	50.064
5	1.631	4	5.827	55.891
6	1.386	1	4.950	60.840
7	1.255	1	4.481	65.321
8	1.127	2	4.026	69.347

Each factor is examined seperately below and % variance values are shown in Table 1.

Factor I: When the content of the questions under this factor are examined, it is seen that all of them are related to the characteristics of PBL application; therefore, this factor is called PBL Application. The value of load factor varies between 0.880 and 0.558.

Factor II: When the content of the questions under this factor are examined, it is seen that all of them are related to Research Project course in Field Education. Therefore, this factor is called The Effect of the Course. The value of load factor varies between 0.752 and 0.423.

Factor III: When the content of the questions under this factor are examined, it is seen that all of them are related to the characteristics of group work in PBL method, so the name of this factor is Characteristics of Group Work. The value of load factor varies between 0.833 and 0.775.

Factor IV: When the content of the questions under this factor are examined, it is seen that all of them are related to insufficient background of PBL application. For this reason, the name of this factor is Insufficient Background. The value of load factor is 0.689.

Factor V: When the content of the questions under this factor are examined, it is seen that all of them are related to the difficulties faced in PBL application period. Therefore, this factor is called Difficulties Faced in Application. The value of load factor varies between 0.714 and 0.485.

Factor VI: When the content of the questions under this factor are examined, it is seen that all of them are related to inadequacy of in-service training which the teacher candidates noticed in schools. Therefore, the name of this factor is the Need for In-service Training. The value of load factor is 0.670.

Factor VII: When the content of the questions under this factor are examined, it is seen that all of them are related to the need for prevocational training. For this reason, this factor is called the Importance of Prevocational Training. The value of load factor is 0.703.

Factor VIII: When the content of the questions under this factor are examined, it is seen that they emphasize the importance of field knowledge, so this factor is called Field knowledge. The value of load factor varies between 0.758 and 0.539. In order to find answers to the second and third questions of this study, the teacher candidates were asked three open-ended questions which aimed at finding how much Reseach Project in Field Education course contributed to them. The obtained data is shown in Table 2, Table 3 and Table 4.

Table 2. The difficulties that teacher candidates face in Research Project Course in Field Education and their distribution in %

Difficulties faced in the course	Teacher Candidate (%)
Determining a project topic and developing	32.39
Time management	30.98
Lack of information in terms of project process	26.76
Technological necessity and equipment supply	23.94
Problems in group work	11.26
Cost of the project	2.81

Table 3. The contribution of Reseach Project in Field Education course to the teacher candidates and their distribution in %

Contribution of the course to teacher candidates	Teacher Candidate (%)
Learning scientific research methods	53.52
Understanding PBL method	52.11
The rise in confidence when PBL is used	32.39
The effect of projects on permanence of learning	29.57
Perceiving the effect of group work on learning	21.12
The increase in the interest for doing and developing projects	21.12
Gaining the habit of studying systematically and regularly	11.26

Table 4. The reasons for feeling sufficient in project management for teacher candidates and the distribution of the reasons in %

The reasons for feeling sufficient in project management	Teacher Candidate (%)
Field knowledge sufficiency	28.16
Having a good command of PBL method	46.47
Having the skill to produce authentic project	19.72
Being interested in watching and understanding scientific developments	60.56
Being prone to group work	14.08

5. Conclusion And Suggestions

The purpose of this study was to determine the views of teacher candidates on using Project Based Learning method and possible difficulties they may encounter while using the method.

In the first part of the study, factor analysis was implemented to determine the views of teacher candidates on the use of PBL method.

When factor I is examined, it is seen that the opinions of teacher candidates focus on the application of PBL method. In PBL application, teacher candidates focused on branch teachers working in cooperation, their skills and abilities in using educational technology, the interest and motivation of students, the time spared for the course and attitude of parents (Balkı 2003, Demirhan 2002, Sezgin ve arkadaşları, 2002, Kaptan ve Korkmaz, 2002.). Factor II shows the effect of the course on teacher candidates. Teacher candidates stated that the course helped them to increase their confidence and knowledge while using the method. That the teacher candidates, being both students and people to apply the method, have confidence and knowledge is very important. Factor III demonstrates group work in the method. Here teacher candidates focused on the difficulties of group work, such as organizing the information problems, communication problems and discipline problems. They emphasized that if the difficulties are eliminated, group work, as (Yalçın, Büyükkasap, 2009) stated in their study, will help students to gain positive qualities and it will increase students' success level, interest in the course, problem solving skills and skills for applying their knowledge to new situations. Factor IV is background. Teacher candidates emphasized insufficiency in equipment and sources. The difficulties encountered in application are gathered under Factor V. The stated difficulties are related to group work and accessing information sources. Demirhan 2002, emphasized the importance of using cognitive tools in education such as computers, electronic equipment, etc. Factor VI is the need for in service training and Factor VII is the need for prevocational training. Önen, Mertoğlu, Saka, Gürdal 2010 in their study titled The Effect of In-Service Training on Teachers' Knowledge Related to Project and PBL and Their Sufficiency in Doing Projects state that Project and PBL should be taught teacher candidates not only in theory but also in practice. Field Knowledge is the last factor.

In the second part of the study, the teacher candidates were asked three open-ended questions which aimed at finding how much Reseach Project in Field Education course contributed to them. The teacher candidates' responses to the question "What are the difficulties you face while studying this course?" were evaluated and gathered under six titles. It is understood that the biggest difficulty for teacher candidates was determining a project topic and developing, and the other difficulties were, respectively, time management, lack of information in terms of project process, technological necessity and equipment supply, problems in group work and cost of the project. The reason

why teacher candidates had difficulties results from the fact that they didn't have any information about PBL and never prepared a project on a topic before they took Reseach Project course in Field Education.

The teacher candidates' responses to the question "What are the contributions of Reseach Project in Field Education course to you?" were evaluated and gathered under seven titles. It can be seen that the biggest contribution is learning PBL method and it is followed by understanding PBL method, the rise in confidence when this method is used, the effect of projects on permanence of learning, perceiving the effect of group work on learning, the increase in the interest for doing and developing projects and gaining the habit of studying systematically and regularly. The results are not surprising since teacher candidates are taught scientific research techniques, Project Based Learning method content and preparing a project in Research Project course in Field Education.

When teacher candidates' responses to the question "What are the reasons for feeling sufficient in Project management in your field?" were examined, nine of the teacher candidates stated that they think they are insufficient due to lack of knowledge related to process of the project. The teacher candidates who think that they are sufficient enough in Project management stated some reasons such as being interested in watching and understanding scientific developments, having a good command of PBL method, having the skill to produce authentic projects, being interested in watching and understanding scientific developments and being prone to group work.

The findings show clearly that Reseach Project in Field Education Course has great contributions to teacher candidates.

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