



## Teaching Project Management Using an Online Project Management Software: Implications for Student Satisfaction and Interaction



Erhan GÜNEŞ<sup>1</sup>

### ABSTRACT

This paper examines the implementation of an online Project management software (OPMS), in the context of teaching Project management, with 90 undergraduate students from two universities. The OPMS enabled students to interact, to go over the course content, to share files, to get timely feedback, to schedule their study, to discuss within or among study groups and to make use of other opportunities while learning via the web. The paper focused on the effects of this educational implementation, during four months, on student satisfaction and interaction. Both quantitative and qualitative data were collected and analyzed separately and the results regarding student satisfaction and interaction were presented and compared. Findings reveal that the implementation was found to be valuable in terms of facilitating student satisfaction, student-student interaction and student-teacher interaction.

**Keywords:** project management, online learning, satisfaction, interaction

### Proje Yönetimi Öğretiminde Çevrimiçi Proje Yönetimi Yazılımı Kullanılmasının Öğrenci Memnuniyeti ve Etkileşim Üzerindeki Etkileri

#### ÖZET

Bu çalışmada, iki üniversiteden 90 lisans öğrencisine çevrimiçi bir proje yönetim yazılımı üzerinden proje yönetimi eğitimi verilerek bu uygulamanın etkileri incelenmiştir. Web temelli bu yazılım üzerinden öğrencilere çevrimiçi etkileşim, ders içeriğine erişim, dosya paylaşımı, zamanında geribildirim alma, çalışma takvimi oluşturma, grup içi veya gruplar arası tartışmalar yapabilme vb. olanaklar sunulmuştur. Çalışmada dört ay süren bu uygulamanın öğrenci memnuniyeti ve etkileşim üzerindeki etkileri incelenmiştir. Süreçte nicel ve nitel veriler toplanarak ayrı ayrı analiz edilmiş ve analiz sonuçları ışığında öğrenci memnuniyeti ve etkileşime ilişkin bulgular sunularak karşılaştırılmıştır. Araştırma bulguları çevrimiçi proje yönetim yazılımı üzerinden gerçekleştirilen bu uygulamanın öğrenci memnuniyeti, öğrenci-öğrenci ve öğrenci-öğretim elemanı etkileşimi açılarından olumlu ve faydalı sonuçlar doğurduğunu ortaya koymuştur.

**Anahtar Kelimeler:** proje yönetimi, çevrimiçi öğrenme, memnuniyet, etkileşim

<sup>1</sup> Yrd.Doç.Dr., Ahi Evran Üniversitesi Eğitim Fakültesi, Bilgisayar ve Öğretim Teknolojileri Eğitimi, guneserhan@gmail.com

## 1. Introduction

Today, almost all of the universities support education with online learning environments. We can observe this effort through research or universities' educational implementations. Courses may be served totally online or as blended. In both cases, educational technologies and online learning environments come into prominence. Definitely it is important to make use of these technologies in educational environments, however, it is more important the way they are utilized. In other words, the main problem to be considered is if universities integrate them into education in the right way or not. It is obvious that this is not an easy question to be answered. Successful educational implementation samples in the educational technology literature seem to help researchers find out solutions related to education in order to solve this problem. Considering the rapidly changing technologies, universities should search for strategies in order to enhance the quality of online learning and integrating technology in course content and instruction (Rogerson-Revell, 2015).

In the 21<sup>st</sup> century, educational research focuses on integration of technology in teaching-learning processes considering how people learn, think, interact and communicate. By this way new technologies are effectively utilized for encouraging these processes (Ardaiz-Villanueva, Nicuesa-Chacón, Brene-Artazcoz, Sanz de Acedo Lizarraga & Sanz de Acedo Baquedano, 2011). Online education requires students to take on greater responsibility for their own learning. Instead of knowledge acquisition, today, learning needs interaction, participation, searching for information and group tasks (Brindley, Walti & Blaschke, 2009). Online communication tools gave students the opportunity to conduct any exchange of ideas (Neo & Neo, 2009). Opportunity for interaction is as important as access to course content (Brindley et al., 2009). In this point of view, online interaction and collaborative learning are important factors to be considered when designing online learning environments.

Teaching and learning via online learning environments remains as an issue on the agenda of researchers. Today, many factors such as student participation (Mazzolini & Maddison, 2003; Croxton, 2014; Michinov, Brunot, Le Bohec, Juhel & Delaval, 2011), satisfaction (Shen, Cho, Tsai & Marra, 2013; Kauffman, 2015), interaction (Tu & McIsaac, 2002; Cho & Kim, 2013; Woo & Reeves, 2014) and learning outcomes etc. are being studied on, in online learning context. Furthermore, many researchers already studied relationships among these variables in order to come up with solutions for better online learning outcomes (Croxton, 2014; Cole, Shelley & Swartz, 2014; Kuo, Walker, Belland, Schroder & Kuo, 2014).

According to Swan (2001), student satisfaction and perceived learning in asynchronous online learning are influenced by three main factors; clarity of design, interaction with instructors, and active discussion among learners. Findings related to these factors seem to be consistent to related literature. Garrison and Cleveland-Innes (2005) conducted a study which focused on online interaction, utilizing four online course designs, with seventy-five participants during a sixteen months period. They pointed out that design had a significant impact on interaction. In addition, they pointed out that structure and leadership should be taken into consideration for online interaction. They also mentioned the need for further research on qualitative nature of online interaction. Kauffman's (2015) review of predictive factors of student success in and satisfaction with online learning showed that there are many factors that affect student satisfaction and success in online learning. In addition Kauffman (2015) pointed out current challenges of designing online courses to meet students' needs or expectations. Sher's (2009) study focused on relationship of interaction variables with university students' learning and satisfaction in an online learning context. Findings of the

study indicated that interaction (student-student and student-teacher) was an important contributor of university students' learning and satisfaction.

A considerable amount of research define interaction as an essential issue to be considered for better learning outcomes in online learning environments (Kearsley, 2000; Kim et al., 2005; Moore, 1993; Northrup, 2001). Furthermore, as mentioned above, student satisfaction is closely related to interaction and learning in online learning. Considering these research, it can be argued that these variables are interrelated and should be taken into consideration together and there are robust research findings pointing out how online learning should be designed and implemented in general. However it must be taken into consideration that some principles, recommendations, equations or relationships may differ according to the teaching-learning context. In other words, learning content, learner characteristics or teaching methods specific to courses etc. become important when designing and implementing online courses. For this reason there is still need for research focusing on online learning environments and implementations in different subject areas or cases. By this way, detailed findings specific to various cases can be produced and research results may be utilized by practitioners for online learning implementations. In this point of view, this study focuses on teaching project management by an online project management software.

According to Ojiako, Ashleigh, Chipulu and Maguire (2011), the most significant components in learning project management specified by undergraduate students were found as transferable skills and virtual learning. At this point organization of information in online learning environments, providing high quality course contents and interaction opportunities for students seem to be important for learning. Duarte and Tennant Snyder (2001) draw attention to benefits of studying in virtual teams in project based learning. In addition they argue that learning process is more complex when the course is totally online and students study in teams. Rodriguez, Sicilia, Cuadrado-Gallego and Pfahl (2006) studied on e-learning in project management. According to the results of this study, using the e-learning system enhanced students' learning and interests notably. Köse (2010) utilized a web based system to support project-based learning process for vocational high school students. The system provided many interaction and work flow tools. According to the results, the web based system was found successful in terms of student achievement and satisfaction. Koh, Herring and Hew (2010) indicated that asynchronous online discussions in project based learning has the potential to support knowledge construction at advanced level. Also they recommended some guidelines for instructors to cope with challenges to promote learning.

The problem of this study is to examine the effects of an online project management education implementation, using an online project management software, on student satisfaction and interaction. Research questions can be listed as the following;

- What are the effects of the implementation on student satisfaction?
- What are the effects of the implementation on student-student and student-teacher interactions?

## **2. Method**

Convergent parallel mixed method design was utilized in this study. In this design, both quantitative and qualitative data are collected, they are analyzed separately, and the results are compared if the findings confirm or disconfirm each other (Creswell, 2013). The research focused on an implementation of project management education using an online project

management software. Student satisfaction and interaction were taken as the variables to be examined in this study. The implementation was conducted during a semester. Both quantitative and qualitative data regarding student satisfaction and interaction (student-student and student-teacher) were collected and then analyzed separately.

### **2.1. Online Project Management Software**

In order to provide course content and interaction (student-student and student-teacher), an online Project Management Software (OPMS) was used. This web based software was specific for developing group projects. Using the OPMS, students were able to;

- access course content
- interact asynchronously within group,
- share files,
- share ideas in forums,
- see announcements and guidelines,
- follow assignments,
- use the interactive calendar in order to schedule their project,
- get timely feedback from the teacher,
- search for information within group reports,
- manage time for group projects,
- upload and download group project reports, report drafts and other documents.

This software gave the students opportunity of using various types of asynchronous interaction. In addition, they were free to use any kind of synchronous interaction tools (Telephone call, Google Hangout, Skype etc.) according their group preferences. They were encouraged to use the OPMS and other synchronous interaction tools. A sample preview of the OPMS is given in Figure 1.

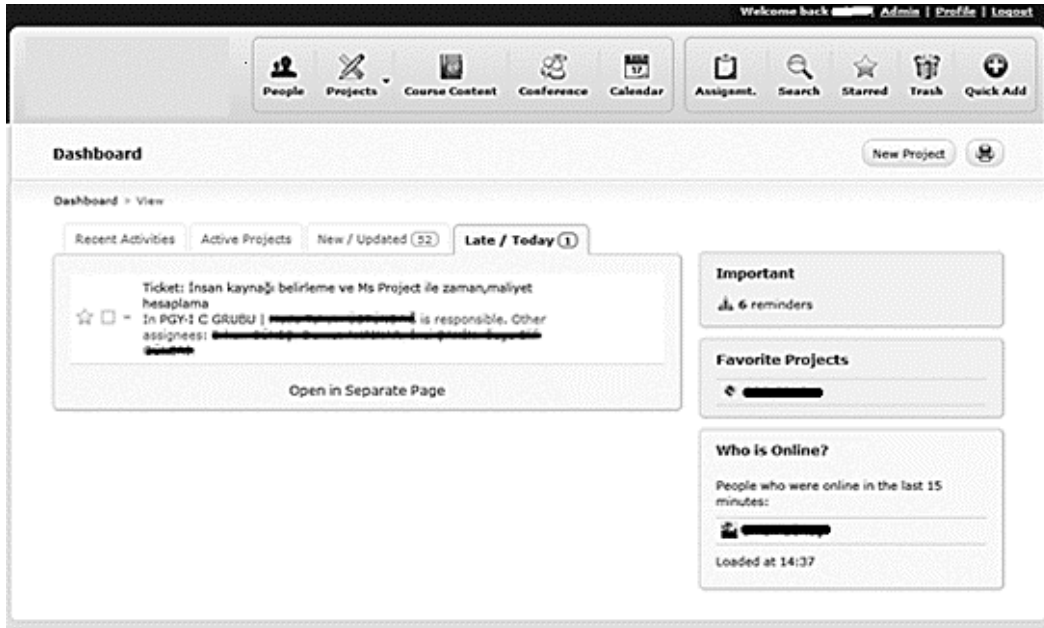


Figure 1. The initial screen of the OPMS

The OPMS was examined by two subject matter experts and an educational technologist before the implementation. Modules of the OPMS, usability and design factors were found to be sufficient by the experts. Furthermore, the OPMS was also tested by four undergraduate students. The students were given some specific tasks to be performed on the OPMS and they were observed when they were trying to perform these tasks. They did not experience any problem during this pre-implementation. Some little corrections were made on the OPMS according to the experts' and the students' feedback. By this way the OPMS was accepted as ready for the implementation.

## 2.2. Participants

The participants of this study were 90 students from the Computer Education and Instructional Technology Undergraduate Program. Students were from Gazi University (53 students) and Ahi Evran University (37 students) in Turkey. Thirty project groups, each of which had three members, were formed. The number of mixed groups was fifteen. Five groups were formed only with Ahi Evran University students and ten only with Gazi University students. Participants' distribution for project groups is given in Table 1.

Table 1. Participants' distribution for project groups

Group Type	Ahi Evran University	Gazi University	Total Number of students	Group quantity
Mixed	22	23	45	15
Simple	15	30	45	15

All of the participants had an experience of e-learning. In addition, they had been provided an orientation for using the OPMS at the beginning of the semester before the implementation. They were assumed to have basic digital literacy skills, because of the program they were enrolled.

### **2.3. Teaching - Learning Process**

Firstly students were taken into an orientation program related to usage of the OPMS and they were given passwords for signing in the OPMS. Subsequently, the OPMS gave them following information on the web:

- Course content: Project Development and Management course content was accessible on the system. Students were able to study anytime they wanted. The course content included basic information about project management, objectives, risks, time management, cost analysis, work breakdown structure and other subtitles in the course outline.
- Group numbers and group members: By this way, students were able to see who they would be studying with and what their group number was. Each project group consisted of 3 students.
- Instructions about the project proposal report: Each group were expected to submit a project proposal report at the end of the semester. Students were informed about deadlines, synchronous and asynchronous interaction opportunities, how to get feedback from the teacher and criteria for a well-done group project proposal.
- Group task description: A group project proposal template was given. This template included titles of the report and brief descriptions for each title about generally what was expected to be written under that title.
- Instructions about exactly what was expected from them: Weekly instructions, about what was expected from project groups and how to address these issues, were presented for students by the teacher.

Students studied in small groups of three during the semester. They used the OPMS to reach the course content, to interact within groups, with other groups and with the teacher. They participated in synchronous and asynchronous group discussions and they got timely feedback from the teacher whenever they wanted by using online interaction tools. They studied on weekly project development related tasks. Each group studied to finish a project proposal report regarding a project which they decided and designed, during the implementation period.

### **2.4. Data Collection Tools**

#### **2.4.1. Questionnaire**

A questionnaire was developed in order to collect data from participants towards student satisfaction, reasons of satisfaction level, interaction and experiences. This online questionnaire intended to collect both quantitative and qualitative data from participants. Two subject matter experts' revisions were taken into consideration in the design process of the questionnaire. It was conducted at the end of the implementation process. It can be

accepted as a limitation of this study that satisfaction and interaction were measured using this questionnaire and other ways given below. In other words, students' perceived interaction level/type/quality and (reasons of) satisfaction level were determined according to their answers, written comments and the system logs instead of using pre-developed scales.

Items of the questionnaire were as follows:

1. What is your satisfaction level of the learning process with OPMS?
2. Please write reasons of your satisfaction or dissatisfaction?
3. Do you think the project group study on OPMS was valuable for your learning?
4. If you were in a mixed group, there was at least one student from a different university you studied together in the same project group. How were you and your study effected by studying with others?
5. In which ways your project group interacted? Which synchronous interaction tools did you use?
6. How and why did you use OPMS?
7. Please evaluate OPMS in terms of its contribution to your interaction by giving a grade from 1 to 5.
8. Were teacher feedback and support sufficient for you?

#### **2.4.2. Participants' Written Comments**

During the teaching-learning process, students used asynchronous interaction opportunities in order to write their comments about the process, the OPMS and specific subjects related to their group project. These comments were valuable for the researcher for evaluating the process and the OPMS in terms of supporting the data derived from the questionnaire.

#### **2.4.3. System Logs**

All of the activities (forum messages, file sharing, following the content etc.) done on the OPMS by the students were logged and could be reported systematically by the OPMS. By this way, it was possible for the researcher to identify number of posts, number of files uploaded, number of questions etc. for each group.

#### **2.5. Data Analysis**

Qualitative and quantitative data were collected online during and at the end of the implementation. Quantitative data were analyzed using SPSS 20 (Statistical Package for the Social Sciences) software.

### **3. Findings**

#### **3.1. Findings Related to Satisfaction**

The questionnaire was used in order to collect data from participants towards student satisfaction and reasons of satisfaction level. Answers for the following three items of the questionnaire were taken into consideration for findings related to satisfaction:

- What is your satisfaction level of the learning process with OPMS?

- Please write reasons of your satisfaction or dissatisfaction?
- Do you think the project group study on OPMS was valuable for your learning?

Frequency distribution for satisfaction level of the participants is given in Table 2.

Table 2. Frequency Distribution for Satisfaction Level

Satisfaction level	n	Frequency
Very satisfied	27	30%
Satisfied	46	51%
Undecided	11	12%
Unsatisfied	6	7%
Very unsatisfied	0	0%
<b>Total</b>	90	100%

According to results of this data analysis, 81% (Very satisfied or satisfied) of the students were found to be satisfied with the teaching-learning process and the OPMS. It can be concluded that the teaching-learning process with OPMS was successful in terms of student satisfaction.

According to analysis results of qualitative data related to reasons of students' satisfaction, the most frequently expressed reasons for satisfaction can be summarized as following:

- The OPMS enabled them to interact easily with each other and to get timely feedback.
- Studying with others on the same project using online tools was found to be valuable in the real life context by students.
- It was a good experience for them to learn with a different method.

The most frequently expressed reasons for dissatisfaction can be summarized as following:

- Some technical and social difficulties were faced when trying to set up a group climate in order to study efficiently because students could not be able to study face to face.
- Some more time could be given because they were wanted to complete a project proposal report of good quality.

Lastly, when we consider the answers of the students for the third question; 83,6% of the students indicated that the implementation on OPMS was valuable for their learning. However, 10,9% of the students were found to be undecided and 5,5% of them did not find the implementation valuable for their learning. It can be inferred that this finding also supported the previous ones regarding student satisfaction mentioned above. Furthermore participants' written comments also supported this result.

### 3.2. Findings Related to Interaction

Answers for the following items of the questionnaire were taken into consideration for findings related to interaction:



- If you were in a mixed group, there was at least one student from a different university you studied together in the same project group. How were you and your study effected by studying with others?
- In which ways your project group interacted? Which synchronous interaction tools did you use?
- How and why did you use OPMS?
- Please evaluate OPMS in terms of its contribution to your interaction by giving a grade from 1 to 5.
- Were teacher feedback and support sufficient for you?

For the first question; only the students in mixed groups answered this questions. Their answers were coded in a context of qualitative data analysis. According to the students, the most important finding was that they did not face with problems when interacting within groups even if they were from different universities and they did not know each other before. Approximately 80% of the students indicated that online interaction tools helped them to set up a good group climate. However approximately 20% of the students, studying within mixed groups, pointed out some difficulties regarding effective group interaction at the beginning of the semester. They indicated that they would prefer studying with students they already knew. On the other hand, according to the system logs and participants' written comments, they seemed to overcome these problems in a short time. Approximately 78% of the students, from mixed groups, indicated that they enjoyed studying in a mixed group and found it valuable to exchange ideas with students from another university.

For the second question; above 90% of the students used Google+, Skype, Facebook, WhatsApp and telephone call for synchronous interaction. Google+ and Facebook were the tools they mostly preferred, because students were more familiar with them. The OPMS was used by all project groups for asynchronous interaction. Students' preferences of synchronous interaction tools varied, on the other hand only e-mail (for teacher feedback and for private messages within groups), was preferred as an asynchronous interaction tool. According to the participants' written comments, almost all of them were pleased to have the freedom to choose their synchronous interaction tools. The written comments clearly indicated that the freedom of choosing synchronous interaction tools was found to be pleasant and valuable by the students.

For the third question; according to the answers of the students, OPMS was primarily used for following the course content, interaction within groups or with other groups, following the instructions and sharing or submitting documents. These finding were compatible with the initial purpose of the OPMS. For this reason, it can be argued that all of the components of the OPMS were used intensely. Also system logs supported this finding, because all of the activities (forum messages, file sharing, following the content etc.) done on the OPMS were logged and could be reported systematically by the OPMS. All of the students were found to be active in terms of using the components of the OPMS. Participants' written comments indicated that the OPMS made it easy to manage their study and communication within or among groups. In addition they found this implementation flexible, enjoyable and different from previous ones they experienced before.

For the fourth question; the grades, from 1 to 5, given by the students for OPMS in terms of its contribution to their interaction were summarized in Table 3.

Table 3. Grades given by the students for the OPMS

Grade	n	Frequency
5	19	29,23 %
4	29	44,62 %
3	13	20,00 %
2	1	1,54 %
1	3	4,62 %
<b>Total</b>	<b>65</b>	<b>100 %</b>

Table 3 shows that 65 students answered this question. The average score for the OPMS was found as 3,92. It can be said that the OPMS was found to be valuable in terms of contribution to interaction. This finding was supported by the system logs. According to the system logs, almost all of the students actively engaged in learning activities using the components of the OPMS and all of the groups were in an intensive interaction. In addition, minimum number of group posts/messages only intending to get feedback from the teacher was 10 and the average was 14. At this point, teacher encouragement can be accepted as an important factor in terms of student engagement.

For the fifth question; according to the answers of the students, 89,1% of them found teacher feedback and support sufficient. However, 7,3% of the students were found to be undecided and 3,6% of them did not find the teacher feedback and support sufficient. As mentioned above, feedback were provided via the OPMS or e-mail. In order to give timely feedback or support, questions or requests of the groups were answered within 6 hours. Many of them were answered in a very short time because the teacher followed requests by connecting to the internet via mobile devices. It can be said that teacher feedback or support were found to be sufficient by the students. In addition the teacher sent messages to each group related to groups' current status of tasks every week.

#### 4. Results and Discussion

This study focus on an educational implementation (online learning) using an online project management system. Student satisfaction and interaction were the two variables focused on by the study.

According to the findings of the study, it can be concluded that the OPMS had a positive effect on student satisfaction. As an e-learning implementation, using such systems or tools can be valuable for student satisfaction. The OPMS provided course content, interaction tools, time schedules, guidelines, calendar and other sub-tools. For this reason, students could easily utilize them in their learning process without experiencing usability problems. Finding related to satisfaction did not differ according to the group type. Students studying in both of the groups (simple or mixed) represented high level of satisfaction in general. In real life contexts regarding project management, project personnel generally study in groups consisting of participants from different organizations and they may have not the opportunity of face to face interaction. For this reason, this implementation showed that students can be satisfied with learning online, studying with people from different universities if they have sufficient interaction opportunities. Students' comments regarding the OPMS and the implementation showed that they need enough time to set a good group climate. Considering the characteristics of the OPMS in terms of group structure, design and principles, these

findings can be accepted as coherent with previous research (Brindley et al., 2009; Cole et al., 2014). Previous research were taken into consideration in designing the implementation of the study, for this reason results of the study regarding satisfaction seem to be the same as expected at the beginning of the implementation and coherent with previous research findings. It can be said that an online learning environment should provide students with many kinds of interaction tools, e-content and flexibility as proposed by many research findings (Croxtton, 2014; Kim et al., 2005) in order to achieve high level of student satisfaction.

According to the findings of the study, it can be concluded that the OPMS had a positive effect on student-student and student-teacher interaction. Both system logs, students' written comments and the analysis results of the data derived by the questionnaire presented that utilizing asynchronous interaction opportunities and synchronous interaction tools, which students' preferred, together and coherent made positive effect on students' perceived interaction quality. Furthermore, student participation, perceived needs and the way students utilize these tools are important factors to be considered in order to receive a high level of interaction quality. Previous research also mention some critical variables (student participation, self-regulation, flexibility etc.) related with interaction in online learning environments (Kuo et al., 2014; Liaw & Huang, 2013; Ke & Kwak, 2013).

In this manner, results of the study regarding interaction can be accepted as coherent with previous research findings. In addition interaction in online learning environments should be studied on in a comprehensive manner. Because online interaction is closely related with many critical variables such as design, satisfaction, participation, social and cognitive presence etc. That is why future research may deeply focus on relationships among these variables in a comprehensive manner, by considering as many variables as possible together, in order to come up with better solutions towards problems in online learning implementations.

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