ATTITUDES AND PERCEPTIONS OF PEDAGOGICAL FORMATION PHYSICAL EDUCATION STUDENTS ABOUT WEB 2.0 TOOLS AND FACTORS FOR SUCCESSFUL ADAPTATION OF THESE TOOLS

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Abstract:
Today, use of the Web 2.0 technologies and applications (e.g. text messaging, wikis, personal web pages, social networks, blogs) in many different areas of education have been increasing, and this can be seen as an important development. However, teaching candidates from specific subject matters, such as physical education, still appear unaware of the potential benefits of such tools in a teaching and learning environment. The purpose of this study was to assess pre-service teachers' perceptions about Web 2.0 technologies and to explore the awareness of this technology among students using the Technology Acceptance Modal (TAM). In this context, the descriptive survey method was used and a questionnaire was applied to 79 pre-service students (53 male and 26 female) enrolled in the physical education department in Dokuz Eylul University. The data for this study was collected by the researcher through a questionnaire after 2017-2018 fall semester of the course including weekly web 2.0 activities based on the lesson topic. The results of the study indicate that gender was an important factor that affected the implementation or use of this technology. Accordingly, male students had higher levels of awareness about web 2.0 applications than female students had. The study also showed that usefulness and ease-of-use are two significant factors that affect students' attitude towards this technology.

Keywords: web 2.0, physical education, technology integration, perceptions

1. Introduction

The most significant issue facing the field of education is the teachers' acceptance of new technologies in their teaching and learning environment. The Horizon Report, published in 2017 indicates that through the new trends in educational technology, it is essential to provide flexibility in course materials and course delivery because teachers

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decide to use and accept these materials or technologies based on their usability (The Horizon Report, 2017). As a part of this generation's technological tools, Web 2.0 technologies have been used by many educators who want to create two-way communication (the user taking two roles: reading and writing) between users and applications. Web 2.0 tools can also be used by teachers to emphasis the 21st century skills that students should gain. Teachers know that the lessons of today are not merely for teaching students academic content knowledge but are also a way to develop skills such as group work, problem solving, critical thinking, and technology literacy.

Basically, Web 2.0 can be defined as a new concept and trend allowing users to create and upload content, to share their thoughts with easily customizing web sites, and to collaborate with others on user-generated content (Genç, 2010). Although Web 2.0 includes many types of tools, the basic properties of these tools are social interaction, collaboration, and sharing. Web 2.0 applications mainly help users by facilitating their interaction with other users, as seen in the examples of discussion boards, Animato, Prezi, WordPress, Google Drive, Blogs, Wiki space, and social media websites. Though the application richness in Web 2.0, many schools try to incorporate these tools into the lesson plans that enable students to create and publish content, make comments, share files, and re-use and remodify the content, allowing students to participate in a collaborative environment that facilitates learning in many ways (Quadri, 2015).

Many researchers have concluded that Web 2.0 has the potential to change education by supporting individual learning and providing students many tools to collaborate with each other (Hsu and at al., 2014). According to Exter and et al. (2012), these online applications are also used in education to give students a chance to take a role in their learning by creating content, providing social interaction with comments and likes, and developing a deeper understanding of the material they engage with. Web 2.0 can be seen as a new stage of internet technology that users interact with as a part of daily life as well as in their teaching and learning processes.

Although there are many studies indicating the importance of using these tools for facilitating learning and teaching in schools (Chapman & King, 2009; Wesch, 2009), teachers generally have some limitations on their knowledge, use, and acceptance of these technologies (Hao and Lea, 2015). In addition to these, there are studies indicating the importance of defining teacher characteristics and their concern levels over the integration of Web 2.0 tools in learning. According to Hao and Lea (2015), teachers have a significant level of concern, especially in the information stage as well as in the personal and management stages when using these tools. The study also indicated that most of teachers who participated in the study said they had little or no knowledge about integration of these tools in students' activity. Simkins and Shultz (2010) also discussed the obstacles teachers encounter during the classroom applications of Web 2.0. The researchers found that teachers perceived Web 2.0 as having great potential in publishing, authoring, file sharing, and blogging. Results also indicated that teachers need development programs that support them in the implementation process and through technical issues related to web based activities and web based learning.

The findings of this study may determine how Web 2.0 tools are perceived by students studying in the field of physical education and may contribute towards revealing which factors are effective in the adaptation of these tools for the teaching and learning processes.

In this study, perceptions and attitudes over the pedagogical formation of students towards web 2.0 technologies were examined through a survey instrument involving questions about their demographic information and a questionnaire exploring their Web 2.0 awareness. In addition to this, the study also aimed to define important factors in the adaptation of Web 2.0 applications based on Technology Acceptance Modal (TAM).

2. Theoretical Modal and Research Questions

Different models and theories have been available to examine the diffusion, acceptance, and adaptation of new innovations. Some of them focus on the individual's intention decision process (Davis, 1989) and others focus on the features of a new technology and its diffusion among the users (Moore & Benbasat, 1991; Rogers, 2000). For this study, the Technology Acceptance Modal (TAM) was selected as the theoretical framework to consider the decision-making process of individuals when using a new innovation. TAM is one of the most well-known and widely accepted theories to study users' system acceptance behavior. TAM was developed by Davis (1989) and its simplest version includes only two factors (ease of use and perceived usefulness) and then it is modified by adding a new factor - attitude - to understand the relationship between ease of use, perceived usefulness, attitude, and intention to use in order to explain the behavior. According to the TAM modal, a person's action can be predicted from a number of variables, which includes three domains: perceived ease of use, perceived usefulness, and attitude. perceived ease of use is defined by Davis (1989) as "*the degree to which a person believes that using a particular system would be free of effort*" (p.320), while perceived usefulness is "*the degree to which a person believes that using a particular system will enhance job performance*" (p.320). Attitude can be defined simply as the degree of positive and negative feeling to which a person performs a target behavior.

Figure 1 below shows the relationships between the constructs proposed by TAM and the use of actual system. As can be seen from the pattern, there are two casual relationships among three factors: one of them is that the perceived ease of use predicts perceived usefulness, which in turn results in the intention to use. The other one is that perceived usefulness and perceived ease of use predicts attitude and that results in intention to use. This pattern was also used to answer one of the research questions based on the specifics elements of the TAM that will be listed in the next part.
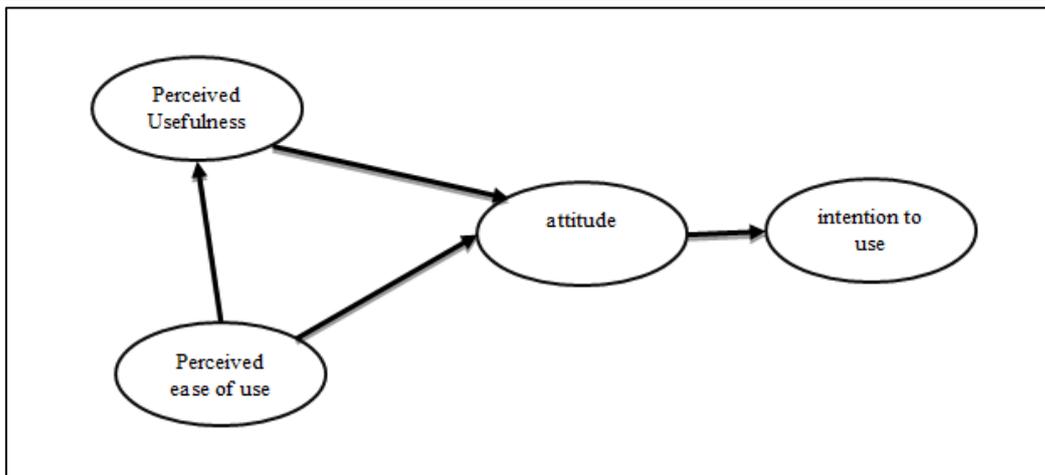
Figure 1: Research Modal

     The following research questions were used to explore the relationship between the elements of TAM and to examine the perceptions of pre-service teachers about the use of Web 2.0 in education.

1. Is there any statistically significant difference among pre-service teachers' perceptions to Web 2.0 tools in terms of their gender, daily computer use, prior knowledge, and future use?
2. What are the relationships among elements of TAM?
   - Is there a positive association between perceived usefulness and ease of use?
   - Is there a positive association between perceived usefulness and attitude?
   - Is there a positive association between perceived ease of use and attitude?

2. Method

A descriptive-quantitative research design was used in this study to get information from the students in the department of physical education, in order to reach a general conclusion about students' perceptions of Web 2.0 applications and to define the factors affecting usage of these tools.

2.1 Settings

The study was conducted at Dokuz Eylul University during fall semester of 2017-2018. Pre-service pedagogical formation students, taking a teacher education course named "instructional technology and material development" participated the study. The aim of the course is to give pedagogical education related to the theory and practice of technology to the students who graduated from undergraduates programs where they did not study education. In addition, the course aims to introduce new technological tools to students and to help them to integrate these tools into their teaching and learning environment. As a part of the course, students were asked to present on one of the web 2.0 technologies (e.g., wikis, blogs, social bookmarking, social networking, and media sharing) of their choosing. Before the presentation, in order to learn a theoretical background of using Web 2.0 in education, and to learn how to use this knowledge to

create instructional materials, participants in the course and the researcher worked on the different Web 2.0 examples created by teachers or other students.

2.2 Participants

A total of 79 pre-service physical education students participated in the study voluntarily with an online survey. There were 53 males and 26 females. The majority of the students (n=69) had a personal computer and rated themselves as "very comfortable" (45%) or "comfortable" (%42) with computers. Fallowing table presents more information about the subjects.

These teacher students have graduated from physical education department in different universities in Turkey, especially the western part of the county, and are now taking one-semester courses to receive their diploma in education to be a teacher in public elementary schools.

Table 1: Characteristics of Participants

	Frequency (N)	Percentage (%)
Gender		
Male	53	66
Female	26	33
Having a personal Computer		
Yes	11	14
No	68	86
Daily Computer Use		
Less than 2 hours	29	37
Between 3-5 hours	30	38
More than 5 hours	20	25
Prior knowledge		
No idea	24	30
Limited	26	33
Much	29	34

2.3 Instrument

The survey instrument consisted of three sections. The first section included the questions about general demographic information of the participants, such as gender, comfort level with computers, daily computer use, and age. The second section included one question with seven multiple choice answers about participants' current Web 2.0 usages. The third section of survey was a questionnaire including 11 statements regarding the perceptions of participants about Web 2.0 tools. The statements were used to examine pre-service teachers' views were selected from a 5-point Likert scale developed by Ajjan and Hartshorne (2008) and adapted for this study and the Awareness of Web 2.0 Scale (AWS), including four factors for the study: compatibility, ease of use, perceived usefulness, and attitude. Turkish version of the scale was reviewed by two researchers in field of education for content validity. The reliability of each factor in the original article ranged from 0.90 to 0.94 (Ajjan and Hartshorne, 2008). For this study the Cronbach alpha values for the factors was calculated 0.81, 0.72, 0.76, and 0.91 for compatibility, ease of use, perceived usefulness, and attitude respectively.

According to the value obtained from the reliability analysis, there is a high reliable construct (Hinton et al., 2004).

2.4 Data Collection and Analysis

All student teachers in the course was asked to anonymously and voluntarily complete an online survey including demographic information, prior knowledge about Web 2.0 before the course, several web 2.0 technologies that they may use for future lectures, and finally a questionnaire including 11 statements based on the three factors of TAM modal: perceived usefulness, attitude, and perceived ease of use. Of the class, 79 students completed the survey after the conclusion of web 2.0 project and weekly assignments during the course. In order to get students' real experiences and perceptions regarding Web 2.0 technologies, students was asked to participate in the study only if they wanted to share their ideas about this technology. Considering security and privacy issues, a google document was used to create the survey, which is only available with a specific link, does not require any email or indicator, and gives one chance for each student to fill out. In addition, participants of the study were asked to not identify themselves on any part of the survey.

For data analysis, various techniques were used, including descriptive analysis (e.g., means, standard deviations, and percentiles), univariate and multivariate analysis to examine the mean difference on Web 2.0 usage related to gender, daily computer use, and age, and correlational analysis was used to see the relationship between factors of TAM: perceived usefulness, perceived ease of use, and attitude. SPSS 22 for windows was used for all of these statistical procedures.

3. Results

3.1 Research Question 1

The aim of this research question is to see the difference between the perceptions of pre-service teachers about web 2.0 tools based on their demographic information; gender, daily computer use, prior knowledge, and future use. To answer this research question, descriptive statistics for demographic information and interpretive statistics for the relationship between dependent and independent variables were used. Before reporting the result of the statistics, assumptions of independent sample t-test and ANOVA including Normality, Homogeneity of variances, and Independence of samples were checked to see if any violation had occurred, and no assumptions were found to be in serious violation.

The table below shows descriptive information about pre-service teachers' awareness toward Web 2.0 tools with different factors, which are ease of use, compatibility, attitude and perceived usefulness. As seen from the table, pre-service students generally do not feel that these tools are totally compatible with their teaching style (Compatibility, M=2.70), however they are also have positive attitude towards these web 2.0 technologies (Attitude, M=3.04).

Table 2: Pre-Service Teachers' Awareness towards Web 2.0 Tools

	N	M	Std.
Ease of use			
I feel that using Web 2.0 will be easy	79	3.08	0.66
I feel that using Web 2.0 will be easy to incorporate in my classroom environment	79	3.07	0.61
Average	79	3.08	0.52
Compatibility			
Using Web 2.0 technologies are compatible with the way I teach	79	2.92	0.65
Using Web 2.0 technologies fit well with the way I teach	79	2.48	0.71
Average	79	2.70	0.59
Attitude			
Web 2.0 is useful in my teaching	79	3.20	0.56
Using Web 2.0 is a good idea	79	3.10	0.70
The advantage of using Web 2.0 outweighs the disadvantages of not using it	79	2.80	0.92
Average	79	3.09	0.54
Perceived usefulness			
I feel that using Web 2.0 will improve students' grades	79	2.79	0.72
I feel that using Web 2.0 will help my students learn more about the subject	79	3.12	0.72
I feel that using Web 2.0 will improve students' satisfaction with the course	79	3,16	0.72
To help my students better learn the material, I will incorporate Web 2.0 technologies in the classroom	79	2.97	0.69
Average	79	3.01	0.63

An independent sample t-test was conducted to determine the difference between male and female students' attitudes scores. Results are summarized in Table 1. When the table was analyzed, pedagogic formation students' web 2.0 attitude score averages were significant for all factors in terms of gender as "ease of use" [t(77) = 2.91, p=0.005], "compatibility" [t(77) = 3.55, p=0.000], "attitude" [t(77) = 3.72, p=0.000], and "Perceived usefulness" [t(77) = 4.12, p=0.000] respectively. Additionally, in all factors, it was determined that male participants' web 2.0 tool awareness scores were higher than female participants' scores.

Table 3: Web 2.0 Tool Awareness Score Average, Standard Deviation
and t-test Scores for Gender

Sub-dimensions	Gender	n	Mean	s.d.	t
Ease of use	Male	53	3.19	.52	**2.91***
	Female	26	2.84	.46	
Compatibility	Male	53	2.85	.54	**3.55***
	Female	26	2.38	.57	
Attitude	Male	53	3.19	.50	**3.72****
	Female	26	2.74	.50	
Perceived Usefulness	Male	53	3.20	.41	**4.12***
	Female	26	2.63	.81	
* p<0.01, ** p< 0.000					

To determine whether students' daily computer use, prior knowledge about web 2.0 tools and future use conditions caused a difference between scale scores, a one-way ANOVA test was applied, and results of this test are summarized below.

Table 4: Students' Attitude Scores and ANOVA Test Results for Different Variables

| | The Awareness of Web 2.0 | | | | | | | | | | | |
| | Ease of use | | | Compatibility | | | Attitude | | | Perceived usefulness | | |
Independent Variables	N	X	F	n	x	F	n	x	F	n	x	F
Daily computer use			0.79			0.12			0.91			**9.49***
<3 hours	29	3.00		29	2.67		29	3.00		29	2.92	
3-5 hours	30	3.12		30	2.73		30	3.12		30	3.23	
>5 hours	20	3.21		20	2.64		20	2.85		20	2.25	
Prior knowledge			1.78			**3.37****			0.72			1.50
No idea	24	3.25		24	2.95		24	3.11		24	3.18	
Limited	26	3.00		26	2.57		26	3.05		26	3.00	
Much	29	3.01		29	2.60		29	2.98		29	2.88	
Use in Future			**28.2***			**6.32***			**12.9***			**12.3***
Definitely Yes	25	3.54		25	2.98		25	3.44		25	3.41	
Yes	28	3.03		28	2.71		28	2.92		28	3.01	
No	26	2.69		26	2.42		26	2.79		26	2.63	

* $p<0.000$, ** $p< 0.05$

The table shows that according to the daily computer usage of formation students, there was only a statistical difference for "Perceived usefulness" sub-dimension when difference between scale scores were considered [$f(2,76) = 9.59$, $p=0.000$]. Post-hoc analysis to determine which sub-dimensions caused this difference showed that there was difference in "perceived benefit" sub-dimension scores of students' with 3-5 hours daily computer use ($p=.000<0.05$) and less than 2 hours ($p=0.016,<0.05$).

When formation students' web 2.0 tool awareness score was evaluated for prior knowledge, there was a difference in only "Compatibility" sub-dimension [$f(2,76) = 3.37$, $p=0.03$]. According to post-hoc analysis results, this difference was between "no idea" and "limited".

Lastly, when the effect of students' answers whether to use these tools in the future on awareness average scores, statistically significant difference was found in all sub-dimensions. "ease of use" [$f(2,76) = 28.21$, $p=0.000$], "compatibility" [$f(2,76) = 6.32$, $p=0.003$], "attitude" [$f(2,76) = 12.92$, $p=0.000$], and "Perceived usefulness" [$f(2,76) = 12.38$, $p=0.000$] respectively. As it can be seen from the table, in all sub-dimensions, students' scale awareness score with "definitely yes" answer was higher than "yes" and scores of "yes" group were higher than "no" group. Post-hoc analysis to determine which sub-dimensions caused this difference showed statistically significant difference in all sub-dimensions of the independent variable.

3.2 Research Question 2

The purpose of this research question was to determine students' web 2.0 tool usage conditions through the TAM model. First, a SPPS bivariate correlation analysis was conducted to determine the relationship between factors according to model. Additionally, a regression analysis was conducted to determine how much one factor explained which relationship. Necessary assumptions were controlled for both analysis and there was no significant violation.

According to model, 3 separate regression analysis were applied to determine the relationship between identified structures. The first analysis was applied to test the

predictor ease of use and dependent variable attitude. As a result of the analysis, the model was found to be statistically significant with 0.333 adjusted R Square value (f (1,77) = 40.49, p <0.000). Standardized coefficient between two variables was statistically significant (β = .608, *p* < .000) (Table 3, Regression No 1).

Table 5: Model Results of Regression Analysis

Regression	Predictors	Dep. Variable	R	R. Square	Adjusted R Square	F Value	Sig.
1	Ease of Use	Attitude	.587	.345	**.336**	40.49	.000*
2	Perceived Usefulness	Attitude	.533	.284	**.275**	30.574	.000*
3	Perceived Ease of Use	Perceived Usefulness	.606	.368	**.359**	44.748	.000*
* p< 0.000							

The second analysis was applied to test the relationship between perceived usefulness (predictor) and attitude (dependent variable). According to findings obtained from these analysis, model was significant with 0.275 Adjusted R Square value (f (1,77) = 30.57, p <0.000). Standardized coefficient between two variables was statistically significant (β = .533, *p* < .000) (Table 3, Regression No 2).

Third analysis was applied to test the relationship between perceived ease of use (predictor) and Perceived Usefulness (dependent variable). According to findings obtained from these analysis, model was significant with 359 Adjusted R Square value (f (1,77) = 44.74, p <0.000). Standardized coefficient between variables was statistically significant (β = .533, *p* < .000) (Table 3, Regression No 3).
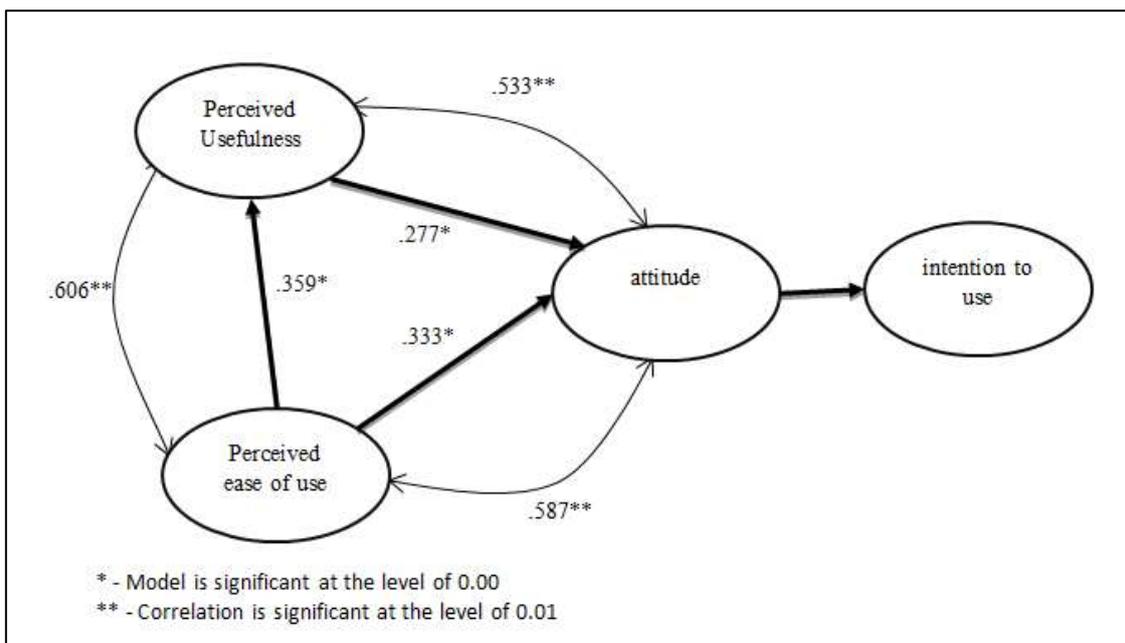

Figure 2: Research Findings According to TAM Model

4. Discussion

The purpose of this study was to analyze physics teaching students' Web 2.0 technology awareness levels for compatibility, attitude, perceived ease of use, and perceived usefulness titles and to analyze intention of use of these tools in their future classes.

The first research question investigated students' awareness level for Web 2.0 by using different variables. According to the obtained data, female and male students evaluated Web 2.0 technologies significantly different. Findings obtained from this scale showed that males were more positive in the scale and in all sub-dimensions compared to females in terms of compatibility, attitude, perceived usefulness, perceived ease of use and results were both high and significant for males for all dimensions. Similarly, another study conducted by Huang et al. (2013) found similar findings and expressed that females were more anxious, challenged, and unwilling to use these technologies when compared to men. Reason for this situation as stated by Ahuja (2002) was male domination in these technologies (software and internet-based applications).

Another important finding of this study was the low score of prospective physics teachers in compatibility factor regardless of gender. Prospective teachers expressed that these technologies are less suitable with their teaching and education strategies. These results were similar with Sadaf et al. (2012) who worked found that prospective teachers experience challenges in including these technologies into their classes although they believed this technology has ease of use. Similarly, Ajjan and Hartshorne (2008) showed that compatibility played an important role in prospective teachers' positive attitude towards Web 2.0 tools.

This study also investigated whether daily internet use and prior knowledge about Web 2.0 tools made a difference on web 2.0 technology awareness. However, it was determined that both variables caused no difference. Although literature showed that students' not seeing these technologies was a reason not to use these tools effectively (Albion, 2008; Moore & Chae, 2007), the findings of this study proved the opposite. Accordingly, it was seen that students with prior engagement with these tools showed a more negative attitude.

On the other hand, students who expressed that they would use this technology in the future had higher awareness level. In this study, it was expressed that these students found these tools easy, beneficial and suitable for both themselves and their students' learning and teaching processes. Similar results were obtained by Sadaf et al. (2012). Accordingly, students who expressed to use this technology in the future stated that this technology will better support their students' learning processes.

In the second research question, the factors that affected students Web 2.0 tool use were examined with the TAM model. Based on experimental findings, it is clear that the ease of use plays an important role in forming an attitude towards these tools. Additionally, it was found that ease of use has a significant effect on perceived benefit towards these tools. There is supporting evidence in the literature. Accordingly, Vijayasarathy (2004) stated that ease of use especially played an important role in

adapting to certain technologies. Additionally, correlation analysis showed a strong relationship between ease of use and perceived usefulness and attitude.

Results in Figure 2 also showed that ease of use has relatively less effect than usefulness when forming an attitude towards Web 2.0 tools. Dwivedi et al. (2011) investigated factors effecting successful adaptation of Web 2.0 tools found similar results. This study found that in integration of Web 2.0 tools, usefulness was less effective than ease of use in terms of behavioral intention.

5. Conclusion

Today, it is inevitable to commonly use technology in education. Accordingly, it is becoming more important to understand technology, pedagogy and content information and interaction of these factors in teacher education. There are numerous studies that show teachers' technology knowledge and attitude and teachers' important role in technology use (Hew and Brush 2007; Usluel, Mumcu-Kuşkaya, and Demiraslan 2007; Yusop 2015). Franklin and van Harmelen (2007) determined that Web 2.0 technologies is highly attractive for students, offered them more independent and personalized environment, ensured more cooperation and thus, increased pedagogic effect. On the other hand, Hao and Lee (2015a) stated that teachers had little information about how to use these tools in technology integration and this led teachers to show negative attitude towards these tools. Morris (2011) also expressed that teachers must understand the importance of both web 2.0 and web 3.0 as Semantic Web fully penetrate to education in future generations, students can only be prepared this way. In this sense, Koehler and Mishra (2005) defined the relationship between technology and pedagogy as using technology's purpose to create more content for teachers and teachers' duty was effectively using this content. Based on the findings obtained as a result of this study, it was seen that ease of use and usefulness affected prospective teachers' attitude towards technology i.e. including these technological practices to their classes.

As a result, as suggested by Technology acceptance Model (TAM) developed by Davis (1989) perceived usefulness and ease of use are the most important determinatives for the real use of the system and they have critical importance for teachers. Therefore, developers of these tools must correct existing problems and consider these two properties in new future technologies. Additionally, when female and male students' attitude difference towards technology was considered, it is important to include women to development of these applications.

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