The Relationship between Educational Ideologies and Technology Acceptance in Pre-service Teachers

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ABSTRACT

After the evaluation of numerous technology integration programs in school districts and universities, it is recognized that the existence of technology does not guarantee its utilization in the classroom environment. Although many models and theories have tried to explain the contributing factors in technology acceptance, most of the models and theories have focused on technology-related factors. This study focused on educational ideology, a factor not related to technology that also affects decisions in terms of educational applications. Based on the literature review, we hypothesized a new model of technology acceptance which includes educational ideology as an external factor. We attempted to create a model that was compatible with our hypothesized model by collecting data from surveys completed by 320 pre-service teachers. Structural Equation Modeling was employed to create the path analytic model. The variables used in the path analytic model were the components of the original Technology Acceptance Model and six different educational ideologies. The results showed that the new model was consistent with the hypothesized model. Therefore, the results illustrate that different educational ideologies may have different effects on teachers' technology acceptance.

Keywords

Educational Ideologies; Technology Acceptance; Technology Adoption, Teacher Education

Introduction

With the swift advent of technology in previous decades, Information and Communication Technologies (ICT) have pervaded the workplace and fostered modern corporations along with providing governments with a proficient infrastructure. Besides these dramatic changes in many aspects of society, education remained by and large a traditional craft (Perkins 1992, p.3).. According to Strommen (1992), "technological changes that affected society left educational systems largely unchanged" (as cited in Semple, 2000, p. 21). Since the users are imperative and have played a major role in the utilization of technology, factors affecting their technology use became an important concern for researchers. This is because merely the existence of technology in the classroom does not guarantee the utilization of that technology. Teachers are less likely to integrate technology into their instruction unless they accept the notion of the requirement of educational technology use in their classroom environment. (Stetheimer and Cleveland, 1998; Weiss, 1994). The central questions with regard to technology acceptance are how individuals perceive technology and which factors contribute to the lack of utilization (Rogers, 1995; Surry, 2000).

Technology Acceptance

It is commonly accepted that today's teachers may benefit from educational technology to a great extent. Therefore, failure in the usage or acceptance of technology is an important issue. At this point, it is necessary to define the term 'technology acceptance' to determine the factors affecting the actual use of educational technology in the classroom environment. Davis, Bagozzi and Warshaw (1989) defined significant factors affecting technology acceptance in their Technology Acceptance Model (TAM). The TAM stems from behavioral theory, and is a well-known model that has undergone significant developments since its conception. A substantial number of factors have been added to TAM as possible significant determinants of technology use. However, only some of the factors remained as major determinants of technology use. In order to understand the rationale in the TAM model, it is necessary to mention the supporting theories.

One of these behavioral theories is the Social Cognitive Theory (SCT) (Bandura, 1986). The SCT outlines three reciprocal factors, the person, behavior, and the environment and explains the relationship among these factors. In this reciprocity, personal and environmental factors affect behavior and vice versa. SCT mentions two different channels, outcome expectation and self-efficacy, between the two factors, the person and behavior. According to this theory, people ask two questions before behaving, 'Can I do it?' and 'Should I do it?' If they believe that they are able to perform the behavior and also if they will attain good outcomes afterwards, they are in close proximity to perform. Although the SCT model showed how the two main factors, outcome expectation and self-efficacy, affected behavior, attitudinal factors were left unmentioned. In 1975, Fishbein and Ajzen produced the Theory of Reasoned Action (TRA) by focusing on attitudinal factors on behavior. TRA posited behavioral intention as a measure of one's intention to perform a specific behavior and represented the primary predictor of actual behavior (as cited in Brosnan, 1999). Therefore, according to TRA, self-efficacy and outcome expectation does not directly affect the actual behavior; however, it affects behavioral intention. In 1988, the TRA model was modified and the theory was changed to the Theory of Planned Behavior (TPB). According to the TPB, behavior is influenced solely by behavioral intention and behavioral intention in turn is influenced by attitudes toward behavior, by subjective norms and by perceived behavioral control (Bajaj and Nidumolu, 1998).

Finally, in 1989, Davis, Bagozzi and Warshaw defined a model, named the "Technology Acceptance Model" (TAM) which covers some significant factors affecting the use of technology (Davis et al., 1989). Similar to the TRA, the TAM explained how one primary factor, the behavioral intention to use, affected actual system use. Although the behavioral intention to use is the only factor related to actual system use, recent studies confirmed that this is only a mediating factor - a hypothetical factor and not used in most of the studies. Corresponding to the TPB, the TAM explains attitudinal factors affecting the behavioral intention to use focusing on the factor, attitudes towards the use of technology. In addition, similar to the SCT, the TAM demonstrates the effects of self-efficacy and outcome expectation on attitudes toward use of technology. The TAM defined self-efficacy and outcome expectation factors as the perceived ease of use of technology and perceived usefulness of technology which are related to self-efficacy and outcome expectation. In TAM, all other factors related to technology acceptance are called external variables.

In summary, technology acceptance is related to four main factors: the perceived ease of use of technology; the perceived usefulness of technology; the attitudes toward the use of technology; and the frequency of use of technology. For instance, if people perceive that technology is easy to use and useful in their field, this builds positive attitudes toward the use of that technology. Positive attitudes toward the use of technology have a positive relationship with the behavioral intention to use the technology. In this sense, four main factors of the TAM, shown in Figure 1, have been used as major determinants of technology acceptance in this study.
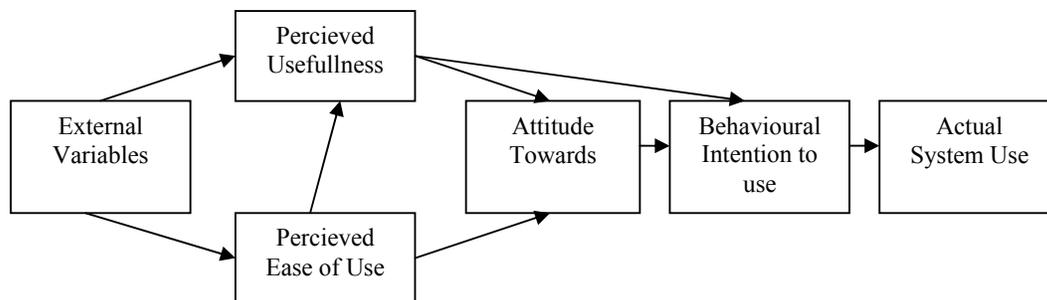

Figure 1. Original Technology Acceptance Model (Source: Legris et. al., 2003)

Thus far, many external variables have been tested in the model and few studies have explained more than 40% of the variance in technology use (Legris, Ingham & Collerette 2003). In addition, Legris, Ingham and Collerette stated that "TAM is a useful model, but has to be integrated into a broader model which would include variables related to both human and social change processes, and to the adoption of the innovation model" (p.191). In accordance with this claim, the main question of this study was "which factors influence the decision directly or indirectly". This study suggests that educational ideology may affect one's decisions directly or indirectly, since every individual has a belief system.

Educational Ideologies

Educational ideologies are rooted in political ideologies and affect decisions related to education. In 1981, William F. O'Neill grouped educational ideologies into six different groups under two main categories. O'Neill categorized these ideologies as conservative and liberal educational ideologies with three subgroups for each category. The conservative educational ideologies are educational fundamentalism, educational intellectualism, and educational conservatism. The liberal educational ideologies are educational liberalism, educational liberationism, and educational anarchism. O'Neill (1990) mentioned that educational ideologies have an impact on individuals' beliefs with regard to the overall goals of education, the objectives of the school, the child as a learner, administration and control, the nature of the curriculum, instructional methods and evaluation and classroom control. However, O'Neill did not mention the effects of educational ideologies on the acceptance of educational technology. At this point, it would be beneficial to delineate what educational ideologies are. The information below is summarized from *"Educational Ideologies: Contemporary Expressions of Educational Philosophy"* (O'Neill, 1990).

In *educational fundamentalism*, knowledge is a tool for reconstructing society in pursuit of a predetermined pattern of moral excellence where man is a moral agent. The approach is tacit anti-intellectualism and is opposed to the critical examination of preferred patterns of belief and behavior. Education is considered as moral regeneration and the ideology focuses on the original purposes of the existing social traditions and institutions, placing emphasis on a return to the past as a corrective reorientation.

In *educational intellectualism,* knowledge is viewed as an end to itself and truth has an intrinsic value, where man is man. That is, man's universal nature transcends specific circumstances. The approach is traditional intellectualism (stressing reason and speculative wisdom). Education is an orientation to life in general. It focuses on the intellectual history of a man, generally identified with the dominant Western intellectual tradition of classicism.

In *educational conservatism*, knowledge is for social utility and a means of realizing existing social values. Man is a citizen, who finds his highest fulfillment as an effective member of the established social order. This approach is based on reasoned conformity and reliance on the best answers of the past as the most trustworthy guide to present action. Education is considered as socialization to the established system. The ideology focuses on existing social traditions and institutions and places emphasizes on the present situation, viewed in a relatively shallow historical perspective, that is, conventionalism.

In *educational liberalism*, knowledge is a necessary tool used in practical problem solving. The individual is a unique personality, who finds his greatest satisfaction in self-expression in response to changing conditions. The approach is effective thinking (practical intelligence), and the ability to solve personal problems effectively. Education is the development of personal effectiveness.

In *educational liberationism*, knowledge is a necessary tool for required social reforms. Man is a product of culture, who finds his highest fulfillment along the lines defined and controlled by the existing social system. The approach is based on the objective (rational- scientific) analysis and evaluation of existing social policies and practices. Education is the fullest realization of each person's unique potentialities as a distinctive human being. This ideology focuses on social conditions that block the fullest realization of individual potentialities, and emphasizes on the future (that is, on changes in the present system required to bring about a more humanistic and humanizing society). The purpose of individual is to bring about immediate large scale changes within the existing society. The ideology stresses the significant changes that affect the basic nature and conduct of the established social system

In *educational anarchism*, knowledge is a natural by-product of daily living. Individual personality is a value that transcends the requirements of any particular society. The approach is based on free choice and self determination in a sane and humanistic social setting. Education is considered as a natural function of everyday living in a rational and productive social environment and the ideology focuses on the development of an "educational society" that either eliminates or radically minimizes the necessity for formal schools and other such institutional constraints on personal behavior, and emphasizes on a post-historical future in which people function as self-regulating moral beings. The purpose of the ideology is the continuous change and self-renewal within a constantly emerging society; stresses the need for minimizing and / or eliminating institutional restraints on a personal behavior (deinstitutionalization).

It is clear that each ideology focuses on different definitions of knowledge and of the individual, and each ideology has different approaches to reach different goals related to education. In this sense, comparing the differences in the general characteristics of educational ideologies, perceptions and attitudes regarding educational technologies may change depending on ideology. While some teachers may think that educational technology is crucial to reach the goal of education, some others may think that educational technologies are not as useful to reach the goals, as the goal of technology may oppose the ideology of the individual.

The aforementioned shed light on the effect of factors such as the teachers' perceptions, attitudes, and beliefs on the use of educational technology. Therefore, using educational ideologies and attitudes, beliefs, and perceptions as meaningful categories, this study investigated whether educational ideologies of pre-service teachers have an effect on technology acceptance.

Method

Based on the literature, this study hypothesized a model including educational ideologies as an external variable of the Technology Acceptance Model. The methodology section of this study outlines the sample, the instrument, the data analysis stages, and presents the stages necessary to obtain a model compatible with the hypothesized model

Sample

Since this study is related with technology acceptance and educational ideologies, whether participants have a well formed educational philosophy is an important issue. Participants of the study were graduates of Teachers' High Schools and are currently attending the Faculty of Education in the Middle East Technical University (METU), Ankara, Turkey. They were selected through nation wide examinations and are training to be teachers. During both their high school and university educations, they have taken courses relating to teaching and learning, such as "Introduction to Educational Sciences", "Introduction to the Teaching Profession", "Instructional Planning and Evaluation", "Development and Learning", "Introduction to Computer Education", "Instructional Materials Development", "Classroom Management", and so forth. They have had exposure to subjects such as philosophy, educational philosophy, terrains of philosophy, schools of philosophy, and the relationship between philosophy and educational practices. They have also had work experience during their undergraduate practicum period, a requirement for all teacher candidates set by the Faculty of Education. Therefore, it can be assumed that these students have satisfactory theoretical and practical backgrounds regarding the formation of a philosophical context.

The sample consisted of 320 students. In terms of their departments, the majority of these students were attending the Department of Elementary Education (50.3%) followed by the Department of Foreign Language Education (38.4%). Furthermore, most of the students (43.4%) who responded to the survey were freshmen, 14.1% of the students were sophomore, 22.2% of the students were junior, and 17.2% of the students were at the senior level. The majority of the sample was female (66.9%). Finally, 50.3% of the students were between the ages of 15 and 20, while 41.3% of the students were between the ages of 21 and 25.

Instruments

The data collection instrument consisted of five sections − demographics, educational ideologies, perceived ease of use, perceived usefulness, attitudes toward computer use and the frequency of use. The second section was adapted from O'Neill (1990) in order to identify the educational ideologies. Perceived ease of use and perceived usefulness sections were adapted from Legris et al (2003). The Attitudes toward computer use section was adapted from a questionnaire developed by Dusick & Yildirim (2000). A committee approach was used in the adaptation process of the instrument. The items were translated by eight different instructors from the Department of Foreign Language Education at METU. An expert familiar with both American and Turkish cultures was responsible for the appropriate translation while subject matter experts adapted the translations. A pilot study was conducted to correct some misunderstandings. The researchers also used a pilot study to check the validity of the items in the instrument.

The *educational ideology* part consisted of 104 questions that measured the two general and six specific educational ideologies. 14 questions were used to identify each of the six specific educational ideologies and 10

questions for each general educational ideology. Given that this study investigated the effect of specific educational ideologies, a total of 84 questions related to specific educational ideologies appeared in the instrument. The *perceived ease of use* and *perceived usefulness* sections included 10 questions on each topic. *The attitudes toward educational technologies* section included 23 questions. Finally, the actual use section had only one question. With the exception of the question related to *actual use*, all of the questions utilized a five-point Likert-type scale with responses ranging from Strongly Agree to Strongly Disagree. The question in the *actual use* section utilized a six-point Likert-type scale ranging from "more than once a day" to "less than once a month".

Data Analysis

The data analysis of the study was conducted in three sections: item analysis, factor analysis, and path analysis.

Item Analysis: For the item analysis, the statistical program SPSS 10.0 (Statistical Package for Social Sciences) was used. Considering the dispersion of the data in each item and the corrected total item-scale correlations, the items were analyzed and the valid and reliable items were selected for the factor analysis stage of the study.

Factor Analysis: Factor analysis was a necessary step to confirm the assumption of the structural equation modeling, that all of the variables in the hypothesized model are independent from each other. Therefore, the results of the factor analysis will prove that the items selected for the path analysis are discriminatory for the factors and that all these variables are independent factors in the model. This part of the analysis includes two subsections: exploratory and confirmatory factor analysis. According to the principal component analysis results, 21 out of 84 questions in the educational ideologies section, 10 out of 10 questions in the perceived usefulness of technology section, 7 out of 10 questions in the perceived ease of use section, 9 out of 23 questions in the attitudes toward use section, and the 1 question in the actual use section were determined to be useable for this study. The details of the exploratory and confirmatory factor analyses will be presented in the next section.

The study first analyzed the dimensionality of the 84 items selected from the questionnaire. The purpose in this stage was to find out which questions statistically represent the six different educational ideologies. Since each participant in the sample may have different ideas stemming from the different ideologies as mentioned above, the educational ideology questions do not divide the sample into groups clearly. Moreover, there are some commonalities among the educational ideology questions. For exploratory factor analysis, principal component analysis was used to determine the discriminatory educational ideology questions. The items determined to be theoretically and statistically separate from the other factors were evaluated using confirmatory factor analysis. After the confirmatory factor analysis, 21 educational ideology questions were chosen for further analysis. Six factors representing educational ideologies were retained for further analysis. The validity values of the factors (eigenvalues) were 3.66, 2.45, 1.44, 1.38, 1.14, and 1.11.

Table 1 presents items grouped as a result of principal component analysis, with their respective factor loadings. Six factors explained 53% of the total variance in this particular analysis. The first factor represents educational fundamentalism, the second educational conservatism, the third educational liberationism, the fourth educational liberalism, the fifth educational intellectualism, and the sixth educational anarchism. The numbers in bold text indicate significant factor loading of each question.

Educational Ideologies Section

Considering the factor structure as indicated in Table 1, we formed latent variables and educational ideologies, for the path analytic model. In this process, two important criteria were used. Firstly, we attempted to keep the number of observed variables to a minimum of three (Schumacher & Lomax, 1996); secondly, we gave greater preference to the items with greater factor loadings.

The first factor in the table above represents the educational fundamentalism ideology and includes questions 90, 101, 97, 87, and 62. The second factor, educational conservatism includes questions 4, 72, 46, 12, and 83. The third factor, educational liberationism includes questions 84, 99, and 69. The fourth factor, educational liberalism includes questions 77, and 53. The fifth factor, educational intellectualism includes questions 2, 23, and 14. The sixth factor, educational anarchism includes Questions 6, 45, and 39. These factors were used as latent factors for path analysis.

Table 1: Factor Loadings of Educational Ideologies Items for Principal Component Factor Analysis

Items	Factor Loading					
	1	2	3	4	5	6
90. The school should encourage a return to the simple and straightforward virtues of an earlier day, to the older and better ways.	**.781**		-.192			
101. The schools should emphasize the virtues of the historical past as a way of correcting the existing overemphasis on the present and the future.	**.758**				.189	-.147
97. The individual finds his greatest fulfillment in a voluntary subordination to the ends of the State.	**.662**	.274		-.138		
87. A central purpose of education should be to revive and reaffirm an almost religious commitment to certain profound national goals.	**.568**	.236	.132		-.401	.186
62. The history of this nation is preeminently a spiritual history guided by Providence.	**.492**	.135	-.361	.256		
4. In the final analysis, human happiness derives from adapting oneself to prevailing standards of belief and behavior.		**.734**		-.125	.128	
72. Students should be trained to be good citizens in terms of prevailing cultural views about the nature of good citizenship and proper conduct.	.245	**.719**		.160	.134	
46. The basic value of knowledge is its contemporary social utility; knowledge is primarily a means of adapting successfully within the existing social order.		**.655**	.246	.176		
12. The school should encourage an appreciation for time – tested cultural institutions, traditions, and processes.	.276	**.540**	.125	.164		
83. Schools should be run in a manner consistent with the conventional wisdom (the common sense beliefs) of society at large.	.215	**.447**	-.318	.235	.158	.175
84. The schools should stress the critical analysis and evaluation of prevailing social beliefs and behavior.			**.734**	.139		.156
99. The schools should encourage students to recognize and respond to the need for particular kinds of liberalizing social reforms.	-.124		**.625**		.180	.284
69. The teacher should be a model of intellectual commitment and social involvement.		.273	**.486**	.118		
77. The teacher should be basically an organizer and expediter of learning activities and experiences.		.102		**.787**		
53. Knowledge is ultimately a tool, a means to be used in solving the problems of everyday living.		.139	.176	**.714**		-.132
14. Secondary education should provide the student with an orientation to life in general, emphasizing his role as a human being rather than training him for any particular social role or position.			.206		**.610**	.211
23. The schools should place their basic emphasis on *man as man;* that is, on the sort of abiding human nature which all individuals share.	.119	.253	-.140		**.594**	
2. The most valuable type of knowledge is that which involves symbolism and abstract thinking.		.132	.244	-.121	**.592**	-.286
6. Individual differences (physical, psychological, and social) are so significant that they dictate against the wisdom of prescribing the same or similar educational experiences for all people.					-.130	**.699**
45. Problems associated with student control and discipline are frequently caused by a society which blocks the development of personal responsibility by over controlling everyone, including students.			.148	.180	.332	**.598**
39. Conventional teaching ordinarily subverts the child's capacity for self – learning.			.130	-.165		**.535**

Note: Loadings below 0.10 were suppressed in the table.

Technology Acceptance Section

This section of the questionnaire consisted of 4 different subsections: the *perceived usefulness of technology*, *perceived ease of use*, *attitudes toward use*, and *actual use* sections. Using exploratory factor analysis, it was ensured that each subsection included only one factor. Therefore, three different exploratory factor analyses were conducted for the *perceived ease of use*, *perceived usefulness*, and *attitudes toward use* sections at this stage. Since the *actual use* section included one question, exploratory and confirmatory factor analysis was not conducted for this section. Ten questions in the *perceived usefulness of technology* section, seven questions in the *perceived ease of use* section, nine questions in the *attitudes toward use* section, and one question in the *actual use* section were determined to be used for this study.

Table 2: Principal Component Analysis Results for Technology Acceptance

	Factor Loading
Items	1
Perceived Usefulness	
8. Computers enhance my educational effectiveness.	.845
6. Computers increase my performance in education.	.824
5. Computers increase my productivity in education.	.810
10. Overall, I found computers to be useful in education.	.801
3. Computers enable me to accomplish tasks more quickly in education.	.777
9. Computers make my work easier in education.	.774
2. Computers give me greater control over my work in education.	.767
1. Computers improve the quality of the work I do in education.	.721
4. Computers support the critical aspects of my work in education.	.672
7. Computers allow me to accomplish more work than otherwise be possible in education.	.648
Perceived Ease of Use	
8. My interaction with the computers are clear and understandable.	.712
3 Interacting with the computers is often frustrating.	.685
2. Learning to operate computer applications is easy for me.	.673
4. I find it easy to get the computers to do what I want to do.	.661
10. Overall, I find computers easy to use.	.649
6. It is easy for me to remember how to perform tasks using the computers.	.633
5. The computers are rigid and inflexible to interact with.	.488
Attitudes toward use	
9. I feel anxiety when I am using computers.	.792
4. I have self-confidence in using computers.	.741
7. I feel terrible while my friends are talking about computers.	.725
5. It is hard to learn new computer applications.	.717
3. I am not the one who can work with computers.	.688
2. It is easy to learn how to use computer software.	.663
10. I fell confused while I am working with computers.	.593
20. The use of computers in classrooms are useful and it is worth of endeavor.	.555
18. I am also using computers out of school.	.507

Note: Loadings below 0.10 were suppressed in the table.

Table 2 presents items grouped as a result of the principal component analysis, with their respective factor loadings. Each variable has one factor in this analysis. The *perceived usefulness* section explained 59%, the *perceived ease of use* section explained 42% and the *attitudes toward use* section explained 45% of the total variance in this particular analysis. The questions in the Table 2 represent the three factors of technology acceptance.

Table 3 indicates the Lambda-x estimates and standard errors as obtained for each of the observed variables from the confirmatory factor analysis, with their abbreviations, the names of the latent variables, response modes, and respective item means. Lambda-x values, which are the loadings of each observed variable on the respective latent variable, indicate reasonable sizes to support the idea of using these latent variables in the proposed path analytic model to explain significant factors in educational technology acceptance.

After the confirmatory factor analysis of each questionnaire, 21 questions in the educational ideologies section, five questions in the perceived usefulness section, four questions in the perceived ease of use and attitudes toward use section and one question for the actual use section were selected for the path analysis. Considering the factor structure as indicated in Tables 1 and 2, we have formed latent variables for the path analytic model. In

this process, the two important criteria were used again. First, the number of observed variables was kept to a minimum of three (Schumacher & Lomax, 1996); second, preference was accorded to the items with greater factor loadings.

Table 3: LISREL Estimates, Standard Errors for Confirmatory Factor Analysis and Item Means with Response Modes

Latent and Observed Variables	Lambda-x	SE	Mean	Response Mode
Educational Fundamentalism				
Question 62	0.48	0.06	2.97	
Question 87	0.44	0.06	3.18	
Question 90	0.82	0.05	2.54	
Question 97	0.58	0.06	2.63	
Question 101	0.68	0.05	2.36	
Educational Intellectualism				
Question 2	0.44	0.07	2.96	
Question 14	0.47	0.07	4.02	
Question 23	0.54	0.07	3.86	
Educational Conservatism				
Question 4	0.60	0.06	3.33	
Question 12	0.57	0.06	3.57	
Question 46	0.59	0.06	4.05	
Question 72	0.76	0.05	3.76	
Question 83	0.49	0.06	3.02	
Educational Liberalism				
Question 53	0.69	0.07	3.87	
Question 77	0.65	0.07	3.87	
Educational Liberationism				
Question 69	0.53	0.06	4.05	**1 (Strongly Disagree) to**
Question 84	0.68	0.06	3.87	**5 (Strongly Agree)**
Question 99	0.63	0.06	3.94	
Educational Anarchism				
Question 6	0.26	0.07	3.46	
Question 39	0.43	0.07	3.81	
Question 45	0.66	0.09	3.93	
Perceived Usefulness of Technology				
Question 2	0.73	0.05	4.03	
Question 4	0.65	0.05	3.87	
Question 7	0.74	0.05	3.89	
Question 8	0.94	0.04	4.11	
Question 9	0.84	0.05	4.23	
Perceived Ease of Use				
Question 2	0.61	0.05	3.25	
Question 6	0.62	0.05	3.41	
Question 8	0.74	0.05	3.56	
Question 10	0.63	0.05	3.44	
Attitudes toward Use				
Question 2	0.69	0.05	2.87	
Question 4	0.81	0.05	3.41	
Question 5	0.70	0.05	3.43*	
Question 16	0.62	0.05	4.05	

* This item was reversed for the analysis.

Path Analysis: In the study, LISREL 8.30 for Windows (Joreskog & Sorbom, 1999) with SIMPLIS command language was used to analyze data for path analysis with latent variables. The maximum likelihood estimation method was used in all of the LISREL analyses. For the model data fit assessment, Standardized Root Mean Squared Residual (SRMR), and Root-Mean-Square Error of Approximation (RMSEA) were used in the study. In this study, we determined a 0.073 Standardized Root Mean Square (SRMR) and a 0.080 Root Mean Square (RMSEA) index. These indices were deemed adequate to treat the respective item groups as distinct latent variables in the path analytic model. The alpha reliability coefficients for the latent variables were 70 for fundamentalism, 40 for intellectualism, 69 for conservatism, 52 for liberalism, 56 for liberationism, 37 for anarchism, 83 for perceived usefulness of technology, 69 for perceived ease of use of technology and 76 for

attitudes toward use. These reliability coefficients are significant to indicate that the questions under each category are reliable.

Based on the evidence from the literature, it would be possible to claim that educational ideologies might affect educators' perceptions on the usefulness of technology and their attitudes toward technology *directly*. Therefore, they might affect technology use *indirectly*. This study has focused on educational ideologies as possible external factors of the TAM. In this study, educational ideologies and perceived ease of use are exogenous variables, the use of educational technology is endogenous variables and finally, perceived usefulness and attitudes toward use are both exogenous and endogenous variables.
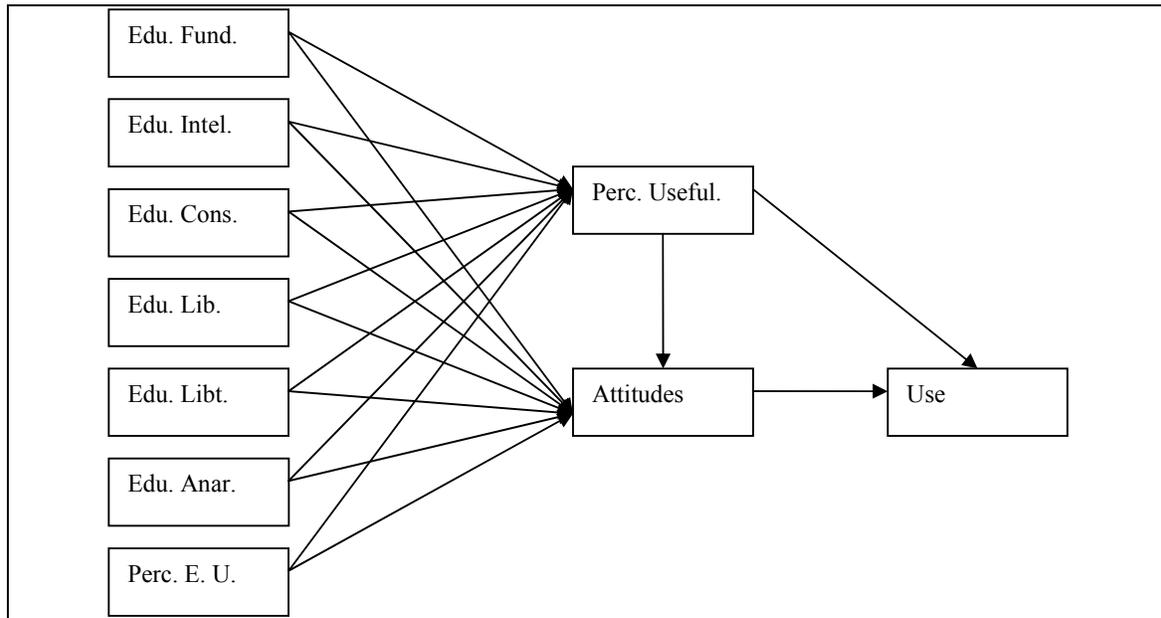

Figure 2: Hypothesized Model

Results

In order to predict the most compatible model, t-test results for both exogenous and endogenous variables and model data fit indexes (such as SRMR and RMSEA) were taken into consideration. The paths that indicated non-significant t-values were deleted from the model. In accordance with the LISREL analysis, some minor modifications were made to the model to obtain the most compatible model. Finally, the model in Figure 3 was obtained with 0.073 SRMR and 0.080 RMSEA fit index values. These values were deemed adequate to interpret the significant relationship among the latent variables. Table 4 shows Lambda-x estimates, t-values and standard errors for the educational technology acceptance model. The Lambda-x estimates and t-values reflect the reliability of the items in the final model. None of the t-values are below 0.30 which means that all these questions could be kept for the best-fit model.

Table 4: LISREL Estimates, t-values, and Standard Errors for LISREL Model

Latent Variables	Observed Variables	L Lambda-x	t	SE
	Question 62	0.49	8.40	0.06
	Question 87	0.45	7.88	0.06
EDUCATIONAL FUNDAMENTALISM	Question 90	0.82	15.51	0.05
	Question 97	0.58	10.23	0.06
	Question 101	0.68	12.34	0.05
	Question 2	0.36	5.10	0.07
EDUCATIONAL INTELLECTUALISM	Question 14	0.42	6.09	0.07
	Question 23	0.58	8.07	0.07
EDUCATIONAL CONSERVATISM	Question 4	0.59	10.55	0.06
	Question 12	0.57	10.14	0.06
	Question 46	0.55	10.21	0.05
	Question 72	0.78	14.95	0.05

	Question 83	0.49	8.39	0.06
EDUCATIONAL LIBERALISM	Question 53	0.63	10.21	0.06
	Question 77	0.59	9.56	0.06
EDUCATIONAL LIBERATIONISM	Question 69	0.22	8.56	0.07
	Question 84	0.72	11.89	0.06
	Question 99	0.66	11.07	0.06
EDUCATIONAL ANARCHISM	Question 6	0.26	3.71	0.07
	Question 39	0.40	5.56	0.07
	Question 45	0.66	7.77	0.08
PERCEIVED USEFULNESS OF TECHNOLOGY	Question 2	0.75	11.54	0.06
	Question 4	0.66	10.42	0.06
	Question 7	0.77	11.81	0.06
	Question 8	0.93	13.58	0.07
	Question 9	0.84	12.64	0.07
PERCEIVED EASE OF USE	Question 2	0.59	10.66	0.05
	Question 6	0.63	11.56	0.05
	Question 8	0.75	14.53	0.05
	Question 10	0.60	10.94	0.05
ATTITUDES TOWARD USE	Question 2	0.71	5.06	0.14
	Question 4	0.84	5.11	0.16
	Question 5	0.69	5.03	0.14
	Question 16	0.33	4.18	0.08

Table 5 presents the Beta estimates, which are the coefficients among attitudes toward computers, perceived usefulness, and frequency of use. The table also presents the Gamma estimates, which are the coefficients among the endogenous and exogenous variables and t-values.

Table 5: LISREL Estimates and t-values for LISREL Model

Latent Variables		Beta	Gamma	*t*
Attitudes toward use & Perceived Usefulness of Technology		0.43	-	4.01
Perceived Usefulness & The Frequency of Use		0.25	-	4.24
Perceived Ease of Use		-	0.96	4.28
Educational Fundamentalism	& Attitudes toward Technology Use	-	-0.15	-1.95
Educational Conservatism		-	0.26	1.97
Educational Liberalism		-	-0.32	-2.22
Educational Anarchism		-	-0.33	-2.49
Educational Liberationism	& Perceived Usefulness of Technology	-	0.49	3.73
Educational Intellectualism		-	0.38	4.33

Table 5 and Figure 2 both indicate the structural model of technology acceptance developed. In this model, the standardized path coefficients varied between –0.33 and 0.96 in the fitted model. Cohen (as cited in Kline, 1998) made some suggestions about the interpretations of the absolute magnitudes of path coefficients. Cohen (1988) explained that standardized path coefficients that have absolute values less than 0.10 might indicate a "small" effect; whereas values around 0.30 indicate a "medium," and values above 0.50 indicate a "large" effect, respectively (Kline, 1998). In accordance with these suggestions, the path coefficient from attitudes towards use to the perceived ease of use could be considered as a high effect in the model. All the other path coefficients indicated medium effect sizes in the model.

The model developed in this study has some similarities as well as differences in regard to the TAM. Similar to the hypothesized model, the fitted model in figure 3 shows that there is a direct effect of perceived usefulness on the actual use, and there is also a direct affect of perceived ease of use on attitudes. However, unlike the TAM, the fitted model shows that attitudes towards use affect perceived usefulness, and there is no significant effect of attitude towards actual use. Also, the fitted model shows that there is no significant relationship between perceived ease of use and perceived usefulness.

PEU: Perceived Usefulness of Technology, ATT: Attitudes toward Technology Use, PU: Perceived Usefulness U: The Frequency of Use F: Educational Fundamentalism, I: Educational Intellectualism, C: Educational Conservatism, L: Educational Liberalism, LB: Educational Liberationism, A: Educational Anarchism.

Figure 3 shows that there is a strong positive relationship between pre-service teachers' perceived ease of use of educational technology and their attitudes toward use. Therefore, pre-service teachers who are competent with technology in a classroom environment have highly positive attitudes towards the use of educational technologies. In addition, fundamentalist and liberalist pre-service teachers have low values for attitudes towards the use of educational technologies. While educational fundamentalists and educational liberalists demonstrate negative linear relationships in relation to attitudes towards use, pre-service teachers who embrace conservative educational ideologies demonstrate high attitude values towards the use of educational technologies. Moreover, pre-service teachers who believe in educational anarchism suppose that educational technologies are not useful in the classroom environment. However, educational liberationists and intellectualists believe that educational technologies are very useful in the classroom environment.
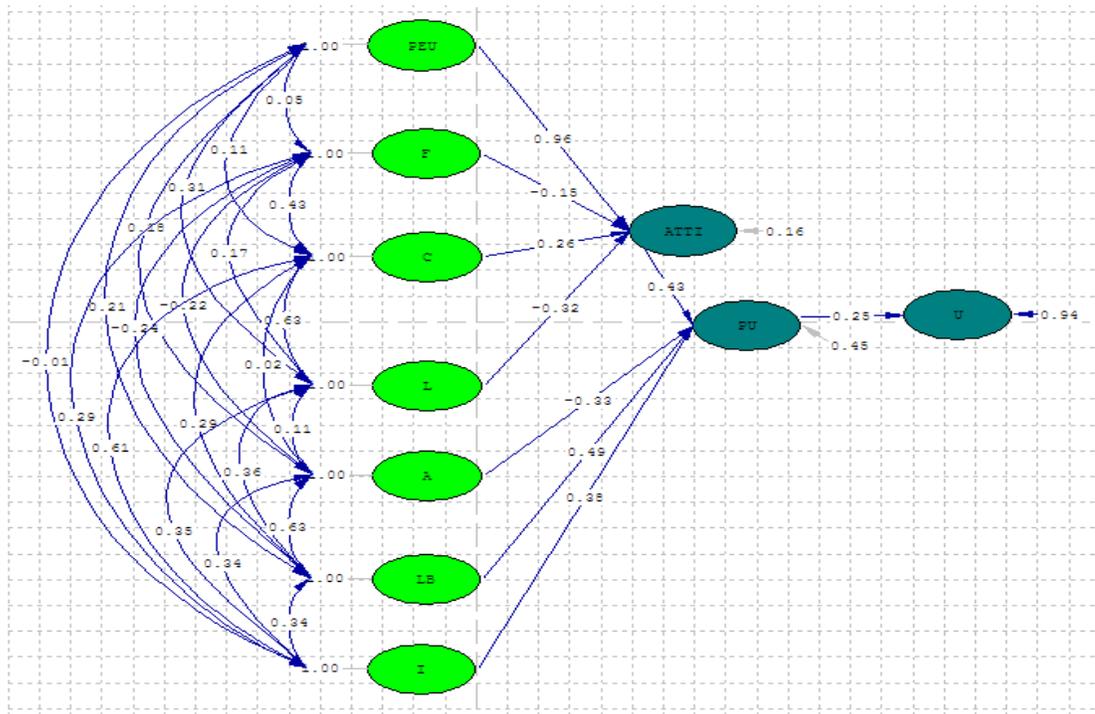

Figure 3: Structural Model of Educational Technology Acceptance Model Integrated with Educational Ideologies

Arguments over the integration of technology in schools have met with many obstacles. Most decision makers or administrators want to benefit from technology in educational practices. For this reason, teacher education institutions as well as training programs have placed a strong emphasis on *technology education courses* in both pre-service and in-service education. However, the literature shows that self-efficacy of the teachers, in other words the perceived ease of use, is not sufficient to allow teachers to use technology in education. This study shows that the perceived ease of use may not directly influence the frequency of use of computer technologies in education. This result might give some clues about the ineffectiveness of computer literacy courses and technology education courses in pre-service and in-service education and training.

Based on the results of this study, we assert that there is a medium effect of perceived usefulness of technology on the frequency of use of technology in education. This result is consistent with the suggestions of Moore et al (1999) who suggested that teachers' technology competencies consist of four major categories: prerequisite technical skills, technical skills, instructional uses, and professional roles (Moore et al, 1999). They explained that teachers react negatively to courses that emphasize technical skills without practice. For this reason, instructional technology use must be related with teaching practices in actual professional implementation. In this sense, we can say that prospective teachers consider educational technologies to be more useful in real educational settings, which also promotes the use of technology in education effectively.

Besides the effect of the perceived ease of technology use on the frequency of use, perceived ease of use positively affected the attitudes toward use. According to our model, attitudes towards use are the only

determinant of perceived usefulness. The pre-service teachers who perceived the use of technology in education to be crucial probably have high positive attitudes towards use.

Although the perceived ease of use is the primary determinant of attitude, three educational ideologies, fundamentalism, conservatism, and liberalism, also have significant effects on attitudes towards use. For example, educational fundamentalist ideology has a negative affect on attitudes towards the use of technology. This result might be stemming from the characteristics of educational fundamentalism, since it tends to implement uncritical acceptance and urges individuals to conform to the existing social order. However, computer technologies, especially the Internet with access to various different sources, provide opportunities for increased critical thinking. From a broader vision, students might get a chance to question common sense by accessing different sources, and consequently, this might lessen the authority of the teacher in the classroom environment. In this aspect, fundamentalist pre-service teachers might see technology as possible threat to their existing routines.

Conservatism has a positive affect on attitudes towards use. According to the model, the educational conservative view appears more moderate to change when compared with the fundamentalist view. As Skolnik (1998) stated, "It has been pointed out that since computers first appeared, predictions have been made about how they would revolutionize education, but that has not happened" (p. 644). Based on the literature, it could be appropriate to say that technology is a tool for changing society. Nevertheless, belief, understanding and acceptance of technology illustrate a complex pattern in relation to the implementation of educational technology. Therefore, there may be a consistency between attitudes towards the use of technology and the conservative educational view.

As opposed to conservatism, the educational liberalist ideology has a negative affect on the attitude towards use. In fact, liberalist pre-service teachers do use technology, especially computer technology, for a significant amount of time and become accustomed to technology as a part of their college life. Interestingly, even though they use technology, they may not be conscious concerning the need of technology in their prospective job settings. In 2001, Steel and Hudson conducted a study regarding academics' perceptions of educational technologies and found that some of the academics thought the use of educational technology was a potential threat to meaningful face-to-face interaction. Whether liberalists assume technology as potential threat or not should be studied in-depth.

All of the ideologies mentioned above have effects on *attitudes toward use*. Moreover, educational anarchism, educational liberationism, and educational intellectualism have an effect on the *perceived usefulness of technology*.

Educational Anarchism has a negative effect on the perceived usefulness of technology. Some applications of computer technology intend to reach a wide population to provide them more a systemized education via synchronous or asynchronous technologies. This is contradictory with what anarchists deem. Because, pre-service teachers who might think of educational technology as a mediator of a centralized and institutionalized society might perceive educational technology as not useful since some of the technology integration programs create centralized and institutionalized society, such as the use of learning management systems and learning content management systems.

There is a positive relationship between educational liberationism and the perceived usefulness of technology. It is an expected result since the literature supports the consistency between the goal of education from an educational liberationist perspective and the general perceived role of technology in education. The educational liberationist belief emphasizes the fullest development of each person's unique potentialities as a human being. Steel and Hudson (2001) also support this notion by underlining the introduction of technology into the learning process as a potential quality-enhancing act.

Educational Intellectualism has positively affected the perceived usefulness of technology. Since educational intellectualism seeks to change existing educational practices in order to make them conform more perfectly to some established and essentially unvarying intellectual or spiritual ideal, technology in education may be seen as a tool to change existing educational practices to be more consistent with those purposes.

Discussion

This study has indicated that attitudes towards use and the perceived usefulness of technology differentiate depending on the educational ideologies of pre-service teachers. These attitudes and perceptions about the

usefulness of technology directly or indirectly affect the frequency of use of technology. Technology education or computer literacy courses in pre-service and in-service teacher education is not enough to increase the frequency of use of educational technologies if they focus only on technical skills, rather than including the instructional use and emphasizing the professional roles of teachers in the environment integrated with technology (Inan, F., Yildirim, S. & Kiraz, E. 2004; Yildirim, S. & Kiraz, E. 1999).

According to a report published by UNESCO (2002), there is continuum of approaches through which schools and education systems proceed in their adoption of ICT. In the first stage of technology adoption, namely the applying approach, teachers and school administrators start using ICT for daily tasks and they adopt curriculum to create more space for ICT in teaching. In the infusing approach, ICT is integrated throughout the school curriculum. School personnel start using more advanced and customized software to increase their productivity as well as their professional competencies. Finally, in schools that demonstrate the transforming approach, ICT becomes an internal part of the curriculum and it is used as a catalyst for school reform. Teachers take more initiative to move from teacher-centered teaching approach to student-centered learning activities, and schools serve as learning centers for the surrounding communities (p. 15-16).

It should be noticed that technology integration in schools largely depends on individuals, especially teachers, since they are obviously gatekeepers for all kind of innovation introduced to the education system. Thus, it is crucial to scrutinize teacher's ICT utilization and reveal factors that contribute to their skeptical practices of teaching with technology.   Unquestionably, this study revealed the fact that educational ideologies cultivate the type and extent of teacher's technology use and thus it has a paramount effect on a successful integration of technology throughout the system.

There could be two different approaches according to the findings of this study. Firstly, educational ideology is a system of belief that has established through a long period of time and it is hard to change. If the truth is that educational technology is useful for every educational practice, its benefits should be emphasized for different individuals rather than imposing specific educational technologies.   Therefore, stakeholders and teacher educators should try to familiarize educators by considering their various educational beliefs. Secondly, this study shows that the use of educational technology and the benefits to education is an arguable matter since there is a contradiction between the overall goals of some educational ideologies and the factors of technology acceptance. Two questions arise from the findings of this study: is the acceptance of educational technology necessary for every single person? Or can we achieve success in education without using educational technology in every situation? The answer is complex, as none of the ideologies is superior to the others. Each ideology is effective in its own scope and has a possible explanation for accepting or rejecting technology. Therefore, some pre-service teachers may not consider the use of educational technology necessary in some situations since their educational goals might be attainable without using the means of technology.

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