

Psychological and Job Factors Influencing the Intention to Use Information and Communication Technology Among Teachers

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Abstract

Introduction: The usage of information and communications technology (ICT) in educational systems is a flowing and active educational programme. However, prior to its usage, an attempt should be made to identify the factors influencing such a phenomenon. This study aims to identify the psychological and job-related factors affecting the intention to use ICT among teachers in Shiraz.

Methods: The present study is applicable from the research type perspective, descriptive from the procedure perspective, and correlative from the research design perspective. The sample includes all teachers in Shiraz. To determine the sample size ($n = 255$), stratified-cluster random sampling and Cochran's formula were used. Several questionnaires were completed by the participants, such as subjective norm, task-technology fit, perceived ease of use, perceived usefulness, and intention to use. Validity (in terms of content) and reliability of the questionnaires were confirmed by comments from experts and professors and Cronbach's alpha coefficient (0.69) respectively. Data analysis was done using structural equation modelling with LISREL software (version 8.8).

Results: Task-technology fit, perceived ease of use, intention to use, and subjective norm variables directly or indirectly affect the intention to use ICT. Among these, subjective norm variable has the highest direct impact (0.33) upon the intention to use ICT, while, task-technology fit variable has the highest indirect impact (0.08). Moreover, the highest and lowest total effects on the aforementioned variable are associated with the impact of task-technology fit (0.39) and perceived ease of use (0.27) respectively.

Conclusions: The findings indicate that the predicted model could provide useful information for the educational authorities with respect to the importance of job-related and psychological factors that directly or indirectly affect the intention to use ICT among teachers.

Keywords: Technology, Psychological Factors, Intention, Teachers

1. Introduction

Nowadays, information and communication technology (ICT) can be used as a powerful means to promote the quality and efficiency of education. Ever-increasing development of ICT-based means and the rapidness of its adaptation with the requirements of people have led to the establishment of a new form of creative, active, and pervasive learning/interactive environment. Moreover, researches indicate that educational innovation and development in the education and training system may fail to attain collaboration and acceptance of teachers. Today's world has focused its attention on the learning of cutting-edge science and the vast knowledge of ICT. Taking advantage of all the facilities and technologies at hand is assumed to be a prerequisite of fulfilling the objectives of educational centres and schools. Therefore, using technology in the learning process is deemed to be a fundamental component (1).

ICT is known to be a constructive and supplementary component of the educational system. Therefore, it is used by teachers for diversifying the teaching methods, providing a continuous and automated training process, short-

ening the teaching time, shortening the education period, taking into account the personal talents, individualizing the education, and coping with the problems of collective education (2). In a world increasingly equipped with ICT, traditional methods of teaching-learning may be no longer efficient (3). In this condition, teachers are the main agents who can successfully insert and implement ICT in the education system. Indeed, teachers can establish changes between the learner and technology. They are also the key to effective usage of technology in the teaching process (4). At this point, the role of various factors in enabling the effective use of technology by teachers may be revealed. Awareness of factors influencing the use of ICT in teaching and sufficient competency for its application play a significant role in the integration of technology into the curriculum (5).

Based on the investigations carried out, there are a variety of methods and models for investigating the factors influencing the acceptance of ICT. Technology Acceptance Model (TAM), first put forth by Davis, is one the most valid models among these (6). This model is adopted from the

Theory of Reasoned Action, which is one of the influencing factors in the acceptance of ICT by users (7). The aforementioned model includes quantitative indicators such as external variables, perceived usefulness, perceived ease of use, attitude, behavioural tendencies, and real usage.

Figure 1 demonstrates TAM and the relevance of the variables to one another.

Davis et al. indicate that use of technology may be affected by personal tendencies, while perceived usefulness contributes to the tendency of the individuals to use the given technology. Perceived usefulness can be defined as 'the extent [to which] a person believes his/her working performance may be promoted by using a specific system' (8).

The perceived ease of use is the second and the most important factor that affects people's intention to use technology (7). This factor is related to the perception in the mind of users about the ease of using the available IT in the workplace for performing their tasks. In fact, the less effort needed to learn and use a technology, the more likely it is to be used by teachers (9).

In the present study, TAM (presented by Davis et al.), task-technology fit (TTF) variable adopted from the TTF model by Goodhue and Thompson (10), and the subjective norm variable adopted from Theory of Reasoned Action by Fishbein and Ajzen (11) were selected as the conceptual and theoretical framework, to be used as a causal model. The conceptual model and the research study are presented in the following sections according to the structure outlined in Figure 2.

TTF is a scale based on which a technology may help an individual to perform his/her tasks (12). Subjective norm is the extent to which an individual believes that people who are important to him think he should or should not do the desired behavior (11). Some studies also investigate the related factors. In a study carried out by Abbassi and Irani, it was found that there is a direct relation between the subjective norm, intention to use technology, perceived usefulness, and perceived ease of use (13). The results of the study by Usoro et al. indicate that TTF has a significant relation with perceived ease of use, perceived usefulness, and intention to use technology (14).

The results of the study presented by Chao et al. show that TTF and perceived ease of use directly have a significant impact on the perceived usefulness (15). In their research, Siang and Santoso show that perceived ease of use directly has a significant impact on the intention to use ICT (16).

Regarding the emphasis on the use of ICT by school teachers in the teaching-learning process, in Section 7 of the Act approved by Steering Committee of Information and Communication Technology in Education, all educa-

tional programmes and curricula of teacher-training at all educational levels are required to use IT. The content of programmes is required to be revised to fit the use of IT in education and training. The use of ICT for in-service training of teachers and investment for the preparation of attractive and effective educational materials to train teachers for applying ICT in education and training have to be taken into account. Further research has to be done on the factors influencing the tendency to use ICT. Regarding the emphasis on this subject matter, the present research was carried out among teachers of Shiraz city during the academic year 2014 - 2015.

2. Methods

Because the present study aims to investigate the factors influencing the intention to use ICT among the teachers of Shiraz city, it is applied from the perspective of purpose. The present study is descriptive and correlative from the perspective of research method, because it aims to investigate the factors and variables related to the intention to use ICT and to determine their relations, and also due to the fact that it seeks to determine the type and degree of correlation between the variables.

The statistical population of the study includes all teachers of four districts under the Department of Education in Shiraz city in two high school grades (I and II), during the academic year 2014 - 2015 (n = 5824). Afterwards, stratified cluster random sampling was used to choose a sample from the given population as the statistical sample. To this end, two districts (1 and 2) were selected among the four districts under the department of education. Using stratified random sampling (based on gender and educational level- high school grade I and II), 255 teachers were selected as the sample. The aforementioned sample size was determined by Cochran's formula.

In this study, variables are classified into three groups- predictive, criterion, and mediator. The intention to use ICT was considered to be the criterion variable. TTF fit adopted from the TTF model by Thompson and Goodhue (1995) and the subjective norm variable adopted from Theory of Reasoned Action by Ajzen and Fishbein (1975) were considered as the predictive variables. Perceived usefulness and perceived ease of use, adopted from the model presented by Davis et al. (1989), were selected as the mediator variables. In the present study, data collection was done through a questionnaire. Since different variables were used and had to be integrated for designing each model, a separate questionnaire was dedicated to each variable. Questionnaires used in this study include subjective norm scale questionnaire (five questions) by Hartshorne, TTF

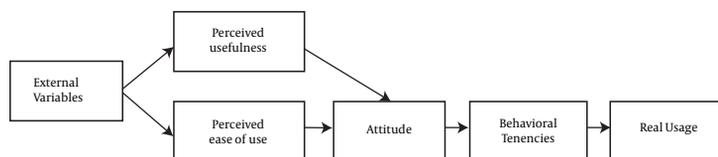


Figure 1. Technology Acceptance Model (8)

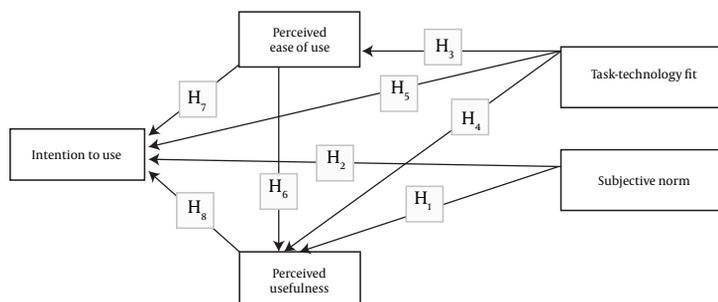


Figure 2. the Conceptual Model of the Study

questionnaire (10 questions) by Vatanasak Dakul et al. perceived ease of use questionnaire (nine questions) by Lu and Hsu, perceived usefulness questionnaire (six questions) by Kim et al. and intention to use questionnaire (four questions) by Sarmiento. All these questionnaires use a seven-point Likert scale (strongly agree, agree, somewhat agree, no idea, somewhat disagree, disagree, strongly disagree) (17-21).

The questionnaires were standard. As there was a relatively good correlation between the variables used in the present study and the structural validity of the questionnaire has been previously confirmed by various researchers, content validity was used to determine the validity of the measurement tool and to examine the extent to which the tool used in the study may evaluate the properties of the study under scrutiny (i.e. the existing variables in the model). The aforementioned questionnaires have been repeatedly used by various researchers. Moreover, according to the judgment of experts and skilled professors, the questions in the questionnaires exactly measure the variables studied in the research. Hence the content validity of the measurement tool can be confirmed with a relatively high confidence. To determine the reliability of the measurement tool considered to be a technical feature of the tool and to evaluate whether the tool provides similar results in similar conditions, Cronbach's alpha was used. In this study, the values of Cronbach's alpha for subjective norm, TTF, perceived ease of use, perceived usefulness, and intention to use variables were 0.72, 0.83, 0.75,

0.73, and 0.69 respectively. The values mentioned above imply that the measurement tool has a relatively high reliability. Moreover, structural equations and path analysis (by Lisrel v. 8.8 and SPSS v.16 software) were used for data analysis and hypothesis testing.

The participants of the study are school teachers of educational districts 1 and 3 in Shiraz city (in high school grades I and II). All participants completed the questionnaire voluntarily and with conscious consent. Participation in the study offered neither benefit nor financial loss to the aforementioned participants. More importantly, researchers undertook to maintain the confidentiality of the data given by participants. The applicable results of the study will be presented to Departments of Education to be used for planning purposes.

3. Results

As the very crux of the study is the analysis of the correlation path among variables. Correlation matrix of the research variables is presented in Table 1.

According to Table 1 among the variables presented in this study, TTF (0.21), perceived usefulness (0.19), perceived ease of use (0.18), and subjective norm (0.15) respectively have the highest to lowest correlation coefficient with the intention to use ICT. All the aforementioned coefficients are statistically significant ($P < 0.01$).

Table 2 demonstrates the direct impacts of variables on one another. This section deals with the direct impacts

Table 1. Correlation Matrix of Variables

Variables	1	2	3	4	5
Intention to use	1				
Task-technology fit	0.21 ^a	1			
Perceived usefulness	0.19 ^a	0.42 ^a	1		
Perceived ease of use	0.18 ^a	0.53 ^a	0.24 ^a	1	
Subjective norm	0.15 ^a	0.34 ^a	0.18 ^a	0.39 ^a	1

^aP < 0.01.

of variables on the basis of the data presented in [Table 2](#). Among the variables presented in this study, the highest and the lowest direct impacts were, respectively, impact of subjective norm on intention to use ICT (0.33) and the impact of TTF on the perceived usefulness (0.13).

Table 2. Estimation of the Direct-Effect Coefficients

Variables	Standardized Parameter	The Standard Error of Estimate	t	P Value
Impact of subjective norm on:	-	-	-	-
Perceived usefulness	0.14 ^a	0.02	2.18	0.03
Intention to use	0.33 ^b	0.02	7.99	0.0001
Impact of task-technology fit on:	-	-	-	-
Perceived ease of use	0.19 ^b	0.03	3.00	0.0009
Perceived usefulness	0.13 ^a	0.04	2.24	0.032
Intention to use	0.31 ^b	0.01	7.07	0.0001
Impact of perceived ease of use on:	-	-	-	-
Perceived usefulness	0.16 ^b	0.03	2.89	0.0008
Intention to use	0.24 ^b	0.01	5.37	0.0004
Impact of perceived usefulness on:	-	-	-	-
Intention to use	0.20 ^b	0.02	4.09	0.0002

^aP < 0.05.^bP < 0.01.

In this study, all the direct impacts of variables were significant at 0.01 level, except for the impact of subjective norm on the perceived usefulness (0.14) and the impact of

TTF on the perceived usefulness (0.13), which were significant at 0.05 level. [Table 3](#) indicates the indirect impacts of variables on the intention to use ICT. As seen in the data presented in the table above, the highest and the lowest indirect impacts were, respectively, the impact of TTF on the intention to use ICT and the impact of perceived ease of use on the intention to use ICT.

Table 3. Estimation of the Indirect-Effect Coefficients

Variables	Standardized Parameter	The Standard Error of Estimate	t	P Value
Indirect impact of subjective norm on: intention to use	0.04 ^a	0.01	2.04	0.028
Indirect impact of task-technology fit on: intention to use	0.08 ^b	0.01	3.24	0.0009
Indirect impact of perceived ease of use on: intention to use	0.03 ^a	0.01	2.02	0.028

^aP < 0.05.^bP < 0.01.

In this study, the indirect impact of TTF on the intention to use ICT (0.08) is significant at 0.01 level, while the indirect impact of subjective norm on the intention to use ICT (0.04) and the indirect impact of perceived ease of use on the intention to use ICT (0.03) are both significant at 0.05 level.

The overall impact is another estimated parameter, obtained from the combination of direct and indirect impacts. In some cases, variables have only direct impact or only indirect impact on one another. In such cases, the overall impact equals the indirect impact or direct impact. For example, in this study, perceived usefulness has only a direct impact on the intention to use ICT. Therefore, the overall impact of this variable on the intention to use ICT equals the direct impact. [Table 4](#) lists the variables having both direct and indirect impacts on one another.

Regarding the data given in [Table 4](#), the highest and lowest overall impacts were, respectively, the impact of TTF on the intention to use ICT (0.39) and the impact of perceived ease of use on the intention to use ICT (0.27). Furthermore, all the overall impacts of variables on the intention to use ICT were significant at 0.01 level.

The comparison of overall, direct, and indirect impacts and the measurement of the amount of explained variance

Table 4. The Overall Impacts of the Research Variables on One Another

Variables	Standardized Parameter	The Standard Error of Estimate	t	P Value
Overall impact of subjective norm on: intention to use	0.37 ^a	0.02	7.52	0.0001
Overall impact of task-technology fit on: intention to use	0.39 ^a	0.02	7.69	0.0001
Overall impact of perceived ease of use on: intention to use	0.27 ^a	0.02	5.97	0.0004

^aP < 0.01.

of each endogenous variable are other features of path analysis. Table 5 reports the estimation of standardized coefficients of direct, indirect, and overall impacts on the intention to use ICT and its explained variance, in order to allow the comparison of direct, indirect, and overall impacts of variables on the intention to use ICT.

As observed in Table 5 the perceived usefulness variable has no indirect impact. Among the variables presented in this study, the highest direct impact on the intention to use ICT is the impact of subjective norm (0.33), which is significant at 0.01 level. The indirect impact of the aforementioned variable on the intention to use ICT is 0.04, and hence its overall impact on the intention to use ICT is 0.37. The explained variance of intention to use ICT is 0.96 in this research.

Fitness indices were used to investigate the model fitness. Among the various fitness indices available, the following were reported in this study: the ratio of chi square to its degrees of freedom (χ^2/df), comparative fit index (CFI), goodness-of-fit statistic (GFI), adjusted goodness-of-fit index (AGFI), and root mean square error of approximation (RMSEA). Table 6 presents the fitness features of the proposed model.

On the basis of these data, the fitted model for the whole sample was presented using the standard coefficients (Figure 3).

4. Discussion and Conclusions

The obtained results show that, among the variables considered in this study, the highest direct impact on the intention to use ICT is the impact of subjective norm. Therefore, with respect to the impact of subjective norm

on the intention to use ICT, it can be argued that employees are one of the most prominent groups affecting the people within the organization. In other words, their way of thinking and their performance may affect the performance of individuals. This, precept, is assumed to be a social pressure to do or not do a task, or the tendency or lack of tendency to do a given task. Persons tend to show the behaviours appealing the people who are important to him, even when the results are not favourable. Therefore, people, by nature, tend to be in line with people of their own interest. School teachers, due to their close relation with their colleagues and their involvement in the teaching process, are also under one another's influence. Moreover, the views of colleagues have significant impact in the intention of people to use ICT. Thus, subjective norm directly has a significant role on the intention to use ICT. The results of the study are in conformity with the results presented by Andrews et al. and Ozer and Yilmaz (22, 23).

With respect to the impact of subjective norm on the perceived usefulness, it can be argued that when teachers believe that it is deemed by their students, friends, colleagues, supervisors, and top management that teachers have to use ICT in their teaching, the perception of teachers about the benefits of such matter may increase in response to the encouraging and compelling social information. Hence, they may be more likely to use ICT in their teaching, and consequently to improve their job performance, performance relationships, and effectiveness as well. In this regard, it is recommended that successful colleagues share their personal experiences and techniques in terms of the use of ICT in the process of teaching-learning and encourage the promotion of the culture of using ICT in education and its usefulness among other colleagues. The results of this study are consistent with the results presented by Khorasani et al. Macharia, and Nyakwende (24, 25).

Furthermore, the highest overall impact among the variables is found to be the impact of TTF on the intention to use ICT. Therefore, with respect to the direct and indirect impacts of TTF on the intention to use ICT, it can be argued that if there is a proportion between the tasks done by teachers and the technology used by them, and also if the required education about how to use technology is provided to the teachers, the intention to use ICT may subsequently increase. On the contrary, if there is no proportion between the components mentioned above, the intention to use ICT among teachers may decrease. However, when learning to use ICT is easy, the required education about how to use technology is provided for the teachers, there are regular updates about technology, and there is sufficient cooperation among teachers with regard to using technology, the proportion between the technology and job may subsequently increase and may consequently

Table 5. Standardized Coefficients of Direct, Indirect, and Overall Impacts on the Intention to Use ICT and Its Explained Variance

Variables	Direct Impacts	Indirect Impacts	Overall Impacts	Explained Variance
On intention to use of:	-	-	-	0.69
Subjective norm	0.33 ^a	0.04 ^b	0.37 ^a	
Task-technology fit	0.31 ^a	0.08 ^a	0.39 ^a	
Perceived ease of use	0.24 ^a	0.03 ^b	0.27 ^a	
Perceived usefulness	0.20 ^a	-	0.20 ^a	

^aP < 0.01.
^bP < 0.05.

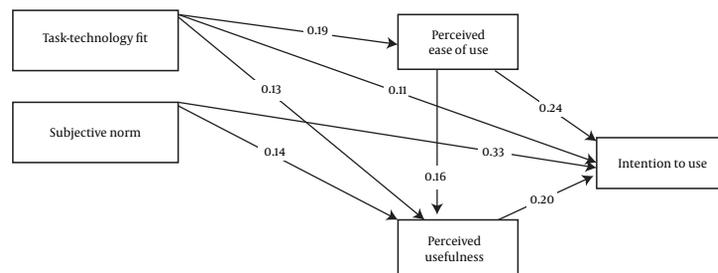


Figure 3. The Fitted Model for the Whole Sample with Standard Coefficients

Table 6. GFI Features of the Model Predicting the Intention to Use ICT

Characteristic	Estimated
Ratio of chi square to its degrees of freedom	2.36
P Value	0.063
Comparative Fit Index	0.98
Goodness-of-Fit statistic	0.98
Adjusted goodness of fit index	0.97
Root Mean Square Error of Approximation	0.036

lead to an increase in the perceived usefulness. On the other hand, if the use of technology is not perceived as an easy task, the perceived usefulness may subsequently decrease. Moreover, when there is a proportion between the technology and the teaching process, there may be a positive sense towards the perceived usefulness among teachers. This in turn may lead to more usage of technology. In this regard, the contents of courses, methods, implementation, and evaluation should be prepared and presented through computers, and the requirements to meet this objective should be taken into account. These results agree with the findings of Klopping and McKinney (9) and Theng et al. (26).

With regard to the direct and indirect impacts of per-

ceived usefulness on the tendency to use ICT, it can be argued that when teachers believe that use of technology would not involve much mental effort, time, or complexity, they would be more likely to use it. On the other hand, when the use of ICT is perceived by teachers as a task requiring a lot of effort and preliminary measures, it may reduce their intention to use ICT and consequently lead to their resistance against its insertion into the educational system; they would prefer instead to use traditional methods as before. To strengthen the belief about the ease of use of ICT among teachers, the Department of Education needs to familiarize teachers with the usage of technology and try to increase their computer skills by holding educational classes. Moreover, the perceived ease of use may have an indirect impact on the tendency to use ICT, through the perceived usefulness. In other words, when teachers believe that using computers is difficult, incomprehensible, or unclear and that it may require more mental effort, they may find the usage of technology inefficient and would have no intention to use it. Therefore, the materials of educational courses are recommended to be provided in such a way that teachers are familiarized with electronic education with/without educational technology and understand the ease of using ICT in education and the teaching-learning process. More to the point, the ICT providers and policy-makers in the Department of Education should take into consideration the documentation related to the appli-

cation of different types of technologies in teaching and learning and also the ease of using ICT. These results are in agreement with the results of Komar Sharma and Komar Chandel, Wu, Cheng, Yen, and Huang, Yuen and Ma (27-29) but are in contradiction with the result presented by Kirmizi, Khalifa and Ning Shen (30, 31).

With regard to the direct impact of perceived usefulness on the intention to use ICT, it may be rational to conclude that when teachers believe that the use of technology may improve the quality of their teaching and teaching performance, may increase the effectiveness of their teaching, may accelerate the speed of their task implementation, and consequently may lead them to access more precise, more up-to-date, higher quality, and broader job-related information, they will undoubtedly have more intention to use ICT. However, when teachers feel that using technology may have no effect on their teaching performance and may even interrupt it, their intention to use ICT may decrease, and they may subsequently show high resistance against the insertion of technology into teaching process or even reject it. Therefore, it is recommended to demonstrate the benefits of technology in teaching by holding workshops, and to increase the intention to use technology in teaching by comparing the traditional teaching method with its technology-based counterpart and explaining the benefits of the latter. The results are consistent with the findings presented in (32-34) but are contradictory to the results presented by Rose and Fogarty (35).

Moreover, future researchers are advised to focus on various factors considered in research done in other countries that could not be taken into account in the present study, e.g. user resistance, performance, experience, tools, organizational support, perception of behavioural control, power gap, uncertainty avoidance.

In this study, TAM was used with other variables added. Other models and new influencing factors that affect the intention to use technology are recommended to be used in future works.

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Footnotes

Authors' Contribution: Mohammad Hassan Seif and Soghra Zarei: development of the main idea and article

writing; Mohammad Hassan Seif and Soghra Zarei: data analysis; Saeed Talebi: methodology; and Ahmad Rastegar: editing.

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