Social Influence in the Adoption Process and Usage of Innovation: Gender Differences

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Abstract—The purpose of this study is to determine in what ways elementary education prospective teachers are being informed about innovations and to explain the role of social influence in the usage process of a technological innovation in terms of genders. The study group consisted of 300 prospective teachers, including 234 females and 66 males. Data have been collected by a questionnaire developed by the researchers. The result of the study showed that, while prospective teachers are being informed about innovations most frequently by mass media, they rarely seek to take expert advice. In addition, analysis of results showed that the social influence on females were significantly higher than males in usage process of a technological innovation.

Keywords—Gender differences, social influence, adoption, innovation.

I. INTRODUCTION

IN a social system there have been different theories and models about factors that influence the process of adoption and usage of an innovation, and being informed about an innovation. It is noticeable that social influence is taking place as an influential construct in the majority of these theories and models. Social influence has been called in different names as social factors, subjective norms or social norms in different theories. Theories which included social influence have been showed below:

TABLE I
THEORIES WHICH INCLUDED SOCIAL INFLUENCE

Construct in theory	TRA	TAM2	TPB	C-TAM-TPB	DIT	MPCU	UTAUT
Subjective norm	✔	✔	✔	✔			✔
Social factor						✔	✔
Image					✔		✔

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Diffusion of Innovation Theory (DIT) is established by Rogers [9] to explain process of diffusion of an innovation in a social system with including factors that influence individuals' perception about innovation. DIT is grounded on four main elements; innovation, communication channels, time and social system. Moore and Benbasat [8] adapted the characteristics of innovation presented in Rogers and refined a set of constructs that could be used to study individual technology acceptance; relative advantage, compatibility, ease of use, result demonstrability, image, visibility, trialability, voluntariness. Theory of Reasoned Actions (TRA) proposes that intention is solely and directly influences the adoption behavior and intention which is determined by two factors: subjective norms which is defined as the person's beliefs that specific individuals or groups think he should or should not perform and motivation to comply with specific referents and attitude towards behavior which is defined as the person's beliefs which behaviors leads to certain outcomes and the evaluation of these outcomes [3]. However, Ajzen [1] introduced Theory of Planned Behavior (TPB) as an extension of TRA which includes a third determinant of intention, perceived behavioral control that refers to people's perceptions of their ability to perform a given behavior. Davis [2] proposed Technology Acceptance Model, building on the TRA, to explain and predict the adoption and use of information technology. He theorized that an individual's intention to use an innovation is determined by two beliefs: perceived usefulness, defined as the extent to which a person believes that using the system will enhance his or her job performance, and perceived ease of use, defined as the extent to which a person believes that using the system will be free of effort. Taylor and Todd [11] combined the predictors of TPB with perceived usefulness from TAM to provide a hybrid model which is called Combined TAM and TPB. So this new model consisted of four factors; attitude, perceived behavioral control, subjective norms and perceived ease of use. Thompson et al. [12] adapted and refined Triandis' model for IS contexts and used the model to predict PC utilization. Their model, PC Utilization is comprised of six factors; job fit, complexity, long-term consequences, affect towards use, social factors and facilitating conditions. Venkatesh and Davis [14] developed the "TAM2" model, a revised model of TAM that explores the antecedents of perceived usefulness. They handled a research to describe how perceived usefulness and usage intentions, taking into account social influences and cognitive processes, affecting technology acceptance. Their research found that social influence processes, such as subjective norm, voluntariness, and image; as well as

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cognitive instrumental processes, such as job relevance, output quality, result demonstrability, and perceived ease of use, are all contributing factors in acceptance of new technologies. Venkatesh et al. [15] have unified conceptual and empirical similarities from existing theories to form the Unified Theory of Acceptance and Use of Technology (UTAUT). They empirically compared the eight existing models: TRA, TAM, the motivational model, TPB, the model of PC utilization, Diffusion of Innovation, and social cognitive theory. To formulate UTAUT, they reviewed all the constructs in eight models and theorized that four constructs(performance expectancy, effort expectancy, social influence and facilitating conditions) will play significant role as direct determinants with the moderators as age, gender, experience and voluntariness of use which are thought to be influential on main effects.

Triandis (1981) called social influence as *social factors* and defined it as "the individual's internalization of the reference groups' subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" [12]. In their own model, Thompson et. al [12] used term of social norms while defining social influence and suggested that social norms are similar with subjective norms because subjective culture consists of *norms* (self-instructions in doing what is perceived to be correct and appropriate by members of a culture in certain situations); *roles* (which are also concerned with behaviors that are considered correct and related to person's holding a particular position in a group, society, or social system); and *values* (abstract categories with strong affective components) [12]. Fishbein and Ajzen [3], Ajzen [1], Taylor and Todd [11] and Venkatesh and Davis [14] used "subjective norms" in their model which is defined as "the person's perception that most people who are important to him think he should or should not perform the behavior in question". Venkatesh et al. [15] defined social influence in their study as the degree to which an individual perceives that important others believe he or she should use the new system.

There have been different studies that explain the role of social influence in the usage process of innovations which individuals meet in different fields.

Kelman [5] defined social influence with 3 different forms in his theory:

Compliance: when an individual accepts influence because he hopes to achieve a favorable reaction from another person or group (social approval/disapproval from others).

Identification: when an individual accepts influence because he wants to establish or maintain a satisfying self defining relationship with others.

Internalization: when an individual accepts influence because it is congruent with her value system.

Malhotra and Galletta [7] made a research based on Kelman's theory within the context of organizational enterprisewide implementation and adoption of collaboration and communication technologies. They found that social influences play an important role in determining the acceptance and usage behavior of new adopters of new information.

Lin et. al [6] investigated key drivers for system usability and user acceptance in the law enforcement context and founded that subjective norm has a significant positive effect on individual acceptance decision making.

Shen et al. [10] accepting education is a social activity, defined social influence as the pressure which students feel to use an innovation from instructors, other students, or key others in the learning context and explained that compliance with the requirements of others, conformity to the expectations of others, and identifying with the way others work are potentially key elements in determining educational activity, including usage of online learning systems.

From this point, in this study it is aimed to explain how social influence plays a role in the elementary education prospective teachers' using process of a technologic innovation according to genders. So, for this purpose, firstly it is aimed to determine in what ways elementary education prospective teachers are being informed about innovations and then what is the role of social influence in the usage process of these innovations. Fishbein and Ajzen [3] and Venkatesh et al. [15] definitions of social influence are adopted in this study. As a result, social influence is defined as the perceived external pressure that individuals feel in the process of being informed about innovation and decide to use it and to the degree in which an individual perceives that important others believe he or she should use the new system.

II. METHOD

A. Study Group

The study group consisted of 300 students, including 234 (78%) female and 66 (22%) male. 94 (%31,3) of these students were attending Elementary Mathematics Education, 89 (%29,7) of them attending Primary School Education, 45 (%15) of them attending Elementary Science Education and 72 (%24) of them attending Early Childhood Education.

B. Data Collecting Tool

Data has been collected by a questionnaire developed by researchers to explain demographic features of students, in what ways they are being informed about innovations and to determine the role of social influence in the usage process of technologic innovations.

The first section of the questionnaire consisted of personnel information form and a 5 level Likert type questions with six options to determine ways of being informed about innovations. It is graded as 5- always; 1-never. The ways of being informed about innovations are determined as; mass media (radio, television, newspaper, and magazine), internet, subject expert, associations and clubs, other people that are important for individuals and friends conservations.

The second section of questionnaire consisted of 10 level Likert type 9 questions to explain the role of social influence in the elementary education prospective teachers' using process of a technologic innovations. This section is graded as 1-"I strongly disagree and ", 5-"neutral", 10-"strongly agree". Four questions were asked about compliance to demands and

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suggestions from others that are important for individual and external pressure; five question were asked about decisions of people who are not influenced by anybody and make their choice in accordance with their own decisions.

Examples;

- I use the innovation if people who are important for me are also using it (Compliance).
- I don't use the innovation even though I want to, not to be exposed sarcastic behaviors of others (external pressure)
- I buy an innovation immediately when it comes out, because I like experiencing new things (personnel decision/choice)

In the data analyses, arithmetic means are calculated for respondents to ways of being informed about innovations. T-test analysis is used to compare differences between genders for the scores of social influence questions.

III. RESULTS

The results of research are summarized below. The ways of being informed about innovation for students are showed in Table II.

TABLE II
HOW DO YOU MOST FREQUENTLY BEING INFORMED ABOUT INNOVATIONS?

	$\overline{X}$	ss
Mass Media (radio, TV, newspaper, magazine)	4.07	0.73
Friends conversations	3.80	0.74
Internet	3.54	0.94
Consulting to people who are important for you	3.47	0.83
Association and club membership	2.19	1.03
Opinions of subject expert	2.11	0.84

As it is seen in Table II, students are being informed about innovations most frequently by mass media. While friends' conversation is coming secondly, it is followed by internet which is in third place. Consulting to people who are important for students is coming fourthly and it is noticeable that association and club membership and opinions of subject expert are not important for students as an informing resource. There could be different reasons for these results. It can be suggested that, because "*mass media*" is easily accessible for students, it is the most frequently used for being informed. On the other hand as students waste their most of times with their friends, influence of opinions and views of their valuable friends can be the reason of being "*friends conversation*" in second place. However "*internet*" is seen as an important information resource in nowadays, it is limited access comparing with mass media could have caused for taking place after mass media and friends conversations. On the other hand, as students consults to their friends, family, colleagues and neighborhoods, the means of option of "*consulting to people who are important for you*" is close to internet's means and takes in the fourth place. Lastly, because "association and club membership" and "opinions of subject expert" could be seen as formal structures and students usually prefer informal structures, these two options are used by students with minimal means.

Comparing Social Influence in Terms of Gender

TABLE III
T- TEST RESULTS OF SOCIAL INFLUENCE IN TERMS OF GENDER IN USAGE PROCESS OF AN INNOVATION

		N	$\overline{X}$	ss	t	p	η2
Personnel	Female	234	4.66	1.87	-2.14	.03	.015
	Male	66	5.23	1.99			
	Total	300	4.79	1.90			
Social	Female	234	4.74	1.23	-2.59	.01	.022
	Male	66	5.21	1.50			
	Total	300	4.84	1.30			

As it is seen in Table III, personnel decision means of total 300 students, participated in study, is $\overline{X} = 4.79$ and social decision means is $\overline{X} = 4.84$. When gender variable is taken account, it has been revealed that there are significant differences in personnel decisions between males and females ($t_{(298)} = -2.14$, $p < 0.05$). Males' personnel decision means ($\overline{X} = 5.23$) is higher than females' ($\overline{X} = 4.66$). Again, Table III shows that social decisions means are significantly different between males and females ($t_{(298)} = -2.59$, $p < 0.05$). Males' social decision means ($\overline{X} = 5.21$) is higher than females' ($\overline{X} = 4.74$).

However, when considering means differences between social and personnel decision for within males, it has been seen that personnel decision are dominant ($\overline{X} = 5.21 < \overline{X} = 5.23$), while it is the social influence for females ($\overline{X} = 4.66 < \overline{X} = 4.74$) opposite to males.

These results are consistent with the findings of prior researches. For example Venkatesh et al. [13] investigated gender differences in the overlooked context of individual adoption and sustained usage of technology in the workplace using the theory of planned behavior (TPB) and found that attitude toward innovation is the most influential factor for males in an innovation decision process while the influential factor is subjective norm for females. Similarly there has been studies of comparison of women and men, in terms of compliance which are indicated that women are more likely to comply with orders, whereas men are more likely to rebel (e.g., Minton, Kagan, & Levine, 1971; Stockard, Van-de-Kragt, & Dodge, 1988) as cited in [13].

IV. CONCLUSION

Social influence can be suggested as influence of others which are important for individuals. However peer influence and superior influences are the key determinants of social influence [14]. Social influence has taken place as direct or indirect determinants of intention to use a system or performing a behavior in different models and theories as TRA, TAM, TPB, C-TAM-TPB, MPCU and UTAUT. As a result, it can be concluded that people, in their social

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environment, use a technologic innovation so that he or she could also decide to use it. Especially in online collaborative learning environments, students who views interest, efforts, success and presence of his or her friends could tend to behave similarly. Otherwise individuals could avoid performing an image which is left behind of technology or out of date [4].

Consequently, because this study revealed that students are most frequently being informed about innovation by mass media, friends conversations and internet, it can be suggested that the media must be aware of its' social responsibility and present actual programs, articles, magazines or introduction pages towards technological innovations. On the other hand, the role of gender differences is very important in the adoption and usage process of a technological innovation [14]. At this point, instructional organizations and educators are expected to contribute to eliminating gender differences divide effects by preparing collaborative learning environments in which students could learn from and teach to each other.

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