THE ROLE OF TEACHERS' ATTITUDES TOWARD TECHNOLOGY INTEGRATION IN SCHOOL

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ABSTRACT: Under the increasing pressure of globalization epoch, which dictated the need of adopting informatization reform, the government of the Republic of Kazakhstan from 1997 started operating a systematic state policy for informatization of education. Many scholarly papers show that the success of the educational reform efforts depend not only on the ability of the government to supply all schools with ICT, but also on the ability to make teachers possess positive attitudes toward ICT integration. This study will contribute to the existing knowledge by providing a real picture of the process of ICT integration in Kazakhstani secondary schools through the lens of the main facilitators of this process – teachers. Most of previous studies pointed out that ICT's successful integration in school is supposed to have a positive impact on students' academic motivation. However, these topics received little attention in the literature. In order to fill up the gap in our knowledge, the purpose of this paper is to gain insight into the teachers' attitudes toward ICT, examining the relationship between their attitudes and students' academic motivation. The study applies the Mixed Methods (a combination of quantitative and qualitative methods) Explanatory Sequential Design, which aims to provide a better understanding of the research problem and questions than either method used by itself.

Key words: ICT, teachers' attitudes, technology integration.

INTRODUCTION

The introduction of ICT in the 20th century forced many countries to transform into information-oriented societies (Kozma, 2004; Law, Pelgrum & Plomp, 2008; Lewis, 2003). In this new millennium, school, as a social institution and an important element in the structure of any society where knowledge and skills are developed (Roeser et al, 2000), also fell under deformations (Kozma, 2004; Law, Pelgrum & Plomp, 2008; Lewis, 2003; Pelgrum, 2001; Sicilia, 2005). Under this digital epoch, the government of the Republic of Kazakhstan from 1997 started operating a systematic state policy for informatization of education (National Center of Informatization, 2010). According to the National Reports, in 2009 internetization and computerization had already covered – 98% of urban and 97% of rural schools (Damitov et al, 2009); which is considered to be a great progress within a short period of time. However, Kozma (2003) states that availability of ICT does not necessarily guarantee the teachers' "likelihood" to use this technology for educational purposes in their classrooms. Van Braak (2001) supports this idea confirming that teachers' attitudes toward ICT influence their acceptance of the technology predicting whether teachers will integrate ICT into their classrooms or not. These could be the reasons for the "impromptness" of ICT integration process in Kazakhstan.

In the literature, many scholars tried to determine factors (variables) that might have an influence on teachers' attitudes. According to the common views, among the most influential factors (variables) are: *confidence, knowledge, gender* and *age*. Taking into consideration the existing assumptions, the researcher constructed the framework which included all the factors mentioned above for this particular study (see Figure 1).

Confidence

Bandura (1991) refers confidence to an individual's ability to perform better in a particular situation. Perceived self-confidence in ICT is an important predictor of teacher's future or present performance quality. Novitzki's (1991) findings had shown that perceived degree of self-confidence in using ICT influenced the teachers' learning as well as their performance. Glasser (1981) explained this phenomenon in this way: teachers continually filter their behaviors and performance through their confidence to the extent that they try to change

the "outside" world making it more consistent with the "inner" world. The psychological aspect of human mind – the balance between self-confidence and actual performance - can predict the teachers' further actions regarding technology integration in the classroom.

Knowledge

Watt (1980) states that ICT knowledge allows "a person to function comfortably as a productive citizen in a computer-oriented society" (p.3); which according to Woodrow (1994) is considered to be the basic requirement of a modern world. In this way, the knowledge of ICT helps a person not only climb career ladder, as it is quite commonly believed to be, but also just to survive in the contemporary living conditions. Preston and Cox (2000) in their study explained that teachers' attitudes were limited by teachers' understanding of the advanced technology. Webb (2002) also mentioned in his study that the lack of knowledge about the concepts of technology was a significant limitation for teachers to design the curriculum activities to make appropriate use of ICT in the classroom.

Gender

The previous research largely ignored the complex systematic nature of gender as a core factor that influence ICT integration in school. Only few scholars reported about the dependence between these two variables. However, the assumption that info-communicational technologies are more important for male teachers than for females still exists (Spear, 1985). Sheffield (1996), who studied the attitudes of male teachers toward technology in education, found out that males are frequently more experienced with ICT than females. Shapka and Ferrari (2003) state: "Teachers may collectively be exacerbating gender biases simply by the patterns they exhibit in their own use of ICT" (p.329). These biases can impact negatively on students' perceptions of ICT, and what is more dangerous, can cause the later technological discomfort (Weil et al, 1990).

Age

Loyd and Gressard (1984) suggested that socialization and developmental characteristics of different age groups play an essential role in the perception of ICT. The interesting fact is that most of the scholars who were able to prove the correlation between two variables were not educators, but sociologists. For example, Morris (1988) studied the social influence of age on attitudes toward ICT. He conducted quantitative survey selecting 380 subjects with age ranging from seventeen to ninety. Both, Alpha and Spearman-Brown coefficient were .73, which was a perfect demonstration that age and computer attitudes were related in a significant manner.
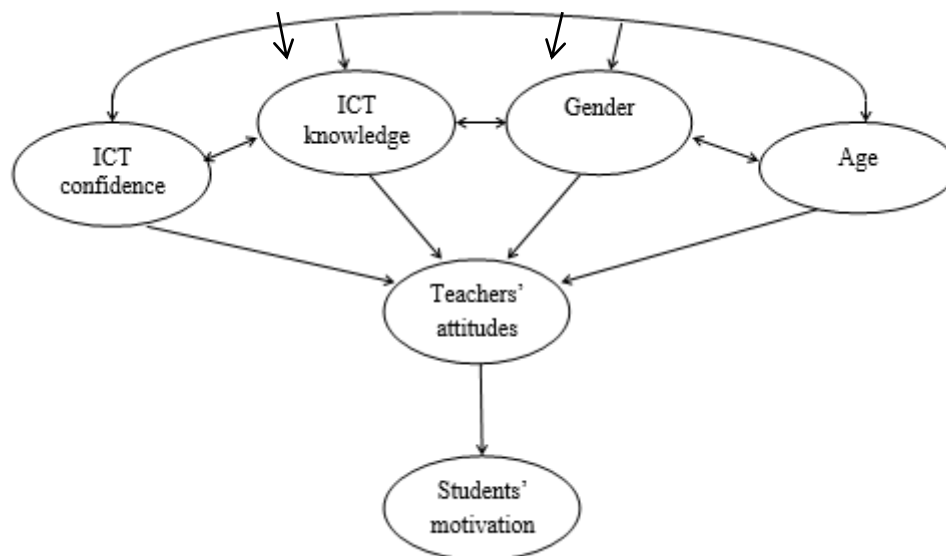

Figure 1. Factors that influence teachers' attitudes toward technology integration

The purpose of this study is to explore the role of teachers' attitudes toward technology integration in school through examining the factors that influence teachers' ICT attitudes (self-confidence, knowledge, gender and age) and analyzing the relationship between teachers' attitudes and their students' academic motivation. Three research questions are addressed:

1.   *What are the teachers' attitudes toward ICT integration in school?*
2.   *Do such factors as self-confidence, ICT knowledge, age and gender influence the teachers' attitudes?*

3.   What is the relationship between the teachers' attitudes toward ICT and their students academic motivation toward school subjects?

METHODS

This study used a combination of two methods (quantitative and qualitative) which is called the mixed method - Explanatory Sequential Design. The quantitative data and results provided numeric data for building a general picture of the research problem giving an opportunity to find "statistical relationship between variables" (Keller, 2009). Through in-depth qualitative data collection, the researcher "collected the true stories about teachers' experiences" in using ICT in the classrooms (Creswell, 2013, p.240). The focus group interview with students helped to compare the students' perceptions with the information presented by teachers. The research was conducted in one particular school in Astana, which means that it was an in-depth exploration of a bounded system in terms of place (Stake, 1995) - an instrumental case study (Creswell, 2014).

Four research instruments were used in the study to help address the research questions:
1.   Survey: "Teachers' attitudes toward technology integration";
2.   Survey: "Academic motivation of students";
3.   One-on-one interview with teachers;
4.   Focus group interview with students.

Sampling

During the quantitative stage of the study, simple random sampling among secondary school teachers and their students was used for selecting the participants. All the individuals had the equal probability to participate in the study (Creswell, 2009). The researcher had 29 teachers and 39 students. In this way the bias in the population was equally distributed among the participants (Creswell, 2014). The sample size was identified with the help of Sample Size formula (2014) according to which these numbers of participants were enough to have confidence that the survey results would be representative, with the Margin of Error less than 20% (see Formula 1, 2 and 3). However, taking into account that the researcher will conduct a case study (one particular school in Astana), the sample needed corrections for the finite population (see Formula 3, 4 and 5) (Sample size formula, 2014).

Formula 1.

$$\text{new ss} = \frac{ss}{1 + \frac{ss-1}{pop}}$$

Where: pop = population
(the total number of teachers = 93;
the total number of students = 1323)

Formula 2.

$$\frac{38}{1 + \frac{(38-1)}{93}} = 27 \ \text{(teachers)}$$

Formula 3.

$$\frac{38}{1 + \frac{(38-1)}{1323}} = 36 \ \text{(students)}$$

During the qualitative stage the researcher used purposeful sampling strategy to choose the participants. Among 29 school teachers and 39 students, the researcher select 5 school teachers of different subjects with diverse backgrounds in using ICT for face-to-face interviews and 3 the most active ICT user-students for a focus group interview.

Limitations

This research was oriented only on one particular secondary school in Kazakhstan which could be considered as a limitation due to the fact that the conclusions drawn from this particular case hardly could be applied elsewhere. The results were not generalizable because the reasercher can never know whether the case is representative of the wider body of "similar" instances or not (Creswell, 2014).

Taking into account that the analysis of qualitative data fully depended on the researcher's own interpretation, there is always a possibility of being biased or subjective which could intrude the assessment of what the data really meant (Creswell, 2009).

PRELIMINARY RESULTS and FINDINGS

RQ1: What are the teachers' attitudes toward ICT integration in school?

In order to answer the first research question, the researcher ran a frequency distribution analysis. The teachers' attitudes toward ICT survey included a series of statements where respondents indicated the extent to which they agreed or disagreed with the statement using a five-point scale (1-strongly agree, 2-agree, 3-neither agree nor disagree, 4-disagree, 5-strongly disagree). The results showed that all the participants filled the questionnaire, so there were no missing data. Almost half of the participants gained scores less than the average (=30) which represent that most of the respondents were closely to the group of teachers who possessed more positive attitudes toward technology integration in school. The mean is 24.03 (out of 60 possible) and standard deviation is 6.450 which meant that the frequency area was between 17.58 (very positive) and 30.48 scores (positive) (see Table 1). However, teachers argue that this desire was more imposed by the time rather than by their curiousity or willingess:

"We have to step in tune with the time. For example, when it was only the beginning of this process, special courses how to work with computers were organized… Because we had to work with this technology, even with a computer… we do not use it only here, at school, thanks God, we have some schools where there are computers in every classroom; plus, all of us have our own private life, for example - cell phones, because it is a demand of time. And also, our children are good at this technology… and we should not be left behind… elementary, in this case. And I also have to mention that it makes our life and work easier".

Table 1. Frequency Distribution - Teachers' Attitudes

Statistics	
Mean	24.03
Std. Deviation	6.450
TOTAL	29

RQ2: Do such factors as self-confidence, ICT knowledge, age and gender influence the teachers' attitudes?

The next step was to find the answer to the second research question. The researchers' null hypothesis (H_0) was: Such factors as self-confidence, ICT knowledge, gender and age of teachers do not affect their attitudes toward technology integration in school, and alternative hypothesis (H_1) stated the opposite: Self-confidence, ICT knowledge, gender and age of teachers do affect their attitudes toward technology integration in school.

Gender

An independent-samples t-test was supposed to be conducted to compare teachers' attitudes toward technology integration scores for male and female groups. The survey was answered by 29 randomly selected teachers: 1-male and 28 – females (see Table 2). This fact can be explained in the following way: the shortage of male teachers in Kazakhstan has always been a great problem due to the low remuneration and status of the profession which deterred men from teaching (Mpokosa et al, 2008). One of the participants pointed out:

"There is no need to mention the salary, which is miserable... that's why I understand the male teachers who don't go to work in school... because they are males, they are supposed to earn for a living... not for a surviving... but we are talking about the fact that we NEED males".

Table 2. Demographic Information

Variables		N	X
Gender	F	28	96.6
	M	1	3.4
TOTAL		29	100

Due to the fact that there was only one male teacher among the whole sample, the analysis was impossible. However, the interviewees' responses showed that none of teachers noticed any difference in attitudes between the representatives of different genders:

"(Is there any difference between the male's and female's attitudes toward ICT?)… We have 14 male teachers… And we think that we have enough males… But, no, I have never noticed something…"

ICT knowledge

An independent-samples t-test also was conducted to compare teachers' attitudes toward technology integration scores for those whose ICT knowledge was limited by observation only and those who were experienced with Microsoft Office (means possess ICT knowledge). The majority of teachers (75,9%) were able to work with Microsoft Office. The reason for such need of Microsoft Office traced in the responses of almost every interviewee was the amount of paper work teachers are required to do/type every day:

"The work became harder because of the paper work... Many people talk about this but nothing changes... Who needs all these papers? Who reads them? Nobody!"

"We still have a plenty of papers… For example, according to my personal experience, I can say that in the rural area, we used only one box of paper, and it was enough till the end of the semester. Now we spend 6-7 boxes of papers… I would say approximately 10. I compare… And after the lesson we are still sitting and writing these papers…"

while 10,3% of teachers were little more than observers. Despite this fact, the evidences from the interviews showed that teachers were willing to become advanced users but the lack time prevented them from this:

"… because PowerPoint is here and teachers are tired of the presentations format. Photoshop is also of a great need. Because we have to create portfolio and e-version of this portfolio. Everything is needed. Many people think that teachers do not need the knowledge how to use Photoshop, but they are mistaken. But it is necessary. Very necessary".

There was a significant difference in the scores for observers (M =33.67, SD =10.693) and knowledgeable (Microsoft Office) teachers (M =23.41, SD =5.058) (see Table 3);

Table 3. Teachers' Attitudes And ICT Knowledge

Variables		N	Mean	Std. Deviation
Teachers' attitudes	Observation only	3	33.67	10.693
	Microsoft Office	22	23.41	5.058

(t (23) = 2.888, p = .008, d =.651) (see Table 4). These results suggest that ICT knowledge of teachers has a moderate effect on their attitudes toward technology integration in school. The results can be generalized to the whole population.

Table 4. Independent Samples Test

Variables	Sig.	t	df	Sig. (2-tailed)
Teachers' attitudes	.028	2.888	23	.008

Self-confidence

The relationship between self-confidence (independent variable) and teachers' attitudes toward technology integration in school (dependent variable) was investagated with the help of a one-way between-groups ANOVA analysis. It compared the effect of self-confidence on teachers' attitudes toward technology integration for confident, average and non-confident teachers. There was a significant effect of confidence on teachers' attitudes toward technology integration at the p < .05 level for the 3 groups [F (3, 29) = 5.081, p = .007] (see Table 5).

Table 5. Teachers' Attitudes And Self-Confidence

Variables	df	F	Sig.
Teachers' attitudes and confidence	3	5.081	.007
TOTAL	29		

Post hoc comparisons using the **Scheffe** test indicated that the mean score obtained by confident teachers (M = -7.733) was not absolutely different from the mean score obtained by non-confident teachers (M = 7.733) (see Table 6). Taken together, these results suggest that self-confidence affects teachers' attitudes toward technology integration in school. So, the researcher can reject H_0. The results can be generalized to the whole population.

Table 6. Multiple Comparisons

Variables		Mean Difference	Sig.
Teachers' attitudes	Confident	-7.733*	.037
	Average confident	7.983	.100
	Non-confident	7.733	.188

However, the interviews responses showed that most of the teachers did not consider themselves to be confident in technology:

"Mmmmmm… May be I have not learned everything I need to call myself confident … I can do slides, presentations, other works… I can do… e-mail, send - not send… all these things I am familiar with… But, nevertheless, I think that there are still a lot of thing I should learn. A lot… It is an endless learning… I would say…"

"I would say that I am somewhere in the middle. Average. Because I know people who can do this better than me. We all know the basis, elementary level. For example, how to make presentations, animations… I, personally, cannot do these animations! I would say that I am average. At least I can find the information I need. Or download this information, copy – paste… etc. Print it out. Show on the screen… what else? Make it full screen or small screen. Because, sometimes I notice, that people cannot do even such simple things".

Age

The same a one-way between-groups ANOVA (see Figure 2) was conducted to compare the effect of age on teachers' attitudes toward technology integration for 22-30, 31-40, 41-50 and 51 or more age groups. There was no significant effect at the $p < .05$ level for 4 groups [$F_{(3, 29)} = .337$, $p = .799$] (see Table 7). So, the researcher cannot reject H_0 and results cannot be generalized to the whole population.

Table 7. Teachers' Attitudes And Age

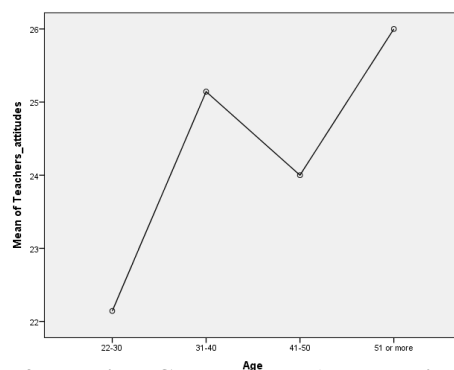| Variables	df	F	Sig.
Teachers' attitudes and age	3	.337	.799
TOTAL	29		

Figure 2. Multiple Comparisons (Teachers' attitudes and age)

Surprisingly, this results strongly contradicted with teachers' opinion. Many of the interviewees stessed that there was a great influence of age on teachers'attitudes toward technology integration. They also explained the reasons for such interrelations:

"For example, the older teachers are not willing to go to courses and learn how to use ICT. They will go only if they have something from this… for example - money… because they are going to retire in the near future… They do not need it! Also, I have heard that older teachers are not accepted as potential users… for example, our older teachers are good at ICT, even better than we (young teachers) are… But the instructors (in courses) think that older generation cannot think like young people… and old teachers are ignored".

"Young teachers learn how to use ICT faster because they meet with it starting from their school years. In our time it was not so… of course, the provision with technology now is better. This is the reason. And it is right. It

is not because they are cleverer or younger… because they are already familiar with this technology… from school years…"

"The younger generation, those who were born in the 90s, completed the higher education in the 21st century. I mean that the higher education institutions have already started using ICT. That is why I think that young teachers are closer to technology… Definitely… That is why they got used to use ICT. And we, the older generation, are used to write everything down, then to read it, and only then, to type something… You see, we need all these stages… The people who have Soviet mentality, work in this way… first read, research, and only then do".

"I think that young teachers are better. For example, I, personally, when have problems go to ask for help… and these young teachers are always ready to help me. I think that I cannot know everything or be sure about something on 100%... May be 50-60%... no more… I can judge because I have two daughters… they are more confident… and young teachers here (in school) are the same…"

However, the students' opinion about this issue varied. The majority did not notice any difference between young and old teachers' attitudes:

"I think that they are equal and use technology equally".
 "I think that both (young and old teachers) use technology equally. No difference because we have an opportunity to observe the old and the young teachers. I haven't notice… Maybe because they do not use ICT very often".
Other pointed out that the difference exists but it is not so gross and obvious:
"Yes, there is a difference but not so big. Young teachers are more developed and modern. They are confident and experienced users of technology".

"I also think that young teachers use interactive board more often".

RQ 3: What is the relationship between the teachers' attitudes toward ICT and their students academic motivation toward school subjects?

Frequency distribution analysis was run in order to get general information whether teachers' attitudes toward ICT influence their students' academic motivation toward school subjects. The questionnaire was answered by 39 students (19- males and 20 - females) (see Table 8).

Table 8. Demographic Information

Variables		N	X
Gender	F	20	51.3
	M	19	48.7
TOTAL		39	100

There were no missing data. Almost half of the participants gained scores less than average (=25) which represented that most of the respondents had academic motivation toward school subjects due to the fact that teachers possessed positive attitudes toward ICT. The mean is 24.36 (out of 50 possible) and standard deviation is 4.992 which mean that the frequency area will be between 19.368 (motivated) and 29.352 (neither motivated nor unmotivated) scores (see Table 9).

Table 9. Students' motivation

Statistics	
Mean	24.36
Std. Deviation	4.992
TOTAL	39

During the focus group, all the students unanimously answered that the teachers' favorable attitudes toward ICT positively affected their motivation toward school subjects. However, it was hard for them to remember any examples. But their general opinion was that something they used every day wastefully was finally beneficially utilized. Moreover, teachers during the interviews proved this by giving several examples:

"I have noticed the student's interest. They are attracted by all these notions, innovations, pictures, movements, animations… they grab students' attention raising their motivation toward subject. Every single teacher knows that if you present the information creatively, students will remember this information anyway… they do this unconsciously… The knowledge will be kept in their memory for longer…"

"For example, let's imagine that we have a teacher who does not use ICT at all… This teacher uses traditional methods of teaching… posters, pictures, etc… There is a possibility that he or she can explain the material… but again, students will not be motivated because everything that is connected with the traditional methods of teaching is boring for them…"
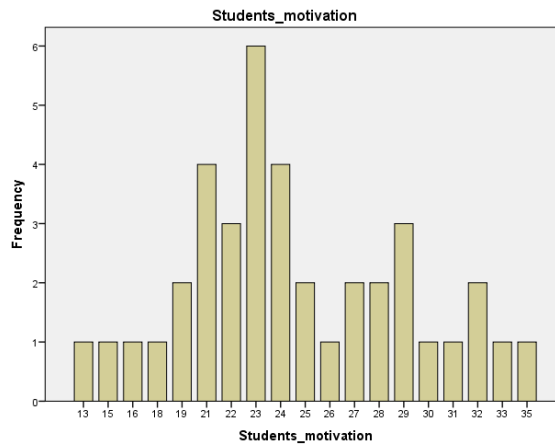

Figure 3. Students' motivation

"Well, I had a student – Sasha. He made the presentation with the use of ICT about Anna Akhmatova. First of all, he did it very responsibly… and not only because of the mark. He was not so very good at my subject… I cannot say that he was an underachivement student, but still… But, he worked hard, really hard… he liked technology and was able to prepare the great presentation where he presented the different periods of Anna Akhmatova's life… He had chosen wonderful background music… students and I cried… You know that children, they do not lie… their reaction is natural… There were some moments where children applauded Sasha…"

"I really like organizing the "reading evenings"… where we prepare poems and musical compositions… performances… Some people can say that it is old-fashioned… We dedicated it to Yessenin… There was one girl who liked the Russian language and literature, and she created an admirable film about Yessenin's life… his family… The whole life and work of Yessenin were presented in this film… Moreover, we turned on the audiotape with Yessenin's real voice. And that was the most interesting thing for students… After, they asked whether it was his real voice… After the concert one of the teachers came to me and said the she cried… The atmosphere was great: everything was so… especially the background music… the film… That girl, she volunteered to create this film… I can say that this is the real motivation".

CONCLUSION

In this way it can be concluded that teachers' attitudes toward technology had a great influence on ICT integration in one of secondary schools in Kazakhstan. The results showed that mostly, the teachers of that particular school were very positive regarding ICT in education, which means that the informatization of secondary education in the country has all changes to be successfully implemented because the main facilitators of this process (teachers) see the necessity to promote it. The mutual relationships between influential variables (ICT knowledge, self-confidence, age and gender) and teachers' attitudes could be interpreted as in Figure 3. According to the data analysis, most of the teachers were knowledgeable enough to conduct the lessons appropriately using ICT in the classrooms, and students noticed positive changes in the teachers' practice. This fact was supported by the statistics, which showed that ICT knowledge and teachers' attitudes were positively correlated. As for the self-confidence, the numeric data demonstrated the significant influence ($p = .007$) of confidence on teachers' attitudes. Another interesting fact was that the age factor, which was commonly believed to have a huge influence, had no effect on teachers' attitudes: the assumption that young teachers were better at ICT and thus possessed more positive attitudes toward its integration than their older colleagues was not proved ($p= .799$). Unfortunately, it was impossible to analyze the relationship between teachers' attitudes and gender variables because of the lack of male teachers participated in the survey; this was counted as an additional limitation for this study. Lastly, it should be stressed that teachers truly believed that ICT facilitated the study process positively affecting their students' academic motivation, and the students' interview responses supported this belief. However, even technology, with all the advantages, is dependent on human factor; still only people decide whether something will take place in their lives or not.
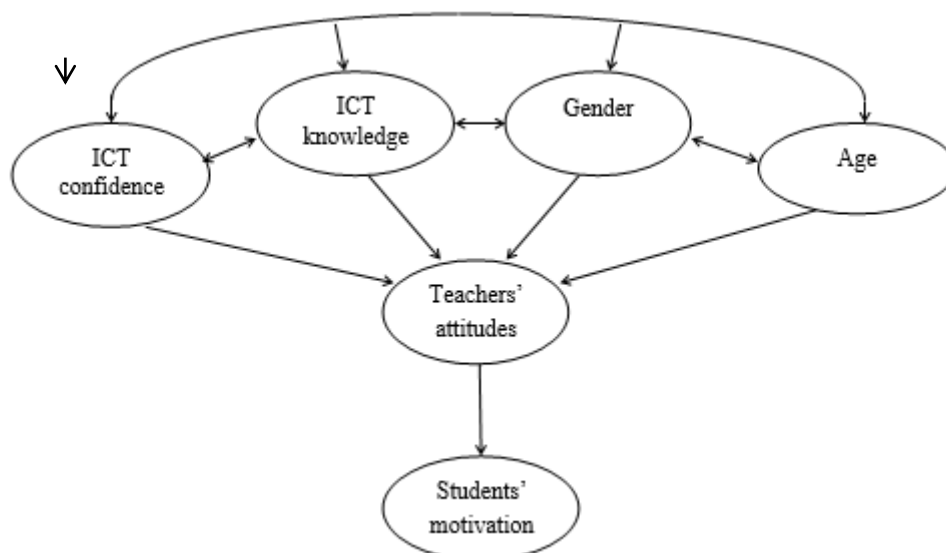
Figure 3. The relationships between influential factors, teachers' attitudes and students' academic motivation

RECOMMENDATIONS

The shortage of male participants in this study caused the infeasibility of analytical calculations in SPSS program. In further research, it will be useful to choose purposeful sampling in order to have an opportunity to control the proportion of male and female participants.

This research was based on survey and interview instruments. The next studies could improve the study by building a classroom observation. In addition, a longitudinal study will be recommended which might be helpful to trace changes in teachers' attitudes with and without technology.

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