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Pre-Service and In-service Biology Teachers' Attitudes towards Internet

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Abstract

The main aim of the study is to measure the attitude toward Internet at pre-Service and in-service biology teachers. From a methodological point of view, a quantitative design based on the use of the Internet Attitude Scale has been applied. 210 pre-service and in-service Biology teachers from Romanian education participated in this study. The research results indicate the existence of positive attitudes of Biology teachers to the educational use of the Internet. The attitudes of in-service teachers is more favorable than the attitudes of pre-service teachers on the following aspects of internet use: the confidence in sending an e-mail message, considering the Internet as an indispensable tool in everyday life, feeling at ease when working on the internet, improving work based on internet use, appreciation of the time spent on the internet and the confidence in using search engines www. The evaluation of the attitudes of Biology teachers to the use of the Internet is useful in the context of the frequent integration of new technologies into the educational process.

Key words: Attitude; Biology Teachers; Internet Attitude Scale

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1. Introduction

The integration of new technologies into teaching and learning activities implies the need to know the attitudes and perceptions of students and teachers. Educators who advocate technology integration in the learning process believe it will improve learning and better prepare students to effectively participate in the 21st century workplace (Hopson et al., 2002). Studies based on knowledge of attitudes towards the Internet are important for both students and teachers. Woodrow (1991) claimed that students' attitudes toward computers were critical issues in computer courses and computer-based curricula. Students' attitudes towards the Internet may influence their motivation and interests towards learning to use the Internet, or vice versa (Coffin & MacIntyre, 1999). Also, students' Internet attitudes may impact their future involvement in Internet-related careers or activities (Tsai et al., 2001). Teachers' attitudes towards computers affect the successful usage of computers in the classroom (Huang & Liaw, 2005). The attitudes towards Internet influence how biology teachers accept and integrate Information and Communication Technology (ICT) into their classroom teaching processes.

Biology teachers are increasingly using technological resources to prepare and carry out educational activities, but also to continuously improve. Under these conditions, teachers must know the ethical issues involved in accessing the Internet and explain to students the correct way to use it. Teacher training requires new ethical competencies, determined by various problems that arise in the current information society. However, awareness of ethical issues related to Internet usage is often absent. According to the authors of Woon and Pee (2004), signed consent to use the Internet can help promote this awareness. Researchers interested in this issue (Cronan and Douglas, 2006; Douglas et al., 2007) show that employees 'decisions regarding Internet use are positively influenced by ethically oriented persuasive managerial means, if employees' rights are respected and if a perception of fairness predominates. Therefore, the approval and support of the ethical attitudes and attitudes of the teachers regarding the use of the Internet at the level of the school organization has positive effects on the quality of education.

The basic notion of the study is the attitude toward the Internet, but to understand its meaning, it is important to define the general concept of attitude. Eagly and Chaiken (2007, p. 1) defined the term of attitude as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor". The attitudes include three components: a cognitive, an emotional, and a behavioural component (Rosenberg et al., 1969). Attitudes toward technology represent a person's general evaluation or feeling towards ICT and specific computer and Internet related activities (Smith et al., 2000). Also, the Internet attitude cand be defined in terms of a general evaluation or feeling related to the Internet and specific activities. The instruments for investigating student attitudes towards the Internet are elaborated by different authors. Hong et al. (2003) elaborated a scale with three sub-dimensions which are skills, students' knowledge of the Internet, the educational environment conducive to using the Internet at the university and students' attitudes to the Internet in education. Morse et al. (2011) developed a general Internet attitudes scale. Tsai et al. (2001) and Zhang (2007) have contributed to development and validation another scales to measure the attitude towards Internet. Joyce and Kirakowski (2015) created a General Internet Attitude Scale (GIAS) to explore the underlying components of the attitudes of individuals to the Internet. The questionnaire was developed in correlation with the three-component psychological model of attitude (affect, behavior, cognition).

In recent years, there have been studies that focus on investigating the attitudes of science teachers towards the use of Information and Communication Technology in education. Research based on investigating teachers' attitudes towards the Internet is a recent concern in the field of new technologies. Some of the studies are focused on investigating students 'attitudes toward the Internet (Al Otaibi, 2012; Abedalaziz et al., 2013; Cazan et al., 2016; Celebi, 2015; Doggan et al., 1999; Eduljee & Kumar, 2017; Sam et al., 2005; Tuncer et al., 2013; Usun, 2003; Wu & Tsai,

2006), while other studies aim at identifying teachers' attitudes (Al Otaibi, 2012; Birgin et al., 2010; Luan et al., 2015; Tekerek & Ercan, 2012). Most studies are centered on identifying attitudes towards the Internet to students and less to teachers. Very few studies (Behera et al., 2016; Mai, 2014) concerned comparative analysis of teacher attitudes towards Information and Communication Technology. There are concerns of researchers to investigate the attitude of Science teachers towards the use of information and communication technology (Gundy and Berger, 2013; Lagat, 2016; Mai and Hamzah, 2016; Mușlu Kaygisiz et al., 2011; Odcházelová, 2015).

Table 1. The current state of knowledge in the field of information technology use by Science teachers

No.	Athor(s)	Aim
1	Dreyfus et al. (1998)	- identifying the perceptions of actively engaged teachers regarding the advantages and problematics of using the electronic spreadsheet in biology teaching.
2	Cavas et. al. (2010)	- measuring Turkish primary science teachers' attitudes towards information and communication technologies in education and the relationship between teachers' attitudes and the factors related to teachers' personal characteristics (gender, age, computer ownership at home, and computer experience).
3	Mansour (2010)	- determining Egyptian science teachers' beliefs about teaching and learning science through Science Technology and Society education
4	Bettencourt et al. (2011)	- exploring perceptions of secondary biology teachers about Science-Technology-Society education
5	Efe (2011)	- investigating science student teachers' intentions to use educational technology in instruction
6	Mușlu Kaygisiz et al. (2011)	- measuring the attitudes of biology teachers toward Computer Supported Teaching and the correlation between teachers' level of computer use and their attitudes
7	Yapici and Hevedanli (2012)	- determining the pre-service biology teachers' attitudes towards information and communication technologies using in biology teaching
8	Gundy and Berger (2013)	- investigating the teachers' perceptions of integrating laptops into their biology courses in high school
9	Bitok (2014)	- identifying Biology teachers' perception on the use of Information Communication Technology in teaching and learning activities from secondary schools
10	Fakomogbon et al. (2014)	- examining secondary school science teachers' perception of Information and Communication Technology for instruction based on their area of specialization
11	Osman (2014)	- evaluating the teachers' perceptions towards WebQuest, with reference to the technical, content and teaching and learning structure
12	Savaşci Açikalin (2014)	- observing teachers' perspectives regarding the use of instructional technologies in science classrooms
13	Županec et al. (2014)	- investigating primary school teachers' attitudes toward Computer Assisted Learning in biology teaching
14	Aslan and Zhu (2015)	- exploring pre-service science teachers' perceptions of ICT integration in teacher education
15	Kapici et al. (2015)	- examining the impact of technology based learning on the attitudes of science pre-service teachers
16	Mai (2015)	- determining the science teachers' attitudes towards ICT and using mobile learning in education
17	Odcházelová (2015)	- exploring the beliefs of the biology teachers about using multimedia
18	Koksal et al. (2016)	- analyzing Turkish pre-service science teachers' perceptions on technology in terms of learning style, computer competency level, possession of a computer, and gender
19	Lagat (2016)	- identifying biology teachers' attitudes towards Computer-Assisted Instruction and conventional Instruction in secondary schools in Nandi South Sub-County
20	Mai and	- investigating the primary science teachers' perceptions of technological

	Hamzah (2016)	pedagogical content knowledge from the perspective of technology application in instruction

Although there are various studies on the attitudes and perceptions of Biology teachers towards Information Communication Technology, no concerns have been identified about studying attitudes towards the Internet.

Research questions

The main aim of the study is to identify the attitude of pre-service and in-service Biology teachers towards the use of the Internet. The questions underlying this study are the following:

- What is the attitude of Biology teachers towards the Internet?;
- Are there significant differences between the attitude of the pre-service biology teachers towards the Internet and that of in-service teachers?.

2. Methodology

There was designed a quantitative study to measure pre-service and in-service teachers' attitudes towards the Internet. The quantitative approach is appropriate for the objective study of human phenomena (Parahoo, 2014). The method of data collection is the questionnaire, which allows obtaining of quantitative data and their analysis using statistical information programs.

2.1 Participants

The research group consists of 210 Biology teachers, of which 155 are pre-service teachers and 55 are in-service teachers who teach in secondary and high school education in Romania. Pre-service teachers follow the training courses for the teaching staff at the psycho-pedagogical module within "Vasile Alecsandri" University of Bacău from Romania. The technique of selecting the research group was random sampling because it presents the advantage that each member of the population has the same chance of being selected as a subject (Sharma, 2017). The process of sampling is achieved in a single step with each subject selected independently of the other members of the population.

2.2 Research instrument

There was used a validated instrument elaborated by Zhang (2007). The Internet Attitude Scale is characterized by construct validity, and examined factorial validity and reliability. The results of research illustrated that the scale is a valid and reliable instrument for measuring Internet attitudes. The scale includes 40 items, with 10 items describing each of the four Internet attributes-enjoyment, usefulness, anxiety, and self-efficacy. The instrument has a 4-point Likert-type scale, where Strongly disagree = 1, Disagree = 2, Agree = 3, and Strongly Agree = 4. Among them, 10 items were constructed for each individual subscale. The maximum score for each subscale was 40. A higher score on a scale indicated more enjoyment, feeling more usefulness and self-efficacy, and less anxiety. The study participants expressed their agreement or disagreement on a number of items, statements about different items. There was used the self-administered questionnaire, because the method assured a high response rate, accurate sampling, and minimum of bias, providing necessary explanations and giving the benefit of personal contact (Oppenheim, 1992). Also, self-completed questionnaires, which respondents fill in for themselves, are very efficient in terms of researchers' time and effort.

2.3. Data collection

The questionnaire was distributed to Biology teachers during the period March and April 2018. Pre-service teachers were handed face to face the questionnaire at training

courses in the psycho-pedagogic module, and in-service teachers were enrolled in a special session where they were invited with their agreement. The objective of the study and the way of completing the scale were clearly explained to the teachers. It was also given the necessary time to complete the questionnaire in full.

2.4. Data Analysis

The SPSS version 21.0 for Windows (IBM SPSS Statistics) was used to perform all statistical analyzes. Desciptive statistics have been conducted to analyze teachers' attitudes towards Internet. The distribution is not normal, as a result of applying the One-Sample Kolmogorov-Smirnov Test, which indicates that Asymp. Sig. (2-tailed) < 0.05. Therefore, Mann-Whitney U nonparametric test was used for measuring the difference between attitudes of pre-service and in-service teachers towards Internet.

3. Results

The results of the study are analyzed at a general level to highlight the attitude of Biology teachers towards Internet use and at a specific level to compare the attitudes of pre-service Biology teachers with those of in-service teachers. Analysis of overall results indicates a positive attitude of Biology teachers without using the Internet (Table 1).

Table 1. Mean scores and standard deviations of each items about using Internet

Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
I1	3.21	.710	I21	2.33	.777
I2	2.94	.657	I22	3.16	.597
I3	2.97	.747	I23	2.76	.706
I4	2.87	.771	I24	2.83	.698
I5	3.36	.664	I25	2.49	.727
I6	3.40	.573	I26	2.54	.706
I7	2.82	.720	I27	2.77	.615
I8	2.81	.684	I28	2.77	.583
I9	3.27	.583	I29	2.60	.706
I10	2.89	.876	I30	3.19	.597
I11	2.92	.633	I31	2.91	.651
I12	2.75	.724	I32	2.59	.715
I13	2.58	.716	I33	2.11	.658
I14	2.95	.686	I34	2.67	.772
I15	3.05	.564	I35	2.90	.577
I16	2.81	.698	I36	2.65	.690
I17	3.02	.626	I37	2.42	.710
I18	3.27	.640	I38	3.56	.586
I19	2.97	.680	I39	3.03	.637
I20	2.95	.654	I40	3.01	.622

Regarding the comparative analysis of the attitudes of pre-service biology teachers and in-service teachers to the Internet, there are no statistically significant differences. The results of One-Sample Kolmogorov-Smirnov Test show that there are some differences at the level of seven aspects (Table 2): the confidence in sending an e-mail message (item 4, item 16), considering the Internet as an indispensable tool in everyday life (item 10), feeling at ease when working on the internet (item 11), improving work based on internet use (item 14), appreciation of the time spent on the internet (item 26) and the confidence in using search engines www (item 28).

Table 2. Mann-Whitney-U Test Values on teachers' attitude towards Internet

Items	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
I4	3409.500	15499.500	-2.419	.016
I10	3279.000	15369.000	-2.677	.007
I11	3325.000	15415.000	-2.807	.005
I14	3110.000	15200.000	-3.391	.001
I16	3413.500	15503.500	-2.493	.013
I26	3439.500	15529.500	-2.334	.020
I28	3538.500	15628.500	-2.255	.024

From the Mean Rank analysis (Table 3), one can find that there are the following significant differences at the level of the Biology teachers' attitudes towards the Internet:

- the attitudes of in-service teachers (M_2=121.01) is more favorable with regard to *the confidence in sending an e-mail message* compared to the attitudes of pre-service teachers (M_1=100);
- the attitudes of in-service teachers (M_2=123.38) is more favorable referring to *considering the Internet as an indispensable tool in everyday life* compared to the attitudes of pre-service teachers (M_1=99.15);
- the attitudes of in-service teachers (M_2=122.55) is more favorable related to *feeling at ease when working on the internet* compared to the attitudes of pre-service teachers (M_1=99.45);
- the attitudes of in-service teachers (M_2=126.45) is more favorable in terms of *improving work based on internet use* compared to the attitudes of pre-service teachers (M_1=98.06);
- the attitudes of in-service teachers (M_2=120.94) is more favorable regarding the *confidence in sending an e-mail message* compared to the attitudes of pre-service teachers (M_1=100.02);
- the attitudes of in-service teachers (M_2=120.46) is more favorable with referring to *the appreciation of the time spent on the internet* compared to the attitudes of pre-service teachers (M_1=100.19);
- the attitudes of in-service teachers (M_2=118.66) is more favorable with related to *the confidence in using search engines www* compared to the attitudes of pre-service teachers (M_1=100.83).

Table 3. Mean Rank on teachers' attitude towards Internet

Items		**N**	**Mean Rank**	**Sum of Ranks**
I4	pre-service teachers	155	100.00	15499.50
	in-service teachers	55	121.01	6655.50
I10	pre-service teachers	155	99.15	15369.00
	in-service teachers	55	123.38	6786.00
I11	pre-service teachers	155	99.45	15415.00
	in-service teachers	55	122.55	6740.00
I14	pre-service teachers	155	98.06	15200.00
	in-service teachers	55	126.45	6955.00
I16	pre-service teachers	155	100.02	15503.50
	in-service teachers	55	120.94	6651.50
I26	pre-service teachers	155	100.19	15529.50
	in-service teachers	55	120.46	6625.50

I28	pre-service teachers	155	100.83	15628.50
	in-service teachers	55	118.66	6526.50

4. Discussions

The purpose of the study was to study the pre-service and in-service biology teachers' attitudes toward using the Internet. The research have highlighted the importance of knowing the attitudes of biology teachers in the context of the increasingly frequent use of new technologies in the educational process. It is certain that the next evolution in teaching is also conferred by the way teachers accept to use modern technologies in lessons.

In most current studies (Aslan & Zhu, 2015; Bitok, 2014; Cavas et. al., 2010); Kapici et al., 2015; Mai, 2015; Muşlu Kaygisiz et al., 2011; Županec et al., 2014), it has been shown that teachers adopt a positive attitude towards the use of technologies, similar to the findings of the present study. The results of other studies (Behera et al., 2016) have shown that the attitude of biology teachers towards technology is neither more favorable nor unfavorable. Although the modern technologies are increasingly used in biology teaching, there are situations where teachers do not use them at all. For example, the results of the study by Savaşci Açikalin (2014) demonstrate that none of the participants used the Internet, interactive smart cards, computer simulations in designing science lessons. Another result of this study indicates that there are no significant differences between the pre-service and in-service biology teachers' attitude towards internet use. These findings were also obtained by other researchers (Behera et al., 2016; Mai, 2014) who were concerned with the comparative analysis of biology teachers' attitudes towards technology.

According to the study conducted by Odcházelová (2015), the main roles of using technology in biology teaching are related to motivation, cognitive activity and learning activity. The pedagogical implications of teachers' use of the Internet in teaching Biology are varied: stimulating interest in what is new, through interactivity, stimulating imagination, developing logical thinking, decomposing a problem in sequential stages, logically organizing reasoning, optimizing performance of teaching, by presenting a variety of examples or patterns associated with a learning sequence. It is important that both pre-service and in-service biology teachers to benefit from training based on the competence of using modern technologies in close connection with the requirements of the knowledge society. Advancement and evolution referring to the use of modern technologies in teaching biology will continue as a result of European and international strategies and policies. The potential of new technologies is a permanent challenge for biology teachers and other specialists who need to adapt to these changes.

5. Conclusions

Investigating the attitudes of pre-service and in-service biology teachers towards the Internet offers more opportunities for researchers and educators. First of all, measuring attitudes towards the internet indicates teachers' acceptance of technology as well as the extent to which they are willing to use them in biology teaching. Therefore, these studies contribute to knowing the possibility to exploit the new technologies by biology teachers in the teaching-learning activity. Secondly, the studies in the field of Internet attitudes are useful for improving pre-service teachers training programs from the perspective of preparing them for the use of technology in biology lessons. The analysis of studies in this field has shown that research on in-service biology teachers is predominant in exploring their attitudes towards Information and Communication Technology. There are very few studies centered on determining the attitudes of biology teachers towards the Internet. It has also been found that there are few comparative studies of pre-service and in-service teacher attitudes towards new technologies.

As indicated by the results of this study, biology teachers have a positive attitude towards the use of Internet. It has also been observed that there are no significant differences between the attitude of pre-service biology teachers and in-service teachers. Nevertheless, the attitudes of in-service teachers is more favorable than the attitudes of pre-service teachers on the following aspects of internet use: the confidence in sending an e-mail message, considering the Internet as an indispensable tool in everyday life, feeling at ease when working on the internet, improving work based on internet use, appreciation of the time spent on the internet and the confidence in using search engines www. Determining the attitudes of pre-service teachers of Biology towards the use of the Internet can enhance the effectiveness of teacher education programs. Assessing the attitudes of in-service teachers of Biology ensures the success of integrating modern technologies into biology teaching and learning activities.

6. Limitations and further research

The generalization of results is not possible due to the specific context and the small number of in-service biology teachers who participated in the study. Therefore, one of the basic objectives of future research will be to develop a similar study on a larger sample of biology teachers. It would also be useful to investigate attitudes towards the use of the Internet and teachers in other disciplinary disciplines such as language and literature, mathematics, primary school teachers, preschool teachers.

References

Abedalaziz, N., Jamaluddin, S., Leng, C. H. (2013). Measuring attitudes toward computer and internet usage among postgraduate students in Malaysia. *Turkish Online Journal of Educational Technology*, *12*(2), 200-216.

Al Otaibi, K. N. (2012). Attitudes Towards the Use of the Internet. *Psychology Research*, *2*(3), 151-159.

Aslan, A., & Zhu, C. (2015). Pre-Service Teachers' Perceptions of ICT Integration in Teacher Education in Turkey. *TOJET: The Turkish Online Journal of Educational Technology*, *14*(3), 97-110.

Behera, S. K., Sao, S., & Mohamed, S. (2016). Attitude of B.Ed. Student-Teachers towards E-Learning. *International Journal of Computer Science Engineering*, *5*(6), 305-311.

Bettencourt, C., Velho, J. L., & Almeida, P. A. (2011). Biology teachers' perceptions about Science-Technology-Society (STS) education. *Procedia Social and Behavioral Sciences*, *15*, 3148-3152.

Birgin, O., Çoker, B., & Çathoglu, H. (2010). Investigation of first year pre-service teachers' computer and internet uses in terms of gender. *Procedia Social and Behavioral Sciences*, *2*, 1588-1592.

Bitok, E. B. (2014). Teachers' Perception and Support on the Use of Information Communication Technology in Teaching/ Learning of Biology in Secondary Schools in Uasin Gishu County, Kenya. *International Journal of Science and Research*, 3(11), 3140-3143.

Cavas, B., Cavas, P., Karaoglan, B. & Kisla, T. (2010). A study on science teachers' attitude toward information and communication technologies in education. *The Turkish Online Journal of Educational Technology, 8*(2), 20-32.

Cazan, A. M., Cocorada, E., Maican, C. I. (2016). Computer anxiety and attitudes towards the computer and the internet with Romanian high-school and university students. *Computers in Human Behavior*, *55*, 258-267.

Celebi, S. I. (2015). How do motives affect attitudes and behaviors toward internet advertising and Facebook advertising?. *Computers in Human Behavior*, *51*, 312-324.

Coffin, R. J., & MacIntyre, P. D. (1999). Motivational influences on computer-related affective states. *Computers in Human Behavior*, *15*(5), 549–569.

Doggan, A., Hess, B., Mogan, D., Kim, S., & Wilson, K. (1999). Measuring students' attitude towards educational use of the Internet. Paper presented at *the Annual Conference of the American Educational Research Association* (Montreal, Canada, April 19-23, 1999).

Dreyfus, A., Feinstein, B., & Talmon, J. (1998). The Advantages and Problematics of Using the Electronic Spreadsheet in Biology Teaching as Perceived by Actively Engaged Teachers. *Journal of Educational Computing Research*, 19(1), 67-81.

Eagly, A. H., & Chaiken, S. (2007) The advantages of an inclusive definition of attitude. *Social Cognition*, 25(5), 582–602.

Ebersold, K., & Glass, R. (2016). The Internet of things: a cause for ethical concern. *Issues in Information Systems*, 17, Issue IV, 145-151.

Eduljee, N., & Kumar, S. S. (2017). Exploring Attitudes Towards the Internet: A Study of Indian College Students. *International Research Journal of Multidisciplinary Studies*, *3*(1), 1-12.

Efe, R. (2011). Science Student Teachers and Educational Technology: Experience, Intentions, and Value. *Educational Technology & Society*, *14*(1), 228–240.

Fakomogbon, M. A., Adebayo, R. F., Adegbija, M. V., Shittu, A. T., & Oyelekan, O. S. (2014). Subject Specialization and Science Teachers' Perception of Information and Communication Technology for Instruction in Kwara State. *International Journal of Information and Communication Technology Education, 10*(1), 25-34.

Gundy, M. S., & Berger, M. J. (2013). Integration of Laptop Computers in High School Biology: Teacher Perceptions. *Journal of Information Technology and Application in Education*, *2*(1), 33-46.

Hong, K. S., Ridzuan, A. A., & Kuek, M. K. (2003). Students' attitudes towards the use of the Internet for learning: A study at a university in Malaysia. Educational Technology and Society, *6*(2), 45-49.

Hopson, M. H., Simms, R. L., & Knezek, G. A. (2002). Using a technologically enriched environment to improve higher-order thinking skills. *Journal of Research on Technology in Education, 34*(2), 109-119.

Huang, H. M., & Liaw, S. S. (2005). Exploring user's attitudes and intentions toward the web as a survey tool. *Computers in Human Behavior, 21*(5)*,* 729-743.

Joyce, M., & Kirakowski, J. (2015). Measuring Attitudes Towards the Internet: The General Internet Attitude Scale. *International Journal of Human–Computer Interaction*, *31*, 506-517.

Kapici, H. Ö., Akçay, H. & İnaltekin, T. (2015). The Impact of technology based learning on the beliefs and attitudes of pre-service teachers. *International Journal of Humanities and Education*, *1*(2), 154-167.

Koksal, M. S., Yaman, S., & Saka, Y. (2016). Analysis of Turkish Prospective Science Teachers' Perceptions on Technology in Education. *Australian Journal of Teacher Education*, *41*(1). Retrieved from http://dx.doi.org/10.14221/ajte.2016v41n1.2.

Lagat, T. (2016). Attitudes of teachers of biology and students towards computer-assisted instruction and conventional instruction in secondary schools in Nandi South Sub-County. International *Journal of Advanced Education and Research*, *1*(9), 41-45.

Luan, W. S., Fung, N.G., Nawawi, M., & Hong, T. S. (2005). Experienced and inexperienced Internet users among pre-service teachers: Their use and attitudes toward the Internet. *Educational Technology & Society*, *8*(1), 90-103.

Mai, M. Y. (2014). In service and pre service teachers' attitudes and perceptions towards information and communication technology "ICT" using in education. *Proceedings of the Australian Academy of Business and Social Sciences Conference 2014*. Retrieved from https://www.aabss.org.au/system/files/published/AABSS2014_197.pdf.

Mai, M. Y. (2015). Science Teachers' Attitudes towards Using ICT and Mobile Learning Technologies in Malaysian Schools. *European Journal of Interdisciplinary Studies*, *3*(1), 187-196.

Mai, M. Y., & Hamzah, M. (2016). Primary Science Teachers' Perceptions of Technological Pedagogical and Content Knowledge (TPACK) In Malaysia. *European Journal of Social Sciences Education and Research*, *6*(2), 167-179.

Mansour, N. (2010). Science Teachers' Perspectives on Science-Technology-Society (STS) in Science Education. *Eurasian Journal of Physics and Chemistry Education*, *2*(2), 123-157.

Morse, B., Gullekson, N., Morris, S., Popovich, P. (2011).The development of a general Internet attitudes scale. *Computers in Human Behavior*, *27*, 480-489.

Muşlu Kaygisiz, G., Bağlibel, M., & Samancioğlu, M. (2011). Computer Use of Science Teachers and Their Attitudes toward Computer Supported Teaching: A Sample from Turkey. *Journal of Turkish Science Education*, *8*(2), 78-90.

Odcházelová, T. (2015). Beliefs of the biology teachers about using multimedia. Problems of *Education in the 21st Century*, *63*, 71-83.

Oppenheim, A. (1992). *Questionnaire Design, Interviewing and Attitude Measurement*. London, Pinter.

Osman, K. (2014). Evaluation of Webquest in Biology: Teachers' Perception. *Turkish Online Journal of Distance Education, 15*(1), 75-88.

Parahoo, K. (2014). *Nursing Research: Principles, Process and Issues*. London: Palgrave Macmillan.

Rosenberg, M., Hovland, C., Mc Guire, W., Abelson, R., & Brehm, J. (1969). *Attitude organization and change*. New Haven and London Yale University Press.

Sam, H. K., Othman, A. E. A., & Nordin, Z. S. (2005). Computer Self-Efficacy, Computer Anxiety, and Attitudes toward the Internet: A Study among Undergraduates in Unimas. *Educational Technology & Society*, *8*(4), 205-219.

Savaşci Açikalin, F. (2014). Use of instructional technologies in science classrooms: teachers' perspectives. *TOJET: The Turkish Online Journal of Educational Technology*. *13*(2), 197-201.

Sharma, G. (2017). Pros and cons of different sampling techniques. *International Journal of Applied Research*, *3*(7), 749-752.

Smith, B., Caputi, P., & Rawstone, L. (2000). Differentiating computer experience and attitude towards computers: An empirical investigation. *Computers in Human Behavior*, *16*, 59-81.

Tererek, H., & Ercan, O. (2012). Analysis of teachers' attitude towards internet use: Examples of Chemistry teachers. *Creative Education*, *3*(3), 296-303.

Tsai, C.-C., Lin, S., & Tsai, M.-J. (2001). Developing an Internet Attitude Scale for high school students. *Computers & Education*, *37*, 41–51.

Tuncer, M., Dogan, Y., Tanas, R. (2013). Vocational School Students' Attitudes Towards Internet. *Procedia - Social and Behavioral Sciences*, *103*, 1303-1308.

Usun, S. (2003). Undergraduate Students Attıtudes towards Educatıonal Uses of Internet. *Interactive Educational Multimedia*, *7*, 46-62.

Woodrow, J. J. (1991). A comparison of four computer attitudes scales. *Journal of Educational Computing Research, 7,* 165-187.

Wu, Y.-T., Tsai, C.-C. (2006). University Students' Internet Attitudes and Internet Self-Efficacy: AStudy at Three Universities in Taiwan. *Cyberpsychology & Behavior*, *9*(4), 441-450.

Yapici, İ. Ü., & Hevedanli, M. (2012). Pre-Service Biology Teachers' Attitudes towards ICT Using In Biology Teaching. *Procedia - Social and Behavioral Sciences*, *64*, 633-638.

Zhang, Y. (2007). Development and validation of an internet use attitude scale. *Computers & Education*, *49*, 243–253.

Županec, V., Miljanović, T., & Parezanović-Ristić, S. (2014). Biology teachers' attitudes toward computer assisted learning. *Archives of Biological Sciences*, *66*(3), 1281-1289.