

Attitudes Of Mathematics Teachers Towards The Use Of Technological Tools In Intermediate Schools In Saudi Arabia

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ABSTRACT

The study aimed to increase understanding of the attitudes of mathematics teachers in intermediate schools towards the use of technological tools in Saudi Arabia in the Hafr Al-Batin province. To achieve the aims of the study, the researchers used a 19-item questionnaire, and its reliability and validity were verified. The sample was 73 male and female mathematics teachers; the study found that the attitudes of mathematics teachers towards the use of technological tools are positive. Finally, the study presented some recommendations: having specialists in the fields of technology and the Internet to help teachers to use technological tools was considered necessary, as well as providing each school with appropriate technological tools, and providing teachers with training courses regarding how to effectively use various technological tools.

Keywords: attitudes, technological tools, mathematics teachers.

INTRODUCTION

This era is characterised by rapid changes resulting from scientific and technological progress, and technology has penetrated into the fields of public life. In 2005, Moqbel claimed that the curricula offered through educational institutions are not useful in public life. Saudi Arabia was one of the countries that took a distinct step towards rebuilding curricula according to clear steps, with an urgent need to keep pace with this accelerating technological development. These changes included teachers, who can gain the necessary expertise by attending courses and workshops which concern how they use technological tools in order to hone their educational talents. Al-Ghassab (2017) indicated that teachers are required to possess the technical and educational skills that allow them to effectively use technological tools, because teachers represent the main pillar of the educational process, and therefore are required to exercise many roles to improve the educational process. Moreover, Al-Dulaimi (2015) emphasised that the employment of technological tools in teaching has become the job of teachers, and this differs from their role in the past, which was limited to indoctrination, for this process of preparing the teacher to use technological tools in teaching has become a scientific and professional requirement.

To achieve quality in teaching, there are several things that must be assessed and examined, most notably the attitudes of teachers towards teaching methods. Mathematics has been chosen in this study for several reasons, including the nature of mathematics in being characterised by a variety of features, including its cumulative structure, and its topics being related and having a logical sequence. Therefore, specialists in mathematics curricula and methods believe that mathematics needs to take advantage of the potential of technological advancement to support mathematics teaching and develop mathematics teaching methods. Furthermore, many studies have indicated that teaching mathematics using technological tools improves students' ability to achieve, provides them with opportunities to compete with each other, increases their positivity towards the subject, and encourages them to learn it (Al-Khatib, 2004). Consequently, this study will assess the attitudes of mathematics teachers towards their use of technological tools in the educational process.

THE STUDY PROBLEM AND RESEARCH QUESTION

Many of our current methods and ways of life, including teaching methods, have changed due to the technological developments of recent times. The use of technological tools in teaching is one of the most common teaching patterns today, and it is considered the most cost-effective, giving students a greater ability to retain the information which they acquire. Despite the advantages provided by technological tools for the educational process, the success of this method and benefits of these features depend on several aspects, most notably the attitudes of teachers towards the use of technological tools in the educational process.

The Ministry of Education in Saudi Arabia presented a set of technological tools in government schools, and held a set of training workshops for teachers regarding how to use the technological tools in teaching. Nevertheless, we have noted that the skills required to use technological tools in the teaching process are not clear to most mathematics teachers, which may prevent students from benefiting from technological tools. In addition, it has been observed that there is a slow pace in the activation of this type of teaching by teachers, especially mathematics teachers. Therefore, the problem of the study is represented by the following question:

What are the attitudes of mathematics teachers towards the use of technological tools in intermediate schools in Saudi Arabia?

IMPORTANCE AND OBJECTIVES OF THIS STUDY

The importance of this study stems from the importance of the topic we are addressing. We expected that this study would contribute by providing adequate information (to those in charge of the educational process) about the attitudes of mathematics teachers towards the use of technological tools, and, additionally, could benefit the designers of the mathematics curriculum. Moreover, the current study aimed to identify the attitudes of mathematics teachers towards the use of technological tools in intermediate schools in Saudi Arabia.

PROCEDURAL DEFINITIONS

Attitudes

An attitude is generally defined as a state of mental readiness that generates a dynamic effect on a person's response and behaviour towards a subject, positive or negative, as a result of the interaction of a group of knowledge, emotional and behavioural aspects of a person, determining

his behaviour towards the things and topics surrounding him (Hewstone, Antony & Wolfgang, 1997).

Technological tools

In the current study, technological tools refer to electronic, digital tools that can be used in teaching by a mathematics teacher. This could include computers, smartboards, projectors, Web 2.0 tools available through the Internet, etc.

Mathematics teachers

Mathematics teachers represent the group of people assigned by the Ministry of Education to teach mathematics in intermediate schools in Hafr Al Batin province, for the second semester of the academic year 2019–2020.

LITERATURE REVIEW

In this section, we present a number of studies that are related to the primary goal of the current study. A study by Borstorff and Lowe (2016) aimed to identify attitudes towards the use of technological tools in teaching, with the study sample consisting of 113 students. The researchers used a questionnaire to identify students' perceptions and convictions with regard to using technological tools, and the results of the study showed that 88% of respondents showed moderate positive attitudes and experiences regarding the use of technological tools, and 79% of them advised others to use this type of teaching. The shortcomings centred on the students' point of view that there is a weakness concerning the clarity of how to use technological tools.

In another study, conducted by Egbo, Ifeanchio, Okoyenuzu and Onwumere (2011), the researchers aimed at understanding and measuring students' attitudes regarding the effectiveness of e-learning and its use in the educational process. They developed a questionnaire and distributed it to 415 students from the University of Nigeria via the Internet. The results indicated that most students have positive attitudes towards the use of technological tools in learning.

A study conducted by Al-Shannaq and Bani Dum (2010) aimed to reveal the attitudes of teachers and students towards the use of technological tools in teaching in Jordan, with 28 male and female teachers and 118 male and female students participating. The results of the study revealed that there are positive attitudes among teachers towards the use of technological tools. Al-Doub, Goodwin and Al-Hunaiyyan (2008) aimed to reveal students' attitudes towards the use of technological tools in higher education institutions in Kuwait. To achieve the goals of the study, the researchers distributed a questionnaire to a sample from the College of Business Administration in the government sector. The sample included 146 male and female students, as well as a sample of students from the College of Science and Technology at Gulf University in the private sector, which numbered 85 male and female students. The results indicated that all individuals of the government and the private sector were enthusiastic about using technological tools, and their attitudes were positive.

Shu, Hsiu and Gwo (2006) conducted a study which aimed at revealing the attitudes of teachers and students towards the use of technological tools in education, with a sample consisting of 76 male and female students and 111 male and female teachers. The results of the study indicated that the majority of respondents had highly positive attitudes towards the use of technological tools in

education. Furthermore, Al-Omari (2006) conducted a study aimed at identifying the reality of the use of technological tools from the viewpoint of teachers, and the attitudes of students and teachers towards it. Two questionnaires were prepared; the first was specific to students and measured their attitudes, while the second questionnaire was for teachers, consisting of four areas: to measure the availability and use of physical and information facilities, to understand the extent to which teachers use e-learning skills, to understand the difficulties they face when using technological tools, and to measure the attitudes of teachers towards the use of technological tools.

The sample of the study consisted of 181 male and female teachers and 400 male and female students, distributed among eight schools in Jordan. One of the most prominent results revealed by the study was teacher attitudes towards the use of technological tools being weak.

STUDY APPROACH AND COMMUNITY

The descriptive approach and a questionnaire were used to collect information, due to their relevance to the nature and objectives of the study. The study population consisted of 73 male and female teachers of mathematics in the Hafr Al Batin province from the second semester of 2019–2020, chosen in a simple, random way.

Study Tool

We chose to use a questionnaire for the current study, and in order to prepare this questionnaire, we reviewed theoretical literature as well as previous studies with comparable goals to the current study. We adopted the questionnaire items from the studies of both Hamadenah and Al-Shawaheen (2019) and Malkawy, Nawafleh and Alsaqqar (2015), and we developed the questionnaire items to suit with objectives of the current study. As a result, the questionnaire consisted of 19 items to measure the attitudes of mathematics teachers towards the use of technological tools in their teaching, and a five-point Likert scale was adopted, as follows:

(1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly Agree.

Statistical Processing

To answer the study question, the means and standard deviations pertaining to the mathematics teachers' attitudes (towards using technological tools in intermediate schools in Saudi Arabia) were calculated.

FINDINGS AND DISCUSSION

In this section, the participants' demographic data will be presented, and then the research question will be analysed and discussed.

Demographic Information Teachers By Gender

Table 1: Teachers by gender

Gender	Response %	Response N
Male	65.8	48
Female	34.2	25
Total	100%	73

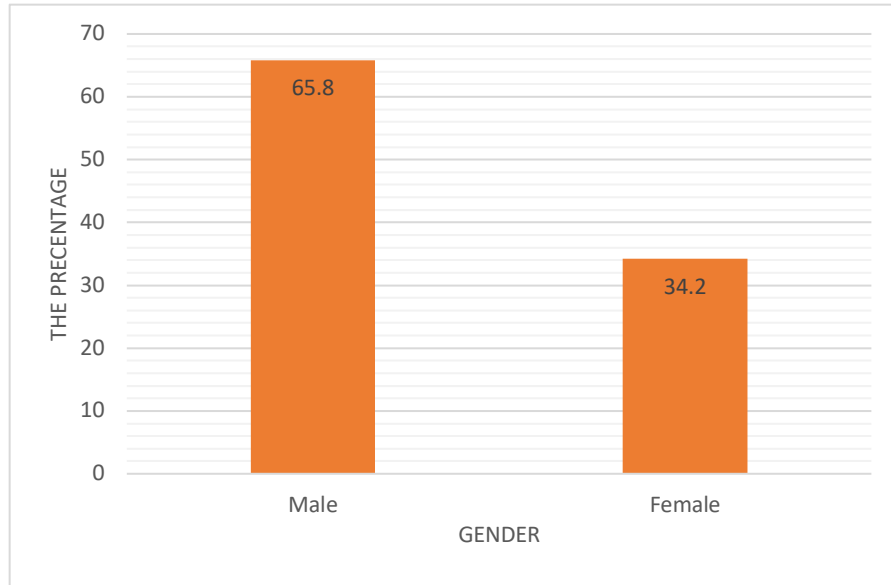


Figure 1: Mathematics teachers by gender.

Table 1 and Figure 1 indicate that approximately two-thirds of the participants were male mathematics teachers, with female mathematics teachers forming the remaining third.

Teachers By Teaching Experience

Table 2: Teachers by teaching experience

Teaching Experience	Response %	Response N
Less than 5 yrs	21.9	16
5-10 yrs	43.8	32
Over 10 yrs	34.2	25
Total	100%	73

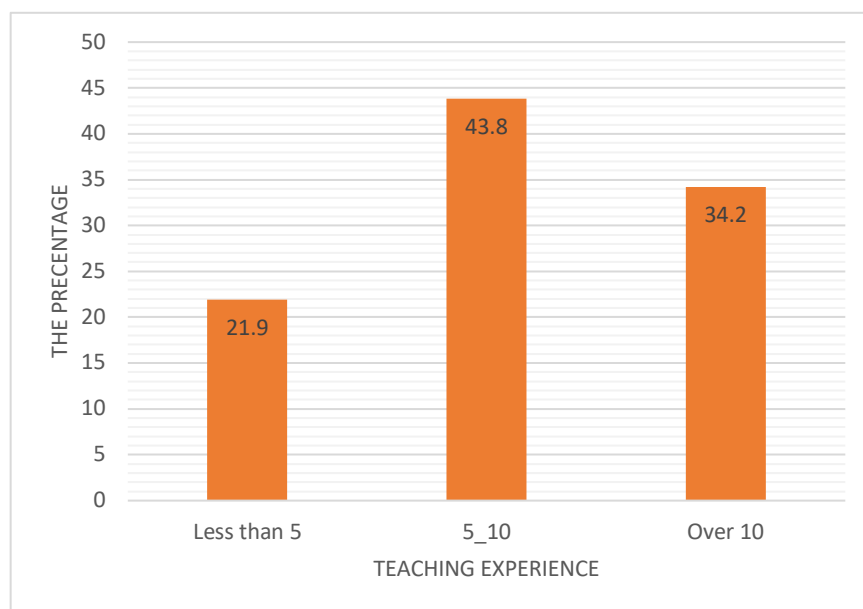


Figure 2: Mathematics teachers by teaching experience.

Table 2 and Figure 2 show that the teaching experience of approximately 44% of the mathematics teachers ranged between 5 and 10 years, while teaching experience for around 34% was more than 10 years. In addition, almost 22% of the teachers had less than 5 years of teaching experience.

Teachers By Training Courses Completed

Table 3: Teachers by training courses completed

Training Courses	Response %	Response N
2 courses or fewer	95.9	70
3-5 courses	4.1	3
More than 5 courses	0	0
Total	100%	184



Figure 3: Mathematics teachers by training courses completed.

Table 3 and Figure 3 indicate that most mathematics teachers had two courses or fewer in the use of technological tools, while no mathematics teacher had more than five training courses in the use of technological tools.

Teachers By Educational Qualifications

Table 4: Teachers by educational qualifications

Educational Qualifications	Response %	Response N
Bachelor's degree	93.2	68
Master's degree	6.8	5
PhD	0	0
Total	100%	184

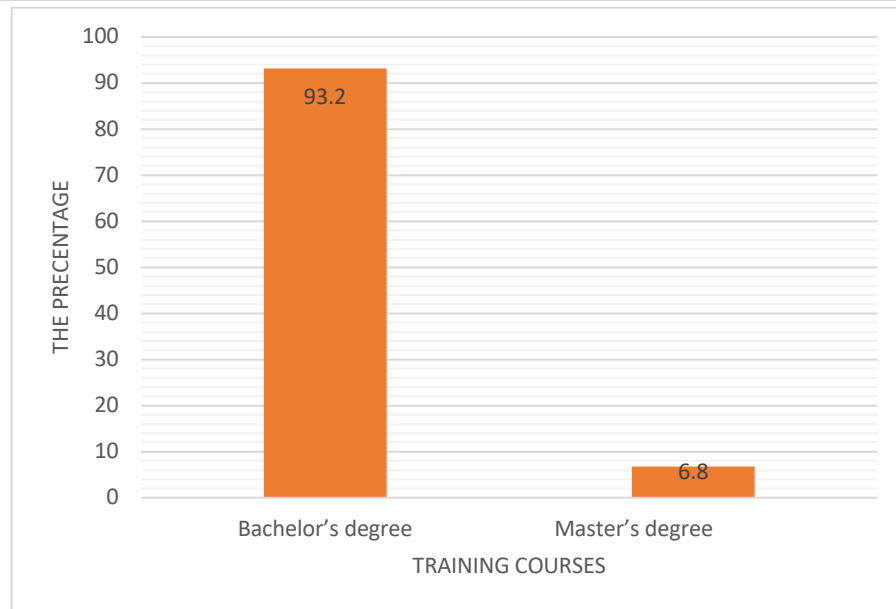


Figure 4: Mathematics teachers by educational qualifications.

Table 4 and Figure 4 indicate that most mathematics teachers held a bachelor's degree, while no participants held a PhD, and almost 7% held a master's degree.

What are the attitudes of mathematics teachers towards the use of technological tools in intermediate schools in Saudi Arabia?

To answer this question, the means and standard deviations have been calculated for the responses of mathematics teachers to the questionnaire focused on their attitudes towards the use of technological tools. The following Table 5 is a presentation of these results.

Table 5: Means and standard deviations for the attitudes of mathematics teachers

No.	Items	Mean	Std. Dev	Items No.
1	I think that the use of technological tools helps to improve students' academic achievement.	4.55	.668	14
2	I think that the use of technological tools increases the motivation of students.	4.49	.648	11
3	I see the use of technological tools as being beneficial for students in terms of interaction and having fun.	4.48	.729	1
4	I believe that the use of technological tools in teaching encourages students to self-learn.	4.47	.728	2
5	I think that employing technological tools in mathematics teaching reduces the economic cost of education.	4.47	.709	4
6	The employment of technological tools enhances students' higher thinking abilities.	4.38	.810	7
7	The use of technological tools helps to improve the quality of education.	4.36	.653	3
8	I believe that the use of technological tools in teaching increases flexibility regarding students' access to educational material anywhere.	4.36	.714	13
9	I think that the use of technological tools enriches the knowledge of students.	4.36	.674	17
10	I believe that the use of technological tools increases students' confidence in themselves.	4.33	.746	15
11	I am happy to enhance education by using various technological tools.	4.33	.708	8
12	I think the use of technological tools saves time.	4.27	.854	5
13	I am glad that technological tools allow students to access educational material at any time.	4.25	.722	10
14	I believe that the use of technological tools enhances the ability of students in the field of technology.	4.18	.991	16
15	I think that the use of technological tools has multiple benefits in the teaching process.	4.15	.681	19
16	I believe that the use of technological tools in teaching mathematics takes into account the individual differences between students.	3.52	1.260	6
17	I see the necessity to use technological tools in various other subjects.	3.42	1.013	18
18	I think that the use of technological tools in teaching increases the teacher's technical competencies.	3.32	1.311	9
19	I believe that the use of technological tools allows continuous feedback to be provided to students.	3.05	1.153	12

Table 5 shows that the means ranged between 3.05 and 4.55, where item no. 14 ("I think that the use of technological tools helps to improve students' academic achievement") ranked first, with a mean of 4.55 and a standard deviation of 0.668. This indicates a highly positive trend, and the researchers suggest that this highly positive result may reflect the awareness of mathematics teachers of the benefits to students from the use of technological tools. In addition, the use of technological tools may enable mathematics teachers to note the improvement in the level of academic achievement of students.

Item no. 11 ("I think that the use of technological tools increases the motivation of students") ranked second, with mean of 4.49 and a standard deviation of 0.648. We have determined that this is the result of mathematics teachers observing that the use of technological tools stimulates motivation among students, for example, by displaying mathematics shapes in different colours to be more

visible to students, as well as the possibility of displaying three-dimensional shapes that may be more realistic and more relatable in the minds of students.

Table 5 shows that the overall mean for the responses of mathematics teachers was 4.12, and this indicates that the attitudes of mathematics teachers towards the use of technological tools were positive. The result of this study is also consistent with the studies of Shu, Hsiu, and Gwo (2006) and Al-Shannaq and Bani Dum (2010), which revealed positive attitudes towards the use of technological tools. However, the current study differed in its results from the study of Borstorff and Lowe (2016), in which the results showed that attitudes towards using technological tools were average. In addition, the current study presents a significant contrast with the study of Al-Omari (2006), the results of which suggested that attitudes towards using technological tools were weak.

CONCLUSION AND RECOMMENDATIONS

The mathematics teachers have positive attitudes towards the use of technological tools in teaching, which reflects positively on the quality of the educational process in improving the achievement level of students. Moreover, using technological tools helps mathematics teachers to communicate information to students from multiple sources. Therefore, it is important to create an appropriate environment that helps mathematics teachers to perform their teaching role, in a way that assists them to keep abreast of developments and changes, which are constantly occurring in the methods of teaching mathematics.

Study recommendations

1. Provide multiple training courses on the use of technological tools in teaching mathematics.
2. Provide material and moral incentives that may encourage mathematics teachers to use technological tools in teaching.
3. Provide appropriate technological tools for the mathematics curriculum in intermediate schools.
4. Provide specialists in the field of technology in intermediate schools to assist mathematics teachers in the use of technological tools in their teaching.
5. Conduct similar studies in other educational areas in Saudi Arabia to be able to generalise the results of the study.

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