



RESEARCH ARTICLE

THE EFFECT OF USING TECHNICAL MATHEMATICS LABORATORY ON FEMALE SECONDARY STUDENTS OF THIRTY-SEVENTH SCHOOL IN JEDDAH - SAUDI ARABIA

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ABSTRACT

**Aim:** The aim of this research is to investigate the impact of technical mathematics laboratory in teaching secondary Thirty-seventh school female students Jeddah - Saudi Arabia

**Methodology:** descriptive-analytical approach, the study included 28 female secondary students of Thirty-seventh school full semester after the use of technical mathematics laboratory, the research sample was chosen randomly, and questionnaire was used as data collection tool, data entry and analysis was done by Microsoft's Excel 2016.

**Results:** The results showed that there was fun, thrill and cooperative participation and teamwork during and after lessons by 99%, and that the teacher used modern and exciting teaching aids by 98% and used modern technology in lesson by 100%, and students reported that learning in the technical laboratory make space for them to participate during the lesson by 98%, increasing understanding and the level of achievement by 96%, and that the students have increased chances for self-evaluation by 97%.

**Conclusion:** The use of technical mathematics laboratory has increased fun, cooperative participation, teamwork and good understanding of mathematics and increased the level of academic achievement among students.

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INTRODUCTION

We now live in the twenty-first century, this century, forms of knowledge doubled and varied with communication technology, satellites and the Internet. Resulting in turning today's society into a small village access to information became an easy and main thing to do for all society members. As the only way to cope with these rapid developments in science is education and curricula. Therefore, it became a must for specialists in this field to develop curricula, activities and strategies to take our children to the top. As well as working on preparing a generation that have knowledge, daily-life skills as much as possible in order to act positively in serving society (Abu Olba, 2012). The principle of learning by doing is based on a learning process established in this way to help the learner be ready for educational material, to make them know every aspect of it, how to implement it and to understand well how to deal with experiments and other applications directly by themselves (Piatti, 2006). Mathematics is an important and

necessary science for any individual, whatever their culture is, because they have an important role in daily life and also it helps societies develop since it helps solving a lot of the problems societies face in order to become scientific and technical ones (Abbas and Absi, 2007)

Creating technical mathematics laboratory in secondary Thirty-seventh school

Table (1) shows the measures taken by the researcher in order to prepare classroom environment which provides members of the group with equal opportunities to interact with each other according to tasks given, encourages them to communicate and exchange opinions in different ways. As it makes classroom environment to be fun and attractive meeting the needs of learners and make them able to acquire learning skills. So the researcher created a full and integrated technical mathematics laboratory, prepared a detailed plan for the laboratory as a safe and comfortable classroom, specified laboratory area suitable for the number of students as agreed with school management and colleagues. It was also taken in consideration that the laboratory is away from noise, chairs and tables were provided with attractive colors according to strength and quality standards.

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**Table 1. Technical Mathematics laboratory preparation procedures**




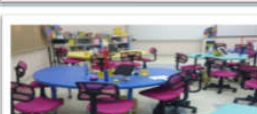
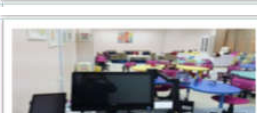






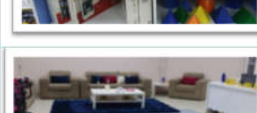
Pictures	Procedures
	Smart Board is placed and a monitor in the classroom. A student (technical supervisor in the class) was assigned to be responsible for preparing and running it at the start of class.
	A computer, a wireless monitor and a high-quality audio sets were provided.
	Desktop computers with Mathematics software suitable for secondary level were provided.
	Organizing some seats and creating a comfortable atmosphere for the students.
	A table equipped with a computer, iPad, Wi-Fi and a seat was brought to a place that allows view for all students.
	preparing teaching aids that are used in lessons (pens- engineering tools - models - graphics - display devices).
	Providing each table with iPads, sheets of paper, multiple choice aids, Buzzer device, feedback device and hourglass
	Preparing different motivational aids for students, creating (behavior rules) board as they were agreed on by students as well as the distinguished student's characteristics.
	Providing light, ventilation, heating and air-conditioning and making sure of safety; and putting rubbish bins and ensuring getting students to be used cleanliness.
	A library was established to motivate students to read during free classes, they also can borrow some to take home and a student was assigned to be its keeper.
	Shelves were designed for achievement portfolio of each student.
	Casio and Ti-nspir graphic calculators were prepared.
	The laboratory was equipped with comfortable seats and curtains to control lighting.

Table 2. Students opinions of using technical mathematics laboratory

Item	Yes	NO	Sometimes
The teacher provides a fun classroom	99%	0%	1%
The teacher organizes classroom to support learning	100%	0%	0%
The teacher uses modern and attractive teaching aids	98%	0%	2%
The teacher uses a modern technique in lessons	100%	0%	0%
The teacher gives us the chance to participate	98%	0%	2%
The teacher ensures cooperative participation among students and supports teamwork inside and outside classroom	99%	0%	1%
Our understanding of mathematics and achievement levels increased	96%	1%	3%
The teacher trains us on self-evaluation	97%	0%	3%
The teacher involves us in creating (behavior rules) board	99%	0%	1%
I stuck to instruction and rules of the classroom	99%	0%	1%
The teacher puts motivation board	100%	0%	0%
The teacher trains us on classroom rules	99%	0%	1%

The height of the chairs was made to proper to students' legs length while their bodies are adjacent to seat cushion and choosing appropriate tables height. It has been in mind the needs of the students when they sit in the classroom and taken into account the physical characteristics specially the hearing and visually impaired, as well as short ones. Educational technology was provided (Computers – iPads - graphics calculator Ti-nspir - Interactive whiteboard – documentary Camera - diverse devices and multiple – Wi-Fi - network printers - teaching aids - educational motivational toys) which make students able to interact and access information.

## Research Methods

**Study type:** descriptive-analytical approach.

**Sample size and target population:** the study included 28 female secondary students of Thirty-seventh school chosen randomly.

**Study place and duration:** the study was conducted in Thirty-seventh school in Jeddah- KSA and it took place during a full semester in 2015-2016.

**Data collection and analysis:** questionnaire was used as data collection tool, data entry and analysis was done by Microsoft's Excel 2016.

**Research ethics:** Permission from school management was taken to create technical mathematics laboratory and collect data using questionnaire and permission was taken from the participating students.

## RESULTS

Table (2) shows that learning in the laboratory achieved fun during the process by 99%. Students supported the role of technical laboratory in supporting the educational process by 100% and these results agree with (Salama, 2005) which indicated good effect of using technical laboratories as a strategy of teaching mathematics. Also, the study of (Wang Tsui Yang Welan, 2009) which aimed to design virtual mathematics technical laboratory in a virtual environment to help students understand mathematics concepts in that environment and to lessen fail percentage at mathematics, it used experimental approach and targeted students applying for

engineering faculty. Results showed satisfaction among most of students on experiencing virtual laboratories which contributed in increasing motivation towards studying specialized engineering courses. Table (2) shows that mathematics technical laboratory helps the teacher to stimulate teamwork and group work in and outside the lesson by 99% which agrees with study of (Barakat, 2005) that mentioned the role of group work inside classroom in improving team spirit and teamwork among students. Current study results, as shown in Table (2), indicated the goal has been achieved through students' participation in using computer programs in general and mathematics program in particular as well as smart devices as iPads, graphic calculator and smart boards in teaching and learning mathematics by 98%. Several studies agree with the current study results such as the study of (Khalafallah, 2013) which aimed to find the effectiveness of utilizing mathematics laboratory to develop geometric thinking. While the researcher implemented the study on 75 students of grade 9 in UNRWA's Al-Shoka preparatory school in Rafah educational area. The most significant study results are that there significant statistical differences between students averages of experimental group and control group in geometric thinking posttest and achievement posttest in favor of the experimental group. The study of (Omar, 2013) showed the effect of using virtual mathematics laboratory on developing mathematical correlation skills. Also, the study of (Abu Olba, 2012) highlighted the positive effect of using smart board on developing practical skills in electrical charts of 9<sup>th</sup> grade students in Gaza. Whistle the study of (Sulaiman, 2015) showed the effect of teaching geometry unit using mathematical laboratory in achievement and motivation towards learning mathematics by 6<sup>th</sup> grade students in Tolkarim governate schools. The researcher notices using the questionnaire that was used to survey students' opinions after applying the experiment that the goal was fulfilled by self-evaluation by 98%. Therefore, the results were positive and the goals of the laboratory about developing teaching process, motivating students to study and solidification of information through applying technical tools that contributed in creating a generation which works hard to build a successful scientific society.

## Conclusion

After reviewing data and literature review it was clear that the existence of technical laboratory for teaching mathematics

which contributes effectively in increasing the achievement level of students, motivation towards learning mathematics with different units, especially geometry which students find difficult. While the study aimed to not only teach geometry units in laboratories but also other subjects that include mathematics. The researcher also assures that teachers should be trained and have their skills developed to use laboratories in order to achieve the hoped-for goals of their existence and spreading them on wider scale.

### Recommendations

Using mathematics laboratories in teaching mathematics in all grades is necessary. Training teachers on using mathematics laboratories to teacher subjects other than geometry; such as fractions and algebra, etc. Conducting comprehensive wider-scale studies on technical mathematics laboratories and disseminating results.

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