

Mathematics Education

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Individual Research Project

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Outline:

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Thesis: This research aims to answer how using technology affects students' skill and mathematical understanding.

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B. The effects of using educational software GeoGebra in teaching math.

C. The effects of using different tools for teaching and learning the notion of equation in teaching math.

III. Strategies for Mathematics Education to Students with Disabilities

A. Using Hypermedia for students with learning disabilities

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INTRODUCTION

In education, technology is a tool for every teacher to achieve the expectation of today's education goals. The National Council of Teachers of Mathematics said, "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances student' learning. Teachers' attitudes play an important role in using technology in teaching and learning mathematics" (Budinski, p.42). That means that using technology makes teaching mathematics for students very easy and salient, and teachers use technology based on their attitudes and confidence. According to Adelaide, mathematics is a way of looking at the world that provides people with tools to solve problems. So, it is commonly said, "Mathematics is a Science of all Sciences and art of all arts."(citation) That means that mathematics is the key to all sciences, and it plays a very important role in building up all sciences. Also, mathematics is related to all subjects because it is important for building a science.

Teachers have many options to include technology in their teaching because there are different tools that support the teaching and learning of mathematics, such as computers, educational software, and hypermedia. The job of a teacher is to choose the appropriate technologies that help students gain knowledge and mathematical skills. There is a relationship between using different tools and mathematical skills and understanding, so it is essential for teachers to use different tools while he or she is teaching mathematics because students learn and understand more effectively, and there are many effects and advantages of using technology in teaching math.

It is essential for teachers to know that students are different in understanding and learning. Some students can learn and understand mathematics from one-step, so teachers can use any technology to teach them. Other students have difficult learning and understanding, so it

is important for teachers to teach them in a different way. So, teachers should use different technologies and strategies, such as hypermedia or FASTT for mathematics education, on students with disabilities. Consequentially, this research aims to answer how using technology affects students' skills and mathematical understanding.

THE EFFECTS OF USING TECHNOLOGY IN TEACHING MATH.

Different technologies, such as films, photographs, and computers have been used as tools to help students learn and understand. All these technologies affect students in education, but the computer is the best tool that can affect students' understanding and learning. There is an important relationship between students' mathematical learning and the best use of technology, so students need to make an appropriate use of tools to know mathematical skills.

According to a study by Drijvers and Barzel, there are two issues, which are the cause of problems in learning mathematics: limited student access to technology and limited teacher time for extended course preparation.

According to survey on the use of computers in mathematical education in Serbia, it examines the using of computers and educational software GeoGebra in teaching mathematics in classrooms and focuses on teachers' attitudes towards technology. The results of the survey show that teachers use computers more in their lesson preparation than in teaching, and the use of GeoGebra is less than the use of computers. A teacher from this survey explained that he came to this seminar in order to have a good experience and new ideas. He has downloaded GeoGebra to his computer, but he has not performed lessons with this software. Also, another teacher from this survey explained the reasons why teachers hesitate to use computers, even though they are part of our everyday life because there is no clear strategy about computer usage (Budinski, p.45). That means that even though computers and educational software GeoGebra are present

in schools, teachers use them very rarely, and they are not confident in using computers in performing lessons. So, we should examine different segments to make sure which strategy supports mathematics education.

The results of this survey could help every teacher develop strategies for using computers and technologies in mathematical classrooms. In fact, according to study from National Kaohsiung First University of Science and Technology, students who used the personalized computer assisted program were better in the achievement and attitude than students who used a nonpersonalized computer program (Chen, p.105). The results of this study show that computers affect students in their grades and achievement.

According to the article by Qingli, Xin ma, the study was an examination of the impact of using computer technology on mathematics education for K-12 students. The result of this study is that students have positive effects of CT (computer technology) on mathematics achievement. "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (Liqing, p.11). That means technology is an important tool, which influences students' learning.

There are three types of digital tools for teaching and learning the notion of equation, such as applets, graphing calculators, and computer algebra tools. According to the article by Drijvers and Barzed, there are three examples of applets to solve equations, such as Algebra Balance Scales, Solving Equations with Balance, and Solving Equation with Cover up Strategy. This means that we have different tools to solve equations, which make students understand more clearly and effectively. For graphing calculators, there are different tools of solving equations, such as specific educational software for computers and for mobile technology, which are useful because of effectiveness on student's skills and understanding. According to the article

by Drijvers and Balance, computer algebra is software that is used for solving equations and algebra education. Computer algebra systems help students understand and solve equations. Also, it helps students be aware of the difference between being exact and being approximate, and read through algebraic expressions.

In the University of Nebraska at Omaha, according to the article on mathematics and computer education, there are smart math tools in computer and ipad, which help both teacher to teach students perfectly and students to enhance learning of mathematics (Hanley, p.150). For example, TI-Emulator provides you with functional graphing calculator on your Smart board, Graphing Tables are useful to choose the size of a graph and to find the values of equations' mathematics. Also, Measurement Tools are important for students to draw and measure angles and they can create perfect angles (Hanley, p.151).

STRATEGIES FOR MATHEMATICS EDUCATION TO STUDENTS WITH DISABILITIES.

For today's students, it is essential to know how to enhance mathematical learning and thinking by understanding the nature of mathematics, which includes three types, such as declarative, procedural, and conceptual types. Mathematics has been difficult for all students, but students with disabilities tend to find these problems because they had more trouble than other students. Of course, it is important to use the appropriate technology to teach mathematics to students with disabilities who have difficulty learning in a traditional way. There is a survey by Mishra, which focuses on the strategies that can reinforce the teaching of mathematics for all students, but especially for students with disabilities. This strategy is called FASTT (Fluency and Automaticity through Systematic Teaching and Technology). The FASTT shows the positive effects of developing mathematical skills on both students with and without math difficulties.

Students who have difficulty in math can be successful at a high level by using technology. These students can learn more effectively based on their teacher's professional experience.

Moreover, in the article, by using Hypermedia to improve the mathematics problem solving skills of students with learning disabilities, Smith found that students with learning disabilities cannot solve word problems or understand effectively at a level equivalent to their computation skills. That means that students with disabilities have more difficulty understanding than normal students. Teaching students with disabilities by using technology can help students succeed in their mathematics problem solving endeavors. For example, practicing using computers shows that students with disabilities have increased learning and understanding mathematics.

According to the same article, it mentioned that the program was more effective and the use of microcomputers were yielding more learning and understanding for students with disabilities. For example, Darch, Carnine, and Gersten found that using strategies step by step is effective in learning concepts and solving different problem types in mathematics education. That means that teachers should teach students every step in order to have the best teaching results. According to the article by Miller, hypermedia programs include some applets, such as text, graphics, sound, animation, and video. Hypermedia is a tool that includes information linked and accessed by a computer (Lynch, p. 395). Hypermedia graphics can change simple diagrams of mathematical shape to photographic diagrams which are natural phenomena. Students can use mathematics in several ways by using hypermedia and continue to develop their skills and learning. So, hypermedia is an effective tool that is used to solve students' problems and develop their mathematical problem solving skills.

Of course, beginner teachers need to enrich their teaching skills. For example, N. Budinski explained that he had only two years of experience, but it helped him a lot. He has gained rich theoretical knowledge about teaching and learning mathematics in his life (Budinski, p. 44). That means experience is very important to help teachers have more knowledge and teach in the effective way.

TEACHING MATHEMATICS WITH ICT.

Fast and widespread communications, such as e-mail, the internet, and video conferencing are changing our lives and access to data and information. ICT (Information and Communication Technology) is an important tool that students need to be able to use to solve mathematical problems and to communicate their findings with others. The ICT affects the way of teaching and learning mathematics and it will prepare students for their future lives and careers. The point of using ICT is not only to use it as a tool for teaching but also to communicate with our technological society. Also, the main idea is not only to know the available hardware, software or other ICT tools but also to learn how to use them to tackle some interesting bits of mathematics. Moreover, it is essential to make sure that teachers will be aware of hardware and software to support students inside or outside the classrooms (Oldknow and Taylor, p. 1-2).

ICT is an essential tool that teachers are using to help plan, prepare, and manage teaching, so students will have access to the Internet, PC, or laptop in order to prepare their lesson plans, task-sheets, assessment records, evaluations, and take information from other sources. This might be helping teachers in mathematics education. Students can use ICT outside normal lessons and they can use it within a lesson as a group. If the school or university has one or more computer suites, that may be useful for students to use computers all lessons in order to improve

and solving mathematics problem and have access to a workstation (Oldknow and Taylor, p.2-11).

There are some main forms of ICT hardware in education, such as networked PCs, laptop computers, notebook and sub-notebook computers, palm top computers, and graphing calculators. For example, Networked PCs is available in the area of schools or university, which makes students work in a big area, such as a library, campus, or in a group in order to help and learn in an interesting way. In addition, laptop computers are the perfect idea that teachers can use to teach students effectively and using different programs on the computer or video games can enhance their teaching of mathematics. Moreover, Graphing calculators are good tools for mathematics and other subjects; you can use them to draw and analyze all the normal mathematical, scientific, statistical and financial calculations (Oldknow and Taylor, p. 6-7).

In the book by Oldknow and Taylor, there are some examples of using ICT that enhances the teaching and learning of mathematics. For example, pedagogy can be used to help teach content, to develop concepts, to increase knowledge, to improve understanding, and to reinforce skills. Also, mathematics is one of the aspects of ICT which can be used to draw graphs, to solve problems, and to compute statistics. In addition, organizations can help teachers or students to keep records, to manage time, and to communicate with others. Learning from feedback can encourage students to make their own conjectures and to test out and modify their ideas. Also, the speed of computers and calculators are very important to produce many examples which make students find answers to their mathematical problems (Oldknow and Taylor, p. 188-191).

There are some activities which are used as the tools of ICT to make students' progress in their understanding of the nature of functions both graphically and algebraically. For example, teachers asked students to work out the number of matches for ten triangles and students used the

calculator STAT function in order to get the solution. There is another example of teachers who use a practical context to help students develop their algebraic modeling skills. Teachers asked students to investigate $y=mx+c$ and $y=ax+bx+c$ in about three 50-minute lessons, the results of this activity were great in students' graphical and algebraic understanding of the nature of functions. Consequentially, we should integrate ICT into mathematics teaching to engage student's attention and motivate them, to encourage students to develop their problem solving strategies, to improve their test and examination results, to stimulate their curiosity, and to provide models and images which aid them in the concept formation. Also, ICT is useful for schools to improve efficiency and reduce teaching costs, improve examination results and the school's position, and improve provision for students who are not learning in their native tongue (Oldknow and Taylor, p. 192-197).

CONCLUSION.

In the survey, by Freudental in 1981, on the use of computers, predicted that there were different reasons for rare using technology that teachers in this survey emphasized, such as an urge for proper didactical training, curricula support, and guidelines to enrich and improve teaching by technology. It is an essential beginning for teachers to share ideas, experiences, and knowledge about the technology development. We mention a lot of advantages of technology use, and we discuss some suggestions on overcoming the disadvantages. The results of surveys could help education in developing strategies of using technology in mathematics classrooms. According to survey for Mishre, they define what teachers are able to do with their students, there are two important facts shaping teacher preparation: what the teachers need to know to teach, and how they learn to teach mathematics. Technology is an important tool for all students, especially students with disabilities, not only to improve their skills and learning but also to

communicate with other students. Also, it is important to use technology in a nontraditional way. The main goal is to focus on all researchers to determine the best use of technology for enhancing mathematical learning. The example of surveys shows that the type of digital tool corresponds to the type of tasks and activates. "Digital tools shape the students' thinking; in the same way that students' thinking shapes the way the tool is used" (Hoyles & Noss, 2003). This means that using a digital tool or technology affects both students' thinking and skills. There is a relationship between using tools and activities, so it is important to be aware which kind of tool is the appropriate for a specific task. Computer technologies are a potential factor that improves and evaluates students' performance. The major advantages of using technology are that students could define their background information into their favorite tools.

REFLECTION.

In mathematics education, teachers sometimes use technology in teaching and learning mathematics because mathematics is boring and most students cannot understand or be attentive through learning and teaching, but according to all sources that I used in this research, teachers should use technology in teaching and learning mathematics. I found when teachers used technology, all students had a higher degree, and their attitudes were positive. Also, they could solve their problems and be successful. The most important things that I learn from all sources is that teacher should not only use technology but also be aware which kind of technologies are appropriate for specific tasks. Also, teacher should use it in a nontraditional way in order to give students more enjoying and interesting in the learning. In additional, before teachers use technology or a new program, they should learn how to use this program and have a lot of information and background about this program. In my future's career, I am going to use different and interesting types of technology in learning and teaching mathematics in order to

help students understand more effectively and solve students' problems. Moreover, if I use computers or any technology, that will be very important for my future and experience which make me professional in my job.

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Works Cited

- Babbitt, Beatrice C., and Susan Peterson Miller. "Using Hypermedia to Improve the Mathematics Problem-Solving Skills of Students with Learning Disabilities." *Journal of Learning Disabilities* 29. (1996): 391. Education Full Text (H.W. Wilson). Web. 16 Apr. 2014.
- Budinski,Natalija. "A Survey on Use of Computers in Mathematics Education in Serbia." *THE TEACHING OF MATHEMATICS*, 2013: 42-46. Web.
- Chen, Chiu-Jung, and Pei-Lin Liu. "Personalized Computer-Assisted Mathematics Problem-Solving Program and Its Impact on Taiwanese Students." *Journal Of Computers In Mathematics & Science Teaching* 26.2 (2007): 105-121. Education Full Text (H.W. Wilson). Web. 15 Apr. 2014.
- Drijvers, Paul1, and Bärbel2 Barzel. "Equations with Technology: Different Tools, Different Views." *Mathematics Teaching* 228 (2012): 14-19. Education Full Text (H.W. Wilson). Web. 16 Apr. 2014.
- Hanley, Denny1. "Smart Math Tools." *Mathematics & Computer Education* 46.2 (2012): 150-152. Education Full Text (H.W. Wilson). Web. 28 Apr. 2014
- Li, Qing, and Xin Ma. "A Meta-Analysis of the Effects of Computer Technology on School Students' Mathematics Learning." *Educational Psychology Review* 22.3 (2010): 215-243. Education Full Text (H.W. Wilson). Web. 15 Apr. 2014.
- Mishra, Santosh Kumar1. "Strategies for Mathematics Education to Students with Disabilities." *International Journal of Social Sciences & Education* 2.4 (2012): 554. Education Full Text (H.W. Wilson). Web. 15 Apr. 2014.

Oldknow, Adrian, & Taylor, Ron. "Teaching Mathematics with ICT." London and New York:
CONTINUUM, 2000. Print.

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