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Exploring students' perceptions of teaching mathematics using ICT

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Abstract

Mathematics is a crucial discipline in human knowledge, a cornerstone of all sciences and arts. It has been a vital component of formal education since ancient times, earning a pivotal position in global school curricula. However, there is a noticeable apathy among students when it comes to learning mathematics. The main objective of this study is to exploring the perception of students toward teaching mathematics with the use of ICT. This study is based on qualitative approach with interpretivism philosophy paradigm. The data was collected from four participants from different schools where ICT was used in pokhara metropolitan city of Nepal. One participant was selected from each school propisivelyly. Interview was taken from the research participants to achieve the research objective. After analyzing and interpreting qualitative data, we deduced the themes about the perception of using ICT to teach mathematics from each interview presentation. Main theme as Students' perceptions of the use of ICT in teaching mathematics for innovation, change, opening up new opportunities, making the classroom interesting, fun learning, excitement, and motivation, as well as for the development and application of mathematical concepts.

Keywords: Mathematics, ICT, perception, qualitative, theme

1. Introduction

Mathematics plays a significant role in school education all around the world. Both daily life and advanced study in the sciences and technologies depend on mathematics. It is regarded as the queen of all science and is necessary in all fields ^[4]. Although mathematics is crucial for the development of many other subjects, many students find it to be a challenging subject ^[9]. Similar to this, mathematical power affects how a person thinks and the learning outcomes that lead to the development of skills, attitudes, knowledge, and abilities that will be replicated in daily behavior, which aims to stimulate and motivate the protection of the complexity of students' achievement in interdisciplinary studies ^[5]. From elementary school to graduate school, there are a lot of students that have no interest in learning mathematics ^[7, 8]. The most worrying part of math's education is how well students achieve in mathematics, despite of viewing math as one of the most challenging subjects to learn. In light of these circumstances, integrating ICT into mathematics learning is a top priority in the twenty-first century.

The word ICT refers to "Information and Communication Technologies." ICT refers to technological concepts that are used to transmit, process, store, generate a display, share, or exchange information via electronic means ^[6]. Furthermore, ICT is an umbrella term that encompasses any communication equipment, including radio, television, cell phones, computer and network hardware, satellite systems, and so on, as well as the myriad services and appliances that go along with them, such as video conferencing and distance learning ^[9]. ICT helps in improving the communication, knowledge exchange and student collaboration. It offers quick and precise feedback, motivating students, and allowing them to focus on approaches and interpretations of results, rather than tedious numerical calculations ^[2]. According to Poudel 2015 ^[7], the use of ICT in mathematics classes, encourages students to engage in enjoyable audio and visual activities, and social interaction, since many students find mathematics to be tedious and challenging, mathematics classes may help to dispel this misconception by using ICT in the classroom. Therefore the objective of this study is to find the perception of students toward using ICT in teaching mathematics In Nepal, students

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struggle hard in learning mathematic. Mathematics causes children a lot of dread and anxiety. Compared to other subjects, mathematics takes more of the students' time. However, failure of huge numbers in mathematics is still evident ^[1]. In schools teachers also prioritized mathematics above other subjects. However, we are unable to observe students performing to our satisfaction in mathematics. Generally, mathematics teachers teach mathematics by using the problem-solving approach, without using the teaching materials but focus only on grades. We can create new teaching methods in this area of mathematics by utilizing ICT. Through, this study we focus in perception of students on teaching and learning mathematics through ICT.

2. Objective of the Study

The main objective of this paper is to explore the student's attitude in learning mathematics through the use of ICT.

3. Methodology

This paper has adopted a qualitative research methodology. The qualitative method of inquiry examines phenomena in their natural habitat and uses a variety of methods to analyze, comprehend, and provide meaning for them ^[3]. The interpretive research paradigm is applied. The location and sample were purposefully chosen within a Pokhara metropolitan city, Nepal. In order to conduct the research, we selected four secondary schools in the area where ICTs should be used to teach mathematics. Grade ten student were purposefully selected from each school. In order to make the study more valid, trustworthy, and reliable, we developed a positive working environment with all of the research participants. Then we made an effort to gather comprehensive data. The study compiled of open-ended interviews with students to gather information on their perspectives. Participants' real identities was kept confidential, ensuring ethical research practices. The interview aimed to understand students' perspectives and perceptions of mathematics teaching by using ICT. The data was then analyzed using themes emerging in the field and deduced meaning inductively.

3.1 Presentation and Meaning Making

For the purpose, each of the participants were carefully interviewed through tactical questions and the themes from the interviews was summarized.

3.1.1 New Opportunities and Change through ICT

Participant 1

Me: Do you like the computer technology in learning?

Participant: Yes! I like computer technology in learning.

Me: How many years have you learned using technology?

Participant: Only two years, It was only used from class nine.

Me: How would you feel if you were taught using ICT? and why?

Participant; I would love it because Not only would ICT be more engaging and provide us with a clear understanding of the lesson, but it would also develop our intelligence and enable us to compete on a global scale. ICT uses diverse mathematical applications, like geogebra, to perceive the mathematical concepts of each topic.

Me: Did you get the difference between class eight and nine?

Participant: Naturally, I understood the distinction between classes eight and nine. In class eight, what the teacher was trying to teach, was difficult to understand. The instructor used to instruct us by only solving the problem technique. But in class nine, by using technology, it made it simple to understand mathematical issues. We proceed to the projective room where the teacher teaches us about topics like transformation and trigonometry. So, it becomes more beneficial.

Me: What is your perception towards mathematics by teaching it traditionally?

Student: When I was up to class eight still that old way of teaching was in practices. Until that time, I wasn't able to do good in mathematics, also concept on mathematics was satisfactory. I was worried that I couldn't choose a better subject to study. My friends were also worried about these teaching approaches. At that time, I felt that if mathematics was taught by applying new techniques and teaching learning process is done by visualizing, I could do better in this subject.

Me: Was your teacher active when he teaches mathematic?

Participant: Yes, since the time my teacher used ICT in mathematics teaching, he is active and creative in classroom.

Me: If your teacher teaches you to uses ICT, Do you use that knowledge in other fields?

Participant: Yes, when my teacher uses the internet and other search engines to present mathematical problems graphically, it is engaging and original. I applied that knowledge in real life in home, creating a different learning environment.

Me: So, in your view what are the benefits of using ICT in teaching mathematics?

Participant: Actually, there are a lot of advantages to adopting ICT in math education. The main benefit of adopting ICT is that it can help to transform pupils' unfavorable attitudes towards mathematics. By incorporating ICT into the teaching and learning process, complex issues can be easily grasped, the subject can be retained for a long time, and studying the subject can even be enjoyable.

Me: Ok, thank you very much for your valuable thoughts and time. I am really impressed by listening to your ideas.

Best of luck for your upcoming SEE exam.

Participant: Thank you, sir

From the view of the student, the student's perception of teaching mathematics has changed significantly due to the use of new tools and technology. They believe that when ICT is integrated into mathematics teaching, students are loving it. This change in perception leads to new opportunities in real-life problems, highlighting the importance of technology in shaping students' understanding of mathematics.

3.1.2 Class Room Interesting and Excitement Through ICT

Participant 2

Me: Hello Student, how are you?

Participant: Hello sir, I am fine and you?

Me: I am also fine, how long are you studying in this school?

Participant: It's been two years, sir.

Me: Which subject do you like to most?

Participant: (Excitingly) Mathematics.

Me: You really seem happy. Do you use to like mathematics earlier?

Participant: It's not like that. Actually, I used to like mathematics since I joined this school.

Me: Oh! What did you find in this school that you are fond of mathematics all of sudden?

Participant: In this school, everyone is focusses in class to start. I had difficult time to understand problems, tips, and tactics in my previous school. Majority of the instructors employed outdated problem-solving techniques. Sincerely, I used to had a poor understanding of the subject and quickly forget what I had learned. I used to despise this topic. When I joined this school, I saw that the atmosphere was considerably nice. A noble teaching method is used in this institution. This is why I enjoy mathematics more and more.

Me: Please explain to me your experience of using ICT in study purpose in this school?

Participant: The use of ICT in our classroom makes me very happy. It made us easier to discuss those disliked subjects. In addition to being excited to see something new, I grasp everything extremely quickly. I learned by seeing and taking it all in without feeling stress. Frankly speaking, I am more interested to study mathematics. My excitement increases during math class. Mathematics is fun and simple subject, in my opinion.

Me: When teacher teach mathematics by using ICT, Is classroom interesting or not?

Participant: When my teacher uses ICT in the class, the learning is interesting and fruitful.

Me: Thank you for your valuable time

Participant: it's my pleasure, sir.

After reading above interview, we may argue that if students are taught through ICT, they will begin to love and like mathematics when there is a condition in school where students are only taught utilizing one technique of instruction, they will certainly learn this subject quickly. He did not like mathematics prior to the use of ICT, and he was weak in this subject as well, but after joining the school that employs ICT in teaching mathematics, he began to like mathematics and did significantly better in this subject. We might infer from his statements the importance of ICT in teaching mathematics to students. As a result, we can argue that changing the teaching methodologies or substituting ICT in the classroom for traditional teaching methods can influence students' perceptions of math teaching as a challenging and interesting subject.

3.1.3 Creativity and Enjoyable Learning through ICT

Participant 3

Me: Hello Student!! how are you?

Participant: Hello sir, Namaste! I am fine.

Me; What is your favorite subject?

Participant: Math and Science.

Me: Why math, don't you like other subjects?

Participant: I love to learn mathematics and enjoy doing mathematics problems nowadays.

(I was quite confused that he used the word 'nowadays' so I asked him)

Me: Then in earlier classes, you didn't like mathematics?

Participant: Yes, in earlier classes I studied in another school, the teacher used to teach us by rote learning method, without explaining the formulae and theorem. If we asked him about the steps, he said that we didn't need it, just to solve the problem, so at that time I was unable to understand

the topic and was also unable to solve any problems. I failed in mathematics many times in exams that caused me to develop anxiety on mathematics. When I first entered this school, I could grasp anything about mathematics. Today I find it to be one of my favorite subjects.

Me: Oh! In this school, you like mathematics because you don't need to solve problem?

Participant: No, while teaching mathematics, our teacher uses smart board to visualize everything, which helps me to pay attention and makes the lesson enjoyable too. I'm excited to observe new things. So we learn by observing and enjoying without any pressure that makes it simple for me to understand. Today, I feel fascinated and really appreciate math because it is so simple to answer the queries after we understand the topic through visualization.

Me: Kindly share me your experience of utilizing ICT for study purpose in this school?

Participant: The use of ICT in our classroom makes me very happy. It has made much easier to discuss those disliked subjects. In addition to being excited to see something new, I also really like it. I learned everything quickly since I learn by watching and accepting it all in without feeling stress. Fairly speaking, I am more interested in studying mathematics. During math class, my excitement increases. In my opinion, Math is fun and simple subject.

From above interview, it can be concluded that if the teacher uses visualization in teaching, no student will be a low achiever. Although we believe that students are incapable of learning, we overlook the numerous strategies that could be employed to help them in learning. The child in the aforementioned narrative is extremely uncoordinated in math, but after attending a math class and using ICT, he discovers that he is creative. We are aware that the teacher frequently stressed the use of developing kinds of activity that complemented or altered practice, as well as the use of ICT to extend and enrich current classroom practices. His prior perception towards teaching mathematics as a boring and harder subject is changed and now he enjoys doing mathematics. As a result, we may conclude that changing the teaching methodologies or substituting ICT in the classroom for traditional teaching methods can influence students' perceptions of math teaching as a challenging and boring subject.

3.1.4 ICT for Motivation and Idea Development

Participant 4

Me: How does your teacher teaches you mathematics?

Participant: In the classroom, my teacher uses ICT to teach us. He leads us into the room with the projector where he teaches us about things like transformation. We benefit more from it, and learning is easier.

Me: Do you take the class in both ways; i.e. using two different techniques: mechanical problem solving and using ICT. Which approach do you think is more effective?

Participant: Since we interact with teachers in a variety of methods, I don't believe mechanical problem-solving can be as effective over using ICT. We can keep our minds open, feel like learning something new, and our knowledge deepens when we are utilizing ICT in teaching.

Me: The students like this sort of class because they get entertainment or they actually understand something out of it, what do you think about it?

Participant: Although we'll use the word "curious" instead, they do receive entertainment. Our learning is more

effective and durable when we are curious about a subject. We work hard to learn everything. We can talk to our teachers about new items when we notice them.

Me: The teacher has to complete your syllabus in time. Isn't it time consuming?

Participant: It may look like that but actually it is not because as we visualize everything and the teacher doesn't have to revise the lessons. What I like the most about this approach is we try to search the new methods of understanding so it is not really time consuming.

Me: Do you solve problems using ICT at home?

Participant: Definitely not. We complete our homework or assignments manually in copies rather than electronically. I don't mean to imply that our teacher doesn't employ the conventional teaching approach; he does, but he also takes us into a room with a projector where he teaches us with slides and images.

Me: Can you tell me the benefits of using ICT?

Participant: Primarily ICT enhances learning. It makes the classroom interesting, which is the most significant benefit. The final one is that it simplifies our schoolwork.

Me: What else do you have to say about using ICT in mathematics?

Participant: We visualize the process and it becomes easier to know the processes. When the teacher teaches us using white board, most often we cannot understand the steps. As I said earlier we cannot ask him all the time but in this approach we visualize everything and we don't have to ask to the teacher.

Me: You gave us so valuable opinions. Thank you very much.

Through the above student, we asserted that the students take pleasure by the use of ICT in the classroom. I questioned them about whether the classroom was the sole thing drawing them in, but he responded intelligently that they were interested in learning because of visualization. The teachers motivate the students to work harder because they perceive that math class should be an engaging one. The student concluded that the use of ICT makes their studies easier. The students believe that learning through visualization will speed up the process. As was already established, tools can influence how motivated students are to learn. While teaching using a traditional technique, some stages could be challenging to explain, but when ICT is used, students can see how something transpired, as the student stated.

4. Conclusion

In this research work, we have visited the schools and meet with the students. We have discussed the student perception towards learning mathematics. We attempted to explore how students perceive the use of ICT in learning mathematics through an interaction. After the interview with those students, we deduced the themes from each participant regarding how they perceived on the use of ICT in learning mathematics. The majority of students believe that the traditional mathematics classes was challenging, the lectures were monotonous, and need to struggle hard to pay attention in the class. This had a negative impact on how they perceive the teaching of mathematics. Students perceive that teaching mathematics through ICT creates motivation, idea development, and creativity in learning. The use of ICT in mathematics lessons helps the students to be motivated and produce the original ideas. They also learn effectively. The

classroom becomes more dynamic and exciting. Students felt comfort after the use of ICT in mathematics classroom and consequently the learning environment improves. Thus ICT fosters the learning environment in mathematics learning perspective from students and teaching perspective of teachers.

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