

Exploring Teacher's Practices Of Blended Ict In University Mathematics Classroom: A Multicultural Perceptive

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Abstract

The purpose of this study is to explore teachers' perspectives and practises of blending information, communication, and Technology (ICT) in mathematics classes at the university level. In addition, this study aims to explore the empowering ways to use blending ICT in teaching mathematics. This study has been conducted using a phenomenological design through an in-depth interview. For in-depth interviews, three mathematics teachers were selected who are teaching graduate level through online modes to explore their experience and practices of blending ICT in their teaching. The data have been analysed by transcribing, coding, categorising, and thematizing. Based on the information provided by the key respondents, various significant findings were obtained: teachers and students are found to be motivated to use ICT tools in the teaching process; ICT can be used as resource tools from many perspectives. The study also explored many physical and psychological problems associated with blending ICT tools in teaching mathematics. There are two ways in which the use of blended ICT in mathematics teaching can be improved: raising ICT awareness and ensuring access to ICT among students and teachers.

Keywords: Higher Education, Teaching-Learning, Mathematics Education, Ict, Scope, On-Line Learning.

Introduction

The application of mathematics in social and technological contexts is made possible by technology, which has the effect of obscuring the processes that underlie constructs. The teaching of mathematics is influenced by technology, which also focuses the learning of diverse students. The use of information and communication technology (ICT) to teach mathematics has the potential to improve students' efficiency and comprehension. ICT, according to the United Nations Educational, Scientific and Cultural Organisation [UNESCO] (2014), is the most crucial instrument for student-centered learning, assisting in the transformation of the teacher-centered, textbook-bound classroom into a student-centered and interactive educational resource. The use of technology to hold lectures online during this coronavirus epidemic is enhancing students' understanding, and bookworms may learn maths with it.

The School Sector Reform Plan (2009-2015) establishes the deployment of ICT infrastructure in schools and offers different ways of learning via the use of technology. People in poor nations like Nepal, where there is a dearth of understanding among the populace, are currently thinking about new ways to educate people without using traditional institutions with the use of technology. The World Health Organisation [WHO] (2020) claims that the pandemic has replaced the century-old chalk-talk teaching approach with a technology-based one. To ensure equitable e-learning solutions and the usage of digital devices, authorities need to understand how to generate engagement at scale. For a better teaching-learning environment, ICT-integrated learning practises are essential.

The Faculty of Education of Tribhuvan University offers ICT subjects at the bachelor's and master's levels. In a study by Bauer and Kenton (2005) it was found that university teachers with basic ICT literacy should be encouraged to have a positive attitude towards using technology in their professional work. In the present times, a majority of students prefer using blended techniques in the university setting. Further, mathematicians prefer the use of ICT in teaching mathematics at the university, as they believe that this mode of learning can reduce the need for students to think critically (Agrawal & Gupta, 2020). Hence, blended ICT approaches are seen as a way to bridge the gap between traditional teaching and learning methods and more modern approaches.

In Nepal, there is a need to use different technologies more diversely in all areas of the country. This includes providing teachers and students with useful information about newly emerging technologies and how they can be used in blended learning environments. Over the past decades, higher education institutes have faced more challenges in an increasingly global, digital, and dynamic environment. However, blended ICT has a technique of strategies in mathematics for effective interactive learning. E-learning is an effective tool for teaching the learning process these days, and different universities in Nepal are also broadly adopting the E-learning strategy and offering distance education or online learning. Blended learning is an effective approach for accommodating an increasingly diverse student population while adding value to the learning environment through the incorporation of online teaching. Blending ICT is a tool in mathematics education at a higher level that helps to fulfil the overall aim of education and improve the effectiveness of teaching and student learning.

Blending ICT into academic sectors opens up a new horizon for the progress of teaching mathematics in higher education. In Nepal, not enough research has been conducted to explore the understanding of teachers, faculties, and students regarding the contribution of ICT to their teaching and learning processes. So, there are many issues with blended ICT learning and the research gap in the study of higher education. So, this study is particularly concerned with the teacher's practices of multiculturalism and blending ICT in teaching and learning in higher

mathematics. In this regard, this study focuses mainly on investigating the perceptions and practices of teachers blending of ICT in the mathematics classroom at higher levels.

ICT has the potential to change education in a number of ways, including by enhancing the design work that teachers do, expanding the roles that students and teachers play in the learning process, and contributing to the creation of a collaborative mathematics learning environment (Kahn, Hasan, & Clement, 2012). Blended teaching can be an approach to enhancing access and quality teaching to help students be more engaged and interactive in their mathematics learning pace. A mathematics teacher needs to address the issues related to each of the students' cultures so that the students feel his or her importance and freely contribute to classroom discussion.

Blended ICT approaches are supposed to be an initiative toward linking conventional teaching and learning mathematics at a higher level. So, different technologies should be used diversely in all areas of Nepal, providing them with useful information regarding the newly emerging technologies and their use of blended learning. The blending of ICT can play a significant role in equalising opportunities for multicultural groups at higher levels.

Blending ICT is a tool in mathematics education at a higher level that helps to fulfil the overall aim of education, improve the effectiveness of teaching, and improve students learning (Bhattarai, 2019). Mathematics education is one of the dynamic subjects of education and is popular in mathematics teaching in higher education in Nepal. The general purpose of this study is to determine how teachers experience teaching mathematics in a multicultural classroom using blended ICT at the university level. How can teachers manage multiculturalism effectively in mathematics classes? And what are the possible solutions that can be seen during blended ICT with teaching mathematics? This study can be used by policymakers, curriculum developers and implementers, university managers, students, and society on the importance of using blended ICT helpfully in teaching mathematics in a multicultural classroom, blended ICT strategies to manage the diversity of mathematics classes effectively. The study has included only three teachers 'participation who are teaching graduate level at the Sanothimi Campus due to the limitations of participation and time.

Methodology

This study adopted a qualitative research design in order to explore the teachers' perspectives and practices of blending ICT in learning in multicultural mathematics classes of the master's first semester. This study is based on social constructivism, which focuses on the social nature of learning through interaction

and communication (Cohen et al., 2018). For this data was retrieved from three mathematics teachers teaching master's first semester classes and having experiences with blended teaching learning. To ensure the privacy of the respondents, their real names were concealed and they were given alpha-numeric identities (S1, S2, and S3). The tool for data collection, I used an in-depth interview as it is the most common and powerful research method, enables participants to speak for themselves and allow them to reflect on the meaning of his/her experiences (Seidman, 2006). I used a semi-structured interview schedule for the in-depth interview.

I applied some systematic procedures to collect the data from the in-depth interview and to build rapport themes with the respondents. I briefly reported the purposes and the terms for confidentiality. In this study, all interviews were first audio-recorded by taking the participations' permission. Then, data was transcribed for analyzing process. Lastly, content analysis was utilized based on the assigned codes, themes, sub-themes, and categories, and also by mapping the themes with data as suggested by Braun and Clark (2013).

Results and Discussion

Use of blended ICT in the mathematics classroom

Blended ICT is supportive of learning mathematics and also for the demonstration of mathematics lessons. The blended ICT in teaching mathematics had better skills in the technology of participation. To support this idea common view of participation, ICT is used for many examples of mathematics content also used by PowerPoint, e-books, e-journals web- site and you-tube to teach mathematics. Also, students' assignment is assigned and presented by students with the help of online books; Google Chromes submitted them with the help of online tools. Aktaruzzaman, Shamim, and Clement (2011) explored that blended ICT is a powerful tool for supporting and extending educational opportunities in education. Supportive tools are Facebook; YouTube, Google, e-book, and e-journal, and use blended ICT in the mathematics classroom. The alternative and better sources of learning materials are blended ICT.

ICT provision is for skill development for a constructive way of learning and opportunities for new reflective learning methods. In the teaching and learning curricula, blended ICT is based on problem-solving in a constructivist way, which helps student-teachers recognize the potential for learning (Alimisis, 2007). One of the participants, S1 said "I teach to connect the content of study with the cultural values and practices of students, and I bring examples from the student practices". It indicates that blended ICT is utilised in the constructivist new paradigm. This alternative way is helpful to the mathematics students in the

online class in the acquisition and transfer of knowledge, information, and skills in mathematics. So, blended ICT tools enhanced constructivist mathematics classroom practices and the original horizon of mathematics teachers and students at a higher level.

Preferred tools for learning in blended ICT

Blended ICT tools were valuable and helpful to make the effective teaching-learning process easy. The teachers preferred tools like Power, Point slides, Youtube, and Google search. It could be used to promote collaborative learning in the teaching field. Participant S1 supported this view by saying, “Students are excitedly using ICT and online materials and very applicable or helpful to students for presentation, assignment and writing a research paper. So it is providing opportunities for learning reflection for the teachers and students of mathematics.

Personalized education was made possible by blended ICT; improved learning of mathematics through teamwork and cooperation. ICT not only gives learners the opportunity to control students own learning process but also provides collaboration, permanence, and incorporation in learning mathematics(Lam & Lawrence, 2002). Similarly, respondent S3 said that “the students are made responsible by giving assignments and also assigning them to give a presentation. The students may panic if they are given the task individually so they can form a group of 2 or 3 and work jointly on it. This way they can do better and gain confidence and experience for the future”. It shows that blended ICT enhances cooperative mathematics learning for students and teachers. ICT is a method for the proficient improvement of instructors' and understudies' presentations.

In this study, the high attendance of students shows that active participation means the use of ICT is a motivational factor in online learning. The enrollment of students in online learning is high attendance of students in mathematics classes. A common view of Participation S₁ and S₂, supported this theme, students are taking active participation in online classes from both rural and urban areas and student's attendance used to be 80% but now students are showing 100% attendance. The teachers can communicate locally and globally with students to gain confidence and competence through the blended ICT tools to achieve the goal of education (Treagust & Rennie, 1993). So, the use of ICT tools in mathematics for learning is interactive, communicates locally and globally, and effective participation and skill promotion. Teachers' experiences in teaching multicultural classes Teaching mathematics with students from different intellectual levels, different socioeconomic backgrounds different communities, different cultures, and different interest groups is exciting because there is a new environment and all circumstances are different for the teachers. When the

teachers enter into the class to teach, they reflect that what they experienced in their previous classes and social context.

Multiculturalism in mathematics classroom

Multicultural classroom management is a great job for teachers. There are different types of classes such as geographical differences, individual intelligence, multicultural students, and problems managed in the classroom. It is a challenge to manage the classroom for teachers. In this issue, one of my participants S1 said; “I have tried my best to manage multiculturalism classroom in the following ways: I try to connect the content of study with the cultural practices of students and then bring the examples from the student practices. I allow students to share their stories and present the concept in a variety of ways so that the students may understand in their own ways and ICT may help in a better way”. I have found that multicultural students' involvement in mathematics education has a very vital role. I, as a teacher always try to manage students from different cultures and different intellectual levels. Secondly, the students have different individual interests, learning styles and poor prerequisite knowledge on the subject matter which is a challenge for us.

Blended ICT in online learning is the best guide to give a suitable environment for proper mathematics learning like their cultural classroom. There are many sources to connect mathematics contents with different cultures”. Shakya, Sharma, and Thapa (2017) asserted that connectives offer specific technological opportunities for the learner to be actively involved in the presentation of a body of knowledge and it will be an alternative learning strategy that states that learners attempt to foster understanding by connecting between specialized communities. Participation S3 said, “Influence of societal culture has been seen among students. Although, I manage the multicultural classroom to form a group of 2 or 3 and work jointly on it.” So, in this type of culture, individual support helps to manage the multicultural mathematics classroom”. I concluded that teachers should manage a good classroom environment by providing equal opportunity and context learning to their students. This method is essential for students to develop collaboration and teamwork through group project and activities can improve social skills and problem solving abilities.

Hindering factors of blended ICT

Lack of ideas and skills are among the faculties in online mathematics learning. Lack of access to ICT components among faculties was the major hindering factor of blended learning. One participant S₃ claimed by saying “the class has to be dismissed due to poor internet connection and the major problem in an online education learning system is lack of knowledge regarding technology and lack of

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internet access in all parts of the country. Still, students are using mobile data for taking the class”. Bauer and Kenton (2005) explained that technology can help students become creative and adept at overcoming obstacles, but students often struggle to feel comfortable using ICT in school or high school. There are numerous issues, including a lack of time, resources, and financial support.

There is a lack of technology friendly environment and integrated tools. In our context of Nepal, many problems with electricity and connectivity, network problems, and scarcity of internet access. Participant S2 said, “situation is difficult, the season is rainy, sometimes, there is rainfall, sometimes it is stormy and the internet can be problematic and students may not be connected in class and lack time to complete the course in time there is influence seen in them and sometimes the students face many problems regarding online classes due to limited use of data, no proper connectivity, and no electricity”. In my experience, online learning has problems using blended ICT, like a teacher not being able to update themselves in the technological field, and lack of ideas and skills among faculties. The evidence above helped me to know that there are many challenges of an online class with blended ICT such as geographical complexity, difficulty to manage multicultural and misconceptions about ICT uses. At the same time, teachers are also found familiar with many hindering factors in blending ICT tools in mathematics teaching.

Empowering ways for use of blended ICT

It may be, raising ICT awareness among teachers and students or, designing a blended ICT curriculum of mathematics in the policy. One respondent S2 said, “Infrastructures cannot be built without making policy. ICT Pedagogy can also be added to the policy. In the present scenario, the paradigm is about to shift in the teaching-learning activities. The University should enhance its boundary. It should invest more, give training to teachers and not only these students, But should also be prioritized to properly use the materials given to them”. The educational reasonings are to use innovation in improving learning, adaptability and effectiveness in educational plan conveyance (Zamir & Thomas, 2019).The importance of ICT in learning mathematics in their teaching and emphasizing electricity, developing online teaching materials, and design online evaluation systems, collecting funds, raising access to ICT components and providing training to the faculties to the students and teachers, designing ICT policy.

Providing various training to the teachers regarding the appropriate use of ICT and must be creating ICT friendly environment in higher schools. Teaching learning in mathematics plays a vital role to empower at higher levels. The ICT in education master plan (2013) has incorporated the four fundamental components such as the development of infrastructure including connectivity, development of

the human resource, the development of digital learning materials, and the enhancement of the education system. According to Karrie and Jennifer (2008), the constructivist educational Paradigm continues to take hold, and it is likely that higher education will continue to make progress in alignment with this movement. I think it is an efficient, effective, and constructivist approach to teaching mathematics and the students should be assured about the future scope to increase their interest.

Blended ICT is more effective for students for the semester system in higher education. Respondent S3 said “Preparing ought to be given to educators about the utilization of ICT with the goal that science showing will be all the more simple and powerful, and to expand admittance to ICT among understudies and instructors”. In the real classroom, constructivist pedagogy can be used with computers (Alimisis, 2007). The sampled teachers have suggested maintaining the resource materials, training of ICT, funding support, and teachers to give more time to use the computer. These are some common ideas empowering ways to use blended ICT.

Conclusion

Teachers and students are found motivated to use ICT in teaching mathematics as most of the teachers feel entertained by blending ICT tools into their teaching. Teaching using ICT tools has been changing from teacher-centric to ICT- based collaborative learning of mathematics. ICT is also important to multiculturalism classrooms because our students may change their learning behaviour to different cultures of student activities and subject content. The coded data also claimed that students' cultural practices can be preserved and promoted through the use of ICT tools. The majority of teachers suggest that ICT can be used as a multiple resource area. When they discuss the benefits, the following are their most common points: high participation of understudies, dynamic investment of the understudies, giving open doors to reflection for the educators and students, and developing ICT mindfulness among instructors and understudies.

This study also lead to the conclusion that the appropriate preferred tools of ICT in teaching mathematics at a higher level. Parajuli (2015) found the necessity of ICT tools in higher education. The 21st knowledge skill requests significantly more ICT than the customary educating and learning approach (Ramli & Ramli, 2013). However, It is necessary to increase access to ICT components and prepare our faculties and students regarding the fundamental ICT skills for effective use. At the same time, teachers are also found familiar with many hindering factors of ICT in blending ICT tools in their teaching in different ways; lack of access to ICT components among faculties and students both, lack of ideas and skills among faculties, lack of time to complete the course in time, geographical

complexness, difficult to manage a multicultural classroom, misconception about ICT uses. The sampled teachers have suggested some common ideas for empowering ways for the use of blended ICT in different ways: designing ICT policy, providing training to the faculties, developing online teaching materials, raising access to ICT components for the students and teachers, and designing, online, evaluation system, collecting the funds. Overall, blended ICT policy in pedagogy created a new discourse in our teaching-learning mathematics. Blended ICT-based learning creates and implements new innovative teaching-learning strategies using the latest technologies and novel approaches to enhance student learning and engagement at a higher level. This study recommendations for future studies on exploring students' practices of blended ICT mode in mathematics classrooms at higher levels in the Nepalese context.

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