



Promoting Blended ICT Mathematics Classroom Practices Of University: A Multicultural Perspective

Maheshwor Pokhrel¹, Tribhuwan Sharma², Madhav Prasad Poudel^{3*} and Laxmi GC⁴, Jayaram Paudel⁵

^{1,2} Prithivi Naryan Campus, Tribhuwan University, Nepal

^{3*} School of Engineering, Pokhara University, Nepal

⁴Sanothimi Campus, Tribhuwan University, Bhaktapur, Nepal.

⁵School of Education, Kathmandu University, Nepal.

*Corresponding Author: Madhav Prasad Poudel

*School of Engineering, Pokhara University, Nepal

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ABSTRACT

The integration of Information and Communication Technology (ICT) is a major arena in today's educational system, it is equally used in all disciplines and mathematics is one of them. Using a diverse teaching and learning environment as a focal point, this study investigates the trends in ICT development within the educational system. From this study, four primary issues are highlighted; the utilization of blended learning techniques in mathematics instruction, teachers' experiences in multicultural classrooms, educators' conceptual understanding of blended ICT learning in education, and the integration and aspects of ICT in mathematical instruction. It also explores the methods of managing multicultural classrooms, emphasizing the significance and limitations of using ICT to support effective education, and also discovers the theoretical foundations of blended ICT learning, highlighting the necessity of in-depth knowledge of how technology can enhance pedagogical techniques in various educational settings. Through a comprehensive analysis of literature, this study offers valuable insights for integrated ICT mathematics teaching practices from a multicultural standpoint. It emphasizes the important of systematic pedagogical techniques to support on effective mathematics education in every educational situations. This literature review aims to explore the promotion of blended ICT mathematics classroom practices at the university level, with an intense focus on multicultural perspectives. This paper addresses on the use of ICT to teach and learn mathematics, highlighting essential components including syllabus placement, teacher preparation, and infrastructure that are vital to effective implementation.

Keywords: *Mathematics Education, ICT, Multicultural, Mathematics instruction, Integration*

INTRODUCTION

Recent advances in Information in Communication and Technology(ICT) are now engaged within a wider educational framework. This trend provides a new constructive perspectives on the progressive situation via integrating technology into education. The promotion of ICT in education, from interactive whiteboards to the widespread use of educational applications and on-line resources, provides the foundation for the potential impact on mathematics classes. Several factors influence the effective integration of ICT in mathematics education. These factors includes teacher preparation and pedagogical ideas on infrastructural availability and technological skills. Integrated ICT knowledge helps to clarify strategies for promoting equitable and inclusive learning environments (Voogt, 2012). It is important to find the benefits of technology-enhanced learning outcomes. Through an analysis of cutting-edge instructional techniques, digital technologies, pedagogical methods that contains a structure specially outlined blended ICT, mathematics and multicultural classroom practices has a deep tooted relationship within the university. So the main objective of this study is to analyse

practices of blended ICT mathematics classroom in Universities from a multicultural perspective. It also takes into account the experiences of educators in multicultural classrooms based on ICT. Blended learning mixes traditional in-person instruction with on-line materials and it is becoming popular as a successful teaching strategy (Leask, 2011). Its theoretical foundations offer a structure for formulating and implementing integrated ICT mathematics instructional methodologies.

METHODS

This study exploits a document analysis research design to promote blended ICT mathematics classroom practices from a multicultural perspective. It is based on a literature review to explore and analyse the use of practices of blended learning in mathematics classrooms and trends of development of ICT used in the education system in different countries. Therefore it is based on four different themes: The experiences of teachers in multicultural classroom situations, conceptual understanding of blended ICT learning in education, integration and factors of ICT in teaching mathematics, and the use of practices of blended learning in mathematics classrooms. It aims to examine the best strategies to develop new ways of learning situations. For the sources, academic journals, conference proceedings, educational databases, and books are taken into consideration. The methodology ensures a rigorous, comprehensive examination of the practices of blended learning in mathematics classrooms.

The literature sources have been cited from on-line journals, books, and internet respectively.

Trends of ICT Development and Its Use in Education System

UNESCO (2009), explored that ICT is expanding through its cross-sectional thematic platform of “encouragement ICT enhanced learning” (P.9). ICT uses pedagogical way of teaching, and discovered the embedded technology in our courses for an extended period. ICT strategy is very beneficial for the transformation of the modern formulation to teaching mathematics. According to Voogt (2012), teachers can be more compact in mathematics teaching by using ICT as a tool in practical learning towards teaching objectives. ICT has a unique way of learning for the students as well as teaching for the teachers. It is an enjoyable way of teaching mathematics. Joshi and Ram (2016) summarized that mathematics teachers in secondary schools of Nepal are using ICT extensively for documentation purposes but less in teaching-learning. Private school teachers were using ICT in school more than their public counterparts. In my view, ICT has variety of roles in education even in mathematics and its peripherals. It helps the students to increase their enrolment rate, students’ attendance rate, and decrease the drop-out rate, class repetition rate, and class leave rate of the students which are directly or indirectly related to education for all and literacy. ICT status of Nepal is lagging behind than other developed and developing countries in terms of infrastructure and services (Sharma & Kim, 2016). It is not considered satisfactory as it lacks infrastructure. On the contrary, telecommunication sector as a growing fast compared to others services.

Nepal government has supported an ICT-facilitated framework and internet to 785 schools in the year 2017/2018 and the Ministry of Education supplied ICT-related apparatus to all district education offices. In 2010, it rolled out instructions for the implementation of ICT in school education in Nepal and provided appropriate ICT education to the students to improve teaching-learning activities. Ministry of Education (2013), expressed ICT as significant to prepare and develop teachers for the use of ICT in the classrooms.

The Experiences of Teachers in Multicultural Classroom Situation

Multiculturalism in education has been rephrased as multicultural education. The goal of multicultural education is to prepare students to adjust diverse society and the teachers should teach children to admire the cultures and values of a multicultural society and promote the students who are most affected by racism, sexism, handicaps, and so on in education (Subedi, 2010). It is necessary to inspire children in diverse cultures as unique parts of a whole community. Teachers must be knowledgeable, sensitive to multicultural issues, and understand today’s diverse student population and must avoid cultural generation in teaching mathematics (Bhattarai, 2019). ICT provides a guideline to combine teaching-learning environment where students will be free to learn in mathematics and multicultural teacher training is important to prepare teachers for ethnically diverse classes and helps teachers to explore and clarify ethnic and cultural identities as well as develop more positive attitudes toward other racial, ethnic, and cultural groups (Dubbeld, Hoog, Brok, & Laar, 2018).

Students and teachers are affected by multicultural society. It is due to the fear of diversity and resistance while dealing with race and racism in teacher education programs of ICT (Gay & Howard, 2010). Dhakal and Panta (2016) found that teachers as a way of addressing social inequalities shaped by differences in race, ethnicity class (p.141). Multiculturalism helps to address education for all students in learning paces. The teachers’ perceptions of culturally diverse students would help Journal of Education and Practice (Online) teacher education programs which prepare student teachers to work more efficiently with culturally diverse students. Multicultural mathematics education is a very significant and necessary concept of blended learning.

Teachers' perceptions and multicultural students in the classroom are an important element in educating, motivating, and making a difference in education among students regardless of their age, gender, ethnicity, language, and religion. So, multicultural education is a must for equal rights and opportunities to be shared among all groups and people in society's structure. Hence, multicultural class is a factor in the conceptual understanding of blended ICT learning in mathematics education. ICT has changed the concept of education, learning, and research by contributing new opportunities and challenges in the creation and dissemination of information by way of web-based education independent of time, pace, and place (Dogra, 2017).

Students have a positive perspective toward mathematics mobile blended learning using smartphones and enjoy learning through the classroom activities which are performed in the form of teamwork and discussion settings as well as believe that mobile assessment helps them to learn effectively (Rifa & Sugiman, 2018). Mathematics has a vital role in various fields like employment, science and technology. Blended ICT requires specification to combine, traditional and digital approaches, implying a combination of places as in online and distance learning, or a combination of the use of technology and traditional tools (Norberg, 2017). ICT constructs education in a technology-supported environment, and teaching learning support, location, learner empowerment, and flow. It is a time-based model as an educational normal, resulting in technologies that are enablers rather than disruptors of learning continuity. ICT is the important key to promote personalization, a baseline measure of change of achievement and transformation resulting concerning learning outcomes, student satisfaction, retention, and achievement (Garrison & Kanuka, 2004). It is connecting face-to-face teaching and learning with ICT refers to blended learning, i.e. different ways to blend face-to-face teaching and different online tools. Blended learning is the thoughtful integration of classroom face-to-face learning experiences with online learning experiences aiming at taking advantage of a synchronous face-to-face situation and the asynchronous, text-based Internet and more advanced way of utilizing the idea of blended learning by connecting the possibilities of face-to-face situation and online environments simultaneously and non-simultaneously (Garrison & Kanuka, 2004). ICT is used to enhance teaching learning and teachers can easily explain complex instructions e.g. teaching the area, the volume of the cube, and cuboid the figure with a clear concept of the object and ensure students' comprehension, as well as teachers, can create interactive classes and make the lessons more entertaining, improve student attendance and concentration (Poudel, 2015). Blended learning focuses on collaboration in learning and global content to be presented in the local classrooms for the international dimension in learning. ICT might be a helpful instrument for teachers and designers of ICT applications in selecting or designing gender-inclusive or cultural environments and the tools may be content, visual and audio interface, and instructional structure are the prior knowledge, learning activities, and the help structure (Heemskerk, Volman, Admiraal, & Dam, 2011). The students indicate that they appreciate an ICT tool and the inclusiveness of the tools can be improved by special attention to these indicators in the education environment.

Factors of Integrating ICT in Teaching –Learning Mathematics

Using ICT tools means enjoying electronic devices. The learning and teaching can be changed by guiding them through these properly. The study found that an audio-visual way of learning helps in understanding the concepts easily as compared to other ways of learning (Aggarwal & Gupta, 2020). Hence, the whole system of learning can be changed through ICT, changing the role of students and teachers in the process of learning and teaching mathematics.

ICT is a constructivist approach to teaching and learning. It is a tool for improving access and training skills, and teacher educators should be prepared for changed teachers by ICT can be used in a way that improves the learning process towards in teaching-learning. The use of ICT Integrated pedagogy can transform the dynamic in securing content, approach, and theory with everyday life and used in the mathematical laboratory to help develop intuition, conjecture, prove, show, and see the mathematical situation in a way of practical (Bhattarai, 2019). So, integrated ICT is a key, an art and science of teaching and learning in classrooms. The use of ICT in education is student-centered learning but also can create some tension for some teachers and students (Pati & Dhembre, 2019). ICT is valuable and helpful in mathematics teaching at the university level but the major problem is that there is a lack of training and workshops for teachers to develop their technical capacity in mathematics software (Dahal, 2018). It was also found that in the 21st century, computers, the internet, and technology have affected dramatically all aspects of our society. The integration of ICT is not effective as there are still teachers who neglect technology. Classrooms are not well equipped with ICT resources and teachers are not well qualified on how to fully utilize these technologies for teaching and learning. Teachers are still not familiar with some of the software that can be used for teaching and learning (Millicent, 2019). ICT is more effective, dynamic, and more useful for independent learning to students and more opportunities to search the internet by providing teachers with a new pedagogy that is Geo-Gebra, Cabri, Microsoft Mathematics, Mathematica and Ms. Excel, are the mathematical educational software that can be used in teaching-learning mathematics (Dhital, 2018). The effect of university teachers' perceptions, attitudes, and motivation towards their readiness for the integration of ICT in classroom teaching, and university teachers with basic ICT literacy should be encouraged to have a positive attitude toward technology use for discharging professional responsibilities (Zamir & Thomas, 2019). Technology plays an important role in developing mathematical cognition, the relationship between access and achievement. The effect of the home technology environment,

computer practice among different social and ethnic groups, and effective intervention strategies, are all desired (Hennessy & Muhlenberg, 2001).

The importance of ICT is expressed in the research by academics, practitioners, trainees, and teachers. (Hennessy & Deaney, 2007). Like technology, ICT is becoming more important which will continue to grow. Therefore, the teacher education institutions, mostly universities in Nepal, plays a crucial role to ensure that teachers can make and promote safe and effective use of ICT in schools and beyond.

The Use of Practices Blended Learning in Teaching Mathematics

Learning theories identify strategies underlying cognitive processes involved in learning and give a clear categorization of the learning theories. The learning theories include behaviorism, cognitivism, and constructivism and these can all be useful in designing blended learning activities (Anonymous, 2013). Blended learning is not only an effective method of teaching mathematics but its use is also becoming a reality to motivate the students in a digital environment and the availability of portable technologies are the digital environment is gaining ground (Korenova, 2014). The combination of traditional and online learning is an ICT set and uses a natural digital environment so the students. They can benefit from both forms of education from the teaching of mathematics (Shvartsman, 2012). Blended learning is the best properties of e-learning and face-to-face learning and helps to overcome many obstacles in traditional teaching. It is an approach to improve students' conceptual knowledge of theorems and online assignments as specifically designed to help students better understand the meaning of a theorem (Lin, Tseng, & Ching, 2016). Students explore the theorem and study it independently and assignments are built in such a way that a student receives feedback and instructions in response to their Web-based activity. The teaching-learning opportunities offered by e-learning platforms in a blended learning setting are tailored units of learning. (Albano, 2012). So, e-learning and mathematics pedagogies are based on the active role of the learner, the interaction with tutors and peers, and the significance of critical thinking and communication skills.

The effects of traditional science instruction and blended learning on the STEM achievement of elementary school students from low socioeconomic areas is studied (Turegun, 2020). The results were that blended learning has the benefit of hands-on learning, as well as independent, self-motivated learning, and students have first-hand experience with the content and take ownership of their learning. the blended learning method of instruction should be taken seriously by administrators and other school decision makers who serve low-socioeconomic areas.

A blended learning model can foster best practices in blended learning or proactive prospects for higher institutions and diverse learning can provide opportunities (Akpan, 2015). Blended ICT faces some issues like challenges in education such as lack of awareness/knowledge towards technology, biased and inadequate policies, high operational and maintenance costs, self-sustainability of ICT services, managing networking facilities available, low ICT literacy among students and faculty, lack of availability of adequate and lack of ICT infrastructure facilities (Mir, 2019). Despite this, it is most important to develop strategies for learning policies, development, and sustainability of the country.

Mathematics provides educational training programs to upgrade levels academically and professionally through educational supervision services (Ali, Khair, Khairani, and Elrofai, 2012). Online learning demonstrated a greater impact on achievement than either traditional or blended learning, but only reading and fully online learning is the best choice for increasing achievement (Chaney, 2016). It was also found that there were no significant differences between any of the groups in math at all and no significant difference between traditional and blended learning. They may recommend the more important use of blended learning. Effective strategies are accommodating increasingly diverse students of teaching-learning which provides insightful learning in current and future trends in mathematics which is influenced by blended learning (Ramdhany, 2019). In this study, blended learning incorporates a variety of delivery styles, and accommodates students' needs for achievement. Statistically significant difference between the presentation of achievement tests in mathematics as a whole, and on behalf of the experimental group which was taught through the use of blended teaching (Yaghmour, 2016). The blended learning model shows potential for teacher professional development, although further research preferably through controlled studies is needed (Owston, Sinclair, & Wideman, 2008). Mathematics learning process, learning method, belief, and blended teaching is a more efficient way of teaching mathematics compared to traditional instruction (Tseng and Dong, 2014). Blended learning includes the nature of the online tasks given to teachers, the role of the online facilitators, the impact on student achievement, and the implications of providing teachers. Teachers were more motivated to online reflective journals. Advantages of blended teaching included the individualization of learning and student-centered learning, and other modern trends in teaching, as well as the practice of various effects including sound, image, motion, and color, which provides students opportunities to search for information and self-discovery, which smoothly facilitates comprehension of concept. Additionally, blended teaching offers the content attractive, due to the various effects; it enables meeting the different levels of the students and designing activities that are appropriate to the real life of the students.

RESULTS AND DISCUSSION

Blended ICT in education helps the policy expansion of access the internet to all schools, co-ordination and collaboration with institutions and to develop skilled human resources for the quality education in every discipline. So, blended ICT is more effective for teaching learning mathematics education to increase access to learning chances. It assists to enhance the quality of education with innovative teaching strategies, improve learning outcomes, and enable reform or better management of education systems. Nepal being backward in the ICT sector means that many new technologies are to be discovered and implemented. Moskofoglou and Doukakis (2011) argued that in-service training the teachers of ICT was a reflection of the accompanied construction of issues of the learning theories and application in teaching that the use of software saved time in the teaching of mathematics resulting in the teacher adapting experimental forms of learning. The ICT education policy by the government of Nepal's prominence is to necessary develop teachers' ICT ability to change the models of teaching to student-centered. The Faculty of Education in the university, having no funding from the government and university for the ICT in education project received funding from an international organization for ICT infrastructure and provide ICT training for teachers and other staff. The research also found the policy in practice, more sustainable mechanisms, and developed to provide ICT facilities for teachers to use ICT in teaching activities (Rana & Rana, 2020. ICT is essential for governments with public funds to develop national websites for teachers and the benefits related to teaching-learning and lessons of good practice, but it may be difficult to link findings and development (Leask, 2011, p.11). It is the most vital tool for independent professional provision on the web and supports the long-term or short-term needs of teacher development. As a result, there is a need for a more formal approach to the development of policies and operations essential to support blended learning of ICT approaches in Mathematics Classroom Practices of the University.

Multicultural teacher training has a more vital role in changing the attitudes and perceptions of teachers so that cultural and ethnic diversity as a resource can be used for the development and learning of mathematics. Teaching in multicultural classrooms requires specific capabilities in creating positive teacher-student relations and achieving student enrollment. ICT develops computer-mediated communication tools but classroom learning is not the only way to achieve strong communities and also found ICT is more effective for students at times, preferred virtual communities over face-to-face communities in terms of learning, interaction, trust, and spirit. In our context, our community will bring new variables and attitudes so the development of any particular community is unpredictable. However, this research will be benefitted to teachers and learners, and influence in common to all types of communities.

Education needs to change on the necessity of an economy and knowledge. Teachers have to be encouraged to use ICT more effectively and encourage innovation in education. So, ICT has the potential to offer solutions to too many of the challenges that an educational institute faces today. So, multicultural education provides equal education and equal educational opportunities for all races, nations, and groups of different cultures whose values ethics, norms, and practices are focused on multicultural education. Mathematics education is also a major part of education. So mathematics requires addressing these multicultural perspectives necessary for the students of different cultures in a teaching-learning environment. In this regard, teacher education curricula are vital in preparing teachers with the knowledge and skills in the management of safe and responsible use of digital technology for learning. Hence ICT helps to develop the quality of education and blended ICT in mathematics Classroom Practices as well as advanced teaching methods, improves learning outcomes, and enables improved management of the education system.

CONCLUSION

This blended instructional model enables math instruction. The blended teaching enhances students' learning and motivation in mathematics, cultivates confidence and independent thinking, and improves their learning effectiveness, and blended teaching can enhance a student's learning attitude and effectiveness in mathematics. ICT mediates learning despite the potential to provide prompt feedback, personalize instruction, and express the inherent generality of mathematical concepts. Besides, given the embedded cognitive hierarchies, computers, instructional software, calculators, and multimedia are likely to imply greater instructional challenges than the constructivist reforms. There is a lack of curriculum coherence, poor articulation within the system of education; inadequate teacher groundwork and professional development, and the tendency for individualistic rather than collaborative learning. However, there is a requirement for integration of ICT in mathematics education, enhanced teacher professional development, and continuous research on students' learning based on ICT environments. So, it could be concluded that ICT would define the next practices in education, and enable it to be competitive in a globalized society.

Mathematics is a multi-disciplinary subject that should be given to some aspects like relative topics and logical sequence. ICT supports to generate new knowledge and create teaching-learning mathematics. So, this theme is significant for this study of blended ICT mathematics and multicultural classrooms. This literature emphasizes on the importance of support through multicultural perspectives in blended learning of mathematics classroom by using ICT in higher education. Through the use of technology in the classroom, teachers can provide inclusive, dynamic, and customized mathematics learning experiences that equip students with the skills they need to succeed in an increasingly digital world.

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