

Volume: 7 Issue: 2 | Feb 2024

<https://journals.researchparks.org/index.php/IJIE>

Pedagogical Practice of Mathematics Classroom

Maheshwor Pokhrel

Prithivi Narayan campus Pokhara, Department of Mathematics

Madhav Prasad Poudel

Pokhara University, Kaski, Nepal

Laxmi Sharma

Nepal Sanskrit University, Department of Mathematics, Kathmandu, Nepal

Abstract

Mathematics is important subject in our daily life. It is compulsory subject in school level in all over the world but nowadays students are indifference toward learning mathematics. Those indifferences related to pedagogical practice in mathematics class room. The main purpose of this study is to explore pedagogical practices in mathematical class room. To meet our objective, we have analyzed books, journals articles, research paper, forum, reports and online documents Pedagogical approach plays the important role for meaningful learning in mathematics teaching in classroom. In our teaching was teacher centered, in accordance with behaviorism pedagogical approach with absolutism philosophy. We recommend mathematics teacher to use constructivism, integrative, inquiry base, reflective and activity base pedagogical practice for self-directed learning in mathematics classroom.

Keywords: Pedagogical practice, Classroom, Mathematics, Indifference, self-directed learning.

Introduction

Mathematics is an important subject as a self-discipline and in other disciplines too. The history of mathematics in this region is as old as human civilization. (Poudel et al. 2023) It is one of the most fascinating intellectual development of all the civilization of the world (Pokhrel, 2020). Mathematics education must view mathematics with the context of total education of the individual (James & James 1986). Mathematics education have been observed in education system in mathematics from pre-primary to university level. Mathematics has been given a key position and compulsory subject at all school level in the world. Nowadays interest in learning mathematics at the school level to university level is seen to be diminishing (Pokherel and Poudel 2023). Those events may be related to pedagogical practice in mathematics classroom. Mathematics students were indifference towards learning mathematics. The performance of students in mathematics in S.L.C is very poor with the average score of 27.57 and pass percentage of 41.21% (Ghimire, 2010). Most of the S.L.C dropouts and fail in mathematics. The achievement level, score in mathematics is lower score than in mathematics is lower than in other subject (MOE, 2015). The lower performance in mathematics develop negative attitude and belief towards mathematics. Most of the students have regards mathematics as one of the boring or tedious subjects as the result of strategies that are pervasive in school level (Lamichane & Bellbase, 2017). This may be due to lack of mathematical fundamentals and parental guidance. Poudel (2020) explains it as the impression of mathematical learning disability. From above discussion, the high dropout, fail and uninterested.

The mathematics education depends on teaching and learning related to pedagogical practices in classroom.

Thompson (2005) defined pedagogy as an art of teaching and the principle and method of instruction. "Pedagogical practices refers to process of how lesson are being carried in the classroom" (Chaia & Lim, 2020, p.307). Hence, pedagogical practices in mathematics classroom related teaching and learning situation. A lesson in a mathematics classroom involves different method of instruction and a variety of classroom activities of teachers and students. So pedagogical practice in classroom mean classroom activities of teachers and students. So activities of teachers and students in classroom for teaching and learning is pedagogical practice. Pedagogical classroom practices are dynamic interaction among subject matter content, teacher and students (Britton & Wolfe, 2002). Pedagogical practices is a form of collaborative activities through the participation of both teachers and learners (Clarke, 2001). Pedagogical practices of classroom are the collaboration, interaction, discourse and activities of students and students & students and teachers in mathematics classroom. Effective pedagogical approach develops student's interest to learn mathematics and teacher interest to teach mathematics (Luitel, 2019). So pedagogical practice in classroom depends on teacher and student's interest and belief. "Pedagogy is the heart of teaching. It is the rules and principles that guide effective and efficient activities which lead to learning. It is described equally as in learning. It is described equally as in art form and as science" (Pritchard & Wollard, 2010, p.45). Pedagogical classroom practices as a process, involves multiple agents and their interaction within classroom as a system. The process can be manifested in diverse formats and structures and its effectiveness can be influenced by numerous factors both internal and external to the classroom. (Li & Oliveria, 2012). In the same way, pedagogical practice is related. Teachers, students and study matters can only be understanding in relation. The teacher works to the context, represent of content and student's way of being, their forms of participants and their learning emerge out the mutually constitutive relationship. Classroom need to be place where teachers and students engaged in rigorous mathematics in way that both parties learn (Franke, et al 2007). "Pedagogy in a classroom is not just for sake of teaching where appropriately correct conceptual knowledge is being transferred to the learners" (Sahrill & Bolty, 2014, p.100).

The pedagogical practice in classroom discusses on acting and understanding. Acting mediates an actions such as negotiating goals and means monitoring other non-verbal forms of behavior or managing interpersonal relationship involved. Understanding involves using language to reflect upon experience (Wang, 2015). So, Suitable pedagogical practice in mathematics classroom are related to acting and knowledge discourse with critical pedagogy. Pedagogical practices are related to discourse of students and teachers. Pedagogical discourse is the action of students and teachers. Hence, pedagogical distance moves not in single way from teachers to students. Interactive pedagogical discourse is multiway between teachers and student and among students. Hence, pedagogical practices in mathematical classroom are related to instructional strategy, instructional program, learning theory, teaching method, pedagogical approach, classroom discourse, assignment and foundation of mathematics education such as philosophy, culture, technology. Society and methodology. Such aspects and discourse are related to pedagogical practice in classroom. In Nepal's context, researches are done in comparative study on achievements, perception, altitudes, belief of students, teaching methods teaching technology, assessment, evaluation, teaching and methodology. Those research are not used practically. The research on pedagogical practice in mathematics classroom in Nepal is seeing to be lacking. So this research attempts to fulfil the study on pedagogical practice in mathematical classroom.

Objective of study: -

The main objective of this study is to explore pedagogical practices in mathematics classroom in Nepal's context referring to the teaching pedagogy throughout the world.

Methodology:

The methodology of this study is qualitative with interpretivism research paradigm. It is based on document analysis method. Bowen defines document analysis method as “Document analysis is a systematic procedure for reviewing or evaluating documents, both printed and electronic material. Like other analytical methods in qualitative research, document analysis requires that data be examined and interpreted in order to elicit meaning, gain understanding, and develop empirical knowledge” (Bowen, 2009 p27). For the study, we have collected related books, research paper, Forum, journals, reports, and online documents. From those documents, I analysis pedagogical practice in mathematics classroom in different countries and write fact, reflection and views about pedagogical practice in mathematics classroom.

Reviews, Discussion and Reflection

Pedagogical Approaches

Pedagogical approach is an approaches related to pedagogy. Pedagogical practice in mathematics classroom is practice of educators for promoting students learning. Pedagogy is about teaching method and principles of instruction. Pedagogical approach related to the instruction and teaching strategy. Teaching strategy related to learning theory. So pedagogical approach related is to learning theory. Kaasila & Pehkonor, P. defines the mathematics educators as

“The main task of mathematics educators could be considered to improve mathematics teaching in school. There are at least two ways to implement this one way is to improve the written curriculum and its implementation and another way is to improve mathematics teaching in school. There are at least two ways to implement this. One way is to improve the written curriculum and its implementation and another way is to improve mathematics teaching itself to develop good mathematics teachers”.

Thus effective pedagogical approach in classroom involves different method of instruction and variety of classroom activities and practice. “Present major pedagogical approach drawn on combination of student-driven and active learning approach such constructivism, collaborative, integrative, reflective, inquiry base and behavior approach” (Hughes, et al, 2017). Familiar pedagogical practices in classroom such as authority (lecture style), demonstration (coach style), facilitators (activity style), delegator (group style) and hybrid (blended style) (Anthony & Watshaw, 2009). Those style are pedagogical practice which are related to pedagogical practice in mathematics classroom. Pedagogical approach related learning theories such behaviorism, constructivism, social constructivism and cognitivism.

Constructivism Pedagogical Approach

Constructivism pedagogical approach is related to constructivist learning theory. Constructivist learning theory is based on Piaget learning theory. In this approach, the individual learns by exploring their environment by means of building their existing cognitive structures. (Westbrook et al, 2013). So constructivism approach is learner centered approach. In constructivism approach, teacher belief all students will not achieve the same goal there are many points to get the same understanding, every one holds different understanding, Learner construct their own language, seating must be flexible, as students need to work in small group of varying size. Zig saw method be used in construction pedagogical approach (Pon, 2001). Constructivism pedagogical approach employs democratic and inquiry approach allowing the learners to explore their own ways of solving problems, discuss, explain, argue, collaborate and negotiate among their pairs and teachers. Learner are encouraging to activity participant in knowledge construction and understanding of mathematical concept based on their socio cultural experience. (Albaro, 2019). “To create a constructivist learning environment in the classroom, mathematics teachers need to employ different teaching strategy that include enquiry base approach, problem solving, collaborative learning, reflective process, exploratory and situate learning” (Albaro,2019, p. 86). Constructivist

pedagogical approach is based on the ideas that knowledge can never be passed from one person to another. Constructivist pedagogical approach focus social interaction, discovery approach, inquiry learning, knowledge construction, self-regulation, cooperative learning and previous experience.

Collaborative Pedagogical Approach

Collaborative pedagogical approach is an educational approach in teaching and learning that involves groups of learners working together to solve a problem, complete a task and to create a product. Five fundamental element that involves in collaborative approach are positive independence, individual and group accountability, interpersonal and small group skills, face to face promote interaction and group processing. (Laal & Laal, 2012). Collaborative pedagogical approach is interaction between students and students, student and teachers including learning and respect the abilities and contribution of their peers. Collaborative pedagogical approach has used those strategies properly such as online collaboration, jigsaw method, pair-share, integrated process approach and peer teaching. Collaborative pedagogical approach focuses to small group work in mathematics classroom. Collaborative pedagogical approach provides teachers with feedback in order to enhance their reflective teaching practice. “In this approach learners improved capability to evaluate critically to argue substantively, and to apply effective learn concept to new situation or context. This approach helps to transform mathematics teaching into participative actively with critical review and quality assurance.” (Kinuthia & Clarke, 2009, p.3). Nowadays, learner centered and learner driven pedagogical approach are widely perceived as way to address the challenges of achieving sustainable education. Both learner center and learner driven approach are based on constructivist learning theory. So collaborative approach followed by constructive learning theory. (Chen, et al,2019). Hence, collaborative learning approach focus to teach and question but not listening and speaking. So, collaborative pedagogical approach guided by meaningful learning in mathematics classroom.

Integrative Pedagogical Approach

Integrative pedagogical approach is interaction of students, teacher and course content for meaningful learning in mathematics classroom. Integrative pedagogical approach provides learners with a learning environment that helps them make connection of their learning across curricula. (Peyser & Gerard & Roegiers, 2006). IPA focuses on connection rather than teaching isolated facts. The goal of such pedagogy is to enable the learners to master those situations he will have to deal with in his professional life. So pedagogy of integration has certain objective like making sense of learning process, differencing matters by relevance, applying the learning to practical situations, associating the learned elements. The features of integrated approach were interactive, discussion base, teaching small group work, problem solving approach, mathematical thinking with creativity, contextual mathematics and open approach. (Ahuja, et al, 2002) reported that integrative pedagogical approaches focused conceptual understanding, relational understanding exploring patterns and relationship, non-traditional assessment, effective and meaningful learning, mathematics using real-life applications, group working and using technology.

Inquiry Based Pedagogical Approach

Inquiry based pedagogical approach focused discovery approach of teaching strategy. “Inquiry based pedagogical approach is requires more than simply answering question or getting right answer. It espouses investigation exploration, search, quest, research, pursuit and study” (Kuklthaus & Caspari, 2007). In inquiry based pedagogical approach, we use strategies like simulation, demonstration, experiment, field study and project work. Inquiry base approach run in the cycle such as: ask - Investigate -create - discuss- reflect-ask. Inquiry based pedagogical approach focused student’s role in learning process. It focused learning by doing, small group discussion. This approaches increase learner’s knowledge and skills. “The American national research council (2007) refers to inquiry based learning as mean of constructing knowledge through collaborative and communicative process. Learners are encouraged to develop and inspire teamwork to reach

decisions together through sharing the knowledge. (Khalaf & Sein, P.554). So inquiry base pedagogical approach increase learner's competence and knowledge.

Reflective Pedagogical Approach

Reflective pedagogical approach means looking at the teacher and learners follow in the classroom, thinking about why they do it, and analyzing about it if it works. This is a process of self-evaluation, con self-observation. Reflective pedagogical approach focus to self-directed learning. Self-directed learning is a process where students make the key decision regarding how to plan, continue, and evaluate their educational experience (Merriam et al., 2007). Self-directed learning is defined as an approach where learners are motivated to assume personal responsibility and collaborative control of cognitive (self-monitoring) and contextual (self-management) process in constructing and confirming meaningful and worthwhile learning outcomes. Hence SDL is viewed from collaborative constructive perspective (Oswalt, 2003, p. 4.). SDL describes the amount of responsibility the learners accepts for his or her own learning. So SDL can increase student's confidence and learning skills (Taylor, 2001). Hence self-directed learning is process of meaningful learning and can be utilized as a pedagogy in mathematics learning. But its empirical justification is necessary and may need to develop different pedagogical models utilizing these conceptualizations, for it is not a prescriptive entity but is a growing entity.

Behaviorism Pedagogical Approach

Behaviorism emerged as a theory of learning from the work of Thorndike (2011), Parlov (1927) and Skinner (1957). Those theories focus stimulus response, reward and punishment, trial and error. (Westbrook, 2013). Those theories focus stimulus response, reward and punishment, trial and error, teacher center pedagogy such as lecturing, demonstration, rote learning, memorization, imitation and cupping. This pedagogy focusses one size fits all in mathematics classroom. Behaviorism pedagogical approach focused by a change in behavior, second the environment shapes, behaviors and third, the principle of continuity and reinforcement are central to explaining the learning process (Acharya, 2007). Behaviorism pedagogical approach is traditional types of approach in the word in mathematics teaching.

Pedagogical practice in mathematics classroom

Pokhrel (2006) studied the cooperative learning in mathematics: Practice in Nepalese classroom context. This article based on experience of student's life to educator and to the life of a researcher. He argues that cooperative pedagogical approach is useful for mathematical learning activities and it developed student's interest in working together. When students do not participate in learning activities activity and depend upon the others, this would damage the learners. From this article, I conclude that cooperative and collaborative pedagogical practice is useful for students and it help to interesting learning and teaching. Sharma(2016) studied the practices and possibilities in Nepal mathematics education .He argue that Nepalese students are always oppressed by our culture, socio political condition, our belief, and foundation ,civilization, religious practices ,information and technology, economic status and educational practice .Similarly he expressed in this activity such as Nepalese mathematics classroom with chalk and talk approach .Nepalese teacher are unable to address our students voice, Nepalese classroom structure are traditional ,informational technology is beyond our access. He suggests that Nepalese teacher need to be critical and they reflect their classroom practices. Self-questioning and self-actualization used to be in mathematics pedagogy in classroom. He also suggests to Nepalese teachers to develop the interest to learn mathematics and positive attitude towards mathematics to the students in mathematical pedagogical approach. Joshi (2016) Study the use of ICT in mathematics teaching in secondary school of Nepal. ICT is new pedagogical approach in teaching mathematics. He argues that use of ICT in mathematics teaching has vital role to increase student's achievement and mathematical understanding. Belbase & Panthi(2017) study the teaching and learning issues in mathematics in context of Nepal. He arises the issues such as social, gender, cultural, political, theoretical, economic and technological issues.

Those issues effect the pedagogical practices in mathematics classroom. “Mathematics teachers mostly apply traditional pedagogical approach such as lecture and transmission. Lecture strategy make unfair to the students just continue lecturing and not giving them the opportunity for reflecting on what they learned. Those banking pedagogy procedures the good, average and bad position of the students in classroom teaching and learning” (Belbase & Panthi, P.14). Those pedagogical practice in mathematics classroom were not suitable for students. In Nepal behaviorism approach follow the pedagogical approach. The persons understanding of nature of mathematics predicates that person’s view of how teaching should take place in the classroom.it means that pedagogical practice of mathematics teacher is guided by their belief toward the nature of mathematics(Luitel,2019). Luitel(2019) argue that pedagogical practices in mathematics classroom depends on teacher and parent belief .In context of Nepal, pedagogical practices of teacher delivering lectures related to facts and theorems, solving the mathematics problems step by step and asking the students to solve the problems to prepare to the test. The pedagogical practices in Nepal related to absolutism philosophy of mathematics. Luitel(2019) suggest to teacher apply new types of pedagogical approach such as activity base approach ,collaborative approach, criticality approach and experience base approach in mathematics classroom. It may be effective teaching with engage learning in Nepal.

Pedagogical practice in mathematic classroom in the world

Takahasi(2006) studied the characteristic of Japanese mathematics lessons. He argues that characteristics of Japanese mathematics lessons were problem solving in order to provide students the environment to construct their understanding of concepts and procedure in mathematics. pedagogical practice of Japanese mathematics lesson is collaborative, constructive and inquiry base. Pedagogical practice in japan were students-center instruction using problem as foundation. Japanese structured problem solving was built on the form foundation of emphasizing story problem in mathematics classroom. Japanese pedagogical practice in mathematics classroom had focused on developing mathematical thinking skills by using a variety of story problems. Japanese teachers worked collaborate with students by using polya problem solving work. For developing mathematical concepts and skills, japans pedagogical practice was also structured problem solving approach develop to interest in mathematics and stimulate mathematical acting in the classroom during the collaborative work of students. Japanese pedagogical practice in classroom follow that rules show in figure 1

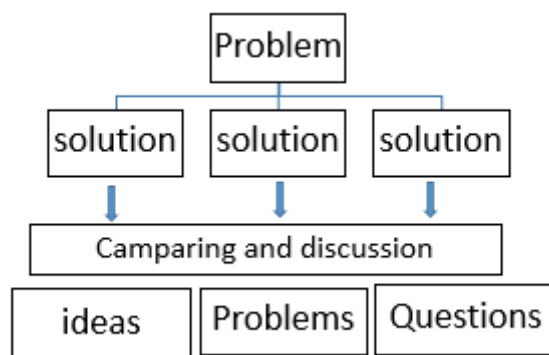


Figure 1: Japanese Pedagogical Practice

Japanese pedagogical practice in classroom also use the characteristics as carefully selected word problem and activities with cohesiveness, extensive discussion and emphasize on blackboard practice. Hence, Japanese pedagogical practice in classroom were collaborative, reflective, integrative and constructivist. Ruzlan(2007) observed two mathematics teacher classroom and he found that the lesson mainly consisted of teacher presentation of concept.

Hogan (2008) observed 76 mathematics lesson of secondary level in Singapore. He argues that the pedagogical practice was answer checking (42%), individual seatwork (26%). Whole class lecture

(12.9%), small group work (8.5%) and other (10.4%). Kasila & Pehkohen,(2009) argue the characteristics of Finland mathematics pedagogy in class were inclusive session with direct teaching involved actively and proactively, regular interaction with students, perceptive questioning, constructive response in classroom involve in variety of activities with rehearse, consolidate the math concept with example. Kaasile & Pehkohen (2009) argue that seven feature for effective pedagogical practices are goal orienteers, flexibility, a mixture of different element, problem centeredness and connection to everyday experience and assessment.

Walshaw & Anthony (2009) published the paper characteristics of effective teaching of mathematics. This paper offers ten principles of effective pedagogical approaches that facilitate learning for diverse learners. Effectively pedagogical is the heart of teaching learning situation. He gave ten principles of effective mathematics pedagogy like teacher knowledge and learning, building on students thinking, mathematical communication, mathematical language, assessment for learning, mathematics takes, making connections, tools and representation. This paper discusses some effective pedagogical practice depend on ten principles. The proceeding of 12th international congress on mathematics education (2012) developed eight theme from presentation of paper about the classroom practice such as theoretical and methodological consideration, instructional context, reflection and improvement, high-quality instructional practices student's perception, classwork and learning teaching, teachers questioning and response in classroom instruction, instructional design and practice. Lim and Kor(2012) observed six expert teacher in mathematics classroom for 12 mathematics lessons. Mostly teachers focus on student's cognitive development and student's active participant. Hughes (2017) argue "production pedagogies engages learners in the activity of production, enabling actors to deconstruction and reconstruction, interpret and refigure, and to make both meaning and things within the context of appreciably meaningful cultural with aesthetic interventions" (p.42). Westbrook, et al,(2013) studied the pedagogical practices being used by teacher in formal and informal classroom in the developing countries. This study represents two types of model of pedagogical approach such as performance model and competence model. They used also 3 pedagogical terms such as students center, child center and activity base learning. They study focuses pedagogical aspects such as students, paying attention, classroom environment, student characteristics, group work learning materials, uses of question, demonstration language and lesson structure. Those pedagogical aspect study different countries such as India, Egypt, Pakistan, Cambodia, Uganda, Srilanka, Bangladesh, kyrgtstant, Benin, Kenya, Tanzania, Somalia. Indian teachers used active approach with teaching aids. Ghana teacher's falsity pupil assessment records to show more exercises done. Kenya teacher used mostly teacher center approach, Tanzania teachers mostly used 14% time in student's center and other times used teacher center approach. Nigeria primary school teachers used to mix approach of pedagogy. They used mostly teacher center and rarely students' centered. Indian teacher used writing on blackboard and reading from textbook. Among the above countries, Indian teacher used effectively pedagogical approach in classroom. Kell et al, (2013) studied the comparing pedagogy in mathematics in Denmark and England. Lesson observation and interviews identified the range of goals towards which teacher in each country worked and the action these prompted. They argue that Danish education give high importance on the group rather than the individual and values to close relationship between class teacher and group of students. In this research, data were taken from eight teachers and their classes. Two lesson were observed from each teacher. This research found that Danish teacher emerging from real life problem and thus emphasized their subject development role more than English teacher. Lessons observed in Denmark, problems often led to doing mathematics rather than the other way round.

In England, teacher and students in lower sets all had a largely functionalist view. Mathematics classroom was primarily seen as a clearly demarcated and distinctive discipline in Denmark but England mathematics classroom practices be in tension, regarded as a limiting and high-stakes assessment regime. England mathematics pedagogy are logical structure and mathematical discourse in classroom were different ways and interesting. In the same ways, Danish teacher

rejected test as the primary goal of mathematics teaching. They focused to continuous formative teacher assessment over summative tests, but English teacher suggested that tests carry a high evolution of both pupils and teacher. Denmark mathematics classroom focused on calculation without abstraction and direct instruction was often followed by guided, interaction exploration. In Denmark classroom students worked individually or in small group on tasks, the teacher circulated, providing feedback on their efforts and encouragement. Teacher adopted strong coaching and supervising roles. Teacher which emphasized small steps and repetition with feedback and practice in mathematics classroom. Teacher also acted as facilitators, encouraging students to complete work rather than on facility their understudy. Teacher also acted as facilitators, encouraging students to actively explore mathematics, asking questions and engaging them in discussion and pored talk in mathematics classroom. Both country mathematics teacher is more responsible to the students. The Danish pedagogical approach focus self-directed learning on the social group and mixed attainment group works and often provides the same task for all. In the same way, England pedagogical approach focused on individualization, differentiated tasks rather than group work. Denmark Pedagogical approach focused on way of reminiscent of humanism but English approach was organized on a techno-rationalist basis, focused largely on its utility. Educational theory was important for teaching learning process. Some learning theory related to mathematics teaching such as Gagne, Vygotsky, Skinner, Pigent, Bruner and Aussubel. Those theories implement in pedagogical practice in mathematics classroom. Component of gagne learning theories such as verbal information, intellectual skills, cognitive strategies, attitude. Similarly, Vygotsky ideas of learning and teaching as essentially social activities that take place between social actors in socially constructed situation. This theory focused on the interaction with the classroom where teaching and learning process take place. So social interaction is important for effective pedagogical practice in mathematics classroom (Sahrill & Bolty,2014). In the same skinner learning theory is also used in mathematics classroom. Shaping, copying, reinforcement, stimulus response are important factors for behavior modification of students in mathematical classroom. Lin & Wang (2014) study the influence of implementing inquiry-base instruction on science learning motivation and interest, a perspective of comparison. This study was to explore the influence of implement inquiry base instruction on science-learning motivation and interest. For this study participant students were taken from high schools located north, west and south of Taiwan. They conclude that inquiry based instruction had positive influence on students learning motivation of 3 school. Inquiry base pedagogical practice develop more self-efficiency and performance and positive effect on the learning interest of the students of school. “pedagogical practice in mathematical classroom related to critical pedagogy. The reflection on the mathematics classroom discourse is made by presenting the interactive discourse and it cost with recourse to commenting the dominant mathematics classroom teaching.” (Wang,2015, p.1). From those arguments interactive discourage in classroom is suitable for self-directed learning pedagogy.

Lu (2016) studied a comparison of math teaching and learning in china and the United states. He argues that Chinese students were more successful than US students in creating auxiliary elements to helping them solve mathematics problems as well as more comfortable switching to different problem solving strategies. Math's teaching in classroom in china were direct instruction, use of worksheets and textbook in instructional and testing mainly for assessment purpose. Chinese teachers have much larger class then U.S. class. Class in china typically have cell of the desks facing the teacher but U.S desks may be clustered into group. In Chinese schools, students tend to study in one room and teacher travel to that room each but in United States, teacher can decorate and be creative in their homeroom. Chinese teachers had better performance in solving mathematics than U.S. teachers because Chinese teacher's ability to apply their mathematics conception flexibility. U.S. teachers do not emphasize enough on problem solving strategy and creating. Chinese teachers uses whole class instruction, engaging all students in the materials and promoting feedback but U.S. model of teaching math's which is more focused on small groups and individual attention. Yuan (2018) study pedagogical training for prospective mathematics teachers in china. He

argue that china's mathematics teacher designing good blackboard writing and drawing 32.3%, creating an active classroom atmosphere 26.2%, applying effective classroom management strategies 13.8%, optimizing language use for teacher 10.8%. So pedagogical classroom practice in china were sound content knowledge, pedagogical content knowledge and general pedagogical knowledge in mathematics classroom. Chaia & Lim (2020) studied the characterizing pedagogical practice in mathematics lesson among selected Malaysian primary schools. They observed 45 Mathematics lessons taught by 24 mathematics teacher from national primary school. They used qualitative research approach based on teacher's activities and student's activities in mathematics classroom. The focus of studies categorizes teacher instruction during the lesson and student's involvement in the classroom. For the data collection, two video camera were used to capture of mathematics classroom. Data were categorized in the teacher activities such as induction set, class management, teaching and explaining, desk instruction, checking for individual understanding, checking for whole class understanding, whole class question and answer. In the same way coding categories in the pupil's activities such as individual seatwork, group work presentation, spell the word and reading the question or answer. From teacher's side, teacher spent time 21.87% in checking individual understanding, 20.70% in individual seatwork, 19.16% in teaching and explaining, 17.92% in desk instruction, 17.73% in question answers, 17.10% in class management, 9.30% for group work and 4.10% in student's presentation. From data analysis, pedagogical practices in Malaysian mathematics classroom involving mainly the teacher posing question to the whole class or individuals and teacher explaining the concept and students doing individual seatwork during the lessons, which SJKC teachers spent more time in teaching and explaining. SJKL teachers spent more time in learning but SK teachers spent more time to check individual understanding. From above research, I conclude that Malaysian pedagogical practice focused on teacher center method. There was no use ICT pedagogy. Teacher focus on checking for individual understanding, individual seatwork, explaining need focus on group work presentation and problem solving for the students.

From above discussion, different pedagogical practice implemented in different countries in mathematics classroom. Developed country mostly used new mode of pedagogical practice such as constructivism, collaborative, self-directed, integrative, inquiry base in mathematics classroom rarely used behaviorist pedagogical practice but developing country used mostly behaviorist pedagogical practice in mathematical classroom

Our reflection about pedagogical practices in mathematics classroom.

Pedagogical practices in mathematics classroom in Nepal mostly follow behaviorist pedagogical approach. Nowadays, some teacher use constructive, reflective, integrative and pedagogical approach in mathematics classroom. In the primary level, students feel teachers are god gifted. They are authentic source of mathematics knowledge. In secondary teacher focused on method to solve the question and remember the process at that time. In intermediate level, the teacher did not give the concept about mathematics and focus to solve the question in examination point of views. In our experience as a learner times, nature of mathematics was rigid, unchanged, absolute and not applicable. Teaching methods were traditional based on rote learning followed by behaviorist pedagogical approach. Examination system was paper-pencil test and complicated. So our experience as student's time pedagogical practice in mathematics classroom were teacher centered, boring, and ineffective. The teacher would solve the problem in blackboard and I would copy in the notebook. Similarly the new teachers followed. As fact, the initial stage of our teaching was guided by the traditional methods. When we study and used new strategies, then teaching approach turned meaningful. As a learner, our teachers follow the behavioral pedagogical approach, as a teacher, initially used behaviorist pedagogical approach after some time used some time constructive pedagogical approach. As a mathematics educator, we study for related literature about pedagogical practice in mathematics teaching. We used different pedagogical practice in mathematics classroom. In our experience as mathematics educator, we have realized that the nature of mathematics is practicable, applicable, creative, logical, dynamic, telescopic, enjoyable.

The Pedagogical approach must be student centered, constructive, reflective, integrative and inquiry based for engage and self-directed learning. If those pedagogical approach are used in mathematics classroom, then mathematics teaching and learning is meaningful and effective.

Conclusion

Mathematics is important in our daily life. This study explores pedagogical practices in mathematical class room. Here we have discussed on constivision collaborative, integrative, reflective, inquiry based and behaviorism pedagogical approach. Pedagogy related to teaching learning in mathematics class room. Constructivism pedagogical approach related to learner center social interaction, inquiry learning, knowledge construction, self-regulation and previous experience. Similarly, collaborative pedagogical approaches interaction with student to student and student to teacher. Integrative pedagogical approach is integration of students, teacher and subject content with interaction class room. Inquiry based pedagogical approaches run in the cycle such as ask- investigate – create – discuss- reflect- ask with constructing knowledge through collaborative and communicative process. The pedagogical practice in mathematics classroom in Nepal is teacher centered, behaviorism pedagogical approach with absolutism philosophy. We recommend the mathematics teacher to use constructivism, integrative, inquiry base, reflective, and activity base pedagogical practice for self-directed learning in mathematics classroom.

References

1. Achary,B.(2072).*Foundation of mathematics Education* .Dikshant prakasan
2. Ahuja,P.&Jahangin(2002).An integrated approach to teaching and learning college mathematics. *Journal of the korea society of mathematics education series Research in mathematics education*.7 (1).11-25.
3. Albuero,F.G.(20190.Mathematics teachers pedagogical beliefs practices; Does being conventional or constructive matters? *The normal light*.13(1).83-106.
4. Anthony, G,& Watshaw,M.(2009). Characteristics of effective teaching of mathematics: A view from the west. *Journal of mathematics education*.2 (2).147-164.
5. Anthony,G.,Walshaw,M.(2009). Effective pedagogy in mathematics. *International bureau of education*. Retrieved from <http://ww.ibe.unesco.org>.
6. Antonia,D.M.S.(2016). *Regional memorandum, M.233*, Republic of Philippines, department of education, Cainta, Rizal.
7. Belbase,S.& Panthi, R.K. (2017). Teaching and learning issues in mathematics in the context of Nepal. *European journal of education & social sciences*.2 (1),1-27.
8. Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40. DoI: 10.3316/QRJ0902027.
9. Chaia,H.M. & Lim,C.S.(2020). Characterizing the pedagogical practices in mathematics lessons among selected Malaysian primary school. *The mathematics enthusiast*, 17(1) .307. Retrieved from <https:// Scholarwork.umt. Edu/time/vol17/Iss1/12>.
10. Chen, C.L., Chen.L.H.&Zhou,X.(2019).Collaborative learning by teaching :A pedagogy between learner center and learner driven. *Sustainability, MDPI*.11.Retrieved from ;DOI :3390/su11041174.
11. Clarke, D. (2004). Contracting comparative research on teaching and learning in mathematics research from. *Proceeding of the 28TH conference of the international group for the psychology of mathematics education*. 1, 197-226.
12. Clement Gwede PhD, M. P. H., & Addiss, F. (2021). 2020 International Cancer Education Conference. *Journal of Cancer Education*, 35(1), S1-S60..

13. Clarke, D.J.(2001). *Perspectives on practice and meaning in mathematics and science classroom*. The Netherlands Rluweer academic publisher.
14. Creswell, J .W. (2013). *Educational Research, phi learning private limited* Delhi (fourth edition)
15. Ellerton & Nerida, F.(2003). *Summary of the best practices and innovation in teaching and learning of mathematics*. Seminar proceeding on best practice and innovation in teaching and learning of science and mathematics.
16. Franke, M. Kazemi, E.& Battely. D.(2007). *Mathematics teaching and classroom practices school handbook of research on mathematics teaching and learning*. 225-250. Charlottee.NC.
17. Ghimire, K.P. (2010). Lower secondary level student's achievement in mathematics in Kathmandu district. *Mathematics Education from* 14(1), 15-20
18. Joshi,D.R.& Ram,P.S.(2016). Use of ICT in mathematics learning in secondary school of Nepal. *A multidisciplinary Quartile international referred research journal*. I (3).64-73.
19. Kaasila,R & Pehkonen(2009). Effective mathematics teaching in Finland through the eyes of elementary student teacher. *Effective mathematics teaching from teacher from teacher perspectives: National and cross-National studies*. (P.203). DOI: 10.1163/978908790822510
20. Kelly,P., Pratt, N., Dorf. H & Hoh(2013).Comparing pedagogy in mathematics in Denmark and England. *European educational journals*. 12(4).553-564.
21. Khalaf,B.(2018).Traditional and inquiry based learning pedagogy; A systematics critical review . *International journal of instruction*.11 (4).545-564.DOI:1012973/iji.2018.11434a.
22. Laal,M.& Laal,M(2012). Collaborative learning: What is it? *Procedia-social and behavioral science*. 31(2012), 491-495 Retrieved from : <http://www.researchgate.net/publication/224766528>.DoI: 10.1016/J.sbspro.2011.12.092.
23. Li,y. & Oliveria, H.(2015). Research on classroom practice. *The proceeding of the 12th international congress on mathematics education*.p.489-496. Retrieved from <http://doi.org/10.1007/978-3-319-12688-3-46>.
24. Lin, Y., Yu, K.W.& Wang, P.H.(2014). Influence of implementing inquiry-based instruction on science learning motivation and interest; a perspective comparison. *Procedia-social and behavioral science* .174(2015), 1292-1299 Retrieved from, <https://www.science.direct.com>
25. Lu, Y.(2016).*A Comparison of math teaching and learning in china and the center state: problem solving skills in geometry of Chinese and V.S students*. Unpublished master thesis. Graduate program in mathematical sciences. The Ohio-state university.
26. Luitel, L. (2019). Nature of mathematics and pedagogical practice. *Tenth international mathematical conference*. Hyderabad, India ISSN.2077-9933).Retrieved from: <http://www.researchgate.net/publication/331113612>
27. Merrian, S.B.,Caffarella, R.S. &Baumgarner, L.M. (2007). *Learning in adulthood: A comprehensive guide*. (3rd ed). San Francisco, CA.; John, Wiley S Sons, Inc.
28. MOE (2015). *Nepal education figure*. Government of Nepal, Kathmandu.
29. Oswalt, D.F. (2003). *Instructional - design theory for Fostering Self-directed Learning*, (Unpublished doctoral dissertation), Indiana University.
30. Peyser, A., Gerand, F.M. & Roegier, X. (2006). Implementing a pedagogy of integration: Some thoughts based on textbook elaboration experience in Vietnam planning and changing press. *BIFF, parternaire de vos project*. Doi: 10.1.625.1964

31. Pokhrel, M., & Poudel, M. P. (2024). Exploring Factors Contributing to Indifference towards Learning Mathematics among Secondary School Students in Nepal. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 15(1), 51-60.
32. Pokhrel, T. R. (2006). Cooperative learning in mathematics: practice in Nepalese classroom context. *Mathematics education form*, II (20),21-29. Council for mathematics Education Kathmandu Nepal.
33. Pon, N.(2001). Constructivism in secondary school mathematics classroom. *Egallery*,3(2) Retrieved from <http://www.ucalgary.ca.2 gallery>.
34. Poudel, M. P. (2020). Interest in Mathematics in the Ethnic Group of Nepal. *GSJ*, 8(8).
35. Poudel, M. P., Harsh, H. V., Pahari, N. P., & Panthi, D. (2023). Extension of geometric series to hypergeometric function in Hindu Mathematics, *International journal of statistics and applied mathematics*, 8(4)
36. Pritchard, A. & Woollard, J. (2010). *Psychology for the classroom: Constructivism and social learning*. Routledge, Taylors Francis group, London and New York.
37. Retrieved from <http://www.researchgate.net/publication/265907282>.
38. Shahrill, M.& Botty, H.M.R.H(2014). The impact of Gagne, Vygotsky and skinner theories in pedagogical practices of mathematics teacher in Brunei Darssalam. *Review of European studies*. 6(4) . 100-109. Canadian center of science and education.
39. Sharma, T. (2016). Practice and possibilities in Nepalese mathematics education. *Experience of teaching with mathematics, science and technology*. 2(1).pp 261-266. Retrieved from <https://www.reseachgate.net /Publication/303923332>
40. Takahashi, A. (2006). Characteristics of Japanese mathematics lessons. *Tsukuba journal of educational study in mathematics*. Vol.25. Retrived from: <http://www.human.tsukuba.a6.jp/n/mathedu/2504.pdf>.
41. Taylor, J. H.(2001). Self-directed learning views of teacher and students. *Journal of advanced Nursing*, 36(4) 496-504.
42. Thompson, C. S. (2005). Powerful pedagogy: Learning from and about teaching in elementary literacy course. *Teaching and teacher education*, 22,194-204.
43. Wang, X.(2015). Reflection on mathematics classroom Discourse: The perceptive of critical pedagogy. *Education and Linguistics research*, 1(2).
44. Westbrook, J.& Durrani, M.& Brown, R.& Payer, J. & Salvi, F.(2013). Pedagogy, curriculum, teaching practices and teacher education in developing countries. *Final report education rigorous literature review*. Department of Internal development.
45. Whitworth, B.A., Maeng, J, & Bell, R.L. (2013). Differently inquiry, *Science scope*,(37). P. 10-17
46. Winslow. C.S., Attorp, S., Liris. & Johansson, Y.A.(2020). Comparing mathematics education lessons for primary school teacher: Case studies from Japan, Finland and Sweden. *International journals of mathematical education in science and technology*. 51(5).
47. Yuan, Z. (2018). Pedagogical training for prospective mathematics teachers in china. Retrieved from www.researchgate.net/publication/329751825 Doi:10.1163/9789463512367_07
48. Yukiko, A.J & Liris, A.& Carl,W.(2020). Comparing mathematics education lessons for primary school teachers: case studies from Japan, Finland and Sweden. *International journal of mathematics education in science and technology*. 52 (5). 688-712. DOI:10.1080/0020739X.2019.1614688.