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Experiential versus Traditional Pedagogy: A study of primary school in Delhi NCR

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ABSTRACT
The Indian education system has been struggling with forming a foundational sense of numeracy among children. The draft of the Indian National Education Policy (NEP) that was released in early June 2019 makes a very clear statement about the "severe learning crisis." The long policy document states that there are a significant number of children in elementary school who don't have the basic reading and math skills and recommends a "pedagogical shift" to change this. Therefore, the research will focus on understanding whether a pedagogical shift from traditional pedagogy to experiential pedagogy will lead to better learning outcomes among primary school students. Using a pre- and post-test, we divided forty students (n = 40) from grade one into two groups. The first group experienced traditional pedagogy, while the second group experienced experiential pedagogy. Using SPSS 19, a t-test was administered. The result indicates students in experiential learning have better pre-test scores than students in traditional learning. The outcome stipulates that experiential learning provides holistic learning with better understanding that students can connect to their lives.

Keywords: learning outcome, mathematics, primary education

INTRODUCTION

The Indian school education system is one of the largest in the world, with more than 15 lakh schools, nearly 97 lakh teachers, and nearly 26.5 crore children. India has made a lot of progress in education over the years, from making it easier to get a good education to increasing the number of students per teacher (PTR). Report released by the Department of School Education and Literacy (2019-2020) mentioned that the gross enrollment ratio increased to 89.7 percent (from 87.7 percent) at the upper primary level, and the PTR for primary has become 34.0 percent, whereas it was 26.5 percent in 2012-13. Between 2012–13 and 2019–20, the Gender Parity Index (GPI) at both secondary and higher secondary levels has also improved. Furthermore, the Unified District Information System for Education **(**UDISE+) shows a remarkable improvement from 2012–13 in the number of schools with functional electricity, functional computers, internet facilities, hand-wash facilities, girl's toilets, and library/reading rooms in 2019–20 over the previous year (literacy, 2019–2020). These achievements have been bolstered by various policies and programmes initiated by the government, such as the Right of Children to Free and Compulsory Education (RTE) Act (2009), the National Early Childhood Care and Education (ECCE) Policy (2013), Sarva Shikasha Abhiyan (SSA) (2001), the draft National Education Policy (NEP) (2019), and Integrated Child Development Services (ICDS) (1975).

However, children are still learning very little in our education system. Draft of Indian National Education Policy (NEP) released in early June (2019) suggests close to 5 crore (i.e., 50 million children) are behind or have fallen behind their class curriculum. Only 33 percent of 5-year-olds could recognise at least one number (1-9) in 2021, and one in every two children in grade 3 cannot use math to solve daily life problems (Annual Status of Education Report, Rural 2021). Even after many years of formal education, there are still millions of children who are unable to read, write, or do simple math. And once they have fallen behind, children are unable to catch up. It is unfortunate that children in India reach young adulthood without developing the most basic numeracy and reading skills, Even if they can learn how to do simple math and/or read simple instructions, a satisfying job is still a long way off. In terms of learning problems, the gap between poor and wealthy students gets bigger as they move through elementary school. And it is mostly first-generation schoolgoers, who increasingly fall behind over the primary cycle (Rose, 2017). Several international and national studies, such as the World Bank Education Report (2020), the Early Childhood Impact Study (2017), and the National Education Policy (2020) and National Curriculum Framework (2005), also show that a large number of children who have finished pre-primary and/or primary education, whether it was public or private, do not have the age-appropriate

math and school readiness skills to move (World Bank, 2020; UNICEF, 2017; Development, 2020; and Training, 2000).

Therefore, the National Education Policy (2020) recommends a "pedagogical change" in school education to make it responsive and relevant to the developmental needs and interests of the learners at different stages (p. 11). They advocate changing the direction of the existing pedagogy with one consisting of flexible, multi-faceted, multi-level, play-based, activity-based, and inquiry-based learning (p. 8; 2020). It propagates a pedagogical approach "that is not only cognitive but also helps in building character and creates holistic and well-rounded individuals equipped with the key 21st-century skills." However, we believe, in addition to "pedagogical change", a change in understanding of learning theory is also required for Indian education system. The current dominant traditional pedagogy follows a behaviourist approach to learning; focusing only on the psychological aspect of learning. However, we believe social environment to be equally important as the psychological aspect, therefore, an effective teacher needs to be able to pivot and craft instruction that meets the needs of the individual student and helps them construct knowledge while including their social environment, Hence, choosing the right learning theory is an essential framework for students, facilitating an agreement on desired learning outcomes between teachers, school leaders, students, and parents.

Therefore, the aim of the study is to understand if "pedagogical change" will change the learning outcomes among primary school students in mathematics. The research was conducted on forty (n = 40) first-grade students in a government school in Delhi, NCR, over a period of fifty days. We aim to compare traditional learning and experiential learning as two pedagogies in classroom settings. In view of discussing two pedagogies, we will begin by establishing a theoretical framework of learning theories catering to each of these pedagogies. As the research intends to compare traditional learning and experiential learning, we try to examine whether pre- and post-test results vary in the respective pedagogies, influencing the learning outcomes of the students.

THEORITICAL FRAMEWORK

The serious development of educational theories didn't start until the early 20th century, yet the ancient Greek philosophers Socrates, Plato, and Aristotle were already interested in how people acquire knowledge. They investigated the question of whether or not one may find knowledge and the truth inside themselves (rationalism) or via external observation (empiricism). Around the turn of the 19th century, psychologists first started using scientific research to solve this topic. The purpose was to get an understanding of how individuals learn so that teaching methods might be developed in accordance with that knowledge. In this article, we will focus on two competing schools of thought on how learning takes place: behaviourist theory and social constructivist theory.

Behaviourism Theory of Learning

Behaviorism asserts that learning is linked to changes in behaviour that can be seen. When the right action is taken in response to a change in the environment, learning takes place. In behaviourism, the stimulus and the response are the two most important parts. After Pavlov, Thorndike, Watson, and Skinner did experiments on animals, the behaviourist paradigm was established. Pavlov's study on dogs brought about the idea of "conditioned stimulus." Skinner's study on rats and pigeons led to the idea of "operant conditioning," which focuses on stimulus-response, reinforcing, and repetition. The results were applied to schools as a whole, and it was thought that students' learning was just a matter of getting into good habits. Drilling (repetition) is the foundation of this paradigm. In most schools today, memorization is an important part of teaching and learning (Mahmood et al., 2021). "Predictability" is also an important part of the behaviourist philosophy, and the transfer-receiving method that teachers use makes school managers happy and sure about how well the school is doing. The paradigm is based on the lecture method, which sees students as empty cups that can be filled with information through the "telling method."

Social constructivism theory of learning

Social constructivism is a theory of knowledge that investigates the knowledge and understandings of the world that are produced collaboratively by individuals. More specifically, social constructivism analyses how people come to know and understand things about the world through shared experiences. The theory holds that individuals develop understanding, significance, and meaning together with other people. The two most important parts of this theory are (a) the idea that people make sense of their experiences by making models of the social world and how it works, and (b) the idea that language is the most important way that people create reality (Leeds-Hurwitz, 2009).

Vygotsky's work from 1978 has had a big impact on social constructivism, which says that knowledge is first made in a social setting and then internalised and used by individuals (Eggen, Kauchak, & Garry, 2007). Social constructivists believe that when people share their own points of view, a process called "collaborative elaboration" (Meter & Stevens , 2000) tends to happen that leads to learners building their understanding

together, which can't happen when each person works alone (Mayer, 2003). It is believed that learning is an active process in which individuals are expected to figure out facts, ideas, and principles on their own. Because of this, they encourage and support learners' guessing and intuitive thinking (Adams, 2006; Keaton & Bodi, 2011). In other words, social constructivism emphasises that people can't discover reality because it didn't exist before they made it up as a group. Other constructivist scholars agree with this and stress that people make sense of their lives by interacting with each other and their surroundings. Kim (2001) states that social constructivist pedagogy should focus on teaching and learning with others, such as peer collaboration, cognitive apprenticeships, problem-based instruction, web quests, anchored instruction, and more. Instructional models based on the social constructivist view show how important it is for learners and practitioners in society to work together (Wenger, 2009). Watson (2001) say that the relationships between practitioners, what they do, and the social organisation and political economy of communities of practise are all important and effective parts of a society's practical knowledge. Because of this, learning should include this kind of knowledge and practise (Irvin , 2008).
Woolfolk (2017) talks about a few strategies for teaching methods, such as reciprocal questioning, jigsaw classrooms, and structured controversies.

Pedagogy
Pedagogy is the study of how to teach, or the practise of teaching. It means "that set of teaching methods and strategies that help people learn and give them chances to gain knowledge, skills, attitudes, and behaviours within a certain social and material context." It refers to how the teacher and student work together and how the student learns (Siraj-Blatchford et al. 2002). It has to do with how adults and children interact with each other, while keeping in mind that how children learn and grow at this age is not just based on what they are taught, but also on how it is taught.

Traditional Pedagogy
Traditional pedagogy generally consists of teacher-centered instruction delivered to students who are the receivers of information and/or theoretical knowledge. More schools still use traditional teaching methods, which are also called conventional teaching methods. This kind of education in India generally stresses lecture methods and the memorization of facts. In traditional ways of teaching, teachers ask students to repeat and remember what they have learned and what they have been taught in class. Students also take turns repeating the lesson. Everyone else listens and waits for their turn, except those who are reading. In this way, students finish the whole lesson. Then, students have to learn the lesson by heart, and based on how well they do, teachers give them homework or oral and written tests. The method implies a stereotypical acceptance of ancient routines in the classroom. "A routine in which students are expected to sit for hours taking notes and answering questions with little interaction with peers" (Nancy Frey, 2009).
The foundation of traditional pedagogy is behaviorism, which focuses on rote-learning and is built on a set of routines that "drill" information into a student's memory bank. According to the theory, knowledge is transmitted from teachers to students through the correct response to a stimulus. Using behaviourism, teachers may demonstrate to students how they should respond to certain stimuli. Traditional teaching methods are used in the classroom in a way that gives students credit for the work they do during each subject. Students' behaviour is kept in check in the classroom by following the rules and regulations. These rules and regulations came from long-standing habits that schools had been using successfully for a long time. Teachers are in charge of teaching students and making sure they follow the rules at school. Historically, traditional education came into existence because books and paper were rare. The main function of lectures was to deliver the sources of knowledge to the children through the teacher’s reading (Park & Choi, 2014). Therefore, the social dynamics in this class make the teacher a dominant entity that can be displaced in several ways. First, the teacher imparts information, and the children are just taking notes. The former is actively participating, and the latter is passively participating. Second, the teacher controls every aspect of a child’s learning. The teacher has final authority on the format and content of how the lesson will be taught (Powell, 2001). The emphasis on external discipline, the acquisition of isolated skills and techniques by the drill, the essence of rote learning and memorization, and not nurturing the capacities and interests of a child in a classroom, are a few characteristics of traditional teaching methods.
However, traditional ways of teaching are less expensive than modern ways, which makes them better for schools in rural areas. In a traditional pedagogical approach, the conversation between the teacher and student increases. We can also say that there is more discipline in a traditional classroom. In this pedagogy, the teacher doesn't need to know much about technology, so he or she can focus more on the subject at hand and teach the students the most important things. Students' eyes don’t get tired because this method strictly follows the blackboard approach. In most parts of our country, schools and universities still use traditional ways of teaching. Teachers use chalk and a blackboard to show students the concepts and elaborate on them. Another powerful feature of the pedagogy is writing on the blackboard and students taking notes from the blackboard. In the

traditional way of teaching, lessons take place inside the classroom. The pace and schedule of learning are set in advance.

Experiential Pedagogy

The most common way to think about experiential learning has been through cognitive reflection on concrete experiences (see Kolb, 2015). This way of thinking has been influenced by behaviourist ideas. Kolb's (2015) and Piaget's (1966) writings argue that the learner must analyse the facts being taught and come up with an interpretation based on past experiences, personal beliefs, and the learner's cultural background. This idea is called constructivism.

However, critics of constructivism view experiential learning as a learning theory catering to the social environment of the students. They believe that experiential learning as a theory has a deterministic view of how people make sense of their experiences and an overly cognitive view of how experience relates to knowledge, both of which limit our ability to reason and may prevent us from experiencing and learning. "Experience exceeds rational attempts to bind, control, and explain it," claims Michelson (1999). Therefore, using social constructivism, scholars like Jayson (2019) and Miettinen (2000) have tried to change how we think about experiential learning. They claim that experience is not restricted to being interpreted just on an individual and psychological level but may also be viewed as a collection of societal knowledge and abilities, as well as the method by which a man comes into direct contact with nature. In their view, an experience is an event that occurs when an organism interacts with its physical and social surroundings and flows into and through its objective environment, modifying it. And this objective environment is defined as a "set of conditions under which individuals relate to one another, interact, and coexist."

Experiential Learning Theory (ELT) provides a holistic model of the learning process and a multilinear model of development, both of which are consistent with what we know about how people learn, grow, and develop. The theory is called "experiential learning" to emphasise the central role that experience plays in the learning process, an emphasis that distinguishes experiential pedagogies from others. It defines learning as "the process whereby knowledge is created through the transformation of experience." "Knowledge results from the combination of grasping and transforming experience" (Kolb 2015, p. 41). According to Smith (2001), the first context of experiential learning is "the sort of learning undertaken by students who are given the chance to acquire and apply knowledge, skills, and feelings in an immediate and relevant setting." In other words, students are given the opportunity to acquire and apply knowledge, skills, and feelings in a setting that is immediate and relevant (p. 1). It is a pedagogy that prepares students for advanced-level jobs in the workplace or for postsecondary education that might readily connect with this form of experiential learning. These programmes train students for advanced-level vocations in the workplace or for higher education. An additional illustration of this would be a workforce education development programme with a particular emphasis on occupationally related pragmatic tasks that need a set degree of precision. Morgan (2008) suggests that the most important part of experiential pedagogy is that it involves direct experience with the learning event, rather than just thinking about the learning. The idea of a transaction between the teacher and the learner is one of the most important parts of the philosophy. The teacher is responsible for presenting opportunities for experiences, helping students utilise these experiences, establishing the learning environment, placing boundaries on the learning objectives, sharing necessary information, and facilitating learning. Experiential education is a student-centred approach. Beavers (2009) has remarked, scholars in the field of experiential learning have used the term in two different ways. From one viewpoint, the term is recognised to depict the kind of learning attempted by students who are allowed to understand and apply information, aptitudes, and feelings in a quick and significant setting. Experiential learning, therefore, includes an immediate experience with the phenomena being examined instead of just reasoning about the experience. The second sort of experiential learning has been alluded to by Houle (1981) as training that happens to individuals due to direct participation in active engagement from the student is required for this direct experiential encounter with a learning event. This is in contrast to the passive engagement that is typically associated with teacher-directed instruction, which typically results in very little interaction between the student and the learning process. Students' reflections on direct involvement and direct interactions within the events of daily life are the topic of discussion in the second context of experiential learning that is outlined in the research.

There are many ways to learn through experience: Outbound Training, Virtual Online Team Building, Small Group Projects or Assignments, Practicums or Field Placements, Service-Learning, Adventure Based Learning, Game-Based Learning, Outdoor Learning Activities, Inhouse Learning Activities, Drama, Art, Theatre, Storytelling, Creativity Games, Mystery Games, and Using Teaching Learning Material (TLM).

Teaching/Learning Material (TLM): A Component of Experiential-Based Learning

Instructional materials, also known as teaching and learning materials (TLM), are one such method to be used in experiential pedagogy. It is a group of things, both living and nonliving, as well as people and other things, that a teacher can use in teaching and learning situations to help students reach their learning goals. They can help

solidify a learning experience, making it more fascinating, interesting, and participatory. Instructional tools that are utilised in tasks such as active learning and evaluation usually help the child discover concepts on their own, with the teacher acting only as a facilitator. It is commonly referred to as a tool that aids in the creation of a learning environment in the classroom, with children interacting and having fun while interpreting their experiences. Teachers use them to pass on information to children, while they use them to improve their knowledge. The worth they possess is reflected back to them. It can be used to assist a student in developing their understanding of various concepts rather than simply agreeing with what the knowledgeable other suggests.

Classifying the various types of teaching-learning resources is critical based on their utility and the subject matter being catered to. So, it is mostly up to the teacher to find and choose the right teaching and learning resources to make teaching and learning easier. It is usually encouraged to keep the TLMs as visually appealing as possible, to attract children to use them. Furthermore, they should always be used in groups of two or three to foster a positive group dynamic and to inspire and motivate them. With the help of TLMs, concepts can be learned through a process of communication between teachers and children, whose understandings are very different. Every child has instincts and inclinations of his own, but we won't know what they imply until we can translate them into social counterparts. One must be able to trace them back to social history and acknowledge them as the result of earlier activity. We must also be able to project them into the future to determine their fate and conclusion.

Objectives of the Study

The objective of the study is to conduct a comparative study between traditional and experiential learning pedagogies to understand the learning outcomes.

Null Hypothesis

The null hypothesis (H_0) is as follows: There exists no difference between the learning outcomes of students in experiential learning versus traditional learning.

Alternative Hypothesis

The alternate hypothesis (H_1) is as follows: There exists a difference between the learning outcomes of students in experiential learning versus traditional learning.

Variables in the Study

The study has three types of variables:

- Independent Variables

In this study, the teaching method is the independent variable. The experiential learning method of teaching and the traditional method of teaching are the two independent variables adopted in the study.

- Dependent Variables

The dependent variable used in this study is the learning outcome in mathematics.

- Extraneous Variables

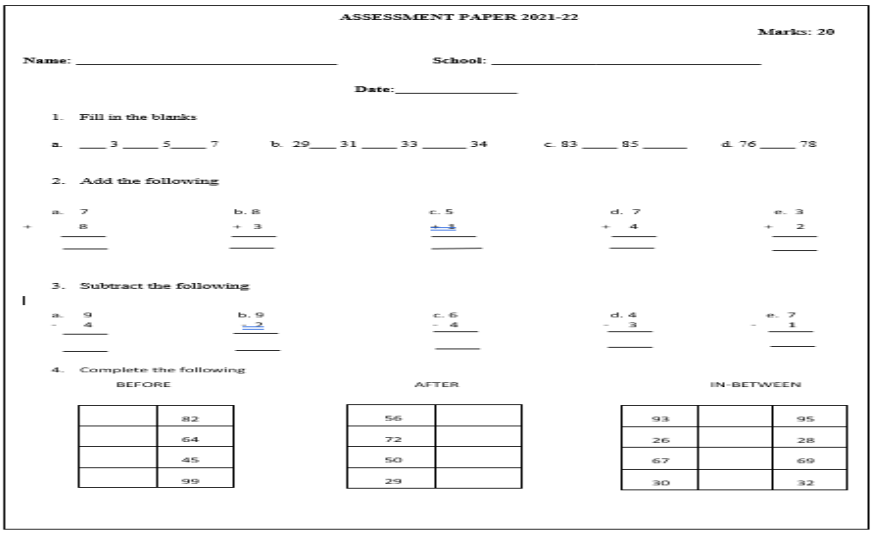
A number of things are thought to be important extraneous variables that could affect the experiment. Some of these factors include learning style, previous achievement, general mental ability, and infrastructure.

Instrument Development

The purpose of the study is to conduct a comparative study between the learning outcomes of two pedagogies in mathematics among primary students. To explore the best suited pedagogy for mathematics among primary students, we designed a quasi-experimental approach by using a pre-post-test group design.

Pre- and post-test

A total of 40 students took part in this study. The test was based on foundational numeracy. After mapping and reviewing the National Council of Educational Research and Training (NCERT) stipulated curriculum textbook, among many units, the researcher chose certain topics such as counting till 100, one-digit addition, and one digit subtraction. These topics were chosen with the understanding that they form the foundation of mathematics at an early stage, and as the study was conducted after the pandemic, the researchers believed it would be prudent to only focus on foundational numeracy with the students.



ASSESSMENT PAPER 2021-22

Marks: 20

Name: _____ School: _____

Date: _____

1. Fill in the blanks

a. ___ 3 ___ 5___ 7 b. 29___ 31 ___ 33 ___ 34 c. 83 ___ 85 ___ d. 76 ___ 78

2. Add the following

a. 7 + 8 b. 8 + 3 c. 5 + 3 d. 7 + 4 e. 3 + 2

3. Subtract the following

a. 9 − 4 b. 9 − 2 c. 6 − 4 d. 4 − 3 e. 7 − 1

4. Complete the following

BEFORE		AFTER		IN-BETWEEN		
	82	56		93		95
	64	72		26		28
	45	50		67		69
	99	29		30		32

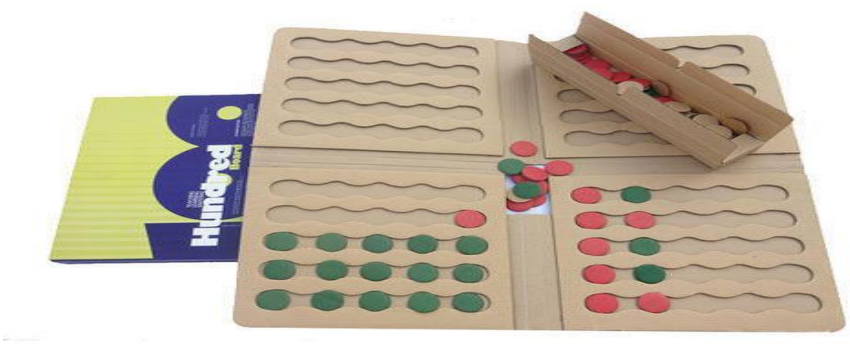
Figure 1: Pre and Post Test

The pre- and post-tests were designed with the help of the student's prescribed textbook and consultation with the teachers. Following extensive deliberation and consultation with experts, it was decided to administer the same test as a pre- and post-test to ensure the validity of the pre- and post-test.The test contained four questions. In Figure 1, the first and fourth questions were based on counting till 100, while the second and third questions had five sub-questions based on one-digit addition and subtraction. Questions about counting to 100 covered the sequence as well as before, after, and in-between.Sequencing is essential to counting, the fundamental operation of arithmetic. Sequencing is the first step in understanding concepts like greater than, before number, ascending and descending orders.

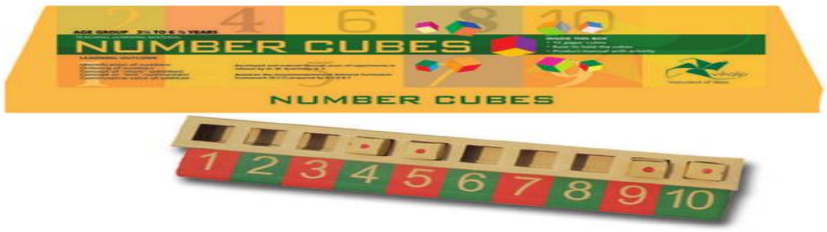
Teaching Learning Material (TLM) Used for the Study

For the purpose of traditional pedagogy, no tools were used except a blackboard and notebook/textbook. For experiential learning, two types of teacher learning materials (TLM) were used.

Hundred broad: the pictorial representation of numbers on a board helps student understand and remember the position of numbers. The majority of students can recite numbers from 1 to 100. But if you ask them to count in between, say, 56 and 63, either there is a pause or they start counting from one again. Students can learn to count by placing discs on a hundred board. Through the board, we aim to develop number sense, that is, the student knows the position of 56 and subsequent numbers until 63. This clarity in understanding will help them understand the relationship between numbers. Which one is bigger? Which number is smaller? Quick and accurate counting, particularly when using skip counting, is facilitated by the mental representation of numbers as rows of tens. It teaches kids that multiplication is just a kind of repeated addition, and division is just the opposite. The mental image of numbers in rows of ten enhances speed and accuracy in different ways of counting, especially skip counting. It helps children understand the meaning of multiplication as repeated addition and division as the inverse of multiplication. The learning outcome of this TLM is counting up to 100 and backward, position of numbers, skip counting, and repeated addition. The box contains one board with one hundred hollow circles and fifty red and green coloured circular rings.



Number Cube: Cubes representing numbers help students recognise numbers and their sequence. Understanding the number operation "+" (addition) or "-" (subtraction) sign is initially difficult for children. In number cubes, we extend the "one more" concept to 'putting together' and subsequently addition. Similarly, we extend the "one less" concept to "taking away" and subsequently "subtraction." This gradual progression leads to a seamless understanding of the concept. Identification of numbers, putting them together (addition), and taking them away (subtraction) are the learning outcomes for the number cube.The tool has one long rectangle-shaped board with ten hollow surfaces and ten rectangular cubes.



METHODOLOGY

The research was conducted in three phases as given below (See figure 2 below)

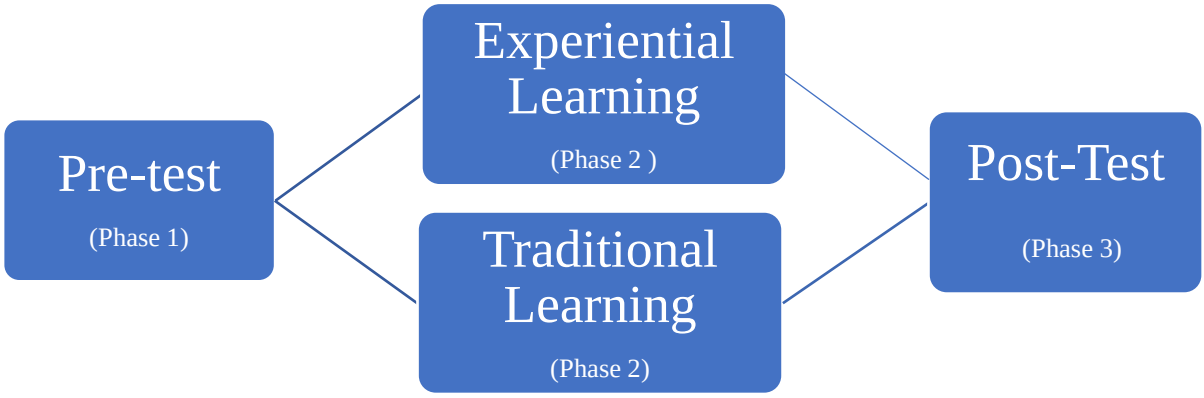


Figure 2: Research Design in three phases

Phase 1: Conducting the Pre-Test

In this phase, a pre-test on 'foundational numeracy' was conducted among all 40 participants. These 40 students were then randomly assigned to traditional learning (the control group) or experiential learning (the treatment group). Students were divided randomly to decrease the influence of extraneous variables on the study.

Phase 2: Conducting traditional and experiential pedagogy simultaneously

Traditional Pedagogy

Just like in the conventional method, we used a blackboard to teach mathematics in class. The class began with introducing 0–10 counting and writing it on the board. The participants were busy taking notes in their notebooks and referring to their textbooks. The process was repeated by saying out loud the count twice, which was then followed by a worksheet. The numbers 0-50 and 0-100 were presented to children once they had mastered the numbers 0-10. In this learning method, a blackboard and notebook play an important role. After having students practise counting from zero to one hundred, teachers moved on to foundational concepts such as before, after, and in between. When everyone finished counting, the instructors used the blackboard to practise adding and subtracting one-digit numbers.

Experiential Pedagogy (Using Teacher Learning Material)

During experiential pedagogy classes, twenty students were split into ten groups of two, with one hundred boards and a number cube assigned to each set of two students. A further division was suggested, keeping in mind; every student should be able to discover concepts at an individual level. Some time was provided to the students to familiarise themselves with the Hundred Board and Number Cube. The students unpacked the teaching/learning material with the teacher; and played with it. Counting was introduced using the Hundred Board. Students began using the teaching/learning material by placing each disc on the table and saying the number out loud. This was repeated until nine. After establishing counting from 1-9, we moved on to before and

after as a concept using the Hundred Board. In skip counting, we again began with 1–9 and established the idea of before and after with the students. This was followed by skip counting. Initially, the students struggled, but once we felt all the students were able to discover before, after, and skip counting between 1 and 9, we moved forward. The goal was to help students learn mathematics in a concrete way by using the hundred board.
We decided to introduce one-digit addition and one digit subtraction using the number cube before beginning the counting from 10 to 100. The intention was to firmly establish 1–9 counting by repeating it in different forms. Addition and subtraction were introduced in the class by saying "keeping together" (adding) and "taking away" (subtracting). The number cube was used. Later, we decided to move to double digits, that is, from 10 to 50. Four concepts were introduced using the hundred board counting from 10 to 50, before and after, and skip counting. The third stage was to finish the counting from 50 to 100, which was again followed by the remaining concepts such as before, after, and skip counting. The classroom environment was definitely chaotic initially, as students were more interested in playing with the teacher learning material. This kind of behaviour, in our opinion, is quite normal with students as young as them. However, over the next few days, we did notice most of the students make sense of the numbers in a phased and self-discovery manner.

Phase 3: Conducting the Post-Test
Students in the traditional learning group and the experiential learning group were provided a pre-test on foundational numeracy after 50 days of their respective classes.

RESULTS
For evaluation, SPSS 19.0 software was used to administer the t-test analysis. The means from two groups were compared using a t test, a statistical analysis tool. Statistical significance is a common tool in evaluating hypotheses about the relationship between a process or therapy and the target population, or about the existence of a difference between two groups. The test was used to determine if a significant difference exists within the learning outcome (dependable variable) between traditional and experiential classrooms (an independent variable). The null hypothesis, which states there is no difference between the learning outcomes of students in experiential learning and traditional learning, is rejected; there is a difference between traditional and experiential learning. While the alternate hypothesis states there is a difference between the learning outcomes of students in experiential learning and traditional learning, this is accepted as there is a difference between the learning outcomes.
Preliminary analyses of the data provided descriptive statistics of means, standard deviations, and standard error means. According to Table 1, prior students were randomly assigned to control and treatment groups, and their pre-test scores in traditional and experiential pedagogy were quite comparable. Based on similar test scores, random sampling was used to eliminate the influence of extraneous variables.
In both traditional and experiential pedagogy, the post-test result varies greatly. The post-test result highlights that pedagogical change makes learning outcomes better among students. The difference in mean between post-tests of traditional learning and experiential learning further enhances the role played by teaching/learning material in learning outcomes. Our findings agree with those of Abramovich, Grinshpan, and Milligan (2019); Indriayu (2019); and Polman, Hornstra, and Volman (2021).

Table 1: Paired sample statistics of all pre and post-test in traditional and experiential pedagogy

Tests	Pedagogy	Mean	N	Std. deviation	Std. error mean
Pre-tests	Traditional	1.57	40	0.732	0.117
	Experiential	1.49	40	0.601	0.096
Post-Test	Traditional	2.08	40	1.085	0.174
	Experiential	4.26	40	0.785	0.126

Table 2: Correlation and Significance in pre and post-test of traditional and experiential pedagogy

Test	Pedagogy	N	Correlation	Significance
Pre test	Traditional	39	-0.273	0.093
	Experiential	39		
Post test	Traditional	39	0.069	0.677
	Experiential	39		

To conform to the hypothesis (Table 2), the t-test statistical criterion was administered. The analysis determined that the post-test score differed significantly between traditional and experiential learning, with t = 10.059 and t = 12.323, respectively. The null hypotheses were introduced stating the dependent variable (learning outcome) will not change during independent variables (traditional and experiential learning) is rejected. The critical value of t is 2.03, which suggests that there is a statistically significant difference in learning outcomes between

conventional and experiential learning (df = 38, p = 0.05). Further, Table 2 also shows, the confidence interval for the difference is taken at 95 percent for a two-tailed significance test. The p-value is equal to .00 or nearly approximately equal to 0, the null hypothesis is rejected (t at df=38, p=0.05). There is a significant difference in learning outcomes between traditional and experiential pedagogy.

Table 3: Paired samples correlations

					95% confidence interval of the difference				
Pedagogy	Test	Mean	Std. deviation	Std. error mean	Lower	Upper	t	df	Sig (2-tailed)
Traditional Pedagogy	Pre-test	-2.615	1.067	0.171	-2.961	-2.27	-10.059	38	.00
	Post-test								
Experiential Pedagogy	Pre-test	-2.385	1.48	0.237	-2.864	-1.905	-12.323	38	.00
	Post-test								

The result confirms the fact that experiential pedagogy provides a better learning outcome than traditional learning. Traditional pedagogy fails to ignite students' curiosity and encourages them to become passive receivers of the information (Chen 2010; McMain and Gunnewig 2012). The pedagogy fails to provide learning that can be used in real life for the students. The social dynamics of a classroom paint a picture of students as passive observers, receiving the teacher-provided knowledge without being given the opportunity to explore the subject on their own. As a learning focus, this type of classroom encourages rote learning and memorization. Students do not question the authority of the teachers, suggesting that the students fear the teachers, thus prefer to do what the teacher directs them to do. However, evidence of a comprehensive package may be seen in the form of improved learning outcomes in experiential learning. The teaching/learning materials assisted the students in experiencing mathematics in a tangible manner before encountering it in an abstract one. In his research, Swan & Marhsall (2010) found that the use of manipulatives over a longer period was more effective than their use over a shorter period. Despite this, the training of the teachers has a substantial influence on the long-term efficacy of the use of manipulatives.

Better learning outcomes in post-test experiential learning indicate students are keen on learning, however, the pedagogy needs to be changed. Experiential learning advocates for deep learning rather than surface learning. Deep learning, normally, involves learning using different tools. By having students apply and debate ideas, rather than just memorise them, these approaches aid in fostering a deeper understanding of the material being covered. The pedagogy does not encourage writing new information onto a blank state of one's mind, the act of memorizing, or any other passive process that happens to a learner; rather, it is an active process that engages and invites participation.

DISCUSSION

In this small-scale, in-depth study, we aimed to understand the difference in learning outcomes between traditional and experiential learning. We wanted to see if post-test scores differed between traditional and experiential learning. The study indicates the learning outcome (dependent variable) is influenced by the types of pedagogy (an independent variable) used in a classroom. The learning outcome significantly differed in the traditional and experiential groups, respectively. There was a notable improvement in retention and comprehension among the students in the group that had been exposed to experiential learning rather than the more traditional method of instruction. This result is consistent with other studies (see Falloon 2019; Kabel, Hwang & Hwang 2021; Lange 2021; O'Meara, Johnson & Leavy 2020).

The principle thrust is the establishment of an alternative hypothesis that there exists a difference between the learning outcome of students in experiential pedagogy versus traditional pedagogy. This difference existed because, in traditional pedagogy, a teacher controlled the learning. In such an environment, as the students are not actively involved, their chances of comprehending the lectures decrease. Meanwhile, the learning outcomes of twenty students in experiential learning classes are better as they involve student interaction with hands-on opportunities to study and apply mathematical ideas, which might increase their motivation and interest in the subject. The process of students learning by doing is emphasised in experiential learning, which is predicated on the idea that students will have a greater chance of comprehending the material if they are actively involved in the material as opposed to simply listening to a lecture or reading certain material.

The result of this study highlights the importance of pedagogy (an independent variable) on learning outcomes (Gasteiger et al 2015). There is a lot of evidence that students who learn by doing show greater verbal communication, high levels of interpersonal and interaction skills, innovative use of play materials, imagination,

the ability to think in different ways, and the ability to solve problems. Using teaching/learning tools (like a hundred board and a number cube) could lead to more advanced knowledge, skills, and understanding (Moyles et al 2002). Barblett (2010) claims that students play lets them discover, name, negotiate, take risks, and make sense of things. Students who learn well with TLMs are more likely to have good memory skills, develop their language skills, and be able to control their behaviour, which helps them do better in school and learn more. Experiential pedagogy was made so that students could learn by understanding and finding things out for themselves. The role of TLM, which required students to control their own learning, was an added benefit of this method for the students in this study. Students should not only learn how to solve problems, but also how to understand them. To do this well, they must evaluate and weigh all kinds of experiences. During experiential pedagogy, as the students got more involved in solving problems, they also became more independent, but within a framework that made sure they met the standards for learning.

CONCLUSION

When one looks at the results, it's clear that pedagogy does affect how well students learn. We think that the students' positive attitudes might have been a reason why they were able to learn more. As the traditional pedagogy is based on strong conventions, it is still important that new ways of teaching math to students not only show to be effective in terms of learning gains but are also easy to incorporate into the pedagogy. Experiential learning has a lot of potential to change the way math is taught and how students learn it, and it will be quickly and widely adopted by professionals in the field.

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