A CLASSROOM-BASED EXAMINATION OF PEDAGOGICAL APPROACHES FOR MATHEMATICS: A STUDY CONDUCTED IN A PROMINENT CHINESE REGION.

Nuenjiya 1*, Midhun Chakkaravarthy 1, Nidhi Agarwal 1

1 Lincoln University College, Petaling Jaya, Malaysia.

*Corresponding author: Nuenjiya, Lincoln University College, Petaling Jaya, Malaysia.

ABSTRACT

Based on their understanding of mathematics curriculum, this research contrasted Chinese middle school students. This study has important consequences for math education since it shows that math educators in the two nations have vastly different understandings of pedagogical topics. Many Chinese educators continue to prioritise assisting students in understanding mathematical ideas and processes via the use of older, less adaptable methods of instruction. In order to help their pupils better grasp mathematical ideas, the Chinese instructors used a range of activities that promoted creativity and discovery. There are advantages and disadvantages to each method. Teachers in one nation might modify their methods to compensate for shortcomings in another. From a global viewpoint, studies on mathematics education in China and other East Asian countries are still in their infancy. Finding methods to improve mathematics education in Western nations is of interest to many Western academics working on the subject. But conversely, it is our responsibility as Chinese mathematics educators to ensure that this kind of study contributes to the improvement of China's mathematics education. One way to do this is to compare our system to that of other nations so that we can identify our strengths and areas for improvement. After all this time, we can say with certainty that it is time to assess and analyse China's mathematical education system in depth. A number of towns in China have also revised their mathematics curricula to account for this shift in perspective. What follows is a scoping review of research on mathematical education that has taken place in these areas during the past 20 years.

Keywords: Pedagogical Methodologies, Mathematics Education, Mathematical Practice, Chinese Communities, Advancements in Mathematical Pedagogy.

INTRODUCTION

More and more, modern approaches of teaching mathematics to elementary school students use games and other types of play. The objective of this process is to improve the children's arithmetic understanding and ability. There is a proud history of reform in China's early childhood education system, with many of the changes being shaped by Western progressive ideas and practices. The idea that kids learn best when they're having fun is starting to sink in for some Chinese educators. There has been a marked effect from the legislation enacted by the Chinese government on this matter. In order to support children's development, early

childhood educators should promote a play-based approach, as stated in the 2001 Guidelines for Early Childhood Education (Trial Version) released by the Ministry of Education of the People's Republic of China. Because of this, the Chinese government has updated its guidelines for children's early education and development from the ages of three to six to incorporate classroom play. The Guidelines recommend incorporating problem-solving and self-discovery techniques into mathematics classes to help students improve their mathematical skills (Zhang et al., 2024). Mathematics education in Chinese primary schools has been a constitutional requirement from the very beginning. Mathematical literacy has always been esteemed in Chinese culture, which explains why there is such a need for it. First, a curriculum that places a fresh focus on children's mathematical growth; second, the need to promote this progress via play—this is the double whammy that Chinese preschool instructors are facing. The majority of the support for educational change comes from EC teachers, or early childhood educators. Despite political expectations that these early childhood educators promote a play-based pedagogy, many of them are struggling to put these ideas into practice in their own classrooms. The connection between play and learning is highly valued in Western culture. However, the seeming conflict between the two has influenced the way children in China perceive play. Seemingly at odds with the long-standing Confucianism and collectivism inherent in Chinese philosophy is the long-standing history of play-based schooling. The Western play-based pedagogy's focus on child-centered learning seems to be a radical conceptual shift for Chinese early childhood educators, who are deeply rooted in Confucian principles of teacher dominance and control. Under addition, individual children's needs and interests are not prioritised under the collectivist perspective, which instead puts a premium on communal work. In an attempt to meet societal expectations, early childhood educators in China are trying to integrate Western play pedagogy approaches into their teachings. Unfortunately, there is a dearth of both theoretical and practical direction on play-based education in the policy guidelines. In the end, what we have is a kindergarten curriculum in China that draws from both teacher-centered and play-based approaches to education. However, studies that look at how Chinese preschool teachers construct their play-based approaches to teaching mathematics are few. Now that the Guidelines have been a part of China's educational reform for twenty years, scholars should look at how maths instructors' viewpoints affect lesson planning and execution. This strategy may be more suited to meet the needs of Chinese society (Chen & Mu, 2023).

BACKGROUND OF THE STUDY

For instance, kids from Shanghai and Beijing have consistently scored well on international mathematical examinations such as TIMSS and PISA over lengthy periods of time. These tests are administered to students from several countries. As a result of this, China has garnered a superb reputation for the quality of its mathematics education. The educational policies of China have traditionally put an emphasis on a comprehensive knowledge of mathematical concepts, fluency in their methods, and mastery of those ideas. This has been the case in the past. As a result of these achievements, China's educational systems have garnered interest from many different countries throughout the world. Cultural influences have a tremendous

effect on the disciplines of discipline, tenacity, and respect for teachers. This is particularly true for those cultural influences that are built on the principles of Confucianism. Following that, the environment in the classroom undergoes a transformation as a consequence of these elements. The most recent educational reforms, on the other hand, have pushed for a more well-rounded approach, with the primary emphasis being on merging traditional teaching methods with student-centered learning, critical thinking, and problem-solving skills. This strategy has been criticised for being in opposition to the conventional approach. The primary objective of this research is to investigate the integration of traditional and modern approaches that are utilised by mathematics educators in a significant region of China. This is in addition to determining the influence that this pedagogical amalgamation has on the participation of students and their academic achievement. There is a possibility that a more in-depth understanding of these strategies might make a contribution to the enhancement of mathematics education in China and other countries across the globe (Fan, 2021).

PURPOSE OF THE RESEARCH

This research is to investigate and evaluate the approaches that are used in the teaching of mathematics in a particular region of China that is considered to be of great significance. To determine which teaching strategies are the most successful in terms of enhancing student knowledge, engagement, and performance in mathematics, the objective of this study is to determine which instructional strategies are the most effective. An examination of a variety of instructional approaches will be carried out in order to achieve this goal. The traditional procedures, in which the instructor takes the lead, and the more contemporary methods, in which the student is the primary centre of attention, are the two sorts of tactics that are included in these types of strategies. In addition, the research is being carried out with the purpose of acquiring an understanding of the impact that cultural, institutional, and policy concerns have on the instructional strategies that are used in this particular educational setting. In addition, the primary objective of the study is to provide insights that are supported by evidence and have the potential to contribute to the development of mathematics education in the years to come. This is the most important goal that the project aims to provide. Not only will these insights be employed in China, but they will also be utilised in other educational systems that are attempting to imitate what China has accomplished with great success.

LITERATURE REVIEW

Throughout the research on teachers and teacher education, there is a significant amount of consensus that the concept of teacher knowledge is a complicated one. These three components are considered to be essential to the professional capabilities of teachers, as well as key indications of effective mathematics instruction and the mathematical learning of students. In addition, the information that teachers possess is considered to be a cognitive construct that is situated and developed inside a specific setting within the classroom. The social and cultural norms and traditions that are prevalent within a given context have a

significant impact on the development of professional knowledge among educators. As a consequence of this, the components of teacher knowledge, as outlined for educators working in a specific setting, display a different pattern of various strengths and weaknesses (Wei et al., 2023). Educators from different environments have been demonstrated to have unique differences in their levels of knowledge, according to previous comparative studies that have been conducted across many countries. This construct, on the other hand, is comprised of a number of processes or components, such as attention to major classroom occurrences, thinking about or interpreting these events, and selecting suitable actions. This is a consensus that has emerged from the research that has been conducted on teacher noticing. There are times when the processes or components of teacher noticing are conceptualised in a way that is more coherent. More specifically, these processes and components are defined as being interrelated and cyclical. To the contrary, researchers could choose to concentrate solely on the investigation of a certain aspect, such as attending or interpreting information (Li et al., 2025).

RESEARCH QUESTION

What is the effect of teaching strategy on mathematics education in a Chinese region?

RESEARCH METHODOLOGY

Research design

The quantitative data analysis was performed using SPSS version 25. The odds ratio and 95% confidence interval were used to determine the strength and direction of the statistical association. The researchers established a statistically significant criterion of $p < 0.05$. A descriptive analysis was conducted to ascertain the primary components of the data. Quantitative methods are often used to assess data acquired via surveys, polls, and questionnaires, together with data altered by computing tools for statistical analysis.

Sampling

A straightforward sampling method was used for the investigation. The study used questionnaires to collect data. The Rao-soft software calculated a sample size of 1784. A total of 1964 questionnaires were disseminated; 1906 were retrieved, and 38 were discarded owing to incompleteness. A total of 1,868 questionnaires were used for the investigation.

Data and Measurement

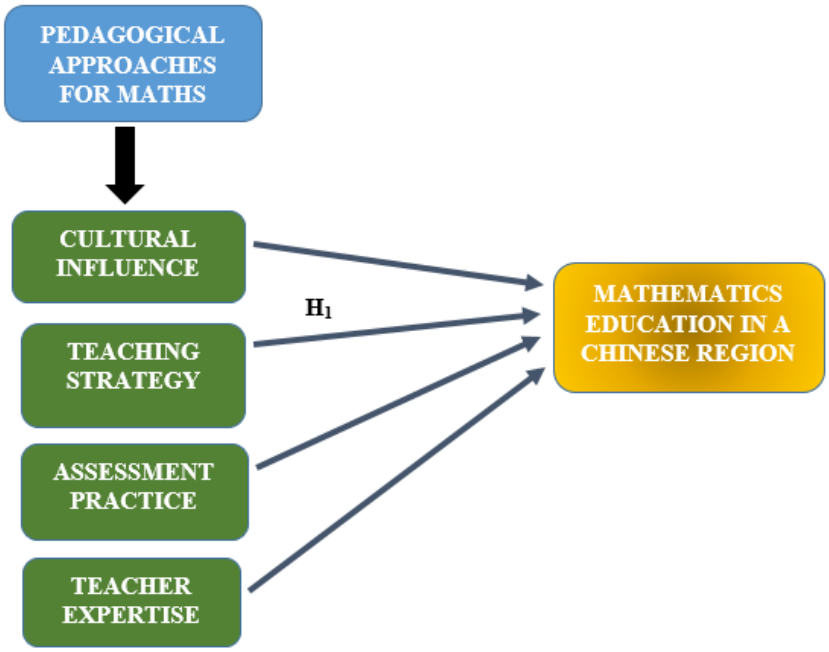
The inquiry primarily used a questionnaire survey for data collecting. Participants were first asked to provide essential demographic information. Participants were thereafter directed to assess various aspects of the online and offline channels on a 5-point Likert scale. Various sources, especially online databases, provide secondary data.

Statistical Software

The statistical analysis was performed with SPSS 25 and MS Excel.

Statistical Tools

Descriptive analysis was used to understand the fundamental characteristics of the data. The researcher must do an analysis of the data using ANOVA.



CONCEPTUAL FRAMEWORK

RESULTS

Factor Analysis: A prevalent use of Factor Analysis (FA) is to identify hidden variables within visible data. In the lack of clear visual or diagnostic signs, it is standard practice to use regression coefficients for evaluations. In FA, models are essential for success. The aims of modelling are to detect mistakes, intrusions, and apparent relationships. The Kaiser-Meyer-Olkin (KMO) Test is a technique for assessing datasets produced by multiple regression analyses. The model and sample variables are affirmed to be representative. The data demonstrates redundancy, as shown by the figures. Decreased proportions enhance data understanding. The KMO output is a quantitative number that spans from zero to one. A KMO value between 0.8 and 1 indicates an adequate sample size. The permissible limits, according to Kaiser, are as follows:

The stipulations set out by Kaiser are as follows: A lamentable 0.050 to 0.059, insufficient 0.60 to 0.69

Middle grades often range from 0.70 to 0.79.

Exhibiting a quality point score between 0.80 and 0.89.

They are astonished by the range of 0.90 to 1.00.

The outcomes of Bartlett's test of sphericity are as follows: The chi-square statistic is about 190, with 190 degrees of freedom and a significance threshold of 0.000, so validating the veracity of claims made just for sampling purposes. Researchers used Bartlett's Test of Sphericity to assess the significance of the correlation matrices. The Kaiser-Meyer-Olkin measure shows that a value of 0.980 signifies a sufficient sample size. The p-value from Bartlett's sphericity test is 0.00. A positive outcome from Bartlett's sphericity test indicates that the correlation matrix is not an identity matrix.

Table 1. KMO (Kaiser-Meyer-Olkin) and Bartlett's Test for Sampling Adequacy statistic: 0.980.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.980
Bartlett's Test of Sphericity	**Approx. Chi-Square**	3252.968
	df	190
	Sig.	.000

Bartlett's Test of Sphericity further confirmed the importance of the correlation matrices. The Kaiser-Meyer-Olkin metric of sampling adequacy is 0.980. Researchers calculated a p-value of 0.00 using Bartlett's sphericity test. The researcher concedes that the correlation matrix is faulty due to a significant result from Bartlett's sphericity test.

INDEPENDENT VARIABLE

Pedagogical Approaches for Maths: Reading Mathematics Education: A Practice-Based Pedagogical Approach is a material that teachers of mathematics in China absolutely need to have in their possession. This book is going to be used in classrooms and schools throughout China by those who are teaching there. The purpose of this book is to study major topics and approaches in mathematical education research. It does so by drawing from a broad variety of theoretical frameworks, including cognitive, historical, socio-cultural, and critical views pertaining to mathematics education. It does this by using an approach that is centred on study and practice. In order to get a more comprehensive and interrelated grasp of the basic ideas, procedures, and activities that are involved with mathematical education, the primary purpose of this book is to obtain such an understanding. The objective of this initiative is to educate students who are pursuing master's degrees or doctorate degrees in mathematics education, as well as teachers and teacher-educators, about mathematics, instructional approaches,

student learning, and their own professional identities. Investigation and introspective analysis of one's own thoughts and actions will be the means by which this aim will be fulfilled. At the secondary and middle school levels, pedagogical content knowledge (PCK) is developed via the utilisation of a broad variety of activities and resources. This is done with the intention of instructing fundamental mathematical concepts. In the process of contextualising PCK, the social, cultural, linguistic, and mathematical variety that is widespread in Indian schools will be taken into consideration (Li et al., 2025).

FACTOR

Teaching strategy: The foundation of a successful education is the use of various teaching techniques. These are the strategies and procedures that teachers use in order to make learning easier for students and to increase their level of involvement. It is essential for anybody who is interested in education to have a solid understanding of these tactics, regardless of whether they are a student, a teacher, or a parent. In this lesson, we will discuss the many facets of teaching tactics and how they may be used to create a more conducive learning environment. As their name suggests, teaching strategies are essentially pre-planned methods that instructors use in order to deliver courses and interest pupils. They include strategies that provide teachers the ability to accommodate a wide variety of learning styles and requirements. Students will be able to comprehend difficult ideas and remember knowledge more successfully if they are provided with the appropriate method, which may create a constructive learning environment. Teaching practices that are effective have the potential to greatly increase student results. They contribute to the creation of an atmosphere that is engaging, in which students feel appreciated and are encouraged to study. Active learning settings have been shown to contribute to improved student performance as well as increased levels of student satisfaction. As an example, a research conducted by the National Centre for Biotechnology Information states that active learning has the potential to improve both the level of student involvement and their level of comprehension (Tang et al., 2021).

DEPENDENT VARIABLE

Mathematics Education in a Chinese Region: Mainland China, Hong Kong, and Taiwan are a few examples of countries where mathematics education tends to prioritise fundamental skills, rigorous standards, and a structured curriculum. Maths is taught to pupils from a young age with a heavy focus on practice, precision, and efficient problem-solving skills in mainland China since it is considered a core subject. In order for students to learn procedures, they are expected to practise them several times and study them extensively in the hopes that they would grasp them. Usually, the teacher is in charge and the classroom is structured in a conventional way. The Hong Kong school system incorporates ideas from both the UK and China. Using what the researcher learns in the classroom to solve real-world problems is a major emphasis. International assessments, like the PISA, show that students are doing well. Taiwan also takes a similar approach, placing a premium on both procedural fluency and conceptual

comprehension. Also, they've been adopting more contemporary methods of teaching in the last several years. Because of the well-structured national curriculum and the cultural focus on education, children are able to do well in mathematics on a worldwide level in many different areasb (Thurm et al., 2024).

Relationship between Teaching Strategy and Mathematics Education in a Chinese Region: Teachers' methods influence most of China's mathematics curriculum. Traditional education emphasised memorisation, exercises, and procedural fluency, with the teacher as the main instructor. Chinese students do well on TIMSS and PISA because the Confucian educational system instills a strong work ethic and a love of learning. This is partly because Chinese professors develop a love of learning. This strategy encourages self-control and academic excellence in pupils. Mathematical courses have agendas and heavy homework. This is because the issue is essential in instructional material. Shanghai, Hong Kong, and Taiwan have developed problem-solving, conceptual comprehension, and critical thinking education. Schools have adopted these improvements. All of these nations have employed these methods. Creative methods have led to more individualised attention for students. These changes aim to combine the best of traditional and contemporary teacher education. Lesson studies, inquiry-based learning, and group planning are growing in schools. Even though this design is less prevalent worldwide, certain places still value test preparation. Chinese mathematics education outcomes and pedagogy combine old and modern methodologies. (Wang et al., 2022).

Following the aforementioned dispute, the researcher formulated a hypothesis that examines the relationship between Teaching strategy and mathematics education in a Chinese region.

"H_{01}: There is no significant relationship between Teaching strategy and Mathematics Education in a Chinese Region."

"H_1: There is a significant relationship between Teaching strategy and Mathematics Education in a Chinese Region."

Table 2. H1 ANOVA Test.

ANOVA					
Sum					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	39588.620	624	5435.536	1015.228	.000
Within Groups	492.770	1243	5.354		
Total	40081.390	1867			

The results of this investigation will be substantial. The F value is 1015.228, attaining significance with a p-value of .000, which is below the .05 alpha threshold. The hypothesis ***"H_1: There is a significant relationship between Teaching strategy and Mathematics Education in a Chinese Region"*** is accepted, whereas the null hypothesis is rejected.

DISCUSSION

Key Chinese places including mainland China, Hong Kong, and Taiwan all have their own distinct mathematical pedagogies that reflect the unique fusion of historical, cultural, and educational ideas present in these areas. This area encompasses the Chinese mainland, Taiwan, and Hong Kong. These findings show that Confucian cultural norms have had an impact on mathematics for a long time in the academic world. This influence has spread to mathematics. Among these guiding concepts are the importance of doing well in school, being disciplined, and respecting those in charge. There is a heavy focus on learning by doing and having teachers lead sessions, which is one of the most significant discoveries. Teachers in Chinese schools generally put in a lot of time and effort into their mathematics lessons, making sure their pupils fully grasp the material and can easily follow the rules. Culture is another significant component that has to be considered because of the impact it has on things. Mathematics is seen as an important and highly esteemed topic in Chinese culture, which puts a great deal of weight on education. It helps students succeed in the formal education system when parents are on board, when expectations are high, and when students have access to tutoring outside of school hours. Those are benefits. Not only does this work ethic and determination culture affect students' views on mathematics, but it also encourages youngsters to take mathematics seriously for the first time at an early age.

CONCLUSION

A wide variety of fresh study avenues that may be followed in the area of education are brought to light by the findings of other investigations. Over the last several years, student-centered methods have gained popularity, especially in schools that are located in urban areas and that claim much better test scores. This pattern has been particularly embraced by schools located in metropolitan areas. Students are able to improve their creative powers, acquire a more profound grasp of a variety of topics, and develop problem-solving skills that are relevant to real life when contemporary instructional tactics such as the integration of technology, group work, and inquiry-based learning are used in the classroom. By using these strategies, it is feasible to achieve these improvements. The purpose of these tactics is to assist students in developing their imagination and creative talents. We hope that by implementing these changes, we will be able to equip students with a more comprehensive set of skills that are useful in the real world, where our researchers now reside and operate. The researcher will also ensure that discipline and rigour, two characteristics that are characteristic of traditional Chinese mathematics instruction, are maintained. In light of the modifications, these are the results that are sought.

REFERENCES

1. Chen, J., & Mu, Z. (2023). The cross-national comparison of pre-service mathematics teacher education and curriculum structure. Journal of mathematics Education, 3(1), 119-136.

2. Fan, L. (2021). Exploring issues about values in mathematics education. ECNU Review of Education, 4(2), 388-395.
3. Li, M., Vale, C., Tan, H., & Blannin, J. (2025). Factors influencing the use of digital technologies in primary mathematics teaching: Voices from Chinese educators. Education and Information Technologies, 1-36.
4. Li, X., Zhang, S., & Cao, Y. (2022). Characteristics of Chinese high-quality mathematics lessons from a lesson structure perspective. ZDM–Mathematics Education, 54(3), 653-664.
5. Tang, H., Seah, W. T., Zhang, Q., & Zhang, W. (2021). The mathematics learning attributes valued by students in Eastern China. ECNU Review of Education, 4(2), 261-284.
6. Thurm, D., Li, S., Barzel, B., Fan, L., & Li, N. (2024). Professional development for teaching mathematics with technology: a comparative study of facilitators' beliefs and practices in China and Germany. Educational Studies in Mathematics, 115(2), 247-269.
7. Wang, Y., Qin, K., Luo, C., Yang, T., & Xin, T. (2022). Profiles of Chinese mathematics teachers' teaching beliefs and their effects on students' achievement. ZDM–Mathematics Education, 54(3), 709-720.
8. Wei, Y., Zhang, Q., Guo, J., & Chen, M. (2023). Learning to teach through noticing: A bibliometric review of teacher noticing research in mathematics education during 2006–2021. Humanities and Social Sciences Communications, 10(1), 1-15.
9. Zhang, Q., Chia, H. M., & Morselli, F. (2024). Exploring the impact of distance teaching on mathematics educational values in Hong Kong: a study of in-service teachers' perspectives. Mathematics Education Research Journal, 36(4), 871-894.
10. Zhu, Y., & Cai, J. (2025). Searching continues for the identity of East Asian mathematics education: Impact of Leung (2001). In Culture matters to mathematics teaching and learning: Research studies in honor of Professor Frederick KS Leung (pp. 15-28). Cham: Springer Nature Switzerland.