



A Classroom Based Analysis Of Teaching Methods For Mathematics Subject: A Study Based In Leading Chinese Region

1st Nuenjiya , 2nd Midhunchakkaravarthy, 3rd Nidhi Agarwal

Abstract

This research set out to examine how well chinese middle school students understood the mathematics curriculum and to draw comparisons between them. Implications for mathematics instruction are substantial since the findings show that maths instructors in the two nations have vastly differing views on pedagogical matters. Still, many chinese teachers place a premium on ensuring their students understand mathematical ideas and processes via the use of less adaptable, more conventional methods of instruction. Teachers of mathematics in china employed a broad range of activities designed to foster students' critical thinking, creativity, and independence in the classroom. There are benefits and drawbacks to every possible strategy. Teachers in one nation could modify their methods to compensate for those in another. From a global standpoint, there has been very little study on mathematics education in china and other east asian countries. Finding strategies to improve mathematics education in western nations is of interest to many western academics. Teachers of mathematics in china, on the other hand, have an obligation to ensure that studies like this contribute to the improvement of mathematics education in their own country. If the researcher wants to know where the researcher stand and how the researcher may improve, the researcher should compare their system to other nations'. The study's author can now say with authority that it is high time for a comprehensive review of china's mathematics education system. This new style of thinking has also prompted some chinese towns to revise their mathematics curricula. In order to get insight into mathematics education, the researcher reviews the last 20 years of research in these fields.

Keywords: mathematics education aspects, mathematical practices, pedagogical approaches, chinese communities, recent advances in mathematics education.

1. Introduction

activities such as games and other forms of play are often included into contemporary methods of teaching mathematics to primary school children. This approach is designed to improve the students' mathematical comprehension as well as their ability to do mathematical tasks. It has been a source of national pride for china that the sophisticated western concepts and practices that have long moulded the early childhood education system have been incorporated into china's system. Some teachers in china are beginning to understand that their students are able to remember more knowledge when the researcher are having fun instead of when the researcher are learning. In light of the rules that have been imposed by the chinese government, the subject matter has been greatly influenced. The guidelines for early childhood education (trial version) were released by the ministry of education of the people's republic of china in the year 2001. It was said in the statement that educators working in this sector should advocate an approach that is based on play in order to effectively assist the development of children. The chinese government has included classroom play into its plans for the education and development of children between the ages of three and six. This is because of the results of the previous sentence. For the purpose of assisting students in developing their mathematical abilities, the guidelines endorse the use of problem-solving and self-discovery strategies within the context of mathematics classrooms. The chinese constitution has, for a very long time, mandated that all elementary schools throughout the country teach mathematics (zhang et al., 2025).



in china, there is a significant need for individuals who are proficient in mathematics because of the country's long-standing respect for the topic. The job that chinese preschool teachers perform is a double-edged sword: first, the researcher have to change their lesson plans in order to put a greater emphasis on the mathematical development of their kids, and second, the researcher have to find ways to encourage this development via play. The educators who deal with young children, often known as early childhood educators, are the most vocal advocates for educational change. A great number of preschool teachers are having difficulty implementing a play-based approach into their own classrooms as a direct consequence of the strain that comes from political pressure. A significant amount of importance is placed on the relationship between play and education in western society. It is possible that the seeming tension between the two has had an effect on the perceptions that chinese youngsters have towards play. There seems to be a contradiction between the lengthy history of play-based education in china and the teachings of confucianism and collectivism, both of which have strong roots in chinese culture. The western play-based education system places a higher value on student agency than it does on the authority of the instructor. This is in contrast to the confucian foundations of the system, which emphasise the significance of teacher domination and control. A paradigm change seems to have occurred for chinese preschool instructors as a result of this. In addition to this, collectivism places an emphasis on group activities rather than accommodating the specific needs and interests of each individual child. By adopting western play pedagogy approaches into their courses, preschool teachers in china are attempting to satisfy the expectations of both the parents and the society as a whole. Regrettably, the policy guidelines do not provide a substantial amount of theoretical and practical recommendations about education that is focused on play. The final output is a kindergarten program in china that incorporates both the more conventional methods of classroom teaching and the more contemporary approaches to early childhood education from across the world. There is, however, a lack of information about the manner in which preschool instructors in china seek to include play into their arithmetic classes. Due to the fact that the guidelines have been a component of china's educational reform for twenty years, academics need to investigate the ways in which the perspectives of mathematics teachers influence the planning and implementation of lessons. There is a possibility that this approach is more efficient in meeting the requirements of the chinese society (chorlay et al., 2022).

2. Background of the study

For many years in a row, students in shanghai and beijing have maintained very high marks on the two global maths examinations, timss and pisa. Examinees come from a variety of countries. This is why maths education in china is well respected across the globe. For a long time, china's educational policy has placed a premium on students demonstrating competence in mathematical techniques and gaining a solid grasp of mathematical concepts. Something similar has happened before. As a result of these achievements, educational institutions in china are attracting attention from many countries across the world. Cultural variables greatly influence tenacity, respect for teachers, and discipline. One notable exception to this rule are cultural influences that have their roots in confucianism. Subsequently, the classroom atmosphere is altered by these elements. On the other side, contemporary educational reforms have pushed for a more comprehensive strategy, one that integrates traditional knowledge with student-centered learning, critical thinking, and problem-solving proficiency. Since it questions the status quo, some see this strategy as useless. This research intends to analyse mathematics educators over a vast region of china and how the researcher integrate conventional and modern approaches. Furthermore, it has to be determined how this pedagogical fusion impacts student involvement and performance in the classroom by the researcher. Improving mathematical



education in china and other countries might be possible with a deeper understanding of these methods (liu et al., 2023).

3. Purpose of the research

The purpose of this research is to analyse and evaluate the present state of mathematics education in a strategically significant region of china. The study's overarching goal is to improve students' mathematical literacy, intrinsic motivation, and performance by determining what works best in mathematics classrooms. To achieve this goal, the researcher will examine several instructional approaches. The secondary goal of the research is to find out what kinds of cultural, institutional, and policy variables impact the teaching practices in this particular educational setting. Research also aims to impact mathematics education in the future by providing evidence-based insights. The main goal of the project is to provide this. As a result of china's outstanding successes, educational systems throughout the world will implement similar policies in an effort to match or exceed them.

4. Literature review

"teacher knowledge" is a complex and abstract notion, according to almost all research on teacher education. These three factors are seen as fundamental to a math teacher's professional competence and as markers of effective math instruction and student mathematical achievement. In addition, the classroom is seen as the site of shaping and establishing the knowledge that instructors possess. The social and cultural norms and practices of a given place have a significant impact on how teachers learn about their subject. What this implies is that there is a diverse pattern of strengths and weaknesses among the components of teacher knowledge as outlined for instructors in a given setting (cheng et al., 2023). Prior international comparative study has shown that there are significant differences in the knowledge levels of instructors from different backgrounds. On the other hand, this framework consists of several components, such as paying attention in class, thinking about or assessing what has happened, and selecting the right answers. There is complete agreement based on the research conducted on the subject of instructors noticing. Eventually, a more unified view of the components of teacher noticing will emerge. A more accurate description would be that these components and procedures are cyclical and reliant on one another. Conversely, researchers may go deeply into one topic, such as attending or information interpretation (zhang & ma, 2023).

5. Research question

- How does teacher expertise influence mathematics education in a chinese region?

6. Research methodology

6.1 Research design: the quantitative data analysis was performed using spss version 25. The odds ratio and 95% confidence interval were used to evaluate 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.

6.2 Sampling: a simple 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. The research used a total of 1,868 questionnaires.

6.3 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

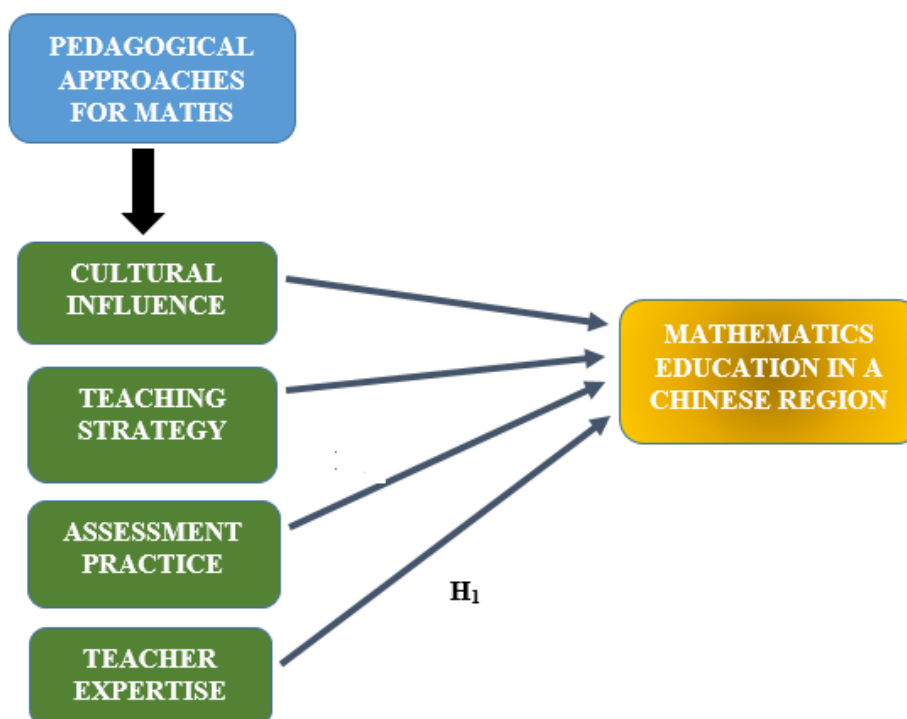


channels on a 5-point likert scale. Various sources, especially online databases, provide secondary data.

6.4 Statistical software: the statistical study was performed with spss 25 and microsoft excel.

6.5 Statistical tools: descriptive analysis was used to understand the fundamental characteristics of the data. The researcher must do a data analysis using anova.

7. Conceptual framework



8. Results

❖ Factor analysis

A prevalent use of factor analysis (fa) is to reveal hidden variables within visible data. In the absence of conclusive 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 flaws, intrusions, and identifiable relationships. The kaiser-meyer-olkin (kmo) test is a technique for assessing datasets produced by multiple regression studies. The model and sample variables have been validated as representative. The data demonstrates redundancy, as shown by the figures. Decreased proportions enhance data understanding. The kmo output is a numerical number between zero and one. A kmo value between 0.8 and 1 indicates an adequate sample size. Kaiser specifies the permissible limits as follows: the ensuing authorisation.

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.



the researcher are astonished by the range of 0.90 to 1.00.

table 1: kmo and bartlett's test for sampling adequacy kaiser-meyer-olkin statistic: 0.980

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 correctness 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 indicates that a value of 0.980 reflects a sufficient sample size. The p-value derived 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 and Bartlett's

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 relevance 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 defective 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 must-read for chinese math teachers. This book will be used in the classrooms and schools by the instructors in china. In this book, the researcher will take a look at some of the most important ideas and practices in mathematics teaching. Various theoretical frameworks connected to mathematics education, including cognitive, historical, socio-cultural, and critical approaches, are used to accomplish this aim. It does this by placing an emphasis on study and practical experience. The primary objective of this book is to provide a more comprehensive and interconnected framework for readers to have a better understanding of the basic ideas, procedures, and activities associated with mathematics education. This initiative seeks to educate future math educators, teacher-educators, master's and doctorate degree candidates in mathematics education, and others in the field about mathematics, instructional approaches, student learning, and professional identities. Introspection and investigation of one's own thought processes are necessary steps on the road there. Students in middle and high school develop their pedagogical content knowledge (pck) via engaging in a variety of lessons and projects. The goal here is to introduce students to the fundamentals of mathematics. In order to put pck into perspective, it



is necessary to think about the great variety of social, cultural, linguistic, and mathematical backgrounds represented in indian classrooms (zhao et al., 2023).

❖ Factor

➤ Teacher expertise

Although focussing on teachers' actions as a means of defining expertise helps the researcher visualise effective instruction, it remains mostly inconclusive when it comes to assisting educators in reaching this level of competence. Examining the thought processes of highly effective educators may provide a definition of competence with the potential to direct professional development for educators. To be more precise, the researcher need to look at teachers' mental models, which include both their actual knowledge and the structure they've put in place to make decisions and take actions in the classroom. There seems to be extensive, intricate, and polished mental models for the areas of practice held by expert educators. The researcher may not be experts in every field, but when it comes to their topics, their students' subject knowledge, and how to best assist their students learn, few people can compare. In a nutshell, the actions of instructors are dictated by their mental models, and the effect of those actions is driven by those actions. Improving the researcher knowledge of these three factors and their interplay is essential if the researcher are to assist educators in reaching their full potential. Both the researcher understanding of expertise and the researcher ability to cultivate it will be severely constrained in the absence of this (lei et al., 2023).

❖ Dependent variable

➤ Mathematics education in a chinese region

The development of students' core talents, as well as well-structured curriculum, hard standards, and stringent standards, are all priorities in the mathematical education systems of many nations. There are three locations where this is quite clear: the mainland, hong kong, and taiwan. Since mathematics is seen as an essential topic, it is taught to students in mainland china from a young age, with an emphasis placed on the development of abilities in the areas of practice, accuracy, and effective problem-solving. Increasing the number of times that students are required to practice and study procedures is done with the intention of increasing the possibility that the researcher will understand them. A traditional classroom is one in which the instructor maintains complete authority over the classroom and the students follow a predetermined curriculum. An amalgamation of british and chinese educational practices may be seen in hong kong's educational system. The ability of the researcher to apply their academic skills to challenges that occur in the real world is something that is expected. The results of international evaluations such as the pisa indicate that kids are doing well. An education in taiwan places a significant focus on both conceptual understanding and procedural skill. This is also true for taiwanese education. Additionally, throughout the course of the last several years, the researcher have been implementing more modern approaches to the teaching techniques that the researcher use in the classroom. Children have the opportunity to flourish in mathematics in a variety of professions because to the well-structured national curriculum and the cultural emphasis on education (wei et al., 2023).

❖ Relationship between teacher expertise and mathematics education in a chinese region

There is a significant relationship between the knowledge, talents, and professional growth of teachers and the mathematical learning outcomes of their students. This is shown by the correlation between the level of skill of teachers and the level of mathematical education in a



region of china. In regions of china where mathematics education is more effective, students often get high results on national and international tests. This may be because the region's teachers receive rigorous and ongoing training. Teachers who are specialists in their professions have a comprehensive understanding of the topics the researcher teach, are able to successfully execute pedagogical strategies, and are able to change their lectures in accordance with the needs of their students. Due to the fact that china places a strong focus on collaborative lesson planning, peer observation, and continual professional development, it is widely acknowledged that teachers in china possess a high level of expertise and are extremely effective instructors. Because of the strong connection that exists between teacher competence and student success, it is very necessary to make investments in the education and professional development of teachers in order to provide effective mathematics teaching (li et al., 2024). Following the aforementioned argument, the researcher formulated a hypothesis examining the relationship between teacher expertise and mathematics education in a chinese region.

“ h_{01} : there is no significant relationship between teacher expertise and mathematics education in a chinese region.”

“ h_1 : there is a significant relationship between teacher expertise and mathematics education in a chinese region.”

Table 2: H_1 ANOVA Test

ANOVA					
Sum					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	39588.620	881	9367.723	1422.369	.000
Within Groups	492.770	986	6.586		
Total	40081.390	1867			

The results of this investigation will be substantial. The f value is 1422.369, 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 teacher expertise and mathematics education in a chinese region.”***

9. Discussion

The mainland each of china's three most significant regions—hong kong, taiwan, and mainland china—has its own distinct mathematical pedagogy that mirrors the specific combination of historical, cultural, and educational values present there. The mainland this area encompasses not just hong kong but also china and taiwan. As these data show, confucian cultural values have always impacted academic mathematics. There has been an effect on mathematical disciplines as well. Respect for elders, restraint, and academic success are all cornerstones of this belief system. The primary conclusion is that students learn best when teachers take the initiative in class and focus on practical application. Many chinese maths instructors put in long hours in the classroom, making sure their pupils fully grasp the material and are able to apply it with ease. Culture is another crucial aspect that has to be considered due to the impact it has. Education is highly valued in chinese culture, and mathematics is particularly esteemed in this nation. Success in the formal education system is more likely to occur when parents are involved, when standards are high, and when students can get tutoring outside of school hours. The benefits include those. Inspiring young people to take mathematics seriously from an early age, this work ethic and perseverance culture shapes students' views towards mathematics.



10. Conclusion

A great deal of fresh ground has been covered in the field of education thanks to the results of previous research. Particularly in urban schools that boast higher test results, student-centered strategies have recently become popular. In the field of education, this tendency is especially noticeable. Educational institutions situated in urban areas have swiftly embraced this approach. By utilising modern pedagogical strategies like inquiry-based learning, group projects, and technology integration, students can enhance their creative abilities, gain a deeper understanding of various subjects, and cultivate problem-solving skills that are applicable to real life. All of the aforementioned advantages are within reach when one employs these tactics. The purpose is to foster students' inventive and creative thinking talents via the deployment of these approaches. The researcher now lives and works in the real world, so the researcher believe that by making these improvements, the researcher can provide students with a more complete set of skills that are compatible with it. The researcher will also take measures to maintain the strict discipline and traditional methods of teaching mathematics in china. The desired outcomes will be these when the modifications have been considered.

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