INNOVARE JOURNAL OF EDUCATION
Vol 12, Issue 1, 2024, 1-9
ISSN: 2347-5528
Research Article

Views of Students' of Pedagogical Departments on the Teaching of Mathematics in Kindergarten

Marina Vasilaki
University of East London, England

Abstract

The purpose of this research was to explain why many people do not like mathematics and find it difficult because it is difficult to understand or because a teacher they had did not give the appropriate weight. The methodology used in this research was the quantitative method. The sample was collected through electronic questionnaires involving sixty-three (63) participants from pedagogical departments. The following survey shows the main results of the research, more specifically, that negative emotions about mathematics are more prevalent. The three main elements that characterize the successful teaching approach of mathematics at school are the transmission of knowledge by the teacher, the approach of knowledge through play, and the selection of appropriate activities. While the two most appropriate ways of approaching mathematics in kindergarten are through play but also through investigation and discovery by the child based on the participants' answers.

Keywords: Mathematics, kindergarten, teachers, mathematicofobia

Introduction

The focus of this research is the views of students of pedagogical departments on teaching mathematics in kindergarten. This research could be used by a parent interested in him or his child who has problems with mathematical stress and mathematics, a teacher who himself may not have had the appropriate stimuli in mathematics. Other researchers have also dealt with such an issue because it is a very important issue, often found in children but also in teachers (Desli & Papachristou, 2007; Remoundou & Avgerinos, 2018).

The basic terms of the topic are mathematical stress and mathematics. Initially, mathematics is equivalent to language since it is the language of numbers. All people must learn in order to be able to solve and deal with various everyday problems in the course of their lives. Mathematics is the main characteristic that man possesses mathematical thinking, consistency, precision, and strict sequence (Richardson & Suinn, 1972). Mathematical anxiety is defined as a person's fear and negative thinking about math class. An important factor that has been identified by other research is exam anxiety, but also pressure and insufficient knowledge (Bai et al., 2009; Gresham, 2008).

In the literature review, the basic terms of the topic are formulated, the research that resembles the topic of this paper is analyzed, and gaps encountered in the bibliography are identified. Then, in the methodology section, reference is made to the method chosen, why the quantitative method has been chosen, and the tool given to the participants. It shall also indicate how the research was conducted, how the results were analyzed, and its validity and reliability. In addition, ethical issues and how the research participants were approached are mentioned. The next section is the research results and the discussion of the findings, and finally, it concludes with key conclusions of the research and the work. The gap filled through this research is not only about the subject of mathematics but also how participants feel about mathematics and the ways of approaching that they believe are appropriate for mathematics.

Review of the Related Literature

Early mathematics is taught in kindergarten, which helps to begin understanding mathematics. Mathematics at this early stage includes counting skills, relational skills, and operations (Charitaki et al., 2021, 2022, 2023). Children with deficiencies and weaknesses in early mathematics seem to have deficiencies until primary school. At the same time, many children develop bad feelings about mathematics that do not allow them to achieve higher levels of knowledge because it supports all cognitive development and is associated with language. The number of children who underperform in this subject is also significant. There are three models: numbering, relationships, and arithmetic operations. The results showed a significant difference in early arithmetic achievement between children who took part in the intervention and children of the same age who did not. In conclusion, it emphasizes the importance of early arithmetic intervention programs that correlate with children's better start to school and can help them cope with math difficulties (Charitaki, 2023; Charitaki et al., 2021).

Parents' attitudes toward mathematics and home numeracy experiences form preschoolers' emotional states and directly affect their mathematical attainments (Charitaki, 2023). Family characteristics also directly affect a child's emotional state and mathematical attainments (Charitaki et al., 2014a, 2014b). Mathematical anxiety, as one of the two basic terms of the topic to be mentioned, is defined as a person's fear and negative thinking about the mathematics lesson. For example, arithmetic operations and problems can be the main causes that lead them to avoid mathematics daily. An important factor that other studies have identified is exam stress, but also pressure and insufficient

DOI: https://dx.doi.org/10.22159/ijoe.2024v12i1.49925. Journal homepage: https://journals.innovareacademics.in/index.php/ijoe.
Acknowledgment: I acknowledge all university students that took part in my study. **Author's Contributions:** The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation. **Conflict of Interest:** There is no conflict of interest. **Funding Source:** There was no funding source.
Correspondence concerning this article should be addressed to Marina Vasilaki, University of East London, England. **Email:** mvasilaki12345@gmail.com

knowledge (Richardson & Suinn, 1972). People who have math anxiety feel "incapable" and avoid taking part in various activities that involve math. Mathematics, as the second basic term, is a subject that can very easily give rise to "mathematicophobia," which has as its main characteristics fear, disgustor even intense stress (Bai et al., 2009). There are various myths that many people may be affected by, such as that men are better than women in mathematics, and there have been various studies that have failed to show that there are differences in mathematical ability between the sexes (Gresham, 2008).

The term mathematicophobia means the anxiety of the individual, the tension created, and the discomfort and fear children feel when it comes to mathematics. Many reasons can lead children to mathematicophobia, such as the wrong examples used by the teacher in the lesson (Harper & Daane, 1998; Skemp, 1987). In mathematics, there are many methods and rules that children, when learning and memorizing, think they know; while progressing the material, mathematics becomes difficult, and if they forget a rule, then they panic and become anxious, resulting in making mistakes while they have tried (Hart, 2002). In addition, the method used by the teacher to transmit knowledge to children plays an important role. Many know mathematics but do not have the appropriate transmissibility that they should have towards children (Gresham, 2007; Harper & Daane, 1998). According to the research of Filippou and Christou (2001), this fear can lead to children dropping out of school but also significantly impact their general development.

Mathematics is equivalent to language since it is the language of numbers. All people must learn in order to be able, in the course of their lives, to solve and deal with various and everyday problems (Riba, 1982; Vosniadou, 2005). Mathematics has as its main characteristic that man possesses mathematical thinking, consistency, precision, and strict sequence. Also, mathematics seems to be the most difficult subject, which is constantly multiplied by the opinions of others for this subject (Richardson & Suinn, 1972) because many of them did not have the right "guide" to love mathematics. Research has shown that systematic teaching of this subject helps students gain an understanding and love for mathematics. Mathematics is taught worldwide and included in several sciences such as medicine and other natural sciences (Bai et al., 2009).

According to the research conducted by Remoundou and Avgerinos (2018), it was the attitudes that students (future teachers) of the pedagogical department had about mathematics and their capabilities. The study was done with an online questionnaire, that is, with quantitative research. In this survey, 282 students participated. The largest percentage of students chose to become teachers because they loved children; 79% said they like to teach children mathematics because it is very important in their lives. Those answered that they do not like to teach mathematics because they had many difficulties and believed that they would not properly transmit them to children. This research showed that many people experience mathematical stress while knowing that mathematics is very important and useful in every person's life and recognizing that they have deficiencies (Remoundou & Avgerinos, 2018).

Another important survey that has been carried out on the views of students of pedagogical departments on mathematics in kindergarten and their approach was carried out by DeSli and Papachristou (2007). This research aims to ascertain students' perceptions of mathematics in their approach to school and their perceptions of teaching mathematics in kindergarten. The sample was 173 students from the Department of Education Sciences in Early Childhood, 93 students, and from the Department of Primary Education 80 students. The method the researchers chose was quantitative, with questionnaires consisting of open-ended and closed-ended questions based on three axes. The first axis concerned students' attitudes and feelings towards mathematics, the second concerned teaching mathematics at school and the third focused on students' perceptions of teaching mathematics to kindergarten children and, at the same time, methods approach to pupils in kindergarten. The results of the survey showed that there were both positive and negative emotions about the math lesson, while there were also students who reported neutral emotions. Regarding the teaching of mathematics, participants stated that the teaching of mathematics should aim to develop children's logical-mathematical thinking and the skills to solve problems. Finally, teaching in kindergarten is considered necessary, while students consider that teaching mathematics in kindergarten is very different from teaching mathematics in primary school because there is a different way of approaching concepts by teachers, the age level of children, and the different material that exists (Desli & Papachristou, 2007).

Argyris (2018) investigated the "Interdisciplinary and exploratory approach to teaching functions in Mathematics using virtual laboratories." More specifically, teaching can be done through some activities, such as the European project Platon, which helps teachers integrate online workshops and various applications for science teaching. The results of this study showed that both students and teachers had positive attitudes. Furthermore, through the survey, which was done with both quantitative and qualitative methods, it was found that students' motivation for mathematics and science became greater (Argyri, 2018).

Another study was conducted by Karabelas et al. (2018), entitled "Use of Educational Material Items in Science and Mathematics Lessons in Primary School." This research is done with a quantitative process. Data was collected information through the observation of the educational practice. This research aimed to investigate the types of educational material used by teachers in mathematics and science in primary school. This study involved 160 elementary school teachers, where researchers observed 640 teaching hours, of which 160 were in math classes. During the lesson, they recorded what educational material the teachers used. It was observed that during mathematics training, teachers used all kinds of educational material. That is, teachers can understand how each educational material helps children. The research concludes that while all types of educational material are used, not all are to the same extent. That is teachers in mathematics use textbooks (Karabelas et al., 2018; Vosniadou, 2005).

A survey by Kalafata et al. (2016) was also conducted with the ultimate aim of examining the views of prospective and current teachers on the material in mathematics teaching. The methodology chosen by the researchers was using a quantitative method. Questionnaires were given to 118 students of TEPAES and 30 students of the Department of Physical Education, as well as to practicing teachers, more specifically to 40 kindergarten teachers and 20 teachers. The years of experience of teachers ranged from 6 to 15, while the year of students was from both the first and the second year, where in the second year, they had completed the course related to the development, design, and management of educational material for mathematics. This survey showed a positive attitude from all survey participants. As the participants mentioned, using the material every week or more often throughout the school year is important. Most of the materials mentioned by students and teachers were mainly materials that exist in a person's daily life regardless of mathematical education. It also appears through the survey that students and teachers are trying to incorporate various materials that are familiar to children for the teaching of mathematics, while they were also the ones who answered that the material is necessary, especially in smaller classes, because students are weaker and need it more (Kalafata et al., 2016).

In addition, research conducted by Sofou and Kassimati (2006) focuses on analyzing metaphorical discourse to investigate teachers' perceptions of teaching Mathematics. The qualitative method was chosen for the study. The participants were 40 kindergarten teachers who had attended the two-year postgraduate program at the Athens Kindergarten Teachers' School. This research aimed for teachers to describe whether they also use metaphorical concepts in teaching mathematics in kindergarten. The research findings showed that using metaphorical speech is an alternative approach to exploring their perceptions through mathematics teaching (Sofou & Kassimatis, 2006).

Research by Karatosiou (2005) on the feelings and attitudes of teachers and students of the Department of Early Childhood Education on mathematics. The participants of the present survey were 161, where 31 were kindergarten teachers from kindergartens in Trikala and Larissa, while the students were 130

from the University of Athens and the University of Volos. The researcher used a quantitative method. More specifically, questionnaires were given with open-ended questions, allowing participants to report their feelings about mathematics and their attitudes without any limitation or guideline answer. The survey results showed positive, negative, and neutral feelings toward mathematics, but most of the sample responded with negative emotions. The feelings of many are those who answered that they have a greater calling in theoretical subjects and not so much in science. The most frequent response to the respondents' feelings was the anxiety and fear they faced in order to be able to properly convey the appropriate information to children (Karatosiou, 2005).

There are also studies done in primary school that show how much children are influenced by teachers and the emotions they may have from early mathematics. One such research was conducted by Pournara (2017), entitled "the influence of academic emotions on school performance during childhood and the influence of teachers on their formation." This research was addressed to 120 children attending fourth, fifth, and sixth grades, who attended them in hours of mathematics and language. The method preferred by the researcher was quantitative and the educational tool she used was the questionnaire. In each lesson, the researcher gave the children a questionnaire where the questions were based on their feelings and how their teachers helped them. He then gave them another questionnaire about how teachers behaved in the classroom. The research results showed that the children did not have anxiety, shame, and negative emotions. On the contrary, with the help of teachers, the children had positive emotions and helped those not to lose hope (Pournara, 2017).

Based on the research, there are several differences between them. Initially, the research conducted by Remoundou and Avgerinos (2018) was on future teachers to find out what makes them anxious and do not like teaching mathematics to children and how they think it is in mathematics. This research was done with quantitative methodology, while Argyri's research (2018) aimed at how mathematics can be integrated with the help of virtual laboratories, which was done with mixed methodology, i.e., both quantitative and qualitative.

The other research done by Karabelas et al. (2018) was also done with a quantitative method. However, this one wanted to prove what educational material teachers use in mathematics and science, while the research conducted by Pournara (2017) was also done with quantitative research to show how mathematics affects children's emotions and how teachers behave in classrooms. Also, the research of Kalafata et al. (2016) wanted to show whether there is a positive attitude toward mathematics material, while the research of Karatosiou (2005) shows the negative emotions that teachers have about mathematics lessons. So, this research has investigated a topic combining both the mathematical anxiety preschool students have and how important they consider teaching pupils in kindergarten.

Purpose of Study

The purpose of this research is because the author noticed that many people do not like mathematics and face it because it is difficult or because a teacher they had did not give proper weight. This research is important because nowadays, children and teachers are stressed with mathematics, and there is no proper transmission of information from teachers to children, resulting in deficiencies and gaps for the whole period of school years. Also, this research will reference how mathematical stress affects children's psychology and school performance (Remoundou & Avgerinos, 2018).

Aims of Study

Based on the research, the proposed research proposal aims to investigate how a child is affected by mathematical stress, whether it affects his self-confidence, whether mathematics is demanding, and how teachers affect children in mathematics. This research seeks to fill possible gaps in various research related to mathematics or mathematical stress and teaching mathematics in kindergartens.

Research Questions

In addition, three main research questions can be answered through the research proposal.

1. How are the views of students of pedagogical departments formed on the teaching of mathematics in kindergarten?
2. What do teachers consider the main elements that characterize the successful teaching approach of mathematics in kindergarten?
3. What do teachers consider to be the most appropriate ways to approach mathematics in kindergarten?

Methodology

Design

Educational research is divided into two approaches: quantitative and qualitative. This research has been conducted using quantitative research. Quantitative research is characterized by its reliability, validity, and statistical measurements. The researcher can collect a large sample of answers from quantitative research since one hundred people who will answer the questionnaire are enough to draw a reliable and true conclusion (Bryman, 2004; Dimitropoulos, 1999; Koul, 2009).

Quantitative research is defined as research characterized by percentages and quantitative data, the main objective of which is to be able to relate research and theory (Athanasiou, 2007). Moreover, through quantitative research, people's opinions on a topic can be expressed objectively through the answers from the questionnaires. The aim is to reveal general regularities or views on various aspects of society through many cases. Quantitative research was chosen, and the questionnaire was used as a tool because quantitative research results in quantitative data, and the purpose of the research proposal is to find a percentage that concerns the influence of mathematical stress on children's self-confidence and school performance. The advantages of quantitative research and questionnaires are that they can be sent to many people, and the researcher cannot change the existing data and the participants' answers (Kyriazopoulos & Samanta, 2011; Paraskevopoulos, 1999). Participants can answer the questions freely without any commitment because they are anonymous and not done directly by the researcher (Paschaliori & Milesi, 2005; Tsalagiorgou & Avgitidou, 2017).

Participants

This survey sample was based on convenience sampling, i.e., people directly interested in the survey will be selected. Also, the researcher has selected people who are as close as possible to research interest and are not accidental. This method is not representative of the whole population, so it will not be generalized, but it can be repeated with different samples of the same discipline, and in this way, the results remain the same. Each participant has a different perception, and the researcher should take this into account to obtain correct results. In this survey, the sample is from 63 students of pedagogical departments from 18 years old to about 60 years old; the largest percentage were women, and there was no leakage or problem during the data collection (Papanastasiou & Papanastasiou, 2016).

Tools

One of the research tools used for this research is the questionnaire, which is based on the research of Remoundou and Avgerinos (2018) and the research of Desli and Papachristou. The questionnaire consists of several questions that the researcher has written on a specific topic that he wants to reach some results. The questionnaires should indicate the purposes of a questionnaire and the objectives and make short and comprehensible choices. There are different types of questionnaires, such as structured, semi-structured and unstructured. In this survey, the type of questionnaire is the structured one in which there are closed questions. In structured questionnaires, there is rigor in the order of closed questions, which does not allow the researcher to ask questions differently. Structured questionnaires are used in

quantitative surveys via the Internet, post, or even telephone (Gronlund, 1981; Zafeiropoulos, 2005).

Also, the questionnaire has short and simple closed-ended questions that are easy for the participant to answer. Closed-ended questions are easy to codify and complete but do not allow participants to add a comment, reasoning, or rating. The questions are dichotomous, there is a hierarchy scale, and multiple options exist for participants' answers. There are a series of possible answers in closed questions, and the participant must choose one or more options. Usually, closed questions are created because they help and allow quantitative analysis. Finally, in closed questions, the prices/options should cover the set of answers and their values should be excluded (Vamvoukas, 2010).

In the first questionnaire (Remoundou & Avgerinos, 2018), there are four questions of a demographic nature and closed-ended but also nine operative questions on a Likert-5 points agreement scale (1 = *strongly disagree* to 5 = *strongly agree*). In the 2nd questionnaire (Desli & Papachristou, 2007), there are 19 closed-ended questions on the perceptions of students of pedagogical departments regarding teaching mathematics in kindergarten.

The reliability and validity of the quantitative and questionnaire are very important for conducting a survey. The reliability of quantitative research is the main characteristic that should be present in a measurement tool and appears in the stability of the results and in successive measurements. A survey and measurement tool is considered reliable when responses and results are consistent in successive measurements at different times (Babbie, 1989; Cohen et al., 2008). Credibility can also be related to the concepts of "internal cohesion" and "stability," which every researcher must examine in order to be able to use a measurement tool in a research (Cohen et al., 1994; Karageorgos, 2002).

Validity, on the other hand, is a measurement tool that can be reliable but not valid when assessing the reliability of a survey must also be checked (Bell, 2007). There are several approaches to ensure validity in a survey with quantitative data, such as content validity, criterion validity, and apparent validity. The validity of the questionnaire is the extent to which the questionnaire measures a concept. When a questionnaire's validity is increased, the probability of systematic error decreases (Zafeiropoulos, 2005). The reliability of the questionnaire is the stability of the value and as the validity increases, the probability of accidental error decreases (Psarrou & Zafeiropoulos, 2001). The pilot evaluation of a questionnaire that has many functions such as increasing credibility, validity, and practicality, should also be carried out, and this serves the length of the questionnaire, the time it takes to answer a questionnaire and the feedback on the validity of the questions (Zavlanos, 2003).

Research Process

The data was collected from February 10 to March 10, 2021, while the analysis, as defined, had to be done by March 31, 2021. The data was collected online through an online questionnaire shared with students of the school where the researcher attends and with other well-known students of the researcher's pedagogical departments. Who was very happy to assist in this research? The researcher emailed the participants the questionnaire, which clarified that it was anonymous and very short, and the willingness shown by all participants was great. The research results to be analyzed and quantified were done through the SPSS 26, a valid data analysis program that helps the analyst analyze the data of his questionnaire quickly to avoid errors and complications in the survey data (Batsidis, 2014).

Ethical Issues

Each researcher must allow all participants for their answers to be anonymous and neither the researcher nor the reader can identify a participant/respondent with an answer. There should be no names or other personal details in the questionnaires, but there should be pseudonyms so no rights are violated and the participant's anonymity is ensured (Athanasiou, 2007). Confidentiality, on the other hand, is when the researcher can distinguish the answers given by a participant but cannot do so publicly, while all data must be based on confidentiality. Personal information such as name, address, and birth year must be deleted. The questionnaire given to participants was anonymous and in this way, no rights were violated (Cohen et al., 2008; Karageorgos, 2002).

The issues of ethics and ethics must be respected, that is, honesty, consent, anonymity, and confidentiality. Ethical and ethical issues play an important role in all research, from the conception of an idea to its implementation. More specifically, the participant must know exactly the purpose of the research but also his rights and obligations. The participant can withdraw from the survey at any time (Latinopoulos, 2010). Research should not discriminate against persons on the basis of race, ethnicity, sex, origin, privacy, religion, physical ability, or any other factor unrelated to scientific research. Any research carried out must have the written consent of the participant. The potential risks and the results must be obvious. Participants are obliged to know the methodology of the research and the written consent is signed by a solemn declaration (Nova-Kaltsouni, 2006; Paraskevopoulos, 1993).

Initially, the researcher must provide a written information letter to the participant requesting permission to provide the questionnaires to the students. The interviewer should approach the participants and provide them with a consent form, which should be answered by the participants who will give their informed consent. The freedom and self-determination of the participant must be provided; the participant can refuse or even withdraw from the survey at any time he wants, and they must first be informed about the survey and then decide whether they want to participate in any survey (Antoniou, 2006; Cohen & Manion, 2000). The researcher must also inform the participants about the purpose of the research, whether someone else will have access to the information given to him and about the results. The researcher will provide all the information the participants need, so they can contact him if they need something (University of Crete, 2012).

In addition, the researcher should not deceive participants by omitting information or the true purpose of the research or even unnecessarily exposing information that will cause anxiety or discomfort without the participants knowing what will happen. Thus, the investigator must inform participants about the purposes and potential risks and adequate and satisfactory explanations must be given at the end of each research. In this research proposal, there are no potential risks unless a participant has anxiety or fear. The researcher will take all necessary measures so that there is no risk of an error or publishing personal information or answers. Participants will first learn the purpose of this research, which is to conclude how mathematics and mathematical stress contribute to children's school performance if they are demanding if this creates mathematical stress, and if their self-confidence is affected (Cohen & Manion, 2000).

Results

The purpose of this research is to show the feelings of the pedagogical department's students about mathematics, the main elements that characterize the successful teaching approach of mathematics at school, and the most appropriate ways to approach mathematics in kindergarten. The results came through the analysis of questionnaires with the SPSS program and the total number of participants was 63 students. The questionnaire included demographic questions. Table 1 first indicates how many answered this option and the corresponding percentage of the answer in the next column.

Demographics

As can be seen from Table 1, the most significant percentage (88.9%) was aged 18-30 years (n = 56), old (4.8%) (n = 3), and only one answer (n = 1), i.e., 1.6% were aged 50-60 years. Also, it appears that (n = 61) women (96.8%) and only two men answered (n = 2), i.e., the percentage was 3.2%. Regarding the years of service, the most significant percentage answered that they had from 0 to 5 years (n = 50), more specifically 79.4%. The following percentage was from 6 to 10 years (n = 5), which reached 7.9%, while some had from 11 to 15 years of service (n = 3) and from 15+ (n = 1). In addition, as shown in the table, most

of them were students of the Pedagogical Academy (*n* = 29), and 46.0% and 44.4% were in tertiary education (*n* = 28). In comparison, there were also students of postgraduate (6.3%) (*n* = 4) or of an IEK (1.6%) (*n* = 1) or College (1.6%) (*n* = 1). When asked if they had any specialization, there were 28 answers out of 63 participants (i.e., 35 did not answer), i.e., the most significant percentage of the answers was their specialization in language, with a percentage of 28.6% (*n* = 18). One answer (1.6%) had no specialization (*n* = 1), 6.3% had ICT specialization (*n* = 4), one answer was in Physical Education (*n* = 1), and one answer was sports coaching and physical education (*n* = 1). The question regarding the participants' knowledge of mathematics shows the most significant percentage, 87.3%, i.e., *n* = 55, who answered yes, while only 12.7% (*n* = 8) answered no. The most significant percentage seems to have acquired their knowledge as students at school (*n* = 53) with a percentage of 84.1%, as students *n* = 4 (6.3%) and one participant in aria seminars (1.6%), while five did not answer this question.

Table 1
Aggregated Demographics

Demographics	*n*	%
Age		
18-30	56	88.9
30-40	3	4.8
40-50	3	4.8
50-60	1	1.6
Gender		
Men	2	3.2
Women	61	96.8
Year of service		
0-5	50	79.4
6-10	5	7.9
11-15	3	4.8
I have no previous experience	1	1.6
Student of pedagogy	1	1.6
Studies		
IEK, pedagogical	1	1.6
Master's degree, field	1	6.3
Pedagogical academy	29	46.0
Tertiary education HEI/TEI	28	44.4
BA early childhood studies	1	1.6
Specialization		
Language	18	28.6
I have no expertise in any of the above	1	1.6
Counselling psychology	2	3.2
Nothing	1	1.6
ICT	4	6.3
Physical education	1	1.6
Sports coaching and physical education	1	1.6
Knowledge of mathematics		
Yea	55	87.3
No	8	12.7
If yes, where did you obtain them:		
Seminars	1	1.6
As a student at school	53	84.1
As a student at the university	4	6.3

Note. The author collected the data in March 2021.
N = 63.

Table 2
Aggregated Questions

Items	SD	D	M	A	SA	Statistic	
						Skewness	Kurtosis
1. Do I like to learn mathematics?	9.5%	14.3%	46.%	15.9%	14.3%	-.014	-.319
2. Mathematics is not interesting.	22.2%	31.7%	33.3%	3.2%	9.5%	.673	.043
3. Mathematics is important in children's lives.	-	-	20.6%	31.7%	47.6%	-.524	-1.187
4. I like mathematics.	15.9%	28.6%	33.3%	12.7%	9.5%	.335	-.525
5. If it were not so difficult. I would like mathematics more.	7.9%	6.3%	20.6%	25.4%	39.7%	-.883	-.131
6. I am not inclined to mathematics. No one is good at all subjects.	14.3%	6.3%	22.2%	30.2%	27.0%	-.643	-.652
7. I am not strong in mathematics.	9.5%	12.7%	17.5%	22.2%	38.1%	-.646	-.821
8. If I try I will become better at mathematics.	-	11.1%	39.7%	25.4%	23.8%	.086	-1.048
9. Is mathematics directly related to everyday life?	-	1.6%	22.2%	38.1%	38.1%	-.426	-.833
10. Are they useful?	1.6%	-	11.1%	44.4%	42.9%	-1.344	3.345

Items	SD	D	M	A	SA	Statistic	
						Skewness	Kurtosis
11. Do you consider mathematics complex?	1.6%	6.3%	28.6%	38.1%	25.4%	-.492	-.063
12. Are there any obstacles you encounter during the process of finding a solution?	1.6%	1.6%	30.2%	38.1%	28.6%	-.511	.288
13. Are you disappointed with the way mathematics is taught at school?	9.5%	6.3%	20.6%	34.9%	28.6%	-.827	-.105
14. Do you consider mathematics important?	1.6%	-	14.3%	38.1%	46.0%	-1.253	2.396
15. Do you consider it important to correctly prioritize mathematical knowledge?	1.6%	1.6%	19.0%	47.6%	30.2%	-.899	1.513
16. Do you need special skills for a teacher to teach mathematics / a student to be taught mathematics?	3.2%	4.8%	27.0%	31.7%	33.3%	-.717	.152
17. Do you think experimentation encourages children to learn?	4.8%	1.6%	23.8%	41.3%	28.6%	-1.007	1.230
18. Is the teaching of infants different from that in primary school?	1.6%	1.6%	9.5%	46.0%	41.3%	-.392	-.433
19. Is there a different way for the teacher to approach mathematical concepts?	-	1.6%	19.0%	47.6%	31.7%	-1.386	3.136
20. Is it affected by the age and level of children?	1.6%	-	14.3%	49.2%	34.9%	-1.112	2.719
21. Is there a different syllabus and a different degree of difficulty in mathematics?	3.2%	1.6%	15.9%	44.4%	34.9%	-1.244	2.146
22 . Do you think there is real teaching only in primary school?	31.7%	23.8%	34.9%	6.3%	3.2%	.429	-.416
23. Do you believe that teaching children in kindergarten aims to reflect and motivate the child?	6.3%	14.3%	42.9%	25.4%	11.1%	-.160	-.158

Note. SD = strongly disagree; D = disagree; M = moderate (neither agree nor disagree); A = agree; SA = strongly agree.

Questions 6, 7, and 10 answer the first research question, "How are the views of pedagogical students on the teaching of mathematics in kindergarten formed?" Questions 6 and 10 were on a Likert-5 point agreenment scale (1 = *strongly disagree* to 5 = *strongly agree*).

To the first question, the most significant percentage answered *moderate* (neither agree nor disagree) with 46.0% (*n* = 29), while the next most significant percentage agreed with 15.9% (*n* = 10). For those who *disagree* and *strongly agree*, each percentage was 14.3% (*n* = 9), and I *strongly disagree* answered 9.5% (*n* = 6) that they like to learn Mathematics.

Mathematics as indicated by the answers of the participants on whether mathematics is not interesting, *moderate* with 33.3% (*n* = 21), *disagree* 31.7% (*n* = 20), *strongly disagree* 22.2% (*n* = 14), *strongly agree* 9.5% (*n* = 6), while answered *agree* 3.2% (*n* = 2).

As shown in the question, mathematics is important in children's lives, answering *strongly agree* 47.6% (*n* = 30), *agree* 31.7% (*n* = 20), and *moderate* 20.6% (*n* = 13).

To the fourth question, I like mathematics, the most significant percentage answered *moderate*, 33.3% (*n* = 21), *disagree* 28.6% (*n* = 18), *strongly disagree* 15.9% (*n* = 10), *agree* 12.7% (*n* = 8), and only participants 9.5% (*n* = 6) *strongly agree*.

In the fifth question, they would like mathematics better if it were not so difficult. Participants *strongly agreed* with 39.7% (*n* = 25) and agreed with 25.4% (*n* = 16), and there were 20.6% participants (*n* = 13) who *moderate*.

In the following question concerning the inclination of students in mathematics, they answered *agree* 30.2% (*n* = 19), 17 with 27.0% *strongly agreed*, 14 with 22.2% were *moderate*, 9 participants answered *strongly disagreed* with 14.3% and answered that they *disagreed* with 6.3% (*n* = 4).

When asked if they believe they are not strong in mathematics, 24 participants answered that they *strongly agree* with 38.1% and with an *agreed* answer 22.2% (*n* = 14) with a small percentage who answered that they are strong in mathematics.

In the eighth question, students believe that if they try to improve in mathematics, they answered that they moderate with 39.7% (n = 25) and agreed that 25.4% (n = 16) believe that if they try, they will improve.

It seems that students believe that mathematics is directly related to a person's everyday life, and 22.2% (n = 14) answered that they *moderate* this question, while only one participant (1.6%) answered that they *disagree* with this question.

The participants, as recorded, *agreed* whether they consider mathematics useful, with a percentage of 44.4% (*n* = 28), 42.9% answered that they *strongly agree* (*n* = 27), and 11.1% (*n* = 7) answered that they *moderate*. Only 1.6% (*n* = 1) answered that they *strongly disagree*.

In the eleventh question concerning the complexity of mathematics, 18 participants *moderate* with 28.6%, 38.1% participants *agreed* (*n* = 24), 16 participants answered that they *strongly agreed* (25.4%), four *disagreed* (6.3%) and one participant *strongly disagreed* (1.6%).

Many of those who answered *agreed* that they encounter obstacles in the process of finding a solution with a percentage of 38.1% (*n* = 24), *moderate* was 30.2% (*n* = 19), those who answered that they *strongly agree* were a total of 18 participants with a percentage of 28.6%, and one answer was that they *disagree* and *strongly disagree*.

Concluding that a large percentage encounters problems in finding solutions in mathematics. Unfortunately, with the data, most students consider that the ways of teaching mathematics at school are not appropriate, with 34.9% (*n* = 22), 28.6% *strongly agreed* (*n* = 18), and 13 participants were those who were undecided 20.6% with four answers that they *disagree* (6.3%) and six answers that they *strongly disagree* (9.5%).

Students consider mathematics important, where they answered *strongly agree* 46.0% (*n* = 29), *agree* answered 24 participants with 38.1%. Nine participants moderated 14.3%. One answered that they *strongly disagreed* with 1.6%.

Regarding the question on the correct hierarchy of mathematical knowledge, 47.6% (*n* = 30) answered *agree*, 30.2% (*n* = 19) answered that they *strongly agree*, and 19.0% (*n* = 12) answered that they *moderate,* and one participant answer to *disagree* and *strongly disagree*.

Table 2 shows that 33.3% *strongly agree* (*n* = 21) that special knowledge is needed for a teacher to teach mathematics, 31.7% answered *agree*, 27.0% participants were moderate, two answered that they *strongly disagree* (3.2%), and three answered that they *disagree* (4.8%).

The experimentation based on the participants' answers encourages the children to learn since 26 students answered completely and that they *strongly agreed*. However, at the same time, some were unsure, with 23.8%, and four participants answered that they *disagreed* and *strongly disagreed*.

The participants consider the teaching to be different in kindergarten and primary school since 29 answered completely (46.0%), 26 participants *strongly agreed* (41.3%), participants were 9.5% (*n* = 6) *moderate,* and one answered *strongly disagreed* (1.6%) and *disagreed* (1.6%).

There is a different way of approaching mathematical concepts. Students answered, since 30 answered completely (47.6%), 20 answered that they *strongly agree* (31.7%), 12 *moderate* (19.0%), and only one participant *disagreed* (1.6%).

Age and level are affected, as 31 students answered *strongly* (49.2%), *strongly agreed*, 22 (34.9%), nine participants answered that they *moderate* (14.3%), and one answer (1.6%) *strongly disagreed*.

Based on the data that emerges, mathematics seems to have a different syllabus and degree of difficulty. The most significant percentage answered completely (44.4%), 34.9% answered that they *strongly agree*, 15.9% *moderate*, while three participants answered that they *strongly disagree* and that they *disagree*.

Table 2 describes the participants who consider that real teaching takes place in kindergarten as well since I answered that 20 (31.7%) *strongly disagree*, 15 *disagree* (23.8%), *moderate* 22 participants (34.9%), two answered that they strongly agree (3.2%) and 6.3% (*n* = 4) were agreed.

Finally, regarding whether the teaching of children aims at the child's reflection, in this question participants, 42.9% (*n* = 27) *moderate, agreed* with 25.4% (*n* = 16), nine participants *disagreed* (14.3%), four *strongly disagree* with 6.3%, and finally seven *strongly agree* with 11.1%.

How do you feel about math?

One question that participants were also asked was how they felt about math, where the largest percentage answered anxiety and weakness. Participants in this question had the option to answer more than one option. Immediately afterward, the most common response was interest, with 31.7% and dislike, with 30.2%. Twelve respondents felt fear of math (19%), ten felt admiration (15.9%), seven felt aversion (11.1%), 5 participants felt annoyance (7.9%), four felt attraction (6.3%), three security (4.8%), two love (3.2%) and one pleasure and another one indifference. Most responses were to negative emotions rather than positive ones.

The following question (8) answers the second research question: "What do teachers consider to be the main elements that characterize the successful teaching approach of mathematics in kindergarten?" Choose the three main elements that characterize the successful teaching approach of mathematics at school.

Based on the participants' answers, the main characteristics are the transmission of knowledge by the teacher with 34 answers and a percentage of 54% and the same percentage had the answer approach to knowledge through play. Immediately afterward, the most frequent response was the choice of appropriate activities, with 28 answers and a percentage of 44.4%. It was the development of a positive attitude towards mathematics by children, who gave 27 answers and a percentage of 42.9%. Next was the experiential approach to knowledge, with 25 responses and a percentage of 39.7%. The selection and use of material (e.g., technological) with 22 answers and a percentage of 34.9%, the interdisciplinary approach to knowledge with 22.2% and 14 responses. The teacher used the child's initial ideas, with a percentage of 12.7% and eight answers, and finally, the correct hierarchy of knowledge, with just seven answers and a percentage of 11.1%.

The last research question (third), "What do teachers think are the most appropriate ways to approach mathematics in kindergarten?" is answered by question 9.

Choose the two most appropriate ways to approach mathematics in kindergarten. Most of these questions answered that the most appropriate way to approach mathematics is through play, with 51 answers and 81%. The most appropriate way was by investigation and discovery by the child, with 24 answers and a percentage of 38.1%. The choice experientially by the child had 22 answers i.e., 34.9%. With actions from the teacher, it had 19 responses (30.2%) and four responses from the choice with transition from the teacher with a percentage of 6.3%.

The last three questions, the seventh, the eighth, and the ninth, could not be analyzed by the SPSS program because they were multiple-choice. They were analyzed qualitatively, which Google Forms already had from where the sample was collected.

Discussion

The results of the survey conducted in the year 2021 showed the negative feelings of pedagogical department students about mathematics. It is a complicated subject, and the teacher must have the appropriate knowledge to transmit mathematics properly. Also, this research shows the three main elements that characterize the successful teaching approach to mathematics and the two most appropriate ways of approaching mathematics in kindergarten. This research has points in common with the mentioned surveys. More specifically, the survey is based on two surveys by Remoundou and Avgerinos (2018) and Desli and Papachristou (2007), where the questionnaire was compiled based on these two surveys. As in the research of Remoundou & Avgerinos, this sample was students of pedagogical departments that aimed to investigate students' feelings and why they consider themselves not good at mathematics. On the other hand, Desli & Papachristou's research was also conducted on students based on students' views on mathematics and their appropriate approach. The most important difference that exists between all the surveys is the sample from which the researchers collected, for example, in Remoundou and Avgerinos with 282 students, in Desli & Papachristou with 346 students, in Karabelas et al. (2018) with 160 teachers and in Kalafata et al. (2016) with 208 participants (both students and teachers).

This research offers important views on mathematics because it is useful in the lives of every person and child. The emotions that mathematics causes to students, how they feel with the existing knowledge they have in this subject, what, in their opinion, are the main elements for the successful teaching approach of mathematics for children at school and what is the most appropriate way to approach mathematics mathematics to help children and not prevent them from feeling bad. From the studies analyzed, there was not a single study that aimed at emotions and ways of approaching mathematics and the importance of this subject in kindergarten. This was done exclusively to students, while studies were conducted on both students and teachers.

Conclusion

In conclusion, the main objective of this research was to explain why many people do not like mathematics and have difficulty dealing with it because it is difficult or because a teacher they had did not give proper weight to it. Also, children and teachers are stressed with mathematics and there is no proper transmission of information by teachers to children, resulting in deficiencies and gaps throughout the school years. In this survey, most participants seemed to have negative feelings about mathematics, but many also answered "interesting." The most common answers were anxiety, weakness, interest, and dislike. The three most frequently answered answers in terms of the main elements that characterize the successful teaching approach of mathematics at school are the transmission of knowledge by the teacher, the approach of knowledge through play, and the selection of appropriate activities.

But when it came to the two most appropriate ways to approach math in kindergarten, the most common answers were through play and the child's exploration and discovery. In this particular survey, there were some restrictions regarding the sample, due to the pandemic, it was difficult to find many participants, but it was set as a sample number of about 40 people and in the end 63 participants responded. The second limitation was the time limit, i.e., the time limit set for the participants to get the answers, which was just one month.

This research can be helpful to many teachers, students and even parents. It is also an idea for future research on the topic investigated in this one, i.e., the views of students of pedagogical departments on teaching mathematics in kindergarten. The future researcher could use it and gather more answers from all students, either from several regions of a country or from one city. Also, another suggestion is for participants to be able to answer demographics. From this region, they work, study, or are located in order to generalize in which area the most significant percentage of the sample is located. In addition, in order to do such a survey, the researcher should spend enough time not only to compile the results but to inform and accept such a large sample in order to be able to collect his questionnaires. Also, a final suggestion is that each researcher who wants to use this research differently will succeed. Instead of addressing students of pedagogical departments, address kindergarten teachers or primary school teachers who have taught in the first grades of primary school. This idea could be implemented with both questionnaires and interviews. In the present research, there is a form of generalization, but because it is small, the sample (63) is not representative, so if a future survey is done with more samples then it can be generalized.

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Received: 16 October 2023
Revised: 07 November 2023
Accepted: 20 November 2023