Views of Teachers Towards Use of Dialogue and Argumentation in the Mathematics Classroom

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ABSTRACT

In the realm of Mathematics education, the use of dialogue and argumentation as pedagogical approach has gained significant attention in recent years. Research shows that the views of the teachers in the use of dialogue and argumentation teaching approach play a crucial role in shaping the learning experience for students. Therefore, the purpose of this study was to investigate the views of teachers towards use of dialogue and argumentation in the Mathematics classroom. The study employed a quantitative approach that used structured questionnaire for data collection from a sample of 100 Mathematics teachers selected from 72 secondary schools in Gutu district of Masvingo Province in Zimbabwe using a judgemental or purposive (non-probability) sampling strategy. Two statistical metrics namely the mean and the standard deviation were used for data analysis. Results of the study show that there is a general agreement among teachers that dialogue and argumentation is an effective approach to the teaching Ordinary level Mathematics. The main study limitation is that it only used a quantitative approach, which may have affected the depth and breadth of data collected about the views of teachers towards use of dialogue and argumentation in the mathematics classroom. The results of this study have implications on both practice and policy about the views of teachers towards use of dialogue and argumentation in the Mathematics classroom.

Keywords: dialogue and argumentation, meaningful and effective approach, participation, attitude, creativity.

INTRODUCTION

In the teaching of Ordinary level Mathematics, the views of teachers regarding the use of dialogue and argumentation play a significant role in shaping the learning experience for students. Dialogue and argumentation are powerful instructional strategies that promote critical thinking, problem-solving skills, and a deeper understanding of Mathematics concepts (Arista et al., 2018). Learning is known to be most effective when students are involved in discourse that enables them to reflect on their thinking while also engaging in cognitive restructuring of their own understanding and knowledge (Muhonen, 2018). Shared thinking or educational discourse is when individuals are receptive to one another's viewpoints and work to comprehend one another (Phillipson & Wegerif, 2017). The development of students' communication skills and capacity for conversation as well as the creation of shared knowledge among students through educational dialogue can have an impact on students' lifelong learning as well as the quality and significance of their lives (Groschner et al., 2015). Zimbabwe School Examination council (ZIMSEC) Ordinary level Mathematics syllabus of 2015-2022 recommends the use of instructional methods that encourage classroom discourse and inquiry. By allowing students to share and discuss their ideas and insights with peers, student participation in classroom discourse improves the development of conceptual knowledge, mathematical vocabulary, communication skills, and problem-solving abilities (Alexander & Hardman, 2017). Despite the value and advantages of dialogue, it is uncommon to use this teaching strategy in classrooms, and interactions between students are frequently ineffective (Muhonen, 2018). Recent educational policy documents (For example., Zimbabwe's Ministry of Primary and Secondary Education(MoPSE) blueprint, 2016-2022; Cyprus' Ministry of Education and Culture (MoEC), 2015; United States of America's Common Core State Standards for Mathematics (CCSSM) of 2015, and South Africa's Mathematics Teaching and Learning Framework of 2018) have encouraged engaging students in mathematical argumentation. These documents encourage students to construct viable mathematical arguments and critique the reasoning of others. According to Langrall and Rumsey (2016), mathematical argumentation is understood as a process of dynamic social dialogue for the

discovery of new mathematical ideas and persuading others that a claim is true. To convince others that a mathematical claim is true needs mathematical justification. This suggests that in a classroom context, justifications are included in mathematical arguments because students present sufficient and acceptable justifications to persuade others that their claim is true. According to Rapanta (2019), argumentation is a dialogue practice that stimulates and promotes students' critical thinking. It is a pathway to the development of critical thinking skills manifested in educational dialogue. In order to encourage, broaden students' critical thinking, and develop their learning and knowledge, dialogic teaching uses the power of discussion (Alexander, 2017). This means dialogic teaching involves argumentation. The reasoning and discussion with others is considered a promising way to strengthen the approach to solving the mathematical problem, since others may bring in new ideas and arguments (Fisher et al., 2016). According to Cheuk (2016), argumentation in Mathematics can help students organize their thoughts, draw links between mathematical concepts and objects, and interact with others. This means that dialogue and argumentation not only allows students to develop a deeper understanding of mathematical concepts, but also fosters critical thinking and problem-solving skills. However, the views of teachers towards the incorporation of dialogue and argumentation in the teaching of Mathematics at the rdinary level vary. The current study therefore seeks to explore the views of teachers towards the use of dialogue and argumentation in the teaching of Mathematics and highlight its significance in enhancing students' understanding and engagement with the subject. The study is guided by the following objective: Establish views of Mathematics teachers towards the integration of dialogue and argumentation in the teaching and learning of Mathematics.

LITERATURE REVIEW

Teachers play a crucial role in supporting students' learning in the classroom and in carrying out the objectives of the curriculum. In order to ensure that teachers receive the proper professional support to implement dialogue and argumentation in their mathematics classroom, it can be helpful to understand how teachers view dialogue and argumentation approach. Thus, in this section, the views of the teachers towards the use dialogue and argumentation in the mathematics classrooms are delineated from literature.

Asterhan et al. (2018) posits that teachers resist to fully implementing dialogic teaching in their classrooms due to their shared beliefs about learning and intelligence that underlie almost every aspect of schooling. Some teachers continues to believe that differences in inherited intelligence explain most differences in learning success (Asterhan et al., 2018). Asterhan et al. (2018) found that many teachers make the assumption that some students are only capable of high-level thinking and reasoning, and that the remainder can only work toward gaining a fixed body of knowledge. Furthermore, many teachers think that before students can have the kinds of discussions that develop conceptual understanding, they need to absorb facts (Asterhan et al, 2018). According to Asterhan et al. (2018), some of the teachers have a view that if learning is understood as mastering the individual components of a task one by one, then drill and practice makes sense, especially in a field like mathematics, where knowledge is relatively hierarchical.

According to a study by Pauli and Reusser (2015), some teachers believe that dialogic teaching is only beneficial for students who are already advantaged by their race and socioeconomic status. Pauli and Reusser (2015) documented a systematic bias against using dialogue methods in classrooms in Switzerland and Germany. The result of Pauli and Reusser (2015) study reveals that teachers have a view that weaker or less intelligent students do not know enough to engage in deep classroom discussion. The study by Pauli and Reusser (2015) also revealed that some teachers viewed mathematical dialogue as a display of knowledge, rather than the site where knowledge is created.

Bati (2019) conducted the study to determine the views of teachers towards usefulness and effectiveness of scientific discussions. The data was obtained from teachers in Ankara, Turkey. The result of the study by Bati (2019) revealed that teachers considered dialogue important to make positive contributions to students' meaningful learning and persistence of knowledge. Teachers believe that students' active participation in the classroom discussions help them gain different communication skills (Bati, 2019). Teachers believe that when students are given the chance to engage in conversations, they use a variety of communication activities, such

as argumentative and epistemic ones, and as a result, they build more communication and discussion abilities (Bati, 2019).

According to a study by Bosseri et al. (2015), in order to increase students' independence as learners, it was necessary to give them opportunities to participate in group projects where they shared accountability for learning the additional content knowledge they need. Teachers, however, voiced worry that if students controlled their own learning, it might make it more difficult for them to read the learning objectives (Bosseri et al., 2015). Furthermore, the study by Bosseri et al. (2015) reveals that many teachers feel ill prepared to structure and lead potentially controversial discussions in their classes. Teachers fear of losing control over the learning situation and the mathematics content that their students learn (Bosseri et al., 2015).

Erduran et al. (2020) examined teachers' perceptions of argumentation and how to teach mathematics using it. The information came from a survey given to English secondary school instructors of students ages 11 to 16. An online survey was sent to twenty-nine teachers in an effort to gather information on their opinions on a range of topics, including instructional techniques that encourage arguing. The study's qualitative and quantitative findings demonstrated that teachers saw argumentation as a means of supporting their positions, as well as a crucial general skill that requires them to draw from a variety of sources. According to Erduran et al. (2020), teachers define argumentation as the act of providing evidence to support a claim. In this study by Erduran et al. (2020), teachers addressed the ability to draw from a variety of information sources as a crucial component of the argumentation skill that needs to be developed. Teachers believed that argumentation was crucial for gathering, analysing, and synthesizing data in order to draw conclusions (Erduran et al., 2020). Thus, the teachers considered argumentation to be an important skill for the students to acquire.

RESEARCH METHODOLOGY

This section delineates on the research design, paradigm, approach, type, methods and instruments used in this study.

Research design, paradigm, approach, type and sampling

The study assumed a quantitative approach located in the positivist approach paradigm. A case study research design was employed in this study to collect and analyse data on the views of teachers towards the use of dialogue and argumentation in the teaching of Mathematics. Unlike a broad statistical survey or thorough comparative investigation, a case study delves deeply into a specific research subject (Larson, 2015). Case study provides tools and opportunities for researcher to study complex phenomena within their natural environments and contexts (Larson, 2015). In support of this view, Krusenvik (2016) argues that a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context. Thus, the case study is useful for testing whether a specific theory and model actually applies to phenomena in the real world. This implies that the case study searches for meaning and understanding. The subjects of this study will consist of approximately 100 O' level Mathematics teachers from 72 secondary schools in Gutu district of Masvingo province. Purposive or Judgmental (non-probability) sampling was used to choose the participating Mathematics teachers of this study. The purposive sampling technique is the deliberate choice of participant due to the qualities the participant possesses (Alkassim et al., 2016). This involves identification and selection of participants that are proficient and well informed with a phenomenon of interest. Thus, the choice of sample participants depends exclusively on the judgment of the researcher. The purposive sample is homogenous with respect to several internal and external characteristics, including academic background (all have at least a professional teaching qualification and have been exposed to teaching methods that involve dialogue and argumentation). Teachers' questionnaire was used to elicit data on the views of the teachers towards the use of dialogue and argumentation in the teaching and learning of Ordinary level Mathematics. The researcher applied and acquired a research permit from the Ministry of Primary and Secondary Education (MOPSE) of Zimbabwe before commencing data collection. The respondents' biographical profiles are displayed in Table (i).

Table 1: Biographic factors of 'O' level Mathematics teachers

Factor	Item	%
Gender	Female	41
	Male	59
Age	<30 years	23
	31-40 years	36
	41-50 years	21
	>50 years	20
Educational Level	Certificate in Education (CE)	20
	Diploma in Education (Dip Ed)	23
	Bachelor's Degree	45
	Master's Degree	12
Years of Teaching Experience	≤10 years	33
	11-20 years	29
	21-30 years	27
	>30 years	11

According to Table 1 findings, there are more male (59%) than female teachers in schools teaching 'O'-level mathematics. Just 43% of the mathematics teachers at the ordinary level lack a degree, with the majority holding college degrees. Table1 also demonstrates that the majority of teachers have 20 years or less teaching experience, which is consistent with the fact that the majority of teachers (59%) are under 40 years old.

Instrument Development

A structured questionnaire with 10 items that used a five-point Likert scale was developed for collecting data on the views of teachers towards the use of dialogue and argumentation in the teaching of Mathematics. The 10 items were as follows: 1. Dialogue and argumentation make the teaching and learning of Mathematics more meaningful and effective. 2. I enjoy teaching mathematics using the dialogue and argumentation approach. 3. Dialogue and argumentation makes learning more interesting for students. 4. My students show high levels of motivation when learning using the dialogue and argumentation approach. 5. I think dialogue and argumentation is the best approach for teaching Mathematics. 6. Dialogue and argumentation allow maximum participation by students in Mathematics lessons. 7. I am always eager to recommend the use of dialogue and argumentation to other Mathematics teachers. 8. Dialogue and argumentation approach has improved the attitude of students towards Mathematics. 9. Mathematical dialogue and argumentation help teachers to demonstrate high levels of creativity when teaching Mathematics. 10. Based on my experiences, I will always use dialogue and argumentation to teach Mathematics.

RESULTS

This section discusses data validation for the measurement scale as well as how data were analysed. The purpose of data validation was to ensure that issues of validity and reliability were addressed and confirmed in the study.

Validation of the research instrument

To establish the reliability of the data, internal consistency reliability was measured using both Cronbach's alpha and composite reliability metrics. The values of Cronbach's alpha as well as of the composite reliability were between .768 and .920 and are above .7 thereby satisfying the benchmark value of $\alpha \geq .7$ for internal consistency reliability (Hair et al., 2010; Howell et al., 2010). Internal consistency reliability is therefore confirmed.

With regards to establishing convergence validity, standardized factor loadings, Cronbach's alpha, composite reliability, and Average variance extracted were used (Hair et al., 2017). Standardized factor loadings ranged between .639 and .933 thus falling within the benchmark of SFL>.6 (Hair et al., 2010), Cronbach's alpha and composite reliability values ranged between .768 and .901 hence falling within the benchmark of $\alpha \geq .7$ (Howell et al., 2010), and Average variance extracted values ranged between .650 and .733 thereby falling within the benchmark of AVE > .6. Since all the benchmarks for each metric used to measure convergence validity were satisfied, convergence validity was thus achieved (Hair et al., 2014; 2019).

Data Analysis

This section analyses the views of O' level Mathematics teachers with regards to the applicability of dialogue and argumentation in the teaching of Mathematics. Table 2 was used to establish the views of teachers towards dialogue and argumentation as an approach to the teaching of O' level Mathematics. Two statistical metrics namely the mean and the standard deviation were used in the analysis of the views of the teachers towards dialogue and argumentation.

Table 2: Views of Teachers on dialogue and argumentation

SN		CM	M	SD
1	Dialogue and argumentation make the teaching and learning of Mathematics more meaningful and effective	3.0	3.711	.629
2	I enjoy teaching mathematics using the dialogue and argumentation approach	3.0	3.947	.715
3	Dialogue and argumentation makes learning more interesting for students.	3.0	4.381	.711
4	My students show high levels of motivation when learning using the dialogue and argumentation approach.	3.0	4.510	.635
5	I think dialogue and argumentation is the best approach for teaching Mathematics.	3.0	4.227	.701
6	Dialogue and argumentation allow maximum participation by students in Mathematics lessons.	3.0	4.129	.715
7	I am always eager to recommend the use of dialogue and argumentation to other Mathematics teachers.	3.0	3.977	.825
8	Dialogue and argumentation approach has improved the attitude of students towards	3.0	3.729	.682

	Mathematics.			
9	Mathematical dialogue and argumentation help teachers to demonstrate high levels of creativity when teaching Mathematics.	3.0	3.816	.650
10	Based on my experiences, I will always use dialogue and argumentation to teach Mathematics.	3.0	3.933	.710
	Average metrics	3.0	3.776	.697

Key: M - Mean; SD - Standard Deviation; CM - Criterion Mean

Table 2 shows results of the views expressed by Mathematics teachers about the use of dialogue and argumentation in the teaching of O' level Mathematics students. For ease of analysis, the researcher first determined the criterion mean (CM) by finding the average of the scale scores as follows: (1+2+3+4+5)/5 = 3.0. Based on the criterion mean, any item mean score below the CM was deemed as representing a disagreement with a given assertion while any item mean score above the CM was deemed as representing an agreement with a given assertion.

The results in Table 2 show that there is general agreement among teachers (M=3.776; SD=.697) that dialogue and argumentation is an effective approach to the teaching of O' level Mathematics. This shows that teachers believe that dialogue and argumentation can be used to effectively teach Mathematics students when compared to other teaching approaches. Critically, the results show that teachers believe that their students show high levels of interest (M=4.381; SD=.711) and also high levels of motivation (M=4.510; SD=.635) when learning using the dialogue and argumentation approach. This shows that dialogue and argumentation approach improved the attitude of students towards Mathematics (M=3.729; SD=.682). The results also show that the approach is student-centred and helps students to participate at maximum levels (M=4.129; SD=.715). It is also shown from the results that teachers generally enjoy teaching using the dialogue and argumentation approach (M=3.947; SD=.715) that is why they also believe that the dialogue and argumentation approach is perhaps the best method of teaching Mathematics (M=4.227; SD=.701).

It is further shown from the results in Table 2 that dialogue and argumentation generally makes teaching more meaningful (M=3.711; SD=.629) hence the teachers show willingness to recommend the approach (M=3.977; .820) to other Mathematics teachers and also willingness to always use the approach (M=3.933; SD=.710) when teaching Mathematics. Finally, teachers believe that they generally demonstrate high levels of creativity (M=3.816; SD=.650) when teaching Mathematics using the dialogue and argumentation approach.

Overall, the results suggests that the teachers in the study have positive views on the use of dialogue and argumentation in mathematics teaching and learning, and they tend to agree that this approach makes the teaching and learning of mathematics more meaningful and effective.

DISCUSSION

This section discusses the analysed data on the views of teachers towards the use of dialogue and argumentation in the teaching and learning of O' level Mathematics. The findings of the study showed that there is general agreement among teachers that dialogue and argumentation is an effective approach to the teaching O' level Mathematics. From the results, it was shown that most teachers believe that dialogue and argumentation approach makes the teaching and learning more meaningful, enjoyable and motivating to the students. It further promotes maximum participation by students, improves the attitude of students towards Mathematics, promotes high level of creativity of teachers when teaching Mathematics, and hence is considered by most as the best approach of teaching O' level Mathematics. The above, therefore, suggests that dialogue and argumentation approach engages students in the Mathematics learning that deepens students'

understanding of mathematics concepts. Thus, the dialogue and argumentation approach promotes student analysis of Mathematics content and encourages reflection in the learning of Mathematics.

The above results are in line with the findings on effect of dialogue and argumentation in the teaching of Mathematics. A study by Alexander and Hardman (2017) found that dialogue is crucial in taking forward students' understanding of Mathematics through negotiating meaning. The study by Cabanas-Sanchez et al. (2019), which found that exchanging opposing viewpoints, arguments, and proof allows both the proponent and the audience to consider their own theories, ideas, and comprehensions, highlights cognitive and metacognitive exchanges. The research findings are also in line with this study. This suggests that dialogue and argumentation provide students with the opportunities to provide the mathematical explanations and justifications of what they have learnt. This further shows the importance of dialogue and argumentation to support enhanced understandings during the lessons.

It was also shown in the study that teachers believe that their students show high levels of interest and motivation when learning using the dialogue and argumentation approach. This suggests that students enjoy challenging instruction that emphasizes conceptual and analytical thinking more than procedural instruction. This also means that the dialogue and argumentation approach is particularly effective in boosting student interest and engagement in mathematical learning activities.

The aforementioned aligns with previous results. According to the findings of a study by Ameniya et al. (2019), students who received more dialogic Mathematics instruction from their teachers had greater pride and happiness and less rage and boredom. The study by Han and Kang (2019) on the implementation of the dialogic model found evidence of positive effects on student engagement, confidence, and motivation using dialogic teaching techniques. Observed high-quality teacher-student interaction and teaching practices showed enhanced students' motivation to learn and contribute to their academic and social development (Cadima et al., 2016; Lerkkanen et al., 2017). Thus, these results demonstrate that the dialogue and argumentation approach has the potential to energise, motivate and enhance students' learning of Mathematics.

It is further shown in this study that teachers believe that the dialogue and argumentation approach is student-centred and helps students to participate to maximum levels. This suggests that dialogue and argumentation improve the participation of students in the Mathematics classroom. This means students are engaging in shared meaning making towards common learning goals through productive dialogues characterised by democratic participation among all participants. The use of the dialogue and argumentation approach enables students to participate in meaningful activities and sharing their thoughts in the learning of Mathematics. This is in agreement with the results of the study by Alexander (2017) that showed that by participating in mathematical discourse, students make reasoning aloud and explanations about what and how they think about the mathematical concepts. Other studies by Alexander (2017), Ameniya et al. (2019) and Lerkkanen et al. (2017) found that through participation students learn to ask questions, explain their thinking, reasons for the choices they make, negotiate, justify, evaluate and negotiate outcomes. By enabling students to share and discuss their questions and insights with peers, this maximum level of student participation in mathematical discourse in the classroom may therefore help contribute to the development of conceptual understanding, mathematical vocabulary, communication skills, and problem solving abilities. Thus, dialogue and argumentation allow students to engage in the classroom work that allows maximum participation of students in the learning of Mathematics.

It emerged from the study that teachers generally enjoyed teaching using the dialogue and argumentation approach. This is why they also believe that the dialogue and argumentation approach is perhaps the best method of teaching Mathematics. This suggests that dialogue and argumentation foster the development of new Mathematics ideas and creative teaching ideas. The results are consistent with the research findings of Iwuanyanwu and Ogunniyi (2020) which showed that the Dialogical Argumentation Instructional Model (DAIM) intervention was significantly more effective than the traditional teaching method intervention in helping teachers to come up with more creative methods of teaching Mathematics.

It is further shown in the study that dialogue and argumentation generally makes teaching and learning more meaningful, hence, the teachers show willingness to recommend the approach to other Mathematics teachers

and also willingness to always use the approach when teaching Mathematics. For teaching and learning to be meaningful, it should contribute to the development of critical 21st century skills such as cognitive skills used to evaluate, analyse, and make comparisons, among others, in the learning of Mathematics at O'level.

The above findings affirm the results of past studies. A study by Knudsen and Rutsein (2014) found that in order to make Mathematics learning a sense-making process, classroom discourse should incorporate mathematical dialogue and argumentation approach. Additional research by Knudsen and Rutsein (2014), Alexander (2018), and Hennessy et al. (2019) also discovered that rich and robust dialogic and interactions in the Mathematics classroom are necessary for the development of mathematical processes including reasoning, explaining, and mathematical thinking. This means the use of the dialogue and argumentation approach enables students to increase opportunities to develop explanatory, debate, justification and defence while engaged in the practices of reasoning, explanation and persuasion. Thus, this makes the teaching of Mathematics more meaningful as it encourages students to select and defend their choice of mathematical theories or positions based on rational criteria.

The results of the study also revealed that teachers believe that they generally demonstrate high levels of creativity to scaffold student learning when teaching Mathematics using the dialogue and argumentation approach. This means that teachers require a pedagogical repertoire for effective teaching and learning to occur. Creativity in Mathematics is generally related to problem posing and problem solving. This is consistent with the literature of this study that showed that students need scaffolding in their interaction in the classroom in order to improve their thinking and understanding (Alexander, 2017; Hennessy et al., 2019). Thus, the teacher has a vital role in facilitating and creating effective learning experiences for students. Similar to this, Muhonen (2018) demonstrates that, in order to effectively scaffold students' active participation in the Mathematics learning activities, teachers must creatively balance their efforts and actions with the needs and interests of the students, regardless of whether the interaction is initiated by the teacher or the students. This shows that teachers need high levels of creativity when teaching using the dialogue and argumentation approach. This therefore shows that dialogue and argumentation is considered as the best approach in teaching O'level Mathematics in schools.

CONCLUSION

This study sought to establish views of Mathematics teachers towards the integration of dialogue and argumentation in the teaching and learning of Mathematics. A number of conclusions were drawn in this study in line with the findings. First, it was concluded that teachers believed that the dialogue and argumentation approach promotes maximum participation by students in the Mathematics classroom, improve attitude of students towards Mathematics and makes teaching and learning Mathematics more meaningful. Second, it was concluded that dialogue and argumentation enable student to actively engage with mathematical concepts, collaborate with their peers, and develop critical thinking skills. Third, it was concluded that dialogue and argumentation enhance conceptual understanding and foster a positive learning environment. By incorporating dialogue and argumentation teaching approach, teachers empower students to become active learners, critical thinkers, and effective problem solvers. Finally, based on the results, it was concluded that the views of teachers towards using dialogue and argumentation in the teaching of ordinary level Mathematics are overwhelmingly positive.

RECOMMENDATIONS

To promote the use of dialogue and argumentation in the teaching of Mathematics at the Ordinary level, it is crucial to address the challenges that teachers may face. Providing teachers with comprehensive training and resources on how to effectively incorporate dialogue and argumentation into their lessons can help build their confidence and competence in using this pedagogical approach. Collaboration among teachers, educational institutions, and policymakers is also essential in promoting dialogue and argumentation in Mathematics education. By sharing best practices, exchanging ideas, and developing guidelines, a supportive network can be created to facilitate the integration of dialogue and argumentation into the curriculum. Furthermore, fostering a positive classroom environment that encourages open discussion and respects diverse perspectives

is crucial. Teachers should create a safe space for students to express their ideas and challenge each other's thinking without fear of judgement. This inclusive approach promotes active participation and engagement in dialogue and argumentation activities.

Implications of the study

This study has implications on both practice and policy about the views of teachers towards use of dialogue and argumentation in the Mathematics classroom. Regarding practice, the study shows that teachers recognize the importance of dialogue and argumentation in enhancing students' learning experiences and fostering a positive classroom environment. While there may be challenges in implementing dialogue and argumentation, careful planning, effective facilitation, and a commitment to creating an inclusive learning environment can help teachers successfully incorporate dialogue and argumentation into their mathematics lessons. By embracing dialogue and argumentation, teachers can empower their students to become confident and proficient mathematicians. With regard to policy, the study can contribute to the development of policies by Zimbabwe's Ministry of Primary and Secondary Education (MoPSE) that embrace and promote dialogue and argumentation as powerful tools in the teaching of ordinary level Mathematics, ensuring the holistic development of students' mathematical abilities.

Study limitations

The study used a quantitative approach, which may have affected the depth and breadth of data collected about the views of teachers towards use of dialogue and argumentation in the mathematics classroom. Future studies may use a mixed-methods approach either to validate the current study's findings or to improve them. Further, the study was carried out in one district of Masvingo Province which limited the researcher from investigating and exploring information from other Provinces in Zimbabwe. Studies involving many respondents are needed to understand the views of teachers towards the use of dialogue and argumentation in the mathematics classroom.

REFERENCES

1. Alexander, R. (2017). Developing dialogue: Process, trial, outcomes. Retrieved from http://www.robinalexander.org.uk/wp-content/uploads/2017/08/EARLI-2017-paper-170825.pdf
2. Alexander, R. (2018). Developing dialogic teaching: genesis, process, trial. Routledge: Taylor & Francis Group. Research papers in Education, 2018. https://doi.org//10.1080/02671522.2018.1481140
3. Alexander, R. & Hardman, F. (2017).Towards Dialogic Teaching: Rethinking Classroom Talk. Thirsk: Dialogos
4. Alkassim, S, R., Etikan, I. & Musa, S.A. (2016). Comparison of convenience sampling and purposive sampling. American Journal of Theoretical and Appied statistics. Vol.5. No.!. doi: 10.116448Ij.ajtas.20160501.11
5. Amemiya, J., Parr, A., & Ming-Te Wang. (2019). Student learning emotions in middle school mathematics classrooms: Investigating associations with dialogic instructional practices. Educational Psychology, Doi: 10. 1080/01443410.2018.1560395.
6. Arista, N. J., Dwi, J. & Raden, S. (2018). Students' Argumentation for solving Geometry in Junior High school.Advances in Intelligent systems Research (AISR), volume 157
7. Asterhan, C., Clarke, S., & Resnick, L., (ed). (2015). Socializing Intellegince Through Academic Talk and Dialogue. Washington DC: AERA.
8. Bati, K. (2019). Are we ready for argumentation in science classrooms? An investigation into the scientific discussion climate in a Turkish school. Hacettepe Critical Questions in Education 10: 1 winter 2019.
9. Bosseri, U., Lundim, M., Lindahli, M., & Linder, C. (2015). Challenges faced by teachers implementing socio-scientific issues as core elements in their classroom practices. European Journal of Science and Mathematics Education. Vol.3, No.2.
10. Cabanas-Sanchez, G., Reid, D. & Cervantes-Barraza, J. A. (2019). Complex Argumentation in Elementary School. PNA 13(4), 221-246.

11. Cadima, J., Verschueren, K., Leal, T., & Guedes, C. (2016).Classroom interactions, dyadic teacher-child relationships, and self-regulation in socially disadvantaged young children. Journal of Abnormal child Psychology, 44(1), 7-17.
12. Cheuk, T. (2016). Discourse Practices in the New Standards: The Role of Argumentation in Common Core Era Next Generation Science Standards Classrooms for English Language Learners. Electronic Journal of Science Education. Vol.20, No.3 (2016).
13. Department of Basic Education. (2018).Mathematics Teaching and Learning Framework for South Africa: Teaching mathematics for understanding. Pretoria: DBE.
14. Erduran, S., Guilfoyle, L., & Park, W. (2020). Science and Religious Education Teachers' views of argumentation and its teaching. Research in Science Education 52: 655-673.
15. Fischer, F., Vogel, F., Kollar, I., Ufer, S., Reichersdorfar, E., & Reiss, K. (2016). Developing Argumentation skills in mathematics through computer-supported collaborative learning: the role of transactivity. Instructional Science, 44(5), 477-500.doi:10.1007/s11251-016-9380-2
16. Gröschner, A., Kiemer. K., Pehmer, A.K., & Seidel, T. (2015).Effects of classroom discourse intervention on teachers's practice and students' motivation to learn mathematics and science. Learning and instruction, 35, 94-103.
17. Hair, J. P., Black, J. P., Babin, J.P., & Anderson, R. E. (2019). Multivariate Data Analysis, Eighth Edition. Harlow: Cengage Learning.
18. Han, J., & Kang, X., (2019). Improving Teaching style with dialogic classroom teaching reform in a Chinese High School. World Journal of Education. Vol.9, No.2; http://wje.sciedupress.com.
19. Hennessy, S. Howe, C.; Vrikki, M.; Wheatley, L & Mercer, N. (2018). Dialogic practices in primary school classrooms, Language and Education. Doi: 10.1080/09500782.2018.
20. Iwuanyanwu, P. N., & Ogunniyi, M. B. (2020). Effects of Dialogical Argumentation Instructional Model on Pre-service Teachers' ability to solve conceptual mathematical problems in physics. South African Journal of Education, 33(2). 1-17. Published online. https://doi.org/10.1080/18117295.2020.1748325.
21. Knudsen, J. & Rutsein, D. W. (2014). Advice for mathematical Argumentation. International Journal of Science Education, 30, 316-326.
22. Krusenvik. L. (2016). Using case studies as a scientific method: Advantages and Disadvantages. Higher Education Research and Development, 31(3), 393-405.
23. Larson,M. (2015). Orchestrating mathematical whole-class discussions in the problem-solving classroom. Sweden: Mälardelen University.
24. Langrall, C. W. & Rumsey, C. (2016). Promoting mathematical argumentation. Teaching children mathematics: Vol.22, No.7.
25. Lerkkanen, M. K., Pakarinen, E., Pikkeus, A.M., Salminen, J., Silinkas, G., Siekkinen, M., & Nurmi, J. E. (2017). Longitudinal association between teacher-child interactions and academic skills in elementary school. Journal of Applied Develoipment Psychology, 52, 191-202.doi: 10.1016/j.appdev.2017.08 .002 Open access.
26. Ministry of Education and Culture: Cyprus. (2015). Information on mathematics curriculum provided by the directorate of primary education (Internal communication, December 2, 2015).
27. Ministry of Primary and Secondary Education. Zimbabwe Education BluePrint 2015-2022.
28. Muhonen, H. (2018). Educational Dialogue in the classroom: Scaffolding, Knowledge Building and Associations with Academic Performance. Jyväskylä : University of Jyväskylä, 58p.
29. Pauli, C., & Reusser, K. (2015). Discursive cultures of learning in (everyday) mathematics teaching in German and Swiss classrooms. In L. Resnick, C. Asterhan, & S. Clarke (Eds.), Socialising intelligence through academic talk and dialogue (pp.181-193). Washington, D.C: American Educational Research Association.
30. Phillipson, N.,& Wegerif, R. (2017). Dialogic education: Mastering core concepts through thinking together. New York, NY: Routledge.
31. Rapanta, C. (2019). Argumentation as critically oriented Pedagogical Dialogue. Informal Logic, vol.39, No.1,pp.1-31
32. Zimbabwe School Examinations council.