Whole Class Group Dialogic Approach and Minimization of Learner Errors in Mathematics Classes in Public Primary Teacher Training Colleges in North Rift Region, Kenya

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Abstract

The purpose of this study was to establish the use of whole class-group dialogue in minimizing learner errors in mathematics classes in Public Primary Teacher Training colleges in Kenya. This study adopted a descriptive survey research design and was guided by social constructivist theory. Stratified and simple random sampling was used to select teacher trainees while purposive sampling was used to identify Heads of Mathematics department and Deans of Curriculum. Data was collected using structured interviews, structured observation schedules, document analysis and questionnaire. Data was analyzed using frequencies, percentages and the hypothesis were tested using chi-square at 0.05 level of significance. The study established that majority of teacher-trainees stated that they did not feel left behind all the time during mathematics lessons and that their mathematics tutors were competent in teaching. Further, majority of the teacher-trainees operates together to improve knowledge. The teacher trainees showed understanding of how group process promotes their learning and that assessment tasks are community products which demonstrate increased complexity of a rich web of mathematical concepts. The study established that tutors allowed learners to talk freely during the lesson and they appreciated each learner’s contribution in the lesson. The study concludes that there is a significant relationship between whole class group dialogue and minimization of learner errors in mathematics classes (a chi-square of 23.187, d.f. =8 and p-value of 0.003). This study will help understanding on problems regarding the development of mathematical concepts and therefore help in pointing out the source of errors in mathematics.

Introduction

Dialogue is a process of inquiry and learning that is based on openness, listening developing meaning, and sharing knowledge through conversation. It is a collaborative approach to discussion that seeks to build awareness, challenge, assumption and reach deeper understanding of issues (Rojas-Drummond and Mercer, 2003). Dialogue should not be used interchangeably with
conversation. He makes a distinction by saying what matters is the act of questioning. He goes further to say “If an answer does not give rise to a new question from itself, then it falls out of the dialogue”.

Different scientists (Rojas-Drummond, 2000; Rojas-Drummond and Mercer, 2003) have contended that dialogic styles of collaboration among guides and students are especially successful in advancing pre-younger students' taking care of numerical issues and elementary school underestimates' understanding cognizance and learning of normal sciences. Rojas-Drummond, Mercer, Fernandez and Wegerif (2006) have likewise demonstrated that kids can receive the utilization of exploratory converse with the job needing to be done, as far as whether they make (or not) thinking express through argumentation. A more extensive method of co-valuable take was proposed for progressively open-finished undertakings, for example, collective composing which incorporates alternating for giving assessments, producing choices, re-detailing and explaining a data being considered, planning and arranging points of view and looking for understandings.

As indicated by Munter, Stein and Smith (2014), in the dialogic instructing, over a progression of exercises, students must have chances to (a) grapple with enormous thoughts, without coaches meddling rashly, (b) set forth asserts and legitimize them just as tuning in to and scrutinizing cases of others, and (c) take part in painstakingly planned intentional practice. This requires tutors to engage learners in two main types of tasks – tasks that initiate learners to new ideas and deepen their understanding of concepts, and tasks that help them become more competent with what they already know; to orchestrate discussions that make mathematical ideas available to all learners and steer collective understanding toward the mathematical goal of the lesson; to introduce tools and representations that have longevity (i.e. can be used separated by overtime for different, but likely related, purposes, as learners understanding grows), and, finally to sequence classroom activities in a way that is consonant with positions of learners as autonomous learners and users of mathematics.

In the dialogic teaching communicating effectively with others is fundamental to knowing and learning. In this model, the sequence of learning experiences reflects both the progression of ideas that the structure of the discipline would suggest and the developmental pathways learner’s current understanding and capabilities take. Such a perspective places importance on building on prior knowledge, which, in this case, refers to the skills and concepts required for learners to meaningfully engage in learning experiences and struggle for understanding, rather than knowing exactly how to solve the problem due to prior exposure to very similar examples (Munter et al, 2014).

Research over the last four decades has focused on how classroom dialogue allows tutors and learners working together to construct knowledge and meanings and develop inter-subjectivity (Howe & Abechin, 2013). Alexander’s (2001) ground-breaking work highlights the central role played by the quality of classroom dialogue in promoting learner learning, and cultural variation in how dialogic and other form of pedagogy are manifested. Ras-Drummond, Torreblanca, Pedraza, Velez and Guzman (2013) posit that learners are active rather than passive participants in the process of dialogic interactions. Likewise, Mercer and Littleton (2007) assert that the in tutor-learner as well as peer interaction, dialogue
Marokoh et al. (2021) enables sharing of ideas and pursuit of common goals. Educational research across the globe overwhelming suggests that dialogic approaches to instruction provide an educationally productive environment that promotes learner learning and engagement (Alexander, 2017). Moreover, current research has shown that the nature and influence of pedagogy in classrooms is comprehensively and persistently dependent on the dialogic patterns at play in the sequential flow of tutor-learner exchanges in lessons (Edwards-Groves & Davidson, 2017).

Dialogue-rich instructional strategies have been shown to be a high-leverage pedagogical tool for both constructing subject knowledge and as a valued process clearly linked with the development critical thinking and productive learning and the connection making between and within subject disciplines (Kazepides, 2012). What is striking is that the research worldwide reporting on the educational potential of participating in dialogues have not resulted in substantial changes in teaching. Rather, studies have consistently shown that in today’s classrooms, discourse remains dominated by monologic teaching (Reznitskaya & Gregory, 2013). Further to this, and despite growing international evidence for the educational value of learner-learner and learner-tutor dialogues, researchers and tutors lack an analytic framework for making sense of the form and function of dialogic approaches to instruction (Hennessy et al., 2016).

Whole class group interactive dialogue targets producing an exceptionally elevated level of consideration, commitment and dynamic investment of students through setting up a high reaction rate to mentors. The coach may start the exercise by introducing realities utilizing a logical or educational methodology, yet then students are relied upon to go into discourse and contribute their own thoughts, express their feelings, pose inquiries and disclose their deduction to the educator and others (Dickson, 2003). Learning isn’t accomplished here by receiving a shortsighted equation of a little talk to the class followed by ‘drill and practice, or by anticipating that students should show themselves from books or different materials. Learning happens on the grounds that students are locked in subjectively in handling and utilizing applicable data, communicating it in their own words and getting criticism (Westwood, 2008).

Anderson et al. (2009) takes note of that setting up a justification for Mathematical talk is basic for building up desire for conscious tuning in. Students should be situated where they can see and hear the speaker, and they are required to listen effectively and be set up to react to the thoughts of others. Students are instructed how to deferentially differ and address each other. Most importantly, there is acknowledgment all things considered and all commitments to the conversations are regarded.

Coaches should concentrate on allocating Mathematical errands that are properly testing and upgrade students’ learning. Numerical assignments ought to examine significant Mathematical thoughts and have legitimate settings and importance for students. The issues presented ought to have various arrangement, energize examination, advance thinking, and expect students to give avocation to their reasoning. Eventually Mathematical undertakings ought to be deserving of student conversation and accentuate significant Mathematical realities. It’s on this basis that this study sought to determine how whole class group
dialogic approach could be applied in minimization of learner errors in Mathematics classes. The study was guided by the following hypothesis.

**H₀₁**: There is no significant relationship between whole class group dialogue and minimization of learner errors in mathematics classes in public primary teacher training colleges in the North Rift region of Kenya.

**Research Design and Methodology**

The study was done in selected Public Teacher Training Colleges in North Rift Region, Kenya. The investigation was secured in social constructivism theory. This Philosophy holds that the very idea of human learning necessitates that every individual make their own comprehension of the world from direct understanding, activity and reflection, not from predigested data and abilities displayed by a mentor and a course reading (Zevenbergen, 1995). Productive cases that significance doesn't exist in its own privilege rather it's built by person as they associate and participate in translation. It perceives that the truth is a result of human knowledge connecting with involvement with this present reality.

Constructivism acknowledges reality as a build of human brain and in this manner the truth is seen as abstract. For constructivism the truth is socially developed (Andrew, Pedersen&McEray, 2011). A descriptive survey design was used in the study. The target population of the study was 4 public teacher training colleges in North Rift, Kenya. The targeted respondents were 4HoDs (Mathematics Department), 4DoCs (Deans of Curriculum, and 1980 teacher trainees in the second year of study. Out of the total 1980 second year teacher-trainees from the sampled colleges, the researcher selected 322 (16.3%) teacher-trainees. Purposively, 8 tutors of second year mathematics teacher trainees, 4 HoDs and 4 DoCs participated in the study. The respondents were selected proportionately from each of the colleges where the study was done. Simple random sampling was used to identify individual participants in the study. Data was collected using interviews, observations and questionnaire. The data was analyzed using frequencies and percentages while chi-square was used to test the hypothesis. Data was presented in terms of frequency tables.

**Findings**

The study sought to determine how whole class group dialogic approach could be applied in minimization of learner errors in mathematics classes. To achieve this objective, the teacher trainees were asked to provide their level of agreement to 14 items that were measuring whole class group dialogic approach. The responses were in a five-point Likert scale from ‘Strongly Disagree, to Strongly Agree’ in a scale of 1 to 5 respectively. The responses are shown in Table 4.1.
As shown in Table 4.1, 65.8% (171) of the teacher trainees did not feel left behind all the time during mathematics lessons while 23.8% (62) agreed that they felt left behind all the time during mathematics lessons. Majority (75.0%) of the respondents stated that their mathematics tutors were quite competent in teaching while 16.9% (44) disagreed and 8.1% (21) were neutral. Another 68.1% (177) of the respondents stated that they received recognition from the tutors when they answered the questions correctly, while 16.5% (45) do not receive recognition for the correct answer from the tutors. It is also shown that 55.3% (144) of the respondents agreed that they have the best communication in their class and 24.2% (63) disagreed while 20.4% (53) were neutral. Further, 15.8% (41) of the tutors were always fast and harsh. However, majority (75.4%) disagreed and 8.8% (23)
were neutral. This implies that majority of the mathematics tutors were neither fast nor harsh.

Table 4.1 also shows that 24.3% (89) of the teacher trainees agreed that many of the approaches of teaching and learning mathematics only favour the bright learners while majority (57.7%) disagreed and 8.1% (21) were neutral. According to 61.2% (159) of the teacher trainees, their mathematics tutors were as good as any other mathematics tutors in other institutions. Only 15.0% (39) disagreed and 23.8% (62) were neutral. The findings also show that 15% (39) of the respondents did not feel that their effort to improve in mathematics was appreciated whereas 66.9% (174) disagreed and 18.1% (47) were neutral. This indicates that majority of the teacher trainees feel that their effort to improve in mathematics was appreciated.

As stated by 30% (78) of the respondents, teacher trainees always feel withdrawn prior to their mathematics lesson while 65.4% (170) disagree and 4.6% (12) were neutral. Majority (80.4%) of the teacher trainees who participated in this study stated that their mathematics tutors make up for the missed lessons while only 5.4% (14) disagreed. Further, 78.1% (203) of the teacher trainees agreed that their class participation positively correlates with their performance in tests and examinations while 10.8% (28) were of the contrary opinion and 11.2% (29) were neutral.

The study also established that 74.2% (193) of the teacher trainees agreed that they always engage in lively discussions during their mathematics lessons whereas 13.1% (34) disagreed and 12.7% (33) were neutral. There were 75% (195) of the respondents who stated that they find learning mathematics enjoyable every time while 13.1% (34) disagreed and 11.9% (31) were neutral. Another 46.5% (121) of the teacher trainees agreed that tutors are always responsible for their lack of interest in mathematics whereas 31.5% (82) disagreed and 21.9% (57) were neutral.

There was need to establish statistically whether there existed a relationship between whole class group dialogue and minimization of learner errors in mathematics classes in public primary teacher training colleges in Kenya. This was stated as:

**H₀:** There is no significant relationship between whole class group dialogue and minimization of learner errors in mathematics classes in public primary teacher training colleges in Kenya.

This hypothesis was tested using Chi-square and the results are presented in Table 4.2.

**Table 4.2: Chi-square results on relationship between whole class group dialogue and minimization of learner errors.**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>23.187</td>
<td>8</td>
<td>.003</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>260</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As revealed in Table 4.2, a chi-square of 23.187, d.f. =8 and p-value of 0.003 was obtained. Since p<0.05, the relationship is significant. The null hypothesis is rejected implying that there is a significant relationship between whole class group dialogue and minimization of learner errors.
in mathematics classes in public primary teacher training colleges in Kenya.

This methodology targets producing an exceptionally elevated level of consideration, commitment and dynamic support by students through setting up a high reaction rate to guides, addressing and inciting. The guide may start the exercise by introducing realities utilizing a logical or educational methodology, yet then students are required to go into exchange and contribute their own thoughts, express their feelings, pose inquiries and disclose their speculation to the coach and others (Dickson, 2003). Learning isn't accomplished here by embracing an oversimplified recipe of a little talk to the class followed by ’drill and practice, or by anticipating that students should show themselves from books or different materials. Learning happens in light of the fact that students are locked in psychologically in preparing and utilizing pertinent data, communicating it in their own words and getting criticism (Westwood, 2008).

Hargreaves et al., (2003) have comments that there are contrasts among guides by they way they decipher the idea of entire gathering intuitive instructing and how they suit it into their own style. To be viable, a coach should be exceptionally gifted at bringing all students into exercise by consolation, intrigue, and direct addressing. Guides likewise should be versatile and ready to 'think and react quickly' so as to react to and underwrite completely on students' commitments. At the point when occupied with intelligent instructing, a few mentors don't appear to perceive the benefit of empowering 'choral reacting' (Learners noting together now and again) and what ought to be an extremely lively pace of progress through the exercise might be eased back unexpectedly by requesting that singular students lift a hand in the event that they wish to respond to an inquiry or make a commitment.

Intelligent entire class discourse has been prescribed in government rules in the United Kingdom as a potential method for bringing students' accomplishment step up in fundamental numeracy (DFEE, 1999). While containing the principle elements of different types of direct educating, this dialogic model isn't obliged by scripted exercises and can be substantially more effectively suited into coaches' current instructing styles. Be that as it may, a few guides despite everything experience issues moving right now (Hargreaves et al., 2003).

With the end goal for students to straightforwardly share their reasoning and hazard committing errors before their companions it is basic that there is steady study hall condition. Everybody ought to comprehend their job in the study hall through the advancement of study hall standards. The coach is relied upon to suggest provocative conversation starters, bolster students' understanding and confusions, energize student interest in conversations and advance student reflection about the learning experience (Anderson et al., 2009). She further recommends that guides train students the significance of and desires for numerical discussions. She clarifies how talking like Mathematics empowers them to be solid Mathematical masterminds.

Anderson et al. (2009) contends that setting up a basis for Mathematical talk is basic for building up desire for aware tuning in. Students should be situated where they can see and hear the speaker, and they are required to listen effectively and be set up to react to the thoughts of others. Students are
instructed how to deferentially differ and address each other. Most importantly, there is acknowledgment all things considered and all commitments to the conversations are regarded.

Guides should concentrate on allotting Mathematical assignments that are fittingly testing and improve students’ learning. Scientific undertakings ought to explore significant Mathematical thoughts and have valid settings and importance for students. The issues presented ought to have different arrangement, support examination, advance thinking, and expect students to give legitimization to their reasoning. At last, Mathematical errands ought to be deserving of student conversation and accentuate significant Mathematical realities.

Conclusion
Concerning the whole class group dialogic approach in minimization of learner errors in mathematics classes, the study established that majority of the teacher trainees did not feel left behind all the time during mathematics lessons and that their mathematics tutors were quite competent in teaching. Further, teacher-trainees received recognition from the tutors when they answered the questions correctly and that the tutors communicate well with them. According to majority of the teacher trainees, their mathematics tutors were as good as any other mathematics tutors in other institutions. Majority of the teacher trainees feel that their effort to improve in mathematics was appreciated. Mathematics tutors make up for the missed lessons. It was also established that teacher trainees’ class participation positively correlates with their performance in tests and examinations. The study also established that teacher trainees engage in lively discussions during their mathematics lessons and that they find learning mathematics enjoyable every time.

Recommendations of the Study
Since dialogic teaching is only infrequently realized in everyday teaching because of the large class sizes, it is therefore necessary to take into account the number of learners in the classrooms and the fact that dialogue is not free but limited by curriculum.

REFERENCES


