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Teacher-Learner Dialogue Approaches and Minimization of Learner Errors in Mathematics Classes in Public Primary Teacher Training Colleges in North Rift Region, Kenya

Marokoh Gideon Shem

Abstract

Although efforts have been made to ensure qualified tutors are employed and instructional resources are provided in Kenyan public teachers training institutions, nearly half of teacher trainees fail the final examinations. This point at the approaches and methodologies used to deliver subject content. This study sought to determine how teacher-learner dialogue can be used to minimize learner errors in mathematics classes in Public Primary Teachers Training Colleges in North Rift Region Kenya. The descriptive survey research was guided by social constructivist theory. Stratified and simple random sampling techniques were used to select teacher trainees while purposive sampling technique was used to select Heads of Mathematics department and Deans of Curriculum. Data was collected using interviews 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 teacher trainees operate together to improve knowledge. They help each other to learn through dialogue in which learning goals emerge and develop during dialogue. The teacher-trainees show understanding of how group processes promote their learning. The respondents stated that classroom social structures promote interdependence and that assessment tasks are community products which demonstrate increased complexity and a rich web of mathematical concepts. The findings revealed that there is a significant relationship between teacher-learner dialogue and minimization of learner errors (a chi-square of 22.594, d.f. = 8 and p-value of 0.004). The study will increase awareness of the need for tutor educators to prepare a safe, friendly, motivating and productive classroom interaction.

Introduction

Dialogic instructing has been the subject of expanding conversation over the most recent couple of years and various scholars have contended that it holds the best psychological potential for students, while simultaneously demanding a lot from teachers (Alexander, 2006). This suggests that dialogic teaching is a concept of growing importance in discussion of learning and teaching. Research over the past four decades has centered on how teachers and learners can work together in the classroom dialog to co-construct awareness and definitions and build intersubjectivity (Hower & Abedin, 2013). In particular, the groundbreaking work by Alexander (2001) highlights the central role played by the quality of the classroom dialog in supporting learner learning and the cultural variability in how dialogical and other forms of pedagogy are manifested. An investigation of arithmetic exercises by Berry and Kim (2008), found that coach talk was 'mostly recitational', with the two primary kinds of inquiry, inspiring and steady, both shut and driving. Such inquiries force tight authority over student support, a finding embraced through Bleicher, Tobin, and McRobbie's (2003) investigation of talk during a science class. Similarly, Pontefract and Hardman (2005) found that mentor drove recitation, repetition and redundancy overwhelmed study hall connections with little spotlight on student understanding. Besides, in arithmetic study halls, Sepeng (2011) found that triadic discourse won in any event, when information was dialogically co-developed. Hansen (2011) argues that tutors need to treat errors sensitively and productively, as errors can be used as tools not only to motivate learners but also to assist them in developing their conceptual knowledge by learning from their errors. Much of the research on errors and misconceptions argue that errors are a normal part of the learning process. Even experienced mathematicians make errors and by so doing create new knowledge. In classrooms, errors make for points of discussions with the learner’s current knowledge (Smith et al., 2013). The notion of errors gives us a way to help tutors see learners as reasoning and reasonable (Ball & Bass, 2003). By tutors searching...
for ways to understand why learners may have made errors, they may come to value learners’ thinking and find ways to engage their current knowledge in order to create new knowledge. An important issue for tutors’ thinking about errors relates to the role and responsibility of the tutors in producing errors. Errors are seldom taught directly by tutors and yet all learners, even ‘strong’ learners, develop them at same point (Brodie, 2014). However, tutors sometimes exacerbate errors through taking them for granted use of language and concepts (Brodie, 2014) and, at another level through not making errors public and dealing with them (Ingram et al., 2013). Brodie (2013) suggests a framework for analyzing how tutors interact with learner errors. Tutors can avoid, correct, probe or embrace errors. Tutors may avoid or ignore errors because they are insecure about their content knowledge, they may not regard errors as important tools for learning, they may not want to shame learners or they fear that errors may be ‘contagious’ (Swan, 2001). Tutors often correct errors, thereby making the correct knowledge accessible to learners. Correcting errors suggest that tutors have identified and evaluated the errors than interpreted the errors from the learners’ perspective. Probing involves tutors attempting to understand errors make sense to learners, usually by asking learners ‘probing questions’ or pressing questions to gain access to learner thinking (Brodie & Shalem, 2011). By asking questions, tutors support learners to develop reasoning and learners learn how to explain their thinking and justify their ideas. Embracing errors is where tutors use errors constructively to generate how knowledge for the other learner who has made the error and for other learners that is why they use errors as tools to enhance epistemological access (Brodie, 2013).

Tutors understanding of the tutor-learner relationship itself may change as they begin by ‘dialogic’ pedagogy and ‘dialogic teaching’ which essentially mean an approach to teach that is predicted on the active, extended involvement of learners as well as tutors in the spoken interaction of the classroom, so that teaching and learning becomes a collective endeavor in which knowledge and understanding are formally constructed rather than talk being used by tutors to transmit co-curriculum content and assess its acquisition by learner as argued in the seminal work of other classroom researchers (Mortiner & Scott, 2003; Alexander, 2008).

As per Alexander (2008), communicative practices in classes over the world assume a unique role that mirrors the manner by which specific social orders are sorted out, the way wherein people identify with society and one another, and contrasting conceptualizations of information. Too he notes there is a verifiable measurement to talk as difficulties after some time cut themselves into talks available for use. These bunch difficulties realize fluctuated rehearses. To start with, the essential trait of essential science training is the accentuation on singular cooperation. Given the low proportion of coaches to kids in numerous homerooms, students are regularly seriously associated with a round of ‘think about what the guide is thinking’ and quest for right answers (Alexander, 2008). In spite of calls for educating to turn out to be increasingly intuitive, explore proposes that the benchmarks drive in proficiency and numeracy has been counterproductive with customary examples of correspondence strengthened as opposed to diffused (Moyles et al., 2003; Smith et al, 2004). This requires a development towards change set in progress by expanding familiarity with the likelihood for open activity and potential effects on student learning and improvement. This is supported by Game and Metcalfe (2009) who argue that actual teaching is conducted by both the teacher and the learner and an important element of teaching is that it is a shared process.it is on this basis that the study sought to determine how teacher-learner dialogue could be applied in minimization of learner errors in Mathematics classes in public primary teacher training colleges in North Rift region of Kenya. The study was guided by the following hypothesis.

**H0:** There is no significant relationship between teacher-learner dialogue and minimization of learner errors in mathematics classes in public primary teacher training colleges in North Rift region of Kenya.

**Research Design and Methodology**

The study covered selected Public Teacher Training Colleges in North Rift Region, Kenya. The public primary teacher training colleges in this region are Mosoriot TTC in Uasin Gishu County, Tambach TTC in Elgeyo Marakwet County, Baringo TTC in Baringo County and Chesta TTC in West Pokot County. The investigation was secured in social constructivism theory. As per Westwood (2008), students are self-persuaded and automatic creatures who will procure the crucial abilities of perusing, composing, spelling of, taking part in, and conveying about age fitting, important exercises each day. A descriptive survey design was used in the study. This investigation was guided by the social constructivist system hypothesis. The target population of the study was 4 public teacher training colleges in North Rift, Kenya. The targeted respondents were 4 Heads of department (Mathematics Department), 4 Deans of Curriculum, and the 1980 learners in the second year of study. Learners in their second year of the course was selected on the basis that they have vast knowledge in
instructional approaches having taken three teaching practices. Data was collected from all the four public primary teacher training colleges in the North Rift, Kenya. 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 questionnaire, document analysis, interviews and observations schedules. The tutors were subjected to interviews and filling of questionnaires. Observations were made during class interactions. 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 and pie charts.

Findings
General information of the Respondents
General information of the respondents in terms of marital status and educational level is presented in the following sub-sections.

Fig. 1: Marital Status of Respondents

Figure 1 Marital Status of Respondents
It was noted that majority (67.3%) of the teacher-trainees who participated in this study were single whereas 25% (65) were married.

Educational Level of Respondents
The study sought information concerning the level of education of the teacher-trainees. Their responses are shown in Figure 2: Educational Level of Respondents

Figure 2 Educational Level of Respondents
As shown in Figure 2, majority (64.3%) were KCSE holders while 32.3% (84) were holders of other certificates.

Tutor-Learner Classroom Interaction
The study also sought to determine how tutor-learner dialogue could be applied in minimization of learner errors in mathematics classes. The responses are presented in Table 1.

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD F</th>
<th>D F</th>
<th>N F</th>
<th>A F</th>
<th>SA F</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allows all learners to talk freely during the lesson</td>
<td>23</td>
<td>8.8</td>
<td>53</td>
<td>20.2</td>
<td>6</td>
<td>23.8</td>
</tr>
<tr>
<td>Appreciates each learners contribution in the lesson</td>
<td>12</td>
<td>4.6</td>
<td>11</td>
<td>4.2</td>
<td>10</td>
<td>3.8</td>
</tr>
<tr>
<td>Avoids spoon feeding the learners with concepts</td>
<td>21</td>
<td>8.1</td>
<td>32</td>
<td>12.3</td>
<td>36</td>
<td>13.8</td>
</tr>
<tr>
<td>Begins from the known to the unknown</td>
<td>5</td>
<td>1.9</td>
<td>3</td>
<td>1.2</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Does not talk enthusiastically about what needs to be done during discussion</td>
<td>46</td>
<td>17.7</td>
<td>52</td>
<td>20.0</td>
<td>45</td>
<td>17.3</td>
</tr>
<tr>
<td>Encourages each learners to share their views and articulate them appropriately</td>
<td>12</td>
<td>4.6</td>
<td>17</td>
<td>6.5</td>
<td>26</td>
<td>10.0</td>
</tr>
<tr>
<td>Rebukes learners who make noise during the lesson and discussion</td>
<td>50</td>
<td>19.2</td>
<td>48</td>
<td>18.5</td>
<td>4</td>
<td>1.5</td>
</tr>
<tr>
<td>Emphasizes the importance of having collective sense of purpose during learning</td>
<td>12</td>
<td>4.6</td>
<td>18</td>
<td>6.9</td>
<td>40</td>
<td>15.4</td>
</tr>
<tr>
<td>Laughs heartily with the learners during mathematics lessons</td>
<td>56</td>
<td>21.5</td>
<td>54</td>
<td>20.8</td>
<td>32</td>
<td>12.3</td>
</tr>
<tr>
<td>Prefers learners working on their own individually</td>
<td>65</td>
<td>25.0</td>
<td>58</td>
<td>22.3</td>
<td>43</td>
<td>16.5</td>
</tr>
<tr>
<td>Prefers correct answers from the learners whenever poses questions</td>
<td>29</td>
<td>11.2</td>
<td>21</td>
<td>8.1</td>
<td>69</td>
<td>26.5</td>
</tr>
<tr>
<td>Articulates a compelling vision for the class</td>
<td>0</td>
<td>0.0</td>
<td>22</td>
<td>8.5</td>
<td>45</td>
<td>17.3</td>
</tr>
<tr>
<td>Explains every concept on the chalkboard and gives learners assignments</td>
<td>15</td>
<td>5.8</td>
<td>28</td>
<td>108</td>
<td>23</td>
<td>8.8</td>
</tr>
<tr>
<td>Has to be in class for meaningful learning to take place.</td>
<td>20</td>
<td>7.7</td>
<td>45</td>
<td>17.3</td>
<td>60</td>
<td>23.1</td>
</tr>
</tbody>
</table>

It is instructive to note that 68.4% (178) of the respondents stated that their tutors allow all learners to talk freely during the lesson while 33.1% (76) disagreed and 2.3% (6) were neutral. Another 87.3% (227) of the teacher trainees stated that their tutors appreciate each learners’ contribution in the lesson. However, 8.8% (23) disagreed and 3.8% (10) were neutral. Further, 63.8% (171) of the trainees agreed that their tutors avoid spoon feeding the learners with concepts whereas 20.4% (53) disagreed and 13.8% (36) were neutral. Another 95.4% (248) of the respondents stated that their tutors begin from the known to the unknown while only 3.1% (8) disagreed and 1.5% (4) were neutral. It is also indicated that 45% (117) of the respondents stated that their tutors do not talk enthusiastically about what needs to be done during discussion while 37.7% (98) disagreed and 17.3% (45) were neutral. Majority (78.8%) of the respondents
stated that their tutors encourage them appropriately whereas 11.2% (29) disagreed and 10% (26) were neutral.

According to 60.7% (158) of the respondents, tutors rebuke learners who make noise during the lesson and discussion. However, 37.7% (98) disagreed and 1.5% (4) were neutral. The study also established that 73.1% (190) of the teacher trainees agreed that their tutors emphasize the importance of having collective sense of purpose during learning while 11.5% (30) disagreed and 15.4% (40) were neutral. Further, 43.3% (118) of the teacher trainees agreed that their tutors laugh heartily with the learners during mathematics lessons. However, 42.3% (110) disagreed and 12.3% (32) were neutral.

Similarly, 36.1% (94) of the teacher trainees asserted that their tutors prefer learners working on their own individually while 47.3% (123) disagreed. Another 54.2% (141) of the trainees stated that their tutors prefer correct answers from the learners whenever they pose questions while 19.2% (50) disagreed. There were 74.2% (193) of the respondents who stated that their tutors articulate a compelling vision for the class while 25.8% (67) disagreed. According to 74.6% (193) of the respondents, the tutors explain every concept on the chalkboard and give learners assignments whereas 16.5% (43) disagreed and 8.8% (23) were neutral. Half (51.9%) (145) of the respondents agreed that their tutors have to be in class for meaningful learning to take place. However, 25% (65) disagreed.

Baktin (1981) makes a differentiation among dialogic and monologic talk. He utilizes the case of mentor – student talk to outline the idea of monologic talk and contends that it blocks veritable exchange (Skidmore, 2000). A monologic guide is generally worried about the transmission of information to students and remains solidly in charge of the objectives of talk.

Further, chi-square was used to test the hypothesis that was stated as:

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

The results are presented in Table 2.

Table 2: Chi-square results on relationship between tutor-learner dialogue and minimization of learner errors in mathematics classes in public primary teacher training colleges in Kenya.

<table>
<thead>
<tr>
<th>Value</th>
<th>D. f.</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>22.94</td>
<td>8</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>260</td>
<td>.004</td>
</tr>
</tbody>
</table>

As shown in Table 2, a chi-square of 22.594, d.f. =8 and p-value of 0.004 was obtained. Since p<0.05, the null hypothesis is rejected which implies that there is a significant relationship between tutor-learner dialogue and minimization of learner errors in mathematics classes in public primary teacher training colleges in Kenya.

**Conclusion**

The study sought to determine how tutor-learner dialogue could be applied in minimization of learner errors in mathematics classes. It is instructive to note that 64.6% of the respondents stated that their tutors allow all learners to talk freely during the lesson while 33.1% disagreed and 2.3% were neutral. Another 87.3% of the teacher trainees stated that their tutors appreciate each learners’ contribution in the lesson.
However, 8.8% disagreed and 3.8% were neutral. Further, 68.4% of the trainees agreed that their tutors avoid spoon feeding the learners with concepts whereas 20.4% disagreed and 13.8% were neutral. Another 95.4% of the respondents stated that their tutors begin from the known to the unknown while only 3.1% disagreed and 1.5% was neutral. It is also indicated that 45% of the respondents stated that their tutors do not talk enthusiastically about what needs to be done during discussion while 37.7% disagreed and 17.3% were neutral. Majority (78.8%) of the respondents stated that their tutors encourage them appropriately whereas 11.2% disagreed and 10% were neutral. According to 60.7% of the respondents, tutors rebuke learners who make noise during the lesson and discussion. However, 37.7% disagreed and 1.5% were neutral. The study also established that 73.1% of the teacher trainees agreed that their tutors emphasize the importance of having collective sense of purpose during learning while 11.5% disagreed and 15.4% were neutral. Further, 43.3% of the teacher trainees agreed that their tutors laugh heartily with the learners during mathematics lessons. However, 42.3% disagreed and 12.3% were neutral. Similarly, 36.1% of the teacher trainees asserted that their tutors prefer learners working on their own individually while 47.3% disagreed. Another 54.2% of the trainees stated that their tutors prefer correct answers from the learners whenever they pose questions while 19.2% disagreed. There were 74.2% of the respondents who stated that their tutors articulate a compelling vision for the class while 25.8% disagreed. According to 74.6% of the respondents, the tutors explain every concept on the chalkboard and give learners assignments whereas 16.5% disagreed and 8.8% were neutral. Half (51.9%) of the respondents agreed that their tutors have to be in class for meaningful learning to take place. However, 25% disagreed.

In relation to learner-learner dialogic interaction, the study established that teacher trainees operate together to improve knowledge. They help each other to learn through dialogue in which learning goals emerge and develop during dialogue. The teacher-trainees show understanding of how group processes promote their learning. The respondents stated that classroom social structures promote interdependence and that assessment tasks are community products which demonstrate increased complexity and a rich web of mathematical concepts.

**Recommendations of the Study**

The study recommends that tutors and teacher-trainees should talk in the lessons. Teacher trainees should not be limited to merely convey correct answers to the tutors. The learners like communicative classes and therefore a good lesson is one where teacher trainees share their opinions on any topic and say something interesting at least to be taught about for a while.

**References**


