

Co-teaching in the Natural Science Classroom: A Case Study

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ABSTRACT This paper reviews the concept of co-teaching and its role in assisting learners of various abilities in a diverse natural science class. Learners were interviewed and requested to give their opinions about their experiences of lessons in a particular theme offered by the natural science teacher and again on another theme where the special needs teacher was present in a co-teaching role. The investigation was carried out over a two-year period each time focusing on a Grade 9 natural science class that included diverse learners, covering the same lesson themes in the same format. Although some learners considered co-teaching as being disruptive, the majority of learners found the experience useful and interesting.

INTRODUCTION

Each classroom of learners represents a remarkable diversity of culture and ability particularly in an international school. Teachers are required to understand and appreciate the considerable learning differences that will enable learners to construct and retain knowledge and match the learning preferences of individual learners with appropriate teaching strategies (Powell and Kusuma-Powell 2007). For any teacher, the greatest challenge is to accommodate each individual learner's needs. These needs may differ; for example, some learners may be newcomers to the language of instruction, while others may have special learning needs, attention deficit disorders or special gifts and talents. Niergarten (2013) points out that the inclusion of learners with special needs has been widely promoted in recent years even though the practice places a heavy burden on the ordinary teacher who is often inadequately trained to meet the needs of such a diverse classroom. As is no single teaching strategy has the monopoly on being successful for all the learners in a heterogeneous class. However, it is important to identify those strategies that are effective

in enhancing learner achievement in diverse classrooms. Co-teaching has been one of the support strategies used to address the challenges and capitalise on the opportunities for learners with special needs in the main stream classroom (Gurgur and Uzuner 2011; Niergarten 2013). Consequently the instructional strategy examined in this investigation is that of co-teaching, involving collaboration between a high school natural science teacher and a special needs teacher in an international intermediate school in Kenya.

Friend et al. (1993: 8) describe co-teaching as "a delivery approach when a classroom teacher and a special education teacher share responsibility for planning, delivering, and evaluating instruction for a group of learners." Gartner and Lipsky (1997) agree, describing co-teaching as an instructional strategy where the general education and special education teachers work together to teach all the learners in a classroom. Both teachers are responsible for the planning and delivery of the lesson, learner achievement, assessment, and discipline. However, as Niergarten (2013) points out, it is challenging to establish co-teaching in any school setting particularly if there are various formats. Gurgur and Uzuner (2011) distinguish between two co-teaching models, namely team teaching and station teaching. This research focuses on the team teaching model which merges general education and special education teaching. Because of the collaboration in the team teaching model, the teachers should be capable of developing a more comprehensive program that could adapt to the needs of all the learners. Co-teaching could allow teachers to best serve the diverse popula-

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tions that exist in general education classrooms, and help avoid the labelling and stigmatisation of particular learners (Bauwens 1991). This is supported by DeLuca et al. (2010: 3) who assert the following: "Co-teaching is one way to deliver services to learners with disabilities or other special needs as part of a philosophy of inclusive practices. As a result, it shares many benefits with other inclusion strategies, including a reduction in stigma for learners with special needs, an increased understanding and respect for learners with special needs on the part of other learners, and the development of a sense of a heterogeneously-based classroom community." A further advantage is that teaching time is used maximally because learners do not leave the classroom to go to another venue for specialised assistance.

Magiera and Zigmond (2005) and Qi Hang and Rabren (2009) report that several researchers have found significant positive academic gains for learners with disabilities in co-taught classes acknowledging the work of Bear and Proctor (1990), Klingner et al. (1998) and Marston (1996). However their own research failed to identify substantial additive effects stemming from having the special needs teacher assigned to co-teach with a general education teacher. These authors concede that though their study had several limitations it pointed out several implications for co-teachers such as "...that teachers were insufficiently prepared to engage in a co-teaching relationship" (Magiera and Zigmond 2005: 84). If this is the reality, then preparation and planning is the key to successful co-teaching. Murawski and Dieker (2004) suggest that before the planning meeting, the general teachers should provide a general overview of content, curriculum and standards to be addressed, and the special needs teacher should provide the individualised education program (IEP) goals, lesson objectives, and possible modifications for the learners in the shared classroom. They believe that this type of information sharing is critical especially at high school level where subject teachers tend to be content specialists and special needs teachers tend to focus on individual learning needs.

Consequently, the following question comes to mind: If teachers involved in co-teaching are willing participants in the delivery and are prepared to work together on their preparation and classroom management of a diverse group of

learners, would it contribute to the learning success of learners with mild disabilities or those with limited fluency in the medium of instruction? This study attempts to extend existing co-teaching research by addressing this and in particular the following research question: How effective is the learning of a particular lesson theme for a diverse group of grade 9 natural science learners at a particular school when co-teaching involving the high school natural science teacher and the special needs teacher is implemented?

Objectives of the Study

The objectives of this study were to determine learners' views on their learning experience of lessons taught by the natural science teacher; to determine whether the differentiation efforts of the natural science teacher had any effect on learning; to get learners' input on their experiences of learning where lessons were co-taught with the special needs teacher; to get feedback from learners on whether the co-taught lessons contributed in any way to their learning and to identify any negative feelings learners associated with co-taught lessons.

RESEARCH DESIGN AND METHODOLOGY

This interpretive investigation was qualitative in nature as the intention was not to make generalisations, but to explore and describe the effect of co-teaching in a natural setting by means of a case study. A case study is suitable for this investigation since it focuses on an in-depth investigation in a real life situation. Robson (2002: 545) defines a case study as "a research strategy focusing on the study of single cases. The case can be an individual person, an institution, a situation, etc." The distinguishing feature of case study research is that it concentrates solely upon a specific case in its context (Rose and Grosvenor 2001). In this investigation the case study focuses on grade 9 natural science learners with a range of educational needs in a particular international intermediate school in Kenya.

Before the investigation commenced, permission was obtained from the authorities and from the administrator of the particular school to carry out the research. All learners in the grade 9

natural science class were asked to participate in the research and because all the participants were minors, permission was obtained from their parents. The consent forms provided information about the research design and also outlined anonymity and confidentiality. The parents also had the opportunity to discuss the research at a parent-teacher conference. All the parents of the learners in the grade 9 natural science class gave permission for their children to participate in the research.

Data was collected by means of semi-structured interviews, which according to Rose and Grosvener (2001) allows a greater opportunity for the interviewer to seek clarification and elaboration. The interview guide was based on a review of literature and adapted with input from the special needs teacher. To ascertain whether co-teaching had any notable influence on the learners, specific issues were considered during the interviews, particularly differentiation and collaboration. Differentiation ensures that teaching and learning is “flexible, purposeful and respectful” (Powell and Kusuma-Powell 2007: 14) and boils down to teaching in a variety of ways to meet the various needs of learners. Morgan (2014) reports on how differentiated learning can assist learners who have difficulty learning by eliminating disengagement. Collaboration is an all-encompassing requirement for successful co-teaching combining the talents and experiences of teachers, in this case those of the natural science and special needs teachers, to create a new approach to teach with a shared goal and responsibility. The purpose of the interviews was to get the views of the learners on the differentiation and collaborative efforts of the teachers. A teacher who was familiar with both the learners and the co-teaching project was requested to conduct the interviews in an attempt to remove any form of bias on the part of the interviewer and to eliminate any form of discomfort that learners may have experienced. Learners were asked to be as honest as possible and ensured that everything they said would be kept anonymous and in the strictest of confidence.

The head of the special needs department collaborated with the natural science teacher as regards the planning of natural science lessons covering a particular theme, the delivery of the instruction and the evaluation of learning. Grade 9 is the first year of the high school and the average age of the learners is fourteen. The nat-

ural science program is an integrated learning area comprising of four disciplines: biological science, earth science, chemistry and physics. The earth science component was chosen for this study because it is taught in the middle of the year giving sufficient time for the establishment of good teacher-learner relationships.

Two trial sessions were held over a period of two years with the grade 9 natural science classes chosen for both sessions and using the same lesson themes. The first group included eighteen diverse learners; two were limited English speakers who attended English Second Language (ESL) classes; three had ‘individual education programs’ (IEPs) and were supported by the Learning Resource Centre (LRC) of the particular school, and two learners were identified by teachers at the school as having ‘learning difficulties’ but parent permission was not obtained for further testing by an educational psychologist. The grade 9 natural science class that was chosen for the second group in the following year had twenty-two learners, two of whom had IEPs and were supported by the LRC. There were no learners who attended ESL classes in this group.

Once the necessary permission was obtained, the special needs teacher observed the presentation of a few natural science lessons to gain an understanding of the investigator’s style of teaching and to get an insight in the learners in the class. This was important as according to Powell and Kusuma-Powell (2007: 35) one of the keys to differentiation is “knowing the learners in your class”. During this time the special needs teacher was introduced to the class and the concept of co-teaching was explained to the learners.

With each trial five lessons were planned and taught by the natural science teacher without the input of the special needs teacher. The special needs teacher was not present and therefore had no influence on the planning stage, instruction or assessment phase of the lessons; however the natural science teacher carefully considered the information available in the literature on differentiation and assisting individual learners in the class. The lesson plans consisted of a framework of the essential content, principles and skills that needed to be covered. Factors such as learner interests, learner readiness levels and needs were woven into the lessons. The lesson plans were organised yet flexible

enough to allow for the adjustment of teaching depending on where the learners are in their understanding and interests. After the series of lessons the learners were interviewed on a one-to-one basis, in an attempt to understand their views on the teaching-learning situation and whether they had difficulties with the content that was covered. These interviews were audio-recorded and later transcribed.

After the lessons without the special needs teacher present, six lessons on a different lesson theme were planned and co-taught with the special needs teacher in the classroom. On completion of these six lessons, the learners were again interviewed on a one-to-one basis to get learners' views on the experience and once more the interviews were audio-taped and transcribed for data analysis.

RESULTS AND DISCUSSION

None of the learners in the first trial group indicated any major differences between the differentiation of lessons with or without the special needs teacher, and all of the learners in the second trial group indicated that there already was sufficient variety in the lessons prior to the co-taught lessons. This suggests that differentiation was probably not a key difference between lessons taught by the natural science teacher alone and those co-taught with the special needs teacher. However, two of the learners with special needs in the first trial, learner 1 (LRC) and learner 7 (referred by teachers as having learning difficulties) indicated that there was no variety in any of the lessons. These two learners were of the opinion that the broad repertoire of instructional strategies did not engage them adequately in their learning experiences. Learner 1 (LRC) gave negative responses to all the questions, but did however indicate that the lessons that were co-taught were better understood.

Learners 9 and 18 (LRC) in the first trial group both indicated that there was more variety in the lessons during the co-teaching sessions, which helped them in their understanding. On the other hand, learner 8 from the first trial group mentioned that the broad variety of teaching strategies in the lessons was confusing and that he had difficulty concentrating on each of them. In the second trial only learner 7 commented on more variety during the co-teaching lessons and

learner 4 made the comment that too much variety can be confusing. One of the characteristics of successful differentiation is designing and facilitating "multiple paths" to reach defined learning goals (Carolan and Guinn 2009: 15) and through individualised teaching (Morgan 2014). However some learners may find too much choice distracting and therefore confusing. Learners get to know and trust their subject teacher and the mere presence of another individual who also talks when their teacher teaches can be unsettling to some learners. These comments help to reinforce the complexity of trying to meet the needs of all the learners in a classroom and that in reality differentiation is complex and challenging work. It appears from the two groups that the lessons were appropriately differentiated for the learners' needs in both the lessons with and without co-teaching. This finding is not surprising because the natural science teacher has always been aware of using varied approaches to teaching in order to address the different learning needs of the learners in the classroom. Learners tend to understand little and lose focus during classroom teaching when their teachers fail to use teaching strategies that match learners' learning styles (Morgan 2014). In order to create a true community of learning Tomlinson (1999) suggests that the teacher should appreciate each child as an individual, and teach the whole child including his or her emotional, physical and academic needs, but this can be problematic in reality because of large class sizes. Having another teacher in the classroom should aid in addressing some of these issues and ensure that lessons are appropriately differentiated.

Learners were also asked about their experience of co-teaching to determine if they benefited from it. All the learners in the first group, except for four learners (numbers 1, 9, 10 and 17) found the presence of the special needs teacher in the lessons helpful. Two of the learners (numbers 1 and 17) did not use any of the learning strategies the special needs teacher had taught them to study for tests. The negative comments from some learners are analysed and discussed further.

As mentioned earlier Learner 1 (LRC) in the first group gave negative responses to all the questions, however, some of his answers did indicate that he had learnt something from the co-teaching approach. For example, he said the

review worksheets that were used during the lessons were helpful; that he used more strategies when trying to answer questions and that he had tried using flash cards when preparing for a test. Learner 17 (ESL) in the first group had a very poor understanding of English and struggled to understand the questions, and as a result she gave negative responses to most of the questions. She mentioned that when she had been in her home country she had exercise books with pictures and these had helped her remember facts but that the diagrams “don’t make sense” to her now because they are not supported in a language with which she is familiar. Learner 10 in the first group indicated being “very irritated” by the presence of another teacher in the classroom and did not like having two teachers in the class. Her answers to all the questions were mostly negative and her irritation was clearly evident in her voice during the interview. A discussion with the learner’s mother after the interview revealed that the learner was going through a very moody stage and that this was impacting negatively on all her schoolwork. The co-teaching approach used in her science classes does not appear to be the cause of her moodiness; however, it did seem to contribute to her irritation levels. Learner 9 in the first group is a confident academic and found the presence of the other teacher “distracting, unnecessary and overbearing” however she did find some of the strategies to study for tests that were discussed in the co-teaching sessions useful. Her interview responses prior to the co-teaching sessions indicated that she prepares well for tests and probably found the input from the special needs teacher superfluous.

Regardless of these negative responses, there were learners in the first group that were very positive. For example, the other ESL learner (learner 4) mentioned that having another teacher in the class was helpful because if she did not understand an explanation given by one teacher, she had the benefit of the other teacher’s explanation. She felt that the learning strategies she had been shown by the special needs teacher would not only help her in natural science, but could also be useful in her other subjects. According to this learner, the special needs teacher “focuses a lot on how we will memorize the subject and I think it is better because it is helpful because this is not only for science but for other subjects also.” The other LRC learners in

the first group, learners 6 and 18, both mentioned that they had found it helpful having a concept explained in two different ways. They also mentioned that they had found the association of facts in a diagram very helpful to remember these facts. “Using the drawings helped a lot... I was able to memorize facts much easier with this technique” (Learner 6). “Reading the work over and over again and drawing a picture to explain the notes really helped me” (Learner 18). Learner 16 in the first group, who was referred by teachers and identified as having learning difficulties, found having two teachers in the class helpful because if one teacher was busy, there was another teacher to help him. He found some of the studying techniques that the special needs teacher had taught him to study for a test to be useful.

The same trend was found in the second trial group with the majority of learners reporting positive perceptions of having the special needs teacher in the lessons. However, five of the learners in the second group (numbers 1 (LRC), 11, 12, 17 and 21) found the presence of another teacher in the classroom ‘distracting, confusing and unhelpful’ and learner 7 was distracted because the special needs teacher kept ‘walking about’. Learner 1 (LRC) experienced anxiety during any change in her environment, and according to her IEP change could cause inattention and feelings of being overwhelmed, which resulted in difficulty to grasp new concepts. This could account for her feeling of being confused in the co-taught lessons. The other learners in the second group that were distracted by having another teacher in the lessons, namely learners 12, 17 and 21, did not find any of the strategies the special needs teacher had taught them useful in any way.

The negative responses by learners to the presence of another teacher in the class were not unexpected because in research done by Gerber and Popp (1999) investigating the views of learners with and without learning disabilities regarding their experiences with the co-teaching approach, mentioned that there were reports of frustration and confusion from learners whose teachers offered different explanations or talked at the same time during the lesson. Further Magiera and Zigmond (2005) concluded that learners preferred to interact more with the subject teacher, though they could seek individual teaching with the special needs teacher present.

Despite these negative responses, the majority of the learners, with and without learning difficulties, indicated that they had benefited from co-teaching approach. These benefits include the following:

- ♦ Increased contact time with teachers: Learners 16 and 18 (LRC) in the first group found that if one teacher was busy the other teacher was available to help them, and learners 2 (LRC), 4, 13, 14 and 16 in the second group, mentioned that it helped having another teacher in the class to ask questions.
- ♦ Teaching using two different styles: Learner 14 in the second group found the repetition of important facts by the two teachers helpful, and learner 5 commented on the special needs teacher 'also being a learner' and interpreting the content in a different way. Learners 2, 3, 4 (ESL), 6 (LRC), 7, 11, 15 in the first group, and learner 20 in the second group found co-teaching helpful in remembering facts.
- ♦ Teaching learning strategies: Learners 5 and 8, 13 in the first group mentioned that the special needs teacher taught them new ways of learning and revising, and learners 12 and 14 in the first group felt they had a clearer understanding of their own learning styles. Learner 3 in the second group found the 'doodles' she was shown by the special needs teacher helpful in remembering facts; learner 18 commented on how helpful the use of diagrams were, and learner 19 mentioned an improvement in his note taking techniques.
- ♦ Discipline issues: Learner 15 in the second experimental group commented on being 'kept on task because there was a bigger chance of getting caught talking' when another teacher was in the classroom.
- ♦ Respect issues: None of the learners during their interviews referred to the other teacher in the co-taught lessons as the 'special needs teacher'. They mentioned her by name and treated her as a normal teacher. They also never referred to any learner in the classroom receiving 'special' attention. This lack of labelling indicates that not only is every teacher valued but also that every learner is valued in an inclusive classroom.

Most of the learners indicated that they benefitted from the co-teaching encounter. This finding supports the research of Qi Hang and Rabren (2009) that co-teaching appears to be effective in facilitating learning of learners with special needs, who are in general education classrooms. Co-teaching could be considered as a strategy to help learners with learning difficulties, as well as those without, in heterogeneous grade 9 natural science classes. More than half of the learners indicated that their understanding of their own learning styles had improved as a result of the co-taught lessons. Those learners who were prepared to try the different methods of studying that were suggested by the special needs teacher found the experience both fruitful and worthwhile. Nearly all the learners involved in this research reported very positive perceptions of co-teaching. However, there were individuals who did not. A few of the learners reported frustration and confusion of having another teacher in the classroom, and these negative responses are similar to those found in research done by Gerber and Popp (1999) and Magiera and Zigmund (2005). However, despite the concerns of these learners, the general consensus was that co-teaching benefitted all learners.

CONCLUSION

This research illustrated that the majority of learners were positive about the co-teaching experience, but whether this will contribute to academic success and performance of learners will have to be investigated. Co-teaching does, however, provide different viewpoints for subject teachers and stimulates new ideas for teaching. The practical application of co-teaching is, however, dependent on specific requirements and teachers need time to plan the lessons together and should consequently have regularly scheduled appointments for discussing implementation strategies. Trust, respect and a willingness to change are key ingredients for successful co-teaching efforts. The teachers need to be open-minded to other teaching and assessment strategies and need to work together as equals to assist all learners in the classroom. Co-teaching offers many benefits to the subject teacher and the learners, especially those with special needs and can therefore be considered as one pedagogical approach that could be used in schools to promote inclusivity.

RECOMMENDATIONS

The findings of this research suggest that even though it is not possible to claim that co-teaching is the panacea to facilitating learning in a class that includes learners with special needs, it could contribute to improved learning of all learners. As the majority of the learners in this study were positive about the co-teaching experience, it is recommended that the format, structure, administration and implementation of co-teaching should be investigated further. Though recent literature reviews on co-teaching have suggested that co-teaching efficacy is limited, its contribution should not be disregarded especially with the current predisposition to include all learners in main stream education.

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