Enhancing Teachers' Questioning Skills to Improve Children's Learning and Thinking in Pacific Island Early Childhood Centres

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ABSTRACT

As we move from a teacher-led mode of teaching and learning to more child-initiated approaches, questions rather than answers are imperative in shaping the socio-cognitive development of learners as they explore and make meaning in collaborative contexts. This paper outlines an action research study with 20 Pacific Island teachers held in 6 different Pacific Island early childhood centres. The participants of the study were trained on a modified model of 'Questioning and Understanding Improves Learning and Thinking' (QUILT) that focused on different teacher behaviours and skills in the process of questioning. Important changes in beliefs and practices were found after the intervention particularly in relation to the fostering of divergent thinking through the type of questions teachers asked and how they undertook the questioning episodes. This paper concludes that it is important to focus on promoting novice teachers' knowledge and skills in questioning so that they can support children's higher levels of thinking. This is especially relevant for teachers in Pacific Island early childhood centres.

INTRODUCTION

Susan Black, an education research consultant in Hammond, sat in on a kindergarten class where the teacher said the day's lesson was the colour green. After pointing out green on the colour wheel she asked the children to find green items among their classmate's clothing. The children quickly found green stripes on a shirt, green socks, a green hair ribbon, and green stitching on a little girl's jumper. Then, for the next ten minutes the teacher held up green object after green object (e.g., a stuffed frog, a fern, and ivy growing in a plastic container) that she pulled from boxes near her chair. For each item, the teacher asked, 'What colour is this?' and the children chimed in unison, 'Green!' But in no time, the kids were sprawled across the floor, bored with the activity and indifferent to the teacher's desperate attempts to hold their attention. 'Green! Green! Green!' a little boy shouted in exasperation. 'Lime, Lime, Lime!' another one yelled and the whole class disintegrated into howls of laughter and relief (Black, 2001).

This scenario demonstrates one of the teaching strategies that is common in classrooms. The knowledge and skills used in asking different types of questions in a classroom is one important, but critical, aspect of the teaching and learning process. The classroom above demonstrated that the children became bored because of the type of questions that the teacher had asked even though the teacher was desperate to get and keep the children's attention.

While the national and international literature has mainly focused on the importance of questioning as a teaching technique and as a strategy in promoting interactive classrooms, teachers are not necessarily taught the essential knowledge and skills to conduct effective questioning episodes which facilitate higher-order thinking. This paper argues with particular reference to Pacific Island early childhood contexts, that questioning skills can be taught and also discusses the importance of questions for effective teaching and learning. Further, it also discusses the role of the teacher in the questioning episodes.

LITERATURE REVIEW

Why are questions important? Questions play an important role in the processes of teaching and learning because children's achievement, and their level of engagement, depend on the types of questions teachers formulate and use in a classroom (Kerry, 2002). Recent models of teaching and learning view learning as a social activity in which children construct knowledge with the teacher and other children. In this context, learning is seen as a situated social practice where children are developing identities as a member of a particular community and it is seen as a socially negotiated and arbitrated process (Lave, 1995). This view of teachers and children acknowledge questions as a core function for both learning and teaching. As Hunkin (1995, as cited in Wiggins & McTighe, 2001) notes, "We are shifting from viewing questions as devices by which one evaluates specifics of learning to conceptualizing questions as a means of actively processing, thinking about, and using information productively" (p.4).

Research in New Zealand has also documented the correlation between the effective questioning practices of teachers and student achievement. For example, in the Ministry of Education's Best Evidence Synthesis series, Alton-Lee (2003) outlines in her report that 59% of variances in students' achievement are attributed to differences between teachers and classes. Hattie (2002) concludes that school teachers account for about 30% of variance in student achievement, compared with 5 to 10% for other school factors. Cameron and Mitchell (2002) confirmed these findings and they state that teachers are the most important factor of school-related influences on students' learning and achievement.

The New Zealand early childhood education curriculum, *Te Whāriki* (Ministry of Education, 1996), is heavily influenced by social constructivist theories which suggest children learn through social interactions within the environment. For example, Vygotsky's (1978, as cited in Berk, 2004) sociocultural theory proposes that talk is not about the transmission of facts but is rather the cultural/socialization interactions between a child and a more competent adult. This requires teachers to co-construct learning with the children. The teacher's role in this context is to build on what children already know and extend that by asking high-level questions. It is through these

scaffolded interactions that the child learns and develops higher cognitive processing skills (Cazden, 2001; Kerry, 2002).

Interestingly, the participants in this research reflected that all of them were taught through a more traditional way of teaching in their Pacific Islands. Low-level questions were dominant in their family socialization practices and especially in their schooling. Most had received their education in the Pacific where much of the learning was based on rote memorization and responding to low-level questions. These traditional educational values were a problem for these teachers, at times, and hindered their engagement in modern theories of learning shown to be more effective in promoting children's learning. Despite their cultural values and beliefs, there were substantial changes in their perceptions after the intervention.

Teachers' questions are imperative to children's learning because they mediate the interactive processes in the learning environment in a number of important ways. Firstly, the questions that teachers formulate and ask children are considered to be cues and clues which focus their attention on what needs to be learned. Secondly, teachers' questioning patterns affect *which* students learn and *how much* (Appalachia Educational Laboratory [AEL], 1995). Thirdly, the tendency of teachers to wait (or not) for students' responses has been found to vary from high achievers to low achievers. Teachers tend to call upon high achievers more frequently because these children usually sit in the teachers' line of vision area (action zone) in a classroom (AEL, 1995).

International evidence suggests that children engage differentially in interactions in classrooms and this is partly due to their proximity to the teacher. Sadker and Sadker's (1985, as cited in Walsh & Sattes, 2005) study of 100 different classrooms found that a few salient students received more than three times the number of teacher interactions than their classmates. In other words, their research suggested that where a student sits in a classroom determines how much interactions the student will have with the teacher. Those students that received the most verbal interactions were seated in the front rows and the centre seats of the other rows.

Contemporary researchers support different seating patterns to facilitate more effective questioning by teachers. For example, Kerry (2002) proposes an 'arc of vision' in which children are positioned in rows of six where the teacher is at the front of the group. Dantonio and Beisenherz (2003) suggest a U-shaped design as being useful for sound teacher-student questioning.

Researchers such as Cazden (2001) have found that teachers who extend the wait times to three to five seconds between the initial question and the student response gain a number of benefits, such as: (1) students give longer responses, (2) students give more evidence for their ideas and conclusion, (3) students speculate and hypothesize more, (4) students ask more questions and talk more to other children, and (5) more children participated in responding. These changes in pacing facilitate more social interactions and higher-level thinking in children.

In sum, teachers' questions and their specific approaches towards and during questioning are imperative for the development of children's learning and thinking.

THE METHODOLOGY

Many researchers choose a combination of methods in order to improve the quality of the research (Gorard, 2002). In this research the following methods were used: (1) pre-experimental design, and (2) participatory action research that involved both quantitative and qualitative data collection. Pre-experimental design was chosen because observation data was collected before and after each stage of the intervention by the participants. Participatory action research methodology was also used because the participants observed each other and collected data.

After initial analysis of the data from the twenty participants in 6 Pacific Island early childhood centres, the followings themes emerged:

1. Low-level questions were dominant in the centres.
2. The majority of participants waited for less than 3 seconds (or didn't wait at all) during questioning episodes before responding to a child.
3. Participants varied in the way they prompted children's responses.
4. Participants most frequently asked questions of children who sat in their line of vision only.
5. The majority of response formats used in questioning episodes were unison responses (i.e., children gave their responses in unison).

Building on the action research methodology, these initial findings led the researcher to engage a group of colleagues and participants in reflective conversations in order to explain these initial findings. Two areas of responses were apparent: firstly, the participants were taught in a traditional way of teaching and learning in their respective islands when they were young; and secondly, because of their cultural values and beliefs.

These responses led the researcher to develop an intervention that focussed on improving the participants' questioning skills and techniques. The Questioning, Understanding, Improves Learning and Thinking (QUILT) model was chosen to train the participants in the necessary skills and knowledge for formulating appropriate questions and structuring effective questioning episodes. The model has four stages.

The three methods that were used in data collection were: (1) structured observations, (2) document analysis, and (3) participant self-reflections. Data were collected for both pre and post training in each stage.

RESULTS

Stage 1 – 'Wording and Syntax' analysis of pre- and post-training data

The initial analyses of pre-training questions showed that the majority of questions that the participants formulated were incorrect in terms of their wording and syntax. After training, the majority of questions were grammatically correct while there were still some questions that were incorrect. Sixty-four percent of post-training questions were correct and 36% were incorrect. Some of the errors included:

1. Inconsistency of tense throughout the whole question,
2. Unclear, ambiguous and imprecise questions,
3. 'double-barrelled' questions.

Inconsistency of tense throughout the questions meant that one part of the question was written in the present tense while the last part was in the past tense (or vice versa). For example, one question was, 'Where do the frogs lived?' The word 'do' is in present tense and 'lived' is in past tense. To correct this question, it should have been written as 'Where do the frogs live?'.

Anther common error was the unclear, ambiguous and imprecise wording of the questions. For example, 'Can someone tells me how many days thats the hungry caterpillar spend eating'? If this particular question was asked to children in a variety of early childhood settings, they would probably have difficulty understanding it. This particular question could have been phrased like: 'Can someone tell me how many days the hungry caterpillar spent eating?'.

Finally, there were some questions which the researcher considered were 'double-barrelled' questions where two complete questions were asked at the same time which required children to provide two different answers. For example: 'What sort of shape is the number, is it round, square, who can point out on our shape board the correct shape?'. Such questions are generally overly complex for young children.

Stage 2 – 'Cognitive Level' analysis of pre- and post-training data

The second part of this intervention focused on the cognitive level of the teachers' questions. The researcher used a modified Bloom's taxonomy to categorize the questions into Recall, Use and Create categories. Recall, is equivalent to the Knowledge level of Bloom's taxonomy; Use, is equivalent to the Comprehension, Application and Analysis levels of Bloom's taxonomy; and Create, is the same as the Synthesis and Evaluation levels.

The majority of the participants' questions to children pre-training were categorised in the low level of Bloom's taxonomy. Of the 100 questions that the participants formulated, 86% of them were in the Recall level, 9% were in the Use level and 5% were in Create level. However, post-training, there was a decrease of 69% in the Recall level, an increase of the Use level of 38%, and an increase of 35% in the Create level.

Stage 3 – 'Selecting the Respondent' analysis of pre- and post-training data

Each participant used a prepared form to record whether (1) the teacher designated a child before posing the question, (2) the teacher posed the question, then designated a respondent, (3) the teacher called on a volunteer, and (4) the questions were initiated by the children.

After collating pre-training data, the researcher found that:

1. for 43% of the questions, the teachers designated the respondent first, then posed the questions.
2. 24% of the questions were posed and the respondent was designated after.

3. 30% of the questions were asked and the respondent volunteered to answer.
4. 3% of the questions were children-initiated.

After the intervention, teachers in pairs observed and recorded how they selected a respondent in their centres again. Partners recorded data on prepared forms. After collating the data, the researcher found that:

1. for 35% of the questions, the teachers designated the respondent first, then posed the questions [a decrease of 8%].
2. 25% of the questions were posed and the respondent was designated after [an increase of 1%].
3. 15% of the questions were asked and the respondent volunteered to answer [a decrease of 15%].
4. 25% of the questions were child-initiated [an increase of 22%].

In comparing this pre- and post-training data perhaps the most important outcome of the intervention in this stage was the substantial increase of 22% in questions that were initiated by the children. As teachers we need to make sure that children are given the encouragement to ask questions too.

Stage 4 – 'Concepts of Wait Times I and II' analysis of pre- and post-training data

'Wait Time I' is the length of the pause after the teacher poses a question and 'Wait Time II' is the length of the pause after a respondent offers a response. Again, participants observed and recorded data in the centres according to whether the teacher waited for: (1) 3-5 seconds, or (2) less than 3 seconds.

The pre-training analysis of data for Wait Time I showed that 37% of the teachers waited for 3-5 seconds, and for 63% of the questions asked, teachers waited for less than 3 seconds. The analysis of data for Wait Time II revealed that, of the 100 questions that were asked, 15% of the teachers waited for 3-5 seconds, and for 85% of the questions asked, teachers waited for less than 3 seconds.

After the intervention, participants observed and recorded data in the centres again. Of the 100 questions that were asked, for Wait Time I, 81% of the teachers waited for 3-5 seconds, and for 19% of the questions asked, teachers waited for less than 3 seconds. For Wait Time II, 74% of the teachers waited for 3-5 seconds, and for 26% of the questions asked, teachers waited for less than 3 seconds.

In comparing this pre- and post-training data, the researcher found that for Wait Time I, there was a 44% increase in teachers who waited for 3-5 seconds and for Wait Time II, there was a 59% increase in teachers who waited for 3-5 seconds.

Participant Reflections

In addition to the quantitative data collected, qualitative data was also collected from the participants after the intervention. Participants were asked to reflect upon the effectiveness of the whole intervention in a written paragraph. The analyses were summarized into different themes.

In summary, the following themes were identified:

1. 13 out of 20 participants referred to the importance of higher cognitive levels of questions to support children's thinking.
2. 13 out of 20 participants referred to a change in their attitudes towards formulating and posing questions and the imperative of allowing more wait time for the children.
3. 5 out of 20 participants wrote about the importance of Wait Time I and II during the questioning episodes.
4. 4 out of 20 participants reflected on the effectiveness of the different response formats that they used with children.
5. 3 out of 20 participants reflected on the importance of using open questions with the children.
6. 7 out of 20 participants reflected that the intervention provided them with a new way of conceptualising questioning sequences with young children.

Overall, the participants found that the intervention was effective for them as teachers and that it provided them with valuable new strategies for promoting the learning of the children in their centres.

DISCUSSION

The research highlighted that question asking could be taught in ways that were likely to benefit children's learning. Teachers, however, needed professional development that focused on the formulation and conceptualisation of questions, how they orally presented the questions, how they prompted children's responses and how they processed the children's responses.

Pre-training data revealed that participants lacked the skills and knowledge in all three stages of the intervention. For example, in Stage 1 (which focused on the wording, syntax and the cognitive levels of the questions) the majority of the questions that were formulated were grammatically correct, though there were still some questions that were inconsistent, ambiguous, imprecise and 'double barrelled'. With regard to the cognitive level of these questions, the majority of the questions were formulated at the lower levels of Bloom's taxonomy. Baseline data in Stage 2 showed that nearly all the questions were initiated by the teacher, with only a small number initiated by the students. Similarly, Stage 3 baseline data indicated that teachers did not wait for the students to respond before or after asking the question.

Questions that are inconsistent, ambiguous and imprecise can confuse children and they are less likely to be able to engage and be involved in the discussions. Questions that are formulated and conceptualised at low levels of Bloom's taxonomy are also likely to limit the level of challenge children experience in the learning environment. The implicit message given to the children through such low-level questions is that this level of learning is more important while they are unlikely to motivate them to engage in higher-level learning.

These low-level questions initially formulated by the teachers required only one correct answer and these answers were already determined by the teachers. An important implication of asking these types of question are that co-construction of learning is limited (Kerry, 2002). The learning process is

determined by the teacher. Such questions also have implications for scaffolding children's learning (Cazden, 2001). Experiencing questions at repetitively low levels limits children's opportunities to further develop their ideas and to be supported to reach higher cognitive levels (Bruner, 1996; Vygotsky, 1978). Teachers need to be aware of these errors in conceptualising and formulating questions because if questions are unclear, ambiguous and imprecise, students' understandings can be hindered and there is a possibility that little learning and thinking occurs.

However, a substantial improvement in post-training data was shown. Teachers' questions, and the way the questioning episodes were structured, improved as a result of acquiring new skills and knowledge through the research and training process. As outlined in the participants' reflections, children enjoyed some of the changes and these changes were more likely to impact on children's learning.

The initial baseline data in Stage 2 revealed that teachers dominated the whole discussion and this also implied that children were not given opportunities to interact with the teacher and most importantly with other children. However, children's questions increased in the post-training data which reflected an increase in teacher-student interactions in the centres.

Stage 3 baseline data found that teachers did not wait for children's responses in the pre-training phase, but there was a substantial increase of Wait Times I and II in the post-training results. These changes meant that children's answers to the questions were more likely to be better and longer because of the longer time given to them to think about their answers. The increase in Wait Time II implied that children were more likely to be given more opportunities to expand on their responses and formulate more complete and accurate answers.

There are some important implications for home-centre relationships in the research. Before the intervention, the teachers in this study regularly engaged in direct teaching to children while after the intervention they used more co-constructed child-initiated approaches to teacher-child interactions in their centres. However, while recent research suggests that this shift from 'traditional classrooms' (where the teacher controls the whole learning process) to 'child-initiated classrooms' has many benefits for children's learning and development, it may provide considerable problems for Pacific Island teachers and children because children are frequently accustomed to direct teaching at home. If a child transitions to an early childhood setting where learning focuses on a child's interest, this could raise some important questions for home-centre relationships. For example, what are the most effective ways for teachers to create sound child-initiated learning environments that motivate Pacific Island children who are brought up within a tradition of direct teaching in the home? How can we ensure that Pacific Island children are obtaining the most from the up-to-date teaching approaches utilized in centres in New Zealand? How can we support Pacific Island parents to provide more child-initiated learning in the home? In sum, how can we ensure that there is 'continuity' of learning from home to centre and visa-versa? These are complex educational, social and cultural questions that need further research because teachers need to avoid what McNaughton (2002) refers to as a 'mismatch' between home and centre. McNaughton (2002) argues that learning experiences at formal educational settings should be related to the experiences that a child brings from home so that the child can make connections

between both contexts. This 'meeting of minds' is a critical part in bridging the gap between centres and the home.

The limitations of the research project centre around two main areas. Firstly, the impact of the research on children's achievement. To determine if the intervention was effective in raising children's achievement, it needed to measure children's outcomes and achievements over time. However, this was not implemented due to time constraints.

Secondly, the research intervention was not able to determine how permanent the changes were for the participants' beliefs and practices. The majority of the participants in their written reflections indicated that their perceptions were changed and the research found that their centre practices changes as well. But, it is not clear how long these changes might last and be maintained? According to Allen (2001), accepting knowledge that challenges our ways of thinking is difficult to undertake, accomplish and sustain because of the anxiety and feeling that we might lose our effectiveness, self-esteem and maybe even our identity. Argyris et al. (1985, as cited in Allen, 2001) also suggests that there are a number of defensive reactions to resist change or learning which prevent the open dialogue and integration of new information that may challenge a person's existing values, assumptions and beliefs. Although, during the intervention, the participants demonstrated substantial changes in their behaviour and it could be agued that it appeared to be more permanent because the participants now realized the importance of the skills and knowledge they had attained in the intervention.

CONCLUSION

This research demonstrated that all the assumptions on which the research were based were correct. Participants in all the six centres lacked knowledge of the way they structured and processed the questioning episodes. Some of the participants indicated that part of this gap was due to their values and beliefs that limited the way they considered using questions in their centre.

Many of the participants in their written reflections signalled that they were not aware of the importance of using effective questions as a teaching technique. This research has highlighted the importance of carefully planning appropriate questions before implementation as well as the facilitation of child-initiated learning experiences. If children's learning is to be promoted in ways consistent with contemporary learning theories then training teachers to ask high-level questions in appropriate ways is essential.

To become effective teachers, we need to re-evaluate our values and beliefs and respond to the ever changing world without compromising our essential values. Teachers need to keep their strong Pacific identity but adapt to the needs of the 21st century. As the knowledge society dominates the new millennium, teachers need to make more informed decisions pertaining to children's learning so that Pacific Island children can gain better outcomes and achievement. After all, we do not want to reinforce and promote similar learning environments and experiences to the one Black (2001) referred to at the start of the article.

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