# Using Student Generated Questions to Foster Twenty-First Century Learning: International Collaboration in Uganda

**Amelia Spencer, Cora Brasfield Causey, James M. Ernest, and Gay F. Barnes**

## Abstract

Teacher-questioning has been acknowledged as critical in teaching and learning. A less researched topic is the ability for students to develop their own questions to deepen understanding. Student questions are important for engagement and to stimulate the understanding of new information. Traditionally, Ugandan teachers rarely instruct in ways that facilitate student questioning. The purpose of this study was to examine the effect of teacher professional development on the ability of Ugandan students to ask meaningful questions. Professional development focused on promoting student questioning and students were assessed using a formative language assessment. Findings indicate that teachers can teach students to ask meaningful questions.

*Keywords:* Pedagogy, teacher questioning, student engagement, Uganda

*Amelia G. Spencer, Ph.D. is an Assistant Professor and Chair of the Education Department at Birmingham-Southern College, Alabama. Dr. Spencer can be reached at aspencer@bsc.edu*

*Cora Brasfield Causey, Ph.D., is an Instructor in the School of Education at the University of Alabama at Birmingham. Dr. Causey can be reached at ccausey@uab.edu*

*James M. Ernest, Ph.D. is a Professor of Early Childhood Education at University of Alabama at Birmingham. Dr. Ernest can be reached at jernest@uab.edu*

*Gay F. Barnes, Ph.D. is a Professor at Birmingham-Southern College, Alabama, in the Education Department. Dr. Barnes can be reached at gfbarnes@uab.edu*

## Introduction

Questions have been a longstanding strategy for teaching and are a cornerstone for what has been termed a Pedagogy of Inquiry (Pagowsky, 2015). Pedagogy of Inquiry is a method of teaching that involves student-centered classroom questioning and learning that leads to academic discussion and metacognition. The push for inquiry has been considered a response to what Paulo Freire (1970) has called a "banking model" of education. With the banking model, teachers may use authoritative texts to deposit skills in children without critical reflection. In contrast, in an environment of inquiry, instruction is designed around curricular big ideas and facilitated by essential questions that lead students to ask more questions and adopt the learning as their own (Pagowsky, 2015). Questioning is critical to student understanding and should be fostered and developed by teachers (Koechlin & Zwaan, 2014).

Questions are an integral part of meaningful learning. Learning which requires critical thinking creates the conditions for students to recognize they have important questions (Caram & Davis, 2005; Chin & Brown, 2002). It is the question itself that constitutes the learning. Both inside and outside the classroom, the ability to formulate questions is a creative endeavor that stimulates individuals to learn something new (Rothstein & Santana, 2011). In fact, the question is often more important than the answer, and one can argue as Joseph Joubert (1842/1896) once said, "It is better to stir a question without deciding it, than to decide it without stirring it" (p. 35).

### Questioning by Teachers

Teacher-questioning has long been established as critical in deepening the learning of students in the classroom and as Fisher, Frey, and Rothenberg (2008) note, "Teacher questions can either stimulate or inhibit student talk" (p.50). Thoughtfully planned questions embedded in lessons ensure that student talk is elevated to a higher cognitive level (Brown & Palinscar, 1982).

Questioning is one of the most common instructional strategies employed by teachers. Leven and Long (1981) found that teachers ask as many as 300-400 questions a day (or roughly one per minute of the school day) and more recent research from Albergaria-Almedia (2010) indicates that teachers ask on average two questions per minute. Although questioning is a frequently used strategy, teachers are often unaware of how frequently they use classroom questioning. Albergaria-Almeida (2010) found that when lessons were recorded, teachers were surprised at the high number of questions they ask.

In addition to the number of questions asked by teachers, the types of questions asked have also been well researched. The majority of questions posed by teachers represent a low-cognitive-level and most are related to recall of factual information. These questions are effective in checking for basic understanding errors but do not facilitate critical thinking on the part of students (Albergaria-Almedia, 2010; Tovanni, 2015). In contrast, high-cognitive-level questions allow for multiple answers and require the students to comprehend their learning, predict further learning, detect anomalies in their learning, and use information in new situations. Achievement gains are found in classrooms where high-cognitive-level questions are often utilized (Redfield & Rouleau, 1981). In inquiry-based classrooms, students can participate in learning that goes beyond standardized assessment goals to learning and understanding (Commeyras, 1995; Redfield & Rouleau, 1981).

**Student Questions**

A less-researched issue is the ability of students to generate and ask questions about their own learning. Research has found that teachers ask up to 93% of all classroom questions; this leaves few opportunities for students to ask questions they may have (Floyd, 1960). Tovani (2015) notes that not only do teachers ask most of the questions, but the questions they ask infrequently require any critical thinking by students in order to answer them. This leaves very

little classroom time for students to think and formulate their own questions. Graesser and Person (1994) estimated that students ask as few as one question per week in the classroom. Regardless of the frequency of student questions in a classroom, there is general agreement that students ask few questions.

Despite the lack of student questioning, the literature indicates good theoretical, empirical, and policy reasons for the importance of students' generating questions to support their learning. Asking questions is a crucial part of academic discourse and understanding and is a pillar of twenty-first century learning (Almeida, et al, 2008; Caram & Davis, 2005; Chin & Osborne, 2008; Minigan & Beer, 2017). Furthermore, Chin and Osborne (2008) associate students asking questions with driving knowledge construction, fostering discussion and debate, helping students to learn to monitor and self-evaluate their own understanding, and increased motivation. The scarcity of student generated questions makes it difficult for researchers to evaluate what types of questions are asked and the value of such questions. For example, Dillon (1988) observed academic discussions in six different high schools in 27 different classrooms and found that only 6% of students' classroom talk were questions and less than 1% of these questions were information-seeking questions.

When teachers assume sole responsibility for creating all of the questions, students learn to rely on the teachers; however, when students are supported in learning to ask effective questions, they are engaged as critical thinkers (Bowker, 2010; Pedrosa, Almeida, & Teixerira, 2007). Questions raised by students serve to activate their prior knowledge, focus their current understanding, and allow them to elaborate on their knowledge (Schmidt, 1993). Initially, questions are used to fill student knowledge gaps and eliminate misunderstandings. But by formulating their own questions, students can evaluate their understanding of a new concept, reconcile new ideas with prior knowledge, and identify areas of confusion. Student-generated

questions place students in control of their learning. Furthermore, questioning facilitates students' engagement, comprehension, and wonderment. In addition to the student benefits, student-generated questions give teachers insight into the students' understanding of a new concept and gaps in learning (Tovanni, 2015). Much is lost in a school environment that does not stimulate comprehension and curiosity.

**Education in Uganda**

Before Uganda's independence from England in 1962, education was provided by missionaries and was only for the wealthy. Although education was taken over by the Ugandan government at that time, the legacy of colonial education was maintained for decades (Odaet, 1990) and still functions as a system that is teacher-centered and focused on high-stakes testing. Universal Primary Education (UPE) was implemented in 1997. This policy allowed all children to attend primary school doubling school attendance during the next decade, from 3.1 million in 1996 to 7.5 million in 2007 (Uganda Ministry of Education and Sports, 2008). This influx of students caused issues including overcrowded classrooms, a lack of qualified teachers, a lack of instructional supplies and books, and wanting school infrastructure (Ojijo, 2014; Ssewamala, Wang, Karimli, & Nabunya, 2011). During the 1990s, the Education Policy Review Commission made recommendations to move to a more child-centered approach to learning reflected in the Ugandan Government White Paper of 1992 (Uganda & Uganda, 1992; Sikoyo, 2010). One of the child-centered instruction recommendations included students facilitating learning, which hinges on students' abilities to question and draw conclusions thus anchoring their learning. According to a 2010 study of primary UCE schools, teachers, and learners, child-centered pedagogy was more effective for all learners in regards to improvement of education quality (Guiloba, Wodadala & Bategeka, 2010); however, teachers were found to use teacher-centered pedagogy in their classrooms, focusing on writing notes on the board and rote learning.

In addition to the challenges inherent in overcoming a colonial past, social and cultural expectations in African cultures, like Uganda, often demand an authoritarian classroom with strong teacher control. Cultural norms support pedagogy where teachers transmit knowledge to the student and the student is expected to listen and learn (Sikoyo, 2010; Tabulawa, 1997). Outside the classroom, adults are seen as keepers of the knowledge and children are to respect and learn from their elders. Questions from students in the classroom may be seen as a lack of respect for adults. There is some argument that learner-centered pedagogy is an affront to the African culture. For example, Tabulawa (2003) argued that the government and aid agencies preference for this type of education elevates democracy and undermines the cultural foundation of Africa. In contrast, others, including the Ugandan Ministry of Education and the National Curriculum Development Centre, believe that schools must engage students differently, through a learner-focused pedagogy, enabling students to think and solve problems. The belief is that students taught in a learner-focused classroom will be successful in the ever-changing world of the 21st century in life and work by learning to think, research, and ask relevant and appropriate questions. With these skills students become more engaged and active in their own learning and are more in charge of their own academic growth (Caram & Davis, 2005; Mitana, 2018; NCDC, 2000).

## Purpose of Study

In Uganda, there has been a long-standing conflict between indigenous culture and the Government's aspiration for all students to receive an education that allows them to become literate in the 21st century (Uganda & Uganda, 1992). It has been argued that when students develop a better capacity to take ownership of their own learning, learning becomes more authentic and engaging (Gordon, n.d.). Child-focused, inquiry-based pedagogy allows teachers to bring relevant, current problems and ideas into the classroom. One important component of a

child-centered pedagogy is expecting students to ask questions and allowing students to propose solutions. Teaching students to ask questions is a basic first step toward inquiry-based teaching (Gordon, n.d.).

Albergaria-Almeida (2010) described a Professional Development (PD) initiative to increase teachers' awareness of classroom questioning. The PD involved the analysis, reflection, and discussion about each of the secondary biology teachers' classroom questioning practices. Results of their study indicate that following the PD, each teacher's questioning practices changed; teacher questions decreased, and student questions increased. Teacher questions decreased from three per minute to one or two, while student questions increased from one every three minutes to one every minute. These results indicate that by increasing teachers' awareness of their own practice, they can change their own questioning practices. When teachers asked fewer questions, it provided space and time that allowed for increased student questions. Also, teachers learned how to provide a safe environment for students to question and learn as well as establish the expectation that students will generate questions about their learning. Furthermore, teachers taught students how to ask relevant questions within the context of their learning, allowing for deeper and more student-focused learning.

The purpose of this study was to examine the effect of a similar model of teacher professional development on the ability of Ugandan students to ask meaningful questions. The study seeks to answer this question: Does focused professional development on questioning and child-centered instruction assist teachers in becoming more aware of their questions and, as a result, increase their students' overall quality and quantity of questions?

## Background of Study

### Education at Ugandan Primary School

A liberal arts college in the southeastern United States partnered with a primary school located in the rural Mukono region of Uganda. The primary school is a tuition-based private, non-profit school for students preschool (ages 4-6) through Primary Grades P-1 to P-7 (ages 7-15). The school serves impoverished families. The majority of the students attending the Ugandan primary school have gaps in their education due to delays in starting formal school or periods of time when they do not attend school in order to help their families at home when needed. All 300 enrolled students pay a subsidized tuition fee and this includes breakfast and lunch every school day. The school currently employs eight primary teachers.

In 2004, with the help of local and international partners, the school began as a free preschool for children, and over the next decade, grew to include all primary grades. During the past three years, the school has added a class of P-7 students, the final primary school year in Uganda's education system. The mission of the school is to educate and enrich the quality of life for all children. The stated goals include quality education from caring and attentive teachers, small class sizes, hands-on and child-centered learning, and vocational training. The school is founded on the principles of constructivist teaching based on the work of Lev Vygotsky (1962, 1986) and John Dewey (1944). The school's curriculum is based on the Ugandan education learning standards for each grade, and integrates hands-on, child-focused learning through reading, writing, mathematics, science, music, and art and promotes a growth mindset of learning.

### Continued Education from School Partners

One of the international partners of the primary school is the service- learning and education departments at a liberal arts college in the southeastern United States. The college and

primary school have partnered together allowing preservice teachers from the U.S. to co-teach with Ugandan teachers. Faculty and preservice teachers worked alongside Ugandan students and teachers to facilitate hands-on, child-centered learning to engage students during trips from 2016 to 2019. The visits allow faculty and teacher candidates to work for two full weeks, both in and out of the classroom. College faculty provided onsite support of the teaching to strengthen the instructional strategies of the student teachers and Ugandan primary teachers.

Using the Ugandan curriculum, the college's preservice student teachers and Ugandan primary teachers plan lessons to prepare for the first two weeks of school. These lessons are collaboratively revised with the Ugandan co-teacher during meetings before school starts. The co-teachers taught in their assigned classrooms every day, and then they reflected on and adjusted lessons accordingly each afternoon. Professional development sessions were led by college faculty after school hours during the two-week classroom experience. Professional development topics were determined by the primary teachers and administrators. Beginning with the first visit in 2016, feedback was received directly from the teachers for self-selected opportunities for growth, and to more closely align with the school's mission and focus. The following topics were identified for professional development: teaching writing, teaching reading, child-centered teaching strategies, classroom community, and classroom management. To address these school-wide areas of interest during each visit, two or more afternoon professional development sessions were designed and implemented, along with co-teaching and faculty modeling. Faculty from the United States presented the research undergirding constructivist and child-centered teaching during each January trip. One consistently identified specific area of interest for the January 2019 time together was child-centered teaching and hands-on-activities. Though required to demonstrate child-centered lessons for the school, teachers report that they have not been taught the methods of child-centered pedagogy or the

research behind it in their teacher education programs. Using a workshop model, college faculty identified the benefits of child-centered pedagogy and facilitated a brainstorming session to identify strategies for both upper and lower primary classrooms. Following the workshop, Ugandan teachers collaboratively taught lessons with college faculty and preservice teachers focused on child-centered teaching. Faculty also modeled lessons for Ugandan teachers when they requested this format.

In addition, there was a one-time year-long placement of a college alumna, inservice teacher during the 2018-2019 school year. As a recent graduate of the partner college's teacher education program, this visiting teacher modeled best practices, a culture of inquiry, and provided ongoing daily support to fellow teachers for child-focused instruction.

## Methods

### Evaluation of Students' Oral Language

The original goal of the partnership was to teach English to the students to improve their ability to speak, read, and write English. To determine the growth and areas of need for the Ugandan primary school students, the Oral Language Acquisition Inventory (OLAI) and the OLAI-2 were utilized (Gentile, 2004 & 2011). The OLAI is a formative assessment used to identify a student's stage of language development. This assessment allows teachers to identify and understand the language development of specific students or a class, giving specific lesson suggestions. Also, the assessment allows the administration of the Ugandan primary school and the college faculty to identify gaps in student learning and related professional development needs for teachers.

To administer the OLAI, teachers explained the assessment to students in Luganda, the native language of the Ugandan primary students. The assessment was administered to students in the teachers' lounge building and the testing time ranged from 30 minutes to 90 minutes. The

assessment was given individually by one of two assessors (college faculty). Interrater reliability was gained by scoring test protocols separately and together. All test protocols were evaluated for the number and type of questions. Triangulation was reached by identifying and defining the types of questions asked by the Ugandan students. Assessors evaluated each question together to reach agreement in identification of the type of question.

For the purposes of this study, only a portion of the OLAI assessment was used. Three components of the assessment, Story Reconstruction and Narrative Comprehension, Picture Drawing, Narration and Dictation, and Information Processing and Critical Dialogue, require more spontaneous language. This allows the student to have several opportunities to converse with the assessor. The Story Reconstruction and Picture Drawing components require a student to retell a story using supportive pictures and the Picture Drawing requires a student to describe a picture he or she draws. The Information Processing component (called the Expository Reading and Writing in the OLAI-2) allows the student to answer questions about a non-fiction reading. Several changes were made to the OLAI-2 regarding the spontaneous language assessment, but because of the low language development of most students at the Ugandan primary school the procedures for the OLAI were used in both 2018 and 2019.

The spontaneous language portion of the OLAI was used to evaluate questioning. The students' ability to formulate a relevant question in English was noted during the use of the OLAI for language assessment, as this is an important indicator of student engagement and comprehension. The OLAI provides one opportunity for an assessor to prompt the student to ask a question. Specifically, during the Information Processing component of the assessment, the assessor reads to the student a short nonfiction passage paired with pictures to illustrate the information. This informational text is used to create a critical dialogue between the assessor and the student. During this dialogue, the assessor asks a question to prompt the student to ask a

question, for example, "What is the most important question about kangaroos?", and the student must either formulate a question or indicate that he or she has no questions.

Professional development, based on self-identified teacher need, is a critical piece of the partnership between the U.S. College and the Ugandan Primary School. In January 2019, all eight primary teachers were interviewed to better understand their perspectives of the influence of professional development. The interviews were guided by a single open-ended and broad-based question, "How has the partnership influenced your teaching practice?" These results were used to triangulate results from the student evaluation.

**Subjects**

Subjects for this study were 32 primary students, ages 9 to 14 years of age. During January 2018, all students were originally assessed. Because of school attrition, 20 of these students were available for post-intervention assessment and an additional seven students were added during January 2019. Participation was voluntary and all students agreed to be assessed. Interested students were required to have written parental permission before testing. Subjects live in a rural area near the school and pay a subsidized fee for school attendance. Middle grade students were chosen for the research because of their understanding of simple English. Additionally, these students will likely attend the school for several years, allowing for follow-up research. Table 1 shows the number and gender of students evaluated by year.

Table 1
*Number and Gender of Students Evaluated by Grade*

| Grade Level | Pre-Intervention, 2018 | Post-Intervention, 2019 |
|---|---|---|
| P-3 | 12 (6 girls, 6 boys) | 0 |
| P-4 | 7 (5 girls, 2 boys) | 7 (3 girls, 4 boys) |
| P-5 | 13 (6 girls, 7 boys) | 11 (8 girls, 3 boys) |
| P-6 | 0 | 9 (7 girls, 2 boys) |

**Pre-Assessment**

During the Information Processing and Critical Dialogue (OLAI) and Discourse section of the OLAI-2, in January 2018, most Ugandan primary students were unable to formulate a single question in English. The data collected in January 2018 from the spontaneous language portions of the OLAI revealed that only15% (5 of the 32) of assessed students asked questions, even when prompted. In total, there were only six questions asked and only two of those were higher order/wonderment questions.

**PD Intervention**

Professional development on student questioning was provided to the Uganda primary teachers. During the afternoon sessions, teachers were presented with research regarding the importance of student questioning ability. They discussed how questions might be solicited from students, and also the importance of creating a safe environment in which students are encouraged to ask questions. In addition to the professional development, an ongoing collaborative relationship between Uganda primary teachers and the college continued during the 2018-2019 school year. A college alumna taught at the Uganda primary school during this year immediately following her graduation from the college. Her collaboration with the P-3, P-4, and P-5 teachers and students facilitated the implementation of child-centered classroom and an environment of inquiry. Teachers shared strategies to encourage oral language and student generated questions in the classrooms which they learned through both the professional development sessions as well as interacting with the visiting teacher.

## Results

**Frequency of Student Questions**

Results indicate that students were able to learn to ask questions as demonstrated in the increase in questions during the OLAI between pre-intervention assessment (2018) and post-

intervention (2019). The number of student questions was recorded during the retelling, drawing, and critical dialogue components of the OLAI. During the pre-intervention assessment in January 2018, the OLAI data revealed only 19% (6 of 32) of the students asked questions, even when prompted during the Critical Dialogue section of the OLAI assessment. In contrast, during January 2019, 67% (18 of 27) of the students assessed were able to ask a question. The number of students who asked questions, by class, is recorded in Figure 1. In addition, Figure 1 provides data to indicate that as students move from one grade to the next grade, they continue to ask questions. For example, only 8% of children in P-3 asked questions in 2018, but in 2019, 43% of the students that moved to the P-4 classroom asked questions.

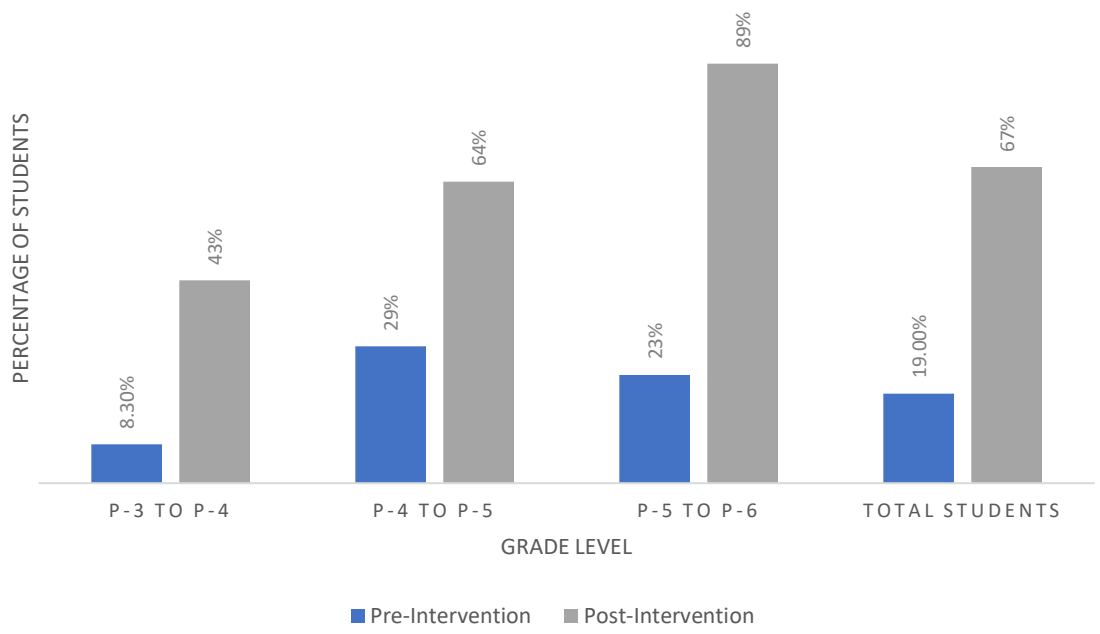


*Figure 1*. Change in percentage of students, per class, who asked questions during the OLAI assessment

Furthermore, Figure 1 shows the percentage of students per class who asked at least one question during the OLAI Assessment. There is a clear increase in students' abilities to ask questions between the pre- and post-intervention assessments. Between 2018 and 2019, the

percentage of all students who asked one or more questions during the OLAI Assessment increased from 19% to 67%. During the 2018 school year assessment, only 6 of 32 (19%) primary students asked questions. In contrast during the 2019 school year assessment, 18 of 27 (67%) students asked questions, more than triple the rate from 2018.

Figure 2 shows the percentage of students per class that asked *two or more questions* during the OLAI Assessment. As discussed above, the OLAI provides one opportunity for the student to ask a question. The student must either formulate a question or indicate that they have no questions. Because students typically did not ask questions, even when prompted, an interesting finding was that some students asked questions beyond the OLAI prompting. Some students were able to formulate spontaneous questions during the OLAI assessment that displayed their more sophisticated command of English as well as the academic content. In 2018, only 1 of 32 tested students (3%) asked spontaneous questions without prompts. In comparison, in 2019, the number of students who asked spontaneous questions grew to a total of 7 of 27 tested students (27%). This indicates a growth of six times the number of students who asked spontaneous questions between 2018 and 2019. Figure 2 shows the percentage of students each year who asked spontaneous questions while taking the OLAI assessment.

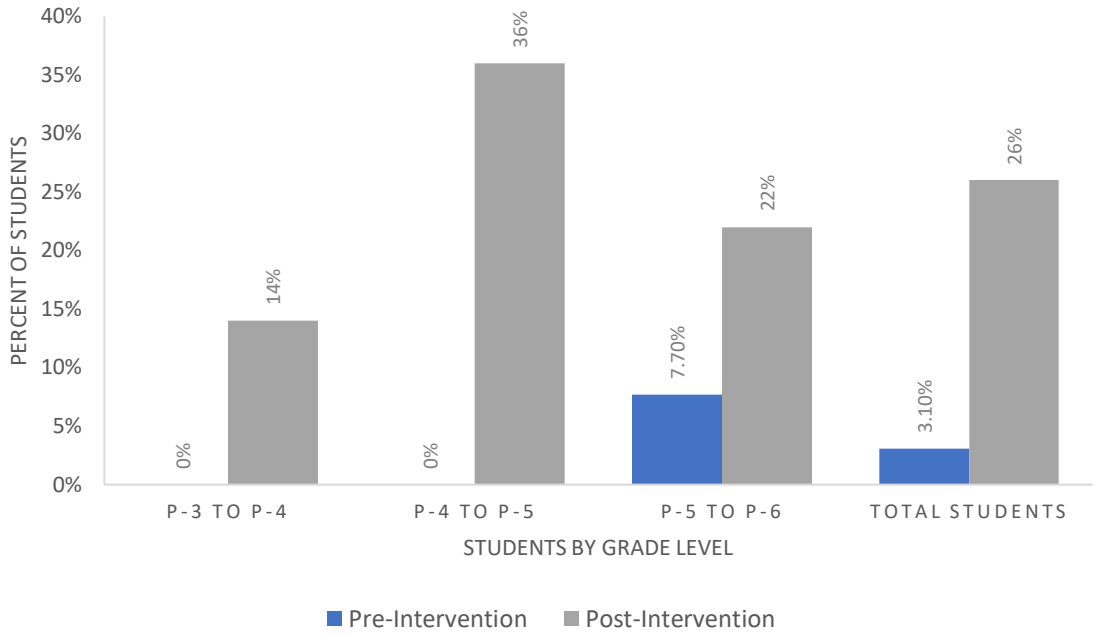


*Figure 2.* Percentage of students, per class, who asked two or more questions during OLAI assessment

**Types of Questions**

Another consideration of student-generated questions is the type of questions students ask. The ability to compose a sophisticated question indicates that students are engaged and interested in a topic. Also, these questions allow for greater critical and higher order thinking to occur. Teachers often believe that students do not have to be taught to ask relevant questions; although, teaching students to ask questions regarding new topics and expecting students to generate thoughtful questions allows students to practice and participate in furthering their learning.

During the OLAI administration, assessors transcribed all student questions during the spontaneous language portion of the OLAI (Story Retell, Picture Drawing, and Information Processing and Critical Dialogue). The students' questions were analyzed according to the purpose of the question. Chin and Bruce (2002) organized student questions in two broad

categories: basic information questions and wonderment questions. Basic informational questions included questions seeking facts and recall. Most were closed-ended questions requiring a factual answer or a simple observation. Other basic informational questions were procedural, regarding instructions for a task.

Wonderment questions were high-order, critical thinking questions developed to seek information or explanation of content. Wonderment questions were divided into five types of questions. These types included: 1) questions seeking an explanation of not yet understood content, 2) questions involving prediction or hypothesis, 3) questions expressing skepticism or regarding discrepant ideas, 4) questions regarding the application of content, or strategy related questions, and 5) questions involving planning.

Questions for this study were identified as basic information questions or wonderment questions using the categories established by Chin and Brown (2002). Table 2 shows the types of student questions for both pre-intervention and post-intervention. An obvious increase is evident in all types of questions between pre- and post-intervention assessments. There are more basic information questions at both assessment periods. There were two wonderment questions during the pre-intervention assessment focused on comprehension and understanding. For example, a student asked, "I wonder, do kangaroos eat people?"

During the post-intervention assessment, the wonderment questions increased from 2 to 30. This increase in sophistication of student questions indicates the students' ability to use questioning to further their understanding of a new topic. For example, a student asked, "Why are stars gone during the day?" When looking at the wonderment questions during post-intervention assessment there is a sharp increase in the number of questions. The increase indicates that students are better able to formulate appropriate questions to engage with new information. There is also more variety in types of wonderment questions. During Pre-

Intervention, both wonderment questions were explanation/comprehension. However, during post-intervention, students asked prediction, discrepancy, and application questions. For example, 16 of the 30 wonderment questions were embedded in the story-retell portion of the assessment. Students demonstrated their ability to use questioning related to a real-life story. During the story, a student had one character ask another, "What happens if you fall off the bicycle?"

Table 2
*Types of Student Questions Pre- and Post- Intervention*

| Types of Questions | Student Questions Pre-Intervention (2018) | Student Questions Post-Intervention (2019) |
|---|---|---|
| Basic Information Questions | 4 | 4 |
| Factual Questions | 2 | 4 |
| Procedural Questions | 2 | 0 |
| Wonderment Questions | 2 | 30 |
| Explanation/Comprehension Questions | 2 | 5 |
| Prediction Questions | 0 | 6 |
| Discrepancy Questions | 0 | 5 |
| Application Questions | 0 | 14 |
| Planning Questions | 0 | 0 |

## Discussion

Key findings from this research indicate focused professional development on child-centered learning and student questioning had a significant effect on student questioning. This study utilized the OLAI assessment, allowing students one-on-one English language time with an assessor. During this period of time, ranging from 30 to 90 minutes, assessors recorded spontaneous language while the students retold a story using pictures, described a picture they

drew, and answered questions about a non-fiction reading. None of the formal assessment scoring was used from the OLAI.

Thirty-two students were assessed pre-intervention in January 2018. Because of school attrition, 20 of the students were available for reassessment in 2019. This rate of attrition is still much lower than the typical drop-out rate of 68% in primary education in Uganda (UNESCO, 2012) and provides another indicator of the success of the school. An additional seven students were assessed in January 2019; the majority of whom had attended the school but had not been in attendance during testing in January 2018. The results show an increase in the total number of questions during assessment. During the pre-intervention, only six questions were generated from 5 of the 32 students, even when students were provided a direct prompt for questioning during the assessment. During post-intervention, 34 questions were generated, more than five times the number of questions asked during the pre-intervention. Further, when examining the number of students who were able to ask questions, more students asked questions during the post-intervention evaluation. During the pre-intervention evaluation, only 15% of the students asked questions during assessment; however, during the post-intervention evaluation, 81% of the students asked questions. This is five times as many students who were able to ask questions during the post-intervention evaluation. This is significant given that students who are provided inquiry-based learning opportunities allowing them to think critically and generate questions can become active participants in their own learning (Caram & Davis, 2005). Furthermore, when classes are designed to encourage questioning, students begin to engage in creative dialogue and learn from the varied perspectives of their peers.

This study also identifies the types of questions asked pre- and post- intervention, to investigate the effect of teacher professional development on the depth and purpose of student questions. Findings indicate that, with professional development, teachers are able to make

changes in the classroom that allow students to not only ask more questions, but also ask questions that are higher order. For this study, questions were sorted into two main categories, basic information questions and wonderment questions (Chin & Brown, 2002). Basic informational questions included factual questions or procedural questions. Wonderment questions were described as a higher conceptual level, including comprehension, prediction, discrepant ideas, and application. The number of basic informational questions was found to remain the same between pre- and post-intervention assessments. Both times, students asked four informational questions. The major difference between pre- and post-intervention assessments was shown in the wonderment questions. During the pre-intervention assessment, only two wonderment questions were asked, compared to 30 wonderment questions post-intervention. During the post-intervention assessment, wonderment questions spread across the categories, illustrating a variety of conceptually higher questions. For example, "How can you see the moon when the sun is up?" and "Where does the sun go when it is dark?"

The change in the quantity and quality of questions between assessments indicates that after professional development regarding questioning in the classroom, students are able to ask a greater number of higher-order, critical thinking questions. The increase in wonderment questions is noteworthy because high quality questions generated by students can stimulate critical thinking. The act of generating questions directs the attention of students to academic content and allows them to check their understanding of the content (Rosenshine, Meister, & Chapman, 1996). Further, for students, the act of generating high quality, wonderment questions can activate prior knowledge, focus learning efforts, and broaden knowledge (Chapman, 1996).

Professional development was provided to the Ugandan primary teachers based on their self-identified needs and focused specifically on questioning and classroom community as part of child-centered pedagogy. Teachers actively participated in grade level groups during the PD to

identify strategies to promote an atmosphere of inquiry in the classrooms. Post intervention, during January 2019, teachers were interviewed to learn about their perspectives of the influence of the provided professional development. Their responses indicate a positive influence in three areas: teachers becoming aware of their questioning, changes in questioning, and providing a safe environment for student generated questions. Teachers noted that working with the college preservice teachers increased their awareness of how to ask effective questions. A P-3 teacher reported, "...they ask questions that make students think and they also give children time to ask questions and they want children to ask questions." A P-2 teacher reported, "[The college preservice teachers] ask, 'What questions do you have?' And they want to know so they can teach better."

The Ugandan primary teachers also commented on changes they could make in questioning. A P-3 teacher stated, "We ask, 'Is everyone together?' and children say, 'yes'. But do they really understand? Your preservice teachers are not afraid of those questions and they like those questions. We need to do that. Our students need to learn to ask those questions." A P-2 teacher noted, "...we ask if everyone has understood but we do not find out if they have understood. [The college preservice teachers] teach so children understand not just to complete the syllabus." A P-1 teacher shared, "We often give the answer to the children and do not allow the children to discover by themselves, but [the college preservice teachers] have the children discover."

The Ugandan primary teachers also indicated the professional development influenced their understanding of the role of a safe classroom environment for student generated questions. A P-1 teacher reports, "[The college preservice teachers] give them ideas and then the children discover something on their own." A P-3 teacher shared that, "the [college alumna and teacher 2018-2019] taught me how to manage a classroom better. I have learned that when students are

active and participating in a lesson, they act better and learn more. She also showed me to welcome the students in the class."

The results of the teacher interview triangulate the success of the PD intervention. Students are able to ask more questions that are wonderment questions and the teachers report that they learned how to facilitate an environment of inquiry in the classrooms.

The results of this exploratory study need to be interpreted with caution due to the small sample size. While the increase in questions from pre-intervention to post-intervention is meaningful, more study must be done to determine effective professional development and co-teaching modeling. Another potential limitation of this study is the conflict between culture and pedagogy. As discussed, the African culture is one of respect for elders, especially one in authority. Teachers are seen as authority figures who have knowledge to share with students. As a result, a classroom culture, in which student questions are expected may impact students, families, and community cultures in negative ways.

Building on the findings of this study, it will be important to investigate the methods teachers are utilizing to foster questioning in their classrooms. Though we believe that the increase was a direct result of the professional development and modeling of an inquiry-based classroom, more information regarding the actual changes in the classroom would be informative. Future research regarding student questioning in classrooms will also be meaningful. Next steps in this area of research would include further interviews with teachers and classroom observation of conversation, specifically questioning.

## Conclusions

A classroom based on the pedagogy of inquiry is designed to provide an environment supportive of student questioning and wondering. Often the inordinate number of questions asked by the teacher takes up most of the instructional time, leaving little time for students to

consider a new concept and formulate their own questions (Albergaria-Almedia, 2010; Floyd, 1960; Leven & Long,1981). Moreover, in a classroom of inquiry, student questions and ideas are prioritized. Young children are naturally curious, and so one would expect that this dynamic would drive student generated questions in the classroom. That that is not the case is likely because teachers do the majority of the talking and questioning.

This study suggests that professional development that focuses on child-centered learning and student questioning will allow teachers to explore specific strategies to support students in generating questions. Teachers who implement a pedagogy of inquiry support student questioning in the classroom. As a result, students are found to increase both the number of questions and the depth of questions they ask. Both teachers and students can facilitate learning in a classroom when the value of questioning is understood. When teachers create an environment to facilitate curiosity, students will learn to *ask* questions rather than *answer* them.

References

Albergaria-Almeida, P. (2010). Classroom questioning: Teachers' perceptions and practices. *Procedia - Social and Behavioral Sciences, 2*(2), 305-309. doi:10.1016/j.sbspro.2010.03.015

Almeida, P., Pedrosa de Jesus, H. and Watts, M. (2008). Developing a mini-project: students' questions and learning styles. *The Psychology of Education Review, 32,* 6-17.

Bowker, M. (2010). Teaching students to ask questions instead of answering them. *Thought & Action,* 127.

Brown, A., and Palincsar, A. (1982). *Inducing strategic learning from texts by means of informed, self-control training* (Tech. No. 262). Champaign, IL: Center for the Study of Reading. Retrieved from https://www.ideals.illinois.edu/bitstream/handle/2142/17590/ctrstreadtechrepv01982i00262_opt.pdf?sequence=1

Caram, C. and Davis, P. (2005). Inviting Student Engagement with Questioning. *Kappa Delta Pi Record,42*(1), 19-23. doi:10.1080/00228958.2005.10532080

Commeyras, M. (1995). What can we learn from students' questions? *Theory Into Practice, 34*(2), 101-106. doi:10.1080/00405849509543666

Chin, C. and Brown, D. (2002) Student-generated questions: A meaningful aspect of learning in science. *International Journal of Science Education, 24(5),* 521-459. doi:10.1080/09500690110095249

Chin, C. and Osborne, J. (2008). Students' questions: A potential resource for teaching and learning science. *Studies in Science Education, 44,* 1-39. https://doi.org/10.1080/03057260701828101

Dewey, J. (1944). *Democracy and education*. New York: The Free Press.

Dillon, J. (1988). The remedial status of student questioning. *Journal of Curriculum Studies, 20*(3), 197-210. doi:10.1080/0022027880200301

Fisher, D., Frey, N., and Rothenberg, C. (2008). *Content-area conversations: How to plan discussion-based lessons for diverse language learners*. Alexandria, DC: Association for Supervision and Curriculum Development.

Freire, P. (1972). *Pedagogy of the oppressed.* New York: Herder and Herder.

Gentile, L. (2004). *The oral language acquisition inventory: Linking research and theory to assessment and instruction*. Parsippany, NJ: Dominie Press/Pearson Learning Group.

Gentile, L. (2011). *The oral language acquisition inventory* (2nd. Ed.). Parsippany, NJ: Dominie Press/Pearson Learning Group.

Gordon, K. (n.d.). *Inquiry Approaches in Primary Studies of Society and Environment Key Learning Area* (Rep.). Queensland School Curriculum Council. doi:http://21stcenturyhsie.weebly.com/inquiry-pedagogy.html

Graesser, A. and Person, N. (1994). Question asking during tutoring. *American Educational Research Journal, 31*, 104-137.

Guiloba, M., Wokadala, J., and Bategeka, L. (2010, September). *Does teaching methods and availability of teaching resources influence pupils' performance: Evidence from four districts in Uganda*. Retrieved from https://ageconsearch.umn.edu/

Joubert, J. (1896). *Pensées of Joubert* (H. Attwell trans.). London: George Allen. (Original work published 1842).

Koechlin, C., and Zwaan, S. (2014). *Q Tasks: How to empower students to ask questions and care about answers*. Ontario, Canada: Pembroke Publishers Limited.

Minigan, A. and Beer, J. (2017). Inquiring minds: Using the question formulation technique to activate student curiosity. *The New England Journal of History, 74*(1), 114–136.

Mitana, J. (2018). Assessment of higher order thinking skills: A case of Uganda primary leaving examinations. *African Educational Research Journal, 6*(4), 240-249. doi:10.30918/aerj.64.18.083

NCDC. (2000). *Teachers' guide to the Uganda primary school curriculum.* Volume 1. Kampala: National Curriculum Development Centre. Retrieved from http://www.ncdc.go.ug/curriculum-type/primary-curriculum

Ojijo. (2014). *Review of Education Policy in Uganda (Revised)*(Working paper). Ugandan National Curriculum Development Centre. Retrieved from https://www.academia.edu/9636316/Review_of_Education_Policy_in_Uganda_Revised_Working_Paper_Submitted_to_Uganda_National_Curriculum_Development_Centre_NCDC_2014_By_Ojijo

Pagowsky, N. (2015). A pedagogy of inquiry. *Communications in Information Literacy, 9*(2), 136-144.

Pedrosa, D., Almeida, P. and Teixeira, D. (2007). Where learner's questions meet modes of teaching: A study of cases. *Research in Education, 78,* doi:10.7227/rie.78.2

Redfield, D. and Rousseau, E. (1981). A meta-analysis of experimental research on teacher questioning behavior. *Review of Educational Research, 51*(2), 237-245.

Rosenshine, B., Meister, C. and Chapman, S. (1996). Teaching Students to Generate Questions: A Review of the Intervention Studies. *Review of Educational Research, 66*(2), 181. doi:10.2307/1170607

Rothstein, D. and Santana, L. (2011). Teaching students to ask their own questions. *Harvard Education Letter, 27(5).* Retrieved from https://www.cbsd.org/cms/lib07/PA01916442/Centricity/Domain/586/Harvard Letter Having Students Ask Their Own Questions.pdf

Schmidt, H. (1993). Foundations of problem-based learning: Rationale and description. *Medical Education, 17,* 11–16.

Sikoyo, L. (2010). Contextual challenges of implementing learner-centred pedagogy: The case of the problem-solving approach in Uganda. *Cambridge Journal of Education,40*(3), 247-263. doi:10.1080/0305764x.2010.509315

Ssewamala, F., Wang, J., Karimli, L. and Nabunya, P. (2011). Strengthening universal primary education in Uganda: The potential role of an asset-based development policy. *International Journal of Educational Development, 31*(5), 472-477. doi:10.1016/j.ijedudev.2010.11.001

Tabulawa, R. (1997). Pedagogical classroom practice and the social context: The case of Botswana. *International Journal of Educational Development, 17*(2), 189-204. doi:10.1016/s0738-0593(96)00049-1

Tabulawa, R. (2003). International aid agencies, learner-centred pedagogy and political democratisation: A critique. *Comparative Education, 39*(1), 7-26. doi:10.1080/03050060302559

Tovani, C. (2015). Let's switch questioning around. *Educational Leadership, 73*(1), 30-35.

Uganda and Uganda. (1992). *Government white paper on implementation of the recommendations of the report of the Education Policy Review Commission entitled "Education for national integration and development."* Kampala: The Republic of Uganda. Retrieved from https://www.cmi.no/pdf/?file=/uganda/doc/government-whitepaper.pdf

Uganda Ministry of Education and Sports (2008). *Education statistics abstract, 2007*. Ministry of Education and Sports, Kampala. Retrieved from http://www.education.go.ug/files/downloads/Fact%20Sheet%202002-2013.pdf

UNESCO (2012). *Stumbling blocks to universal primary education: Repetition rates decline but dropout rates remain high.* Retrieved from https://en.unesco.org/news/stumbling-blocks-universal-primary-education-repetition-rates-decline-dropout-rates-remain-high

Vygotsky, L.S. (1962, 1986). *Thought and language*. Cambridge, MA: Massachusetts Institute of Technology Press.