

Old technology - New experience: Teachers' and pupils' reactions to Interactive Radio Instruction (IRI) in grade two mathematics classrooms in Guyana.

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Abstract

The paucity of trained and qualified teachers, and poor mathematical attainment at the primary school level in Guyana triggered the introduction of the cost effective Interactive Radio Instruction (IRI) mathematics programmes. This study examined teachers' classroom practice, and explored teachers' and pupils' reactions to IRI in Grade Two mathematics classrooms. Eighteen schools, 9 urban and 9 rural schools, were involved in this study. Data for this study were collected via ten focus group interviews involving 52 pupils, semi-structured interviews with 30 teachers, and 38 classroom observations. Unlike the pupils who reacted positively to the IRI radio programme, most of the teachers expressed reservations for the IRI methodology. Comprehensive teacher training should precede the implementation of any new programme. Twenty- eight percent of the teachers observed had unsatisfactory classroom practice. There was evidence of lack of preparation and leadership by the teacher which resulted in ineffective management of pupil learning.

Introduction

Radio as a cognitive tool has featured in Guyana's classrooms for more than sixty-six years. This relatively old technology brings new experiences to mathematics classrooms and has been recognized for its pedagogical value (Nambair 2010; Gulati 2008; Bosch 2004). Interactive Radio Instruction (IRI) continues to attract policy makers in many other developing countries such as Haiti, Nigeria and Somali. In some countries, like India and China, radio had been placed on the educational web from primary to

university level. Radio brings new experiences to the classroom and should be seen as a cognitive tool.

The paucity of trained and qualified teachers in Guyana, especially in the hinterland, coupled with the poor mathematical attainment at the primary school level was the catalyst for the introduction of a different mode of instruction in mathematics classrooms. For more than a decade, mathematics was ranked the lowest of the four core subjects examined at the National Grade Six mathematics examination. During the period 1999 to 2010 mathematics recorded a mean score of less than 50%. The highest mean percentage was 46% in 2001 and the lowest was 33.5% in 1999 (NCERD 2010).

The first model for Interactive Radio Instruction was created by a team from Stanford University for Nicaragua in the 1970's. The IRI programmes, which employ a fun and interactive format, were designed to increase access to basic education for all learners. Interactive Radio Instruction was introduced in grade1 mathematics classrooms in Guyana during September 2005. Three years later, the Ministry of Education had institutionalized the IRI Mathematics programme at the first three of the six grades in the primary school.

Any programme that accounts for more than fifty percent of the school's curriculum would need careful monitoring. The gravity of the negative comments on the IRI mathematics programmes from student-teachers at the University of Guyana, over a five-year period, triggered this research. This study explored teachers' and pupils' reactions to the Interactive Radio Instruction in grade 2 mathematics classrooms, and examined teachers' classroom practice.

Face and Place Value of Interactive Radio Instruction

Despite conflicting arguments about the efficacy of technology, we cannot dispute that technology is inherently interesting. Whether it is new technology or a new experience provided by an old technology, we share Willingham's (2010) view that there is a 'wow' factor that is real. Nonetheless, we are cautioned by Chang and others (1998, 43), that "the magic lay not exclusively in the technology, but in the interweaving of a systematic program of education reform with the judicious use of technology-based resources." Radio is the "most often utilised and successful medium for social change" (Dagron, 2001, 2). Further, as Lindgren (2004, 707) posits, radio has "the power to bring the world to the classroom, and programmes could be presented as textbooks of the air."

Radio provides a productive educational landscape. After three decades, radio is still the only relatively low cost medium through which educators can reach a mass audience in many countries (Thomas 2001). Radio as a technology can encourage pupils' engagement in academic content through interactive mode of instruction. Technology has certainly changed how pupils access and integrate information (Willingham 2010). Several studies show gain in children's achievement. Bosch (1997) showed that IRI can increase learning and improve test scores, and is useful in bringing rural children up to the level of those in urban schools, who have access to better teachers and materials. Generally, the sustainable success rate for IRI projects since the 1980s was 66 percent (Bosch 2004).

The IRI teaching techniques target different kinds of learners. The choral responses may match the styles of learners who prefer to tell or hear information aloud. Verbal or linguistic learners, as described by Howard Gardner's theory of multiple

intelligences, learn better from hearing words spoken aloud than they do from silent reading. These learners have less trouble concentrating, and remembering what they learn if they find a way to link the subject to music (Gilam 2001). Likewise, the inclusion of games or exercise accommodates kinesthetic learners. These learners “feel most comfortable in a classroom environment where they have the freedom to stand, stretch, and move at regular intervals” (The Teachers Network 1998, 42). In addition, the needs of the intrapersonal learner, who may feel uncomfortable in groups and may not voluntarily participate in class discussions, might be met through the opportunity provided by the individual seatwork.

One unique benefit of radio technology is that parents or guardians can keep abreast with their children’s mathematical learning on a daily basis and support children’s efforts at home. The IRI mathematics programmes, afford parents the opportunity to listen to lessons through radio broadcast and be involved in their children’s education.

Land of Numbers

Land of Numbers is the IRI grade 2 mathematics programme. The programme emphasizes active learning and meaningful interactions through distributive learning. Lessons are designed to provide an opportunity for pupils to develop their mathematical ability and encourage active engagement in the learning process. The radio lessons which include songs and games require frequent audience responses. Teaching techniques include choral responses, individual seatwork, and activities using manipulatives such as counters.

The grade 2 mathematics programme comprises one hundred and thirty-six lessons which are delivered via radio broadcasts or CDs. Each lesson, which lasts

approximately 50 minutes, has an audio and a face-to-face component. The 28-minute audio component allows pupils to listen to and interact with radio teachers and characters in various learning situations. The face-to-face interaction between the classroom teacher and pupils, which follows the audio lesson, lasts for 22 minutes. The face-to-face lessons introduce new topics and to some extent reinforce or continue topics covered during the audio programme.

Basically, the IRI programme requires a radio and an adult facilitator. Before each radio lesson commences, facilitators or classroom teachers are required to write exercises from the teachers' manual onto the chalkboard and pupils copy the exercises into their checkered-line book. Pupils are guided through the exercises by radio teachers and characters during the audio lessons. Approximately every 20 seconds, pupils answer questions or perform some other activity. Learners actively participate by responding orally, writing, drawing pictures, using counters and singing. Oral responses are used in the mathematics lessons to encourage active mental participation. Children solved problems silently before giving the answer aloud.

Methodology

Eighteen primary schools were involved in this study over a six-month period. The 18 schools were randomly selected from 55 schools in one geographical area. There were nine urban schools, and nine rural schools. Data for this study was collected by the two researchers via teacher and pupil interviews, and classroom observations.

Interviews

A total of thirty grade 2 teachers from 18 schools were interviewed: 2 teachers

from 12 schools and 1 teacher from 6 schools. A semi-structured interview guide was used to gather data during the interview. Teachers gave their reactions on the nature of the IRI grade 2 mathematics programme, and the availability of resources. Individual interviews, which lasted for about ten to fifteen minutes, were conducted immediately after the IRI mathematics lesson.

Ten focus group interviews were conducted over a nine-week period with fifty-two pupils. Pupils from five rural schools and five urban schools were randomly selected to participate in the focus group interviews. Written consent to participate in the interview was received from the parents or guardians of seven grade 2 pupils from each of the ten schools. However, the actual size of the groups that participated in the interview was determined by the pupil's presence and willingness to participate. Consequently, one group comprised seven participants; two groups had six; six groups had five and one group had three.

The focus group interviews were initiated through the use of open ended questions which focused on pupils' reactions to Interactive Radio Instruction, their perceptions of their teachers' instructional practice, and home support. The focus group technique best suited the researchers' purpose of gaining insight into pupils' perceptions of IRI. It was assumed that the social interactions that take place within each focus group interview will be quite productive in widening the range of responses.

Children's viewpoints were often considered merely as reflections of what their parents and teachers think (Smith 2007). Rethinking such traditional views of children and childhood is essential for today's researchers, professionals and policy-makers who work with children. Smith (2007, 2) contends that "listening to children does not imply

doing everything that children ask for, or giving children's views more weight than adults.” Rather, listening to children means more respectful listening and taking into account children's perspectives.

Classroom Observations

Eighteen schools had a total of thirty-eight classroom observations. Sixteen schools had two observations and each of the other two schools had three. The classes observed were selected by the schools' administration. A 14-item classroom observation guide was used to record the observations during the 28-minute audio component of the IRI lesson. The observation guide focused on three aspects of management: Environmental, Curriculum, and Behavioural. A 5-point rating scale, from excellent to poor as outlined in table 1, was used to rate fourteen aspects of the teachers' practice.

The modal score of the two or three observations was recorded for the analysis. In the case of bimodal scores the highest score was recorded. The grade assigned for the classroom observations was determined by the computation listed in Table 1.

Grade	A	B	C	D	F
Score	52.5 – 70	45.5 – 52.4	38.5 – 45.4	31.50 – 38.4	0 – 31.4
Percentage	100 – 75%	74 – 65%	64 – 55%	54 – 45%	< 45%
Remark	Excellent (5)	Very Good (4)	Satisfactory (3)	Unsatisfactory (2)	Poor (1)

Table 1: Classroom Observation Grading Scale

The two researchers observed each lesson simultaneously. After consultation, the lead researcher, who had more than 20 years experience conducting practicum, completed the observation guide.

Ethical Considerations

In conducting this research several ethical guidelines, including information, consent, confidentiality and conduct were considered. Firstly, entry and access to the field was negotiated by seeking permission from the Ministry of Education. Permission to conduct the investigation was sought and had from the schools' authority through the Chief Education Officer. The head teachers and grade 2 teachers of participating schools were briefed on the conduct and purpose of the research.

Permission to audio-record the interview conversations was requested from the parents or guardians of selected grade 2 children. Only those children for whom written consent was obtained participated in the study. Further, although permission was granted by the parents or guardians, participants were informed of their right to withdraw from participating at anytime.

In addition, parents, grade 2 teachers, and head teachers were informed that the findings of the study would be used for academic purposes and to inform teachers' instructional practice.

Discussion

Teachers' Reactions

More than 90% of the teachers interviewed was uncomfortable with the fact that each lesson highlighted many concepts. The format of IRI programme allowed for the learning of a concept to spread over several exposures, both within one lesson and throughout a number of lessons, which created opportunities for reinforcement. Many of the teachers did not benefit from any training to equip them with skills to manage the IRI

programme. Consequently, many teachers did not embrace the programme.

Comprehensive teacher training should precede the implementation of any new programme.

During the lesson, the radio teacher prompted responses from the pupils, paused for the responses, and then supplied the correct responses to the prompts. However, the majority of the teachers claimed that the less-abled learners had difficulty coping mainly with the fast rate at which radio characters supplied the answers. Nevertheless, after careful analysis of the situation in each classroom it was revealed that less than 20% of the pupils was affected. Any new programme in which more than 80% of the learners was coping may be satisfactory until the teachers gain more experience managing the programme.

Some teachers dubbed the IRI programme as more work. This was probably because of the volume of work they were forced to complete in a relatively shorter period of time. The use of technology usually results in more coverage of content. Further, some teachers viewed the daily setting-up of radio or mp3 player as a burden which resulted in the delivery of lessons without the audio component. Teachers must view teaching as a service rather than a task.

The IRI programme was not designed for open classrooms. Two-thirds of the classrooms used in this study was open classrooms separated from other classrooms by chalkboards. Teachers who worked in open classrooms indicated that other classes were distracted by the high volume of the audio programme. However, the problem could have been controlled if the radio was used instead of CD's. The sound emitting from the classrooms using radios is synchronized when compared with different sounds from

classrooms using CDs.

Many teachers had an inadequate supply of teaching and learning materials. These include radio and mp3 players, CDs, batteries, teachers' manual, and checkered line exercise books. One may argue that teachers should be proactive in securing materials for classroom instruction, and the school administration, through their Parent Teacher Association (PTA), should be more aggressive in ensuring that Radio and mp3 players are available for each lesson. Ultimately, the Ministry of Education must monitor the conduct of the IRI programme including the availability of school supplies in grade 2 classrooms.

Any action by teachers other than proper planning and preparation coupled with careful monitoring of pupils' work is unacceptable. The structure of the IRI programme, with the high quality exercises, has the potential of providing teachers with in-service training. Only one teacher indicated that the radio programme helped to improve her teaching skill. Extensive training of teachers should always precede the implementation of any programme. Inadequate training programmes resulted in unnecessary delay in terms of teachers embracing the programme which was hinged on the success of the programme.

Pupils' Reactions

Focus group interviews were used to determine pupils' reaction to the grade 2 IRI mathematics programme. An interview guide consisting of open ended questions triggered the discourse on pupils' reaction to Interactive Radio Instruction, their perceptions of teachers' instructional practice, and home support. The audio recorded interviews were used to prepare 10 transcripts. Extracts from the transcriptions were

presented in three categories: Things pupils like about the radio instruction, Things pupils think the teacher can do to help them learn mathematics, and Home support.

Things pupils like about the radio instruction

To conceal identities, pseudonyms were given to the schools and the participants. Ten letters (A to J) were used in the transcription to represent the pupils' school and the number represented the interviewee.

All the children interviewed said IRI helped them to learn mathematics. Most of the children indicated that IRI mathematics was their favourite subject and they enjoyed writing, adding, multiplying, plus, the hundreds, singing, dancing and exercising. Pupils from all 10 schools reported that they liked the radio lessons. A child from school F sums up the sentiments of the pupils interviewed when she claimed that “there is only one thing I don't like. I don't like when the radio programme finish.” Extracts from the interviews are presented.

Child 3A: IRI is nice
Child 2A: I like everything
Child 1F: I like the maths. I like to do mathematics
Child 1J: I like when the radio give me the answers so that I can see if I get my answers right

When children like 3A, 2A and 1F express appreciation for mathematics, teachers must value and nurture this relationship with mathematics to help them preserve their positive attitude for later years. Positive attitude breeds success which is the best way to promote and advance mathematics learning.

The conversation with school J showed a common but important learning process in which the child was intrinsically motivated and anxiously awaited the response from

an authentic source. What might be equally important was that learners could have checked their answers privately. Relieving learners from the burden of checking an uncertain response publicly is essential in encouraging a learner to at least attempt a solution. This provides an opportunity for teachers to diagnose learners' problems.

Responses to what they enjoy most about IRI from children of schools A, G, and F have pedagogical value.

Child 5A: I like when we stand up and march
Child 3G: It helps me to learn to add and about education and other things
Child 2F: I like to get my book marked to get points
Child 1F: I like to write the answers myself
Child 4F: I like when I get the answers all by myself
Child 6F: I feel vex sometimes, because I don't like when the radio give me answers

Child 5A probably learned best when there were opportunities for physical activities which support Howard Gardner's bodily-kinesthetic intelligence. The two children 1F and 4F were not only given the opportunity to construct their own knowledge which is the root of learning mathematics, but also to enhance their self-confidence. Further, the comment made by child 6F emphasizes the need for learners to have successful experiences. Connection with the child's world, which puts learning in context, was also evident in child 3G's comment.

Further, pupils' conversations about their favourite character subscribe to effective classroom practices.

Child 2A: Number seeker
Child 4A: Number seeker! She jokey
Child 3C: Number seeker will ask us questions
Child 4D: The wise man. I like the wise man because he has a donkey

Effective teachers have a wide range of strategies within their repertoire to motivate learners. Timely injection of a joke, searching questions and even mapping activities with things learners (child 4D) were fond of such as animals are likely to contribute positively to the learning process.

Things pupils think teacher can do to help them learn mathematics

Grade 2 pupils' views on things they would like their teacher do during the IRI lessons to help them learn mathematics reflected recommended classroom practices.

- Child 2D: Using the counter*
- Child 3D: Sharing*
- Child 5D: Explaining*
- Child 1E: Showing you the answer*
- Child 3E: Give you harder work*
- Child 4E: I like when she sends me to write on the board*
- Child 6F: I like when my teacher point to the answer*
- Child 6F: I think if she write it on the board it will help me*
- Child 2F: She would explain it, and we would listen to it and when she is finish explaining it we would be sent to start*

The use of counters and sharing materials imply that the teachers provide the learning materials to engage pupils in active classroom participation which is necessary for the success of radio instruction. Although there is the radio teacher, the classroom teacher must prepare the chalkboard before the lesson starts and show some level of interest and enthusiasm by fully participating in the lesson. Teachers' involvement in the classroom discourse includes writing on the chalkboard, recording and pointing to answers and offering additional explanation as indicated by child 6F, 1E, and 5D. Such actions will assist the audio-visual learners.

Requests from child 3E, 4E and 2F target the face-to-face component of the programme. Well monitored and structured classroom discourse in which learners feel

free to contribute is essential. Also, teachers must carefully assess learners and provide challenging work, where necessary, if they are to sustain their interest.

Home Support

The extracts that follow show a wide range of persons at home who help children with their grade 2 IRI mathematics.

- Child 2F: My uncle, or if my uncle has to go out my grandfather or my mommy helps me*
- Child 1F: My cousin or my brother or my sister*
- Child 4G: I give my mother my work and when she see anything I get wrong we does learn it at home*
- Child 5H: I do my work by myself then my mother does check it*
- Child 1I: Well most of the time before our mother come and is in the kitchen daddy tells us to revise our work by the time*

There were clear indications that pupils got support at home. The home support ranged from supervising to checking and explaining. The importance of home-school connections cannot be overemphasized.

Classroom Observations

The 14-item classroom observation guide used in this study was divided in three categories of management. These categories, as displayed in table 2, were: Environmental Management which highlighted environmental interventions, Curriculum Management which focused on managing cognitive development, and Behavioural Management.

Categories	Items (1 to 14)
Environment Management: <i>environmental interventions</i>	Pupil readiness (1), Pupil participation (2), Pupil motivation (3), Use of supporting materials (4), Chalkboard display (5)
Curriculum Management: <i>managing cognitive development</i>	Teacher preparation (6), Teacher leadership (7), Teacher Presence (8), Teacher involvement (9), Treatment of misconceptions (10), Pupil focus (11), Monitor pupils' work (12)

Behavioural Management	Class tone (13), Class control (14)
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Table 2: Categories and items on the classroom observation guide

Eighteen schools had thirty-eight classroom observations. Each school had two or three observations and the modal score for each item on the observation guide was recorded. Table 3 shows that teachers from two of the eighteen or 11% of the schools recorded excellent classroom practice. Excellent teachers were best at classroom leadership which is the key to any learning process including promoting classroom citizenship.

School Rating	Gr	F(%)	Mean score recorded per item for each group													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
Excellent	A	2 (11)	4.0	4.0	4.0	4.5	4.0	4.0	5.0	4.5	4.5	3.5	4.5	4.5	4.5	4.0
Very Good	B	4(22)	3.8	4.0	3.5	3.5	3.5	3.8	4.0	3.8	4.0	3.3	3.8	3.3	4.0	4.0
Satisfactory	C	7(39)	3.0	3.3	3.0	2.7	2.7	2.7	3.1	4.3	3.6	2.0	3.0	2.7	3.3	3.4
Unsatisfactory	D	5(28)	2.6	2.8	2.6	2.4	2.2	1.8	2.4	2.4	2.8	2.4	2.2	2.6	2.6	2.8
Overall mean			3.4	3.5	3.3	3.3	3.1	3.1	3.6	3.8	3.7	2.8	3.4	3.3	3.6	3.6

Table 3: Results from the classroom observations

Sixty-one percent of the schools was at least satisfactory. Twenty-two percent of the schools had very good classroom practice. Nevertheless, they only recorded very good for 5 items and satisfactory for the other 9 items. The majority of schools (39%), as shown in Table 3, was satisfactory with their classroom practice. The teachers at these schools were very good in terms of teacher presence but were unsatisfactory in the use of supporting materials, chalkboard display, teacher preparation, and monitoring pupils' work, and worst at addressing misconceptions.

Five schools (28%) had teachers employing unsatisfactory classroom practices. None of the teachers recorded better than satisfactory in any of their classroom practices. Teacher presence, use of supporting materials, chalkboard display, and helping pupil

focus were all unsatisfactory, and teacher preparation was poor. Twenty eight percent of the teachers in any school system should not be rated unsatisfactory. Ineffective classroom practice at this magnitude could result in learners having poor self-confidence which could result in a faulty impact analysis of the programme.

The highest overall mean scores recorded were for teacher involvement and presence in classroom throughout the lesson but they were worst at addressing misconceptions. Misconceptions do not only hinder the construction of new knowledge but they are difficult to remove from the mental structure. The classroom teacher must strive to address problems such as misconceptions. However, it was noted that teachers do not record their strengths and areas of concerns for each lesson to facilitate the mandatory review lesson on Fridays.

The only item recording the maximum 5 points was teacher leadership, which was from the excellent schools. Apparently, a low level of planning and preparation by teachers resulted in them being consumed with other mental activities rather than with key activities such as the treatment of misconceptions. The overall mean score showed that schools were not only unsatisfactory but worst at treating misconceptions.

It was observed that although all the lessons were provided, in the teachers' manual, many of the teachers were not fully prepared. More than 65% of the teachers was unsatisfactory as it relates to teacher preparation. Teachers need to capitalize on the luxury of prepared lessons and get familiar with the audio and written materials rather than waiting to experience the materials at the same time as their pupils. Teachers need to be free to listen and respond to the radio teacher and manage pupils' learning. Lack of

preparation by teachers will not free their sub-conscious mind to enhance their focus in terms managing pupils' learning.

Categories of Classroom Management Assessed		Percentage (%) Frequency				
		1s	2s	3s	4s	5s
1	Environment Management: <i>environmental interventions</i>	0	22	46	31	1
2	Curriculum Management: <i>managing cognitive development</i>	6	17	44	27	8
3	Behavioural Management	0	8	44	45	3
Mean percent of all three categories		2	16	45	33	4

Table 4: Performance on the categories of classroom management

Table 4 shows that none of the teachers were poor at environmental management but only 1% of the teachers was excellent. Seventy-eight percent of the time teachers were at least satisfactory. Although the majority (46%) of the schools was satisfactory, too many of them (22%) were unsatisfactory. The schools were best at behavioural management. ninety-two percent of the schools was at least satisfactory. In terms of curriculum management 23% of the schools was poor or unsatisfactory. Of the three categories curriculum management recorded the highest percentage for excellence but it was a meagre 8%.

In addition to the data recorded on the observation guide, it should be noted that sixty-one percent of the time teachers started the lessons late and many of these teachers did not make use of the scheduled five minutes for the initial chalkboard preparation before the lesson commenced. There were several cases in which the teacher wrote the incorrect exercises on the chalkboard that did not match those of the radio teacher. Whenever the class teacher changed the exercises on the chalkboard, the entire class was forced to re-write the exercises which robbed them of important instructional time from the radio teacher.

There were no striking behavioural problems observed during the radio lessons. The main contributory factor could have been that the programme provided meaningful work throughout the lesson. However, one significant flaw was that the children were not exposed to printed words during the lesson. Reading words could contribute positively to their reading ability.

Conclusion

Most of the teachers expressed reservations for the IRI methodology. They claimed that the slow learners had difficulty coping mainly with the rate at which the radio characters supplied the answers. Nonetheless, pupils reacted positively to the radio programme. This was perhaps due to their successful experiences during the lessons which were hinged on a wide range of teaching strategies which supported effective classroom practices, and Gardner's multiple intelligences.

The findings showed high teacher involvement and presence which could have contributed to pupils not displaying any striking behavioural problem during the radio lessons. However, the lack of preparation and leadership by the teachers resulted in ineffective management of pupils' learning. The programme was not designed for the *radio teacher* to treat misconceptions immediately but the classroom teachers were worst at addressing misconceptions.

Only the Urban schools used the radio regularly because the time of the radio broadcast did not match the rural schools' timetable. No school had the full complement of working radios or mp3 players. The lack of equipment and materials for the programme and the noise distraction created by the open classrooms were other concerns

of the teachers. In addition, many teachers did not make full use of the scheduled five minutes preparation time before the lesson commenced, and some teachers dubbed the managing of the IRI mathematics programme as more work than the previous programme. In some cases, the teacher used the audio lesson reluctantly mainly because their lesson was being observed.

In addition, grade 2 pupils' views reflected strong home support which ranged from supervising to checking and explaining home assignments and class work. They also requested recommended classroom practices, such as frequent use of concrete materials, more classroom discourse, challenging work, and the effective use of the chalkboard. However, children were not exposed to printed words during the lessons.

Interactive Radio Instruction is an educational method that has the potential to improve mathematics learning in Guyana classrooms. However, teachers must meet an acceptable standard in the teaching and learning process. Teachers and administrators must value the fact that most of the children interviewed said that they liked the radio lessons. This can only be achieved if there is a comprehensive and rigorous monitoring of teachers' classroom activities including the level of preparation for lessons, strong mentoring, and the support of all stakeholders.

Recommendations

The following recommendations are based on the implications outlined in the preceding section.

- There is room for the IRI programme to be more effective and sustainable.

The Interactive Radio Instruction programme cannot be productive without the audio lesson. Every classroom must be furnished with a radio or mp3 player.

- Time-tabling in the Regions should be synchronized with the radio broadcasts. Teachers will be forced to follow the IRI daily time-table. Further, the use of radio instead of the mp3 player will also support the energy conservation drive.
- Children were not exposed to words on the chalkboard during the IRI lessons. Teachers should write appropriate vocabulary on the chalkboard where possible to help pupils develop their reading skills. In addition, the inside and outside cover of the IRI exercise books should display useful grade 2 mathematical facts pupils could use as a learning tool.
- During any mathematics lesson there could be misconceptions. It is the teacher's responsibility to address misconceptions appropriately at the earliest opportunity.
- Children requested more engagement from the teachers during the programme. During the IRI programme, teachers should be guiding children or monitoring their work.
- Some teachers were reluctant to use the audio component of the programme. Their action is probably due to the extra effort required to collect, set up and return the radio to the storage area. In cases where the radio (mp3 player) is

available, the level Head should be held accountable for the non-use of the audio lessons.

- All grade 2 level Heads for grade 2 should be exposed to a series of workshops. Their knowledge from workshops should form the basis for mandatory staff development sessions. Many teachers were not enthusiastic about the IRI programme. They also did not follow classroom practices that are consistent with the IRI methodology.
- There seems to be a lack of accountability for pupils' learning especially those who need special attention. No lesson plan is required for IRI, but teachers should write an evaluation for each lesson and record problems pupils encounter and an action plan to address pupils' learning difficulties.
- The IRI programme provided meaningful work throughout the lesson. There were no striking behavioural problems observed during the radio lessons. Teachers could maximize their efforts in managing pupils' learning.

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