Research: Using the Xbox Kinect in Foundation Phase English Language Acquisition

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Context

A seriously high failure rate and extremely low levels of English language competence characterise many rural primary schools in South Africa. Microsoft wishes to test the hypothesis that English language skills of primary learners can improve through exposure to English while playing games using Xbox and Kinect technology.

In order to implement a pilot project to test this potential, Microsoft has identified a primary school in rural KwaZulu-Natal that fits this profile, Lakeside Park Primary in Vryheid. There are three computers in the school that are used for administration but none that are used for teaching and learning. There are two classes in each of grades 1 to 3, which comprise the junior primary phase of the school. The average class size is 42 learners per class. There are six teachers who will be trained and whose classrooms will be equipped with the necessary infrastructure including the technology and security.

This document discusses the rationale for using Kinect in the classroom, and outlines a pedagogical approach. The suitability of various Kinect games is then evaluated and recommendations made for games to be used in the study. An outline for a 2-day training course for teachers is also provided.

Basic Educational Philosophy

This study is grounded in a particular approach to education. The key principle is that it is grounded in a Learner-centred approach, which is summed up as follows:

"The learner-centred education approach is a paradigm shift from the traditional view of education where learning is upheld as a result of, and a response to the transmission of authoritarian and coded knowledge. The learner-centred approach legitimizes learners' experiences by allowing the space for the learners to participate in the process of knowledge construction. However, the learner-centred approach does not involve a diminished role for the teacher, rather it affirms his/her position as a facilitator of the learning process." (Molteno Institute for Language and Literacy, 2010)

The implications are that teachers should:

- aim to create environments in which learners are helped and encouraged to discover and **explore** concepts and skills;
- adopt an approach which takes account of the need for **cognitive development**, through encouraging thinking, problem solving, fantasy and creativity;
- accept that learners are all different, that they prefer a **variety of ways of learning** and expressing themselves, and that merely listening to the teacher does not work for many learners;
- develop ways for learners to **be active**, physically, cognitively and emotionally by creating activities that are fun, challenging and relevant to their lives in the real world outside of the classroom;
- encourage **motivation** in learners through their own enthusiasm and involvement, and through creating activities which are naturally engaging.

This study is based on the assumption that by introducing games into a classroom, and specifically the Xbox Kinect, creative teachers will be able to enliven the learning experiences they develop for the learners in their care.

Games in Education

With the increasingly widespread availability of computers, much energy has been devoted to finding educational uses of computers, and more specifically of computer-based games. Broadly, educational uses of games can be split into two categories:

- **Computer as Teacher**: the software presents material to be learners, and then provides practice activities and an assessment of how well the skill or knowledge has been mastered.
- **Computer as Creator of Context**: the software provides an immersive experience which simulates real life, and which a skilled teacher can make available to learners so that they can explore a topic or project in a new way, in the process learning relevant content and skills.

(At this point it is necessary to state that I include gaming consoles under the broad heading of "computers".)

Many computer games are based on activities which are basically of the "drill and kill" variety (ie using the computer as a very patient, but ultimately quite boring teacher), merely embedding tasks in some kind of scenario, and then rewarding learners for getting a correct answer by allowing them to make progress in the game. The following comment seems to suggest an approach, and the lack of such games for Xbox:

"The more I think about Xbox in the classroom (or Kinect) the more I am convinced that the Games can't really do anything other than teach hand eye coordination / team work etc. As at the moment there just aren't any educational games. Kinect needs to launch a maths title, where it asks what is 4+5 and the kid points to the answer … or, the game says "spell APPLE" and the child has to say / select the correct spelling… The games are not educational at this point." (Lankwarden, 2011)

The problem with this approach is that crucial aspects of "real" computer games are absent. A good game is engaging and exciting because it provides an immersive experience, and places the players in a world in which their creativity, problem solving, cunning, teamwork and/or courage will be rewarded. The tasks of the game are part of and are relevant to the world that is being simulated, and players are free to explore and interact with this world however they want. A problem for educational games is that children are used to very slick, multi-million dollar commercial games, and so find educational games rather "lame".

An alternative approach is to see the computer or gaming console as a means by which a teacher can conjure up a world for learners that would not be possible otherwise, and then to use their engagement with that world for a useful educational purpose. An excellent example of this is Tim Rylands' use of the game *Myst* (Rylands). His learners are transported into the world of the game, and then are encouraged to write about what they see and experience. Another excellent example is Ollie Bray's (Bray, MGS gets First Prize in European Innovative Teacher Awards!, 2009) project using the Xbox game *Guitar Hero* as the core of a project which involved learners in creating and managing a rock band as part of a programme to assist Grade 7 learners with the transition to secondary school.

This approach to the use of games is well summed up in the following quotation: (Times Higher Education, 2009):

In a speech … , Professor Broadfoot said that computer simulations offered a more "authentic" test of creative problem-solving than current approaches. "Games are excellent learning tools in that they are interactive and provide rapid feedback, opportunities for extensive practice, engagement with intellectual complexity, emotional involvement and, increasingly, open-ended outcomes that challenge the creativity of the player," she said. They also offer training in metacognition, strategic thinking, concentration and even social skills. "Perhaps most important of all for many students is the level of engagement that computers can provide," she said. "Engagement, as we have seen, is the essential starting point for creative thinking, whether this is at school, at university or in the workplace."

New Generation, Whole-Body Gaming

Alongside all the enthusiasm for computer games, there has also been justifiable criticism. Much gaming, despite the possible benefits of cognitive and emotional engagement, is essentially a sedentary activity, and involves mere "button-mashing" as a way of interacting with the computer. Clearly this does not offer much engagement for learners whose style is more kinaesthetic. In 2006 the introduction of the Nintendo Wii console changed this by introducing the idea of controlling the computer with motion sensitive controllers, thereby changing the gaming experience into a much more active and social one. This sparked interest amongst educators, keen to bring a new style of gaming into the classroom (Weir, 2008), (Wiebe, 2009).

Adding to this momentum, Microsoft recently introduced the Kinect, an add-on for the Xbox. This has once again completely changed the way gaming takes place. The Kinect provides a Natural User Interface (NUI), which means it requires no controller, merely the movements of the players' bodies. The potential and possibilities for the use of Kinect in education are vast, as suggested by Anthony Salcito (Salcito, Blue-sky thinking on Kinect and Xbox in education, 2010):

"I certainly see the potential beyond gaming to think about what the future of a classroom would look like or the future of connection between students and team-based activities, as well as things as simple as raising your hand and having your classroom recognize the student who raised their hand. Interactive experiences, really new dynamics for interacting with content, using gestures to navigate, using voice recognition, creating new types of simulations using full motion and even helping kids with fitness. There's lots of opportunity for this type of technology to really accelerate the way in which we get more and new, different experiences with technology."

This study aims to engage a group of Foundation Phase teachers in looking for creative ways to use Xbox Kinect to promote the learning of English.

Learning English in the Foundation Phase

The principal and teachers at Lakeview Primary, in a survey and in video interviews, outlined the difficulties they experience in their teaching of English:

- Large class sizes mean that it is almost impossible to provide individual attention. Consequently teachers need to maintain control and this leads to a fairly passive role for the learners.

- Most learners come from homes where English is not spoken or understood. This means that learners enter the school with no background, and parents cannot help with homework.
- The task for learners is threefold: they need to become literate, they need to learn English, and they need to learn how to use English so that they can learn across the curriculum.
- Teachers feel under-confident when it comes to dealing with this situation. This might be because the school's collection of resources, and the training of the teachers, has been geared towards a First Language scenario.

In a study of the possibilities for using digital resources to promote the learning of English, Clegg *et al.* point to a very similar situation in the schools they studied:
"Learners in primary schools in Africa are doing a lot of things all at the same time: they are learning curricular concepts within each subject, they are learning English, they are learning an academic variety of English and they are also learning how to use English as a vehicle for acquiring these curricular concepts. They need therefore to be good language learners and good learners of subjects through a second language." (Clegg, Ogange, & Rodseth, 2003)
The implication of this is that for any intervention to be successful, it will need to address this issue. As Clegg *et al.* point out:
"Many children find learning through English difficult. Language-related disadvantage - for example, family illiteracy, low exposure to English and the gap between learners' language ability and the language demands of the curriculum - makes it difficult to learn in a second language. For this reason, teachers need to use a language-sensitive pedagogy specifically designed to address the needs of children who are learning through English." (Clegg, Ogange, & Rodseth, 2003)
The question is what constitutes a "language-sensitive pedagogy", and whether such an approach be encouraged and supported by means of games, and more specifically the use of the Xbox Kinect.

Learning strategies for language development

Clegg *et al.* point to various strategies that can be used to promote a language-sensitive approach.

- learning vocabulary (e.g. by noticing words and features of their form and use, by keeping vocabulary books)
- learning grammatical structures (e.g. by repetitive practice, by meaningful practice, by learning explicitly about grammar)
- learning to read in the second language (e.g. by getting ready to read, guiding one's reading, checking the results of reading)
- learning to talk in the second language (e.g. by helping oneself to be accurate and to be fluent)
- learning to write in the second language (e.g. by planning, drafting, editing and revising wring)
- learning to work in groups in both first and second languages (e.g. by planning, monitoring and shaping the direction of groupwork talk)

Many of these are part of any language instruction, but it is the amount of focus given to these activities which would be different. In a learning environment more geared towards first language learners, many aspects might be taken for granted.

In terms of this study, it is necessary to narrow down the above list to make the intervention more manageable. In this regard it is helpful to refer to a study conducted in the US to determine best practices with regard to teaching literacy in a second language (August, 2006). The study found the following:

"Many language-minority students can keep pace with their native English-speaking peers when the instructional focus is on word-level skills, but lag behind when the instructional focus turns to reading comprehension and writing. … It is not enough to teach language-minority students reading skills alone. Extensive oral English development must be incorporated into successful literacy instruction. The most promising instructional practices for language-minority students bear out this point: Literacy programs that provide instructional support of oral language development in English, aligned with high-quality literacy instruction are the most successful."

In other words, the most important area to focus on is to get the learners speaking in English. The aim would be to find ways of creating learning opportunities surrounding the various Kinect games which promote speaking in English.

However, to achieve that, it might be necessary to make use of the learners' first language. This is also something which Clegg *et al.* refer to. According to the US study:

"Language-minority students are not blank slates. They enter classrooms with varying degrees of oral proficiency and literacy in their first language. Studies that compare bilingual instruction with English-only instruction demonstrate that language-minority students instructed in their native language as well as in English perform better, on average, on measures of English reading proficiency than language-minority students instructed only in English (August, 2006).

Talking

The Molteno Institute, in their Breakthrough to Literacy approach, suggest that an effective approach to literacy development linked to the development of oral skills should include the following activities:

"Familiar pictures are presented to learners and they thus develop oral skills and vocabulary. They then progress naturally and logically to the written expression of the words that the children themselves have spoken. Likewise, phonics teaching takes place in the context of pictures and meaningful discussion around them. Thus Breakthrough converts mindless traditional "ma me mi mo mu" chorusing into empowering learning-through-generalizing and meaningful, motivating, and contextualized instruction." (Molteno Institute for Language and Literacy, 2010)

Clegg et al. make suggestions for specific activities that will promote learners' oral use of English:

- talk (in small groups) without guidance
- speak using guidance from visual (picture, graph, map, etc)
- information gap activities
- speak using card sorting
- speak, record and listen
- speak using guidance from words/phrases
- speak using guidance from connectors
- speak using a speaking frame with any of the above guidance
- speak using a model (e.g. sentence pattern)
- listen and repeat a sound/structure

Other strategies

These three pre-activities listed by Clegg *et al.,* used in reading and listening, are also relevant, and can be used effectively in preparing for oral tasks also:

- discuss the topic briefly with the learners (possibly initially in the first language, then in English, so as to create links to existing knowledge and experiences)
- ask them to predict what the topic will involve (also possibly initially in the first language, then in English, so as to establish the cognitive habit of prediction)
- introduce some of the key vocabulary.

There are many other activities which can be useful in developing literacy in English, and English for listening, reading and writing, however, for the purpose of this study, it is recommended to focus primarily on the development of oral skills as the backbone for both literacy and English in general.

Summary

The pedagogical approach for the acquisition of literacy in English needs to be in accordance with the educational philosophy outlined at the beginning of this document. In the area of language, it means that the key objective in learning language is communication. To foster a communicative approach, teachers need to focus primarily on Oral proficiency by creating an environment which supports and encourages learners to experiment with speaking in English and developing basic literacy skills. There are many activities which can be used to this end. In all activities, a language-sensitive approach must be used, ie one which makes the learning of language skills more explicit than would be the case in a first language environment. This approach will need to be introduced across the curriculum, not just in "English" lessons.

Implications for using Xbox Kinect

Based on the above discussion, the introduction of the Xbox Kinect into an educational setting as a means of teaching English should be based on the following principles:

- the games should not be expected to teach anything on their own; it is up to the teachers to craft creative ways of incorporating the simulated worlds of the games into exciting learning activities;
- make use as much as possible of the specific potential of Kinect to enable learners to move freely and energetically;
- accept that this is an English Second Language learning situation, additionally complicated by the fact that literacy is being taught at the same time in English, and that English is the language of learning across the curriculum;
- use the games to create opportunities to develop oral skills in English, using a variety of activities before, during and after the games;
- develop oral, listening, reading and writing activities based on the initial oral activities, in line with a language-sensitive pedagogy.

Some Ideas for using Kinect Games

In keeping with the above principles, what are some ways in which the Xbox Kinect can be used creatively in the classroom? Before suggesting some possible activities, it should be noted that this is an initial exploration, and that as part of the study, it is important for the teachers who will be using the technology in the classroom to be involved in generating ideas and developing specific activities.

The numbered list is used as a key in the reviews in the following section, in the part of the table labelled "possible uses".

1. **Use as a reward**: after completion of certain tasks, or for good behaviour, etc.
2. **Learn direction words**: make labels to stick on the TV, eg up, down, left, right.
3. **Create a communication gap**: have one learner explain to another how to do an activity; for more excitement, blindfold the Kinect user, and allow another non-

player to look at the screen and give instructions in real time; could be good for learning verbs, and giving instructions, eg “jump”, “run”, “throw”, etc as well as directions;

4. **Expand on a game:** tell a story, orally initially, then written, about a game, to describe what happened; in keeping with the above principles, this could be done using a frame or specific structures relevant to the game; or stop half way and predict what will happen.
5. **Allow learners to create avatars**: this could be an opportunity to learn words for body parts (eg eyes, mouth, etc), and to justify choices made using describing words (colours, other adjectives); this could be prepared for and followed up with “who am I” activities, eg describing oneself to the class with your avatar on the screen. To introduce the ideas of avatar creation, the teacher could create a series of “Guess who I am” avatars of famous people, and discuss how we know it is that person (eg Mandela).
6. Games, especially ones of a more narrative nature, can be used to **initiate role play:** after suitable preparation of vocabulary, grammar structures and/or frames, learners can play out interactions they experienced, or watched others experiencing, on-screen;
7. **The language of Numeracy**: particularly relevant to sports activities, learners can be helped to understand results tables, score sheets, performance graphs etc; also distance and measurement can be explored, together with concepts of near/far, short/long, low/high etc.; aspects of games invite counting and keeping tally, eg in field events, players each have 3 turns, and in 10 pin bowling, learners can count the pins, and would have to understand bonds of 10 to see how many still need to be knocked down;
8. **The concept of overview**: most games start with an introductory menu offering choices, and in narrative-based ones this is often linked to progress through the story; this can be used to teach the important cognitive concept of overview, an important sub-skill for learning prediction and for promoting confidence in dealing with new ideas;
9. **Understanding maps:** a specific kind of overview is a map, giving a geographical view of a narrative; teachers could use the map in the story to introduce the concept of mapping, and learners could draw maps of their school, their neighborhood, etc.
10. **Learn self-management:** learners could be encouraged to keep a diary of activities undertaken on the Xbox, and record which game they played and what their achievements have been; this could also assist the teacher in choosing activities for particular learners to be involved in, and in facilitating equal access to the Xbox;
11. **Emotional intelligence:** some games could lend themselves to promoting understanding of emotion by providing a safe, clear picture which can be discussed, eg what is the character feeling now? This could provide a vocabulary which would facilitate this kind of understanding and discussion;
12. **Environmental awareness:** games take place in a context, some of which are like the natural world; care for the environment could be a topic to be discussed as a spin-off of such games.

Other uses of Xbox

Lankwarden suggests many exciting ways in which the Xbox could be used, basically as a PC, to facilitate learning, for example by using it to set up video conferencing with learners in other schools, to view photos, videos and presentations, etc. (Lankwarden, 2011). While there

is huge potential in this approach, it is recommended that as an initial intervention, and to keep this study manageable, the focus remain purely on the use of Kinect-based games. The following section explores the games that are available, and recommends some which will be suitable for this study.

Assessment and Selection of Games

There are various Xbox Kinect games available. There are those which are "better with the Kinect sensor" and those which "require Kinect sensor". For the purposes of this study, only those which can be purely played with a Kinect sensor have been selected.

Eliminated for In-Principle reasons

For the purposes of this study, the following were eliminated from the sample of available games because they were unsutiatble for specific reasons:

- *Fighters Uncaged*: rated 16 for violence;
- *Harry Potter and the Deathly Hallows*: rated 12 for violence and bad language; limited use of Kinect; dependence on book and film knowledge; language too complex;
- *Your Shape: Fitness Evolved*: not a game, aimed more at fitness-seeking adults; seen as boring;
- *Motionsports*: *Play for Real*: rated 12 for violence and bad language; activities quite difficult for young children;
- *Sports Island*: *Freedom*: rated 12 for violence; activities quite difficult.

  With regard to the above two sports games, it is recommended in any event that it is better to start with one sports game package so that the various conventions and methods can be mastered easily. The above sports games can be added later when the recommended game (see below) has been exhausted.

Evaluation of Remaining Games

Before suggesting which games are most suitable and useful, it should be noted that this is an initial exploration, and that as part of the study, it is important for the teachers who will be using the technology in the classroom to be involved in choosing the games and suggesting how they can be used. It is recommended that all 6 of the games assessed below are included in the package for teachers to assess and try out in the classroom. To get the "kids think it is…" comments, various children of a range of ages 5 – 15 were observed (and joined) in playing. Various online reviews (most from IGN – www.ign.com) were also consulted.

Game	*Sonic Free Riders*
Age appropriate	Suitable for all
Content	Control your avatar through a variety of races
Language content	Minimal
Kids think it is…	Fun
Boring adult thinks it is…	Too frenetic, beginner kids might get confused
Possible uses	1, 2, 3

Game	*Kinect Adventures*
Age appropriate	Suitable for all
Content	Control your avatar through a 5 mini adventures
Language content	Minimal
Kids think it is…	Fun
Boring adult thinks it is…	Fun; but could be "used up" quite quickly
Possible uses	1, 2, 3, 4, 8

Game	*Kinectimals*
Age appropriate	Suitable for all, although it is a bit complex for young children
Content	Train and care for an adopted cub; various activities to be played by the player with the assistance of the cub; unlock parts of a map
Language content	Fairly complex written and spoken instructions, in and American accent; mostly much too complex for second language beginners
Kids think it is…	Aw, Cute; other activities are irritating
Boring adult thinks it is…	Beautiful animation and scenaery, good that it has some narrative content; but some activities seem off the point of the story, which is its strong point; some controls don't work very well, which can be frustrating; lots to do "I can already see this being used in the classroom to create a great cross-curricular project where *Kinectimals* is used as a contextual hub for learning and we structure the curriculum around the game. Not only are there obvious links to teaching about animals, eco-systems and place but I also think that the immersive environment that the game provides would develop a magical environment for creative writing. The game also looks like it will provide some great opportunities to teach and reinforce some of the softer skills of care and empathy." [Ollie Bray, commenting on Anthony Salcito's Blog post: (Salcito, Blue-sky thinking on Kinect and Xbox in education, 2010)]
Possible uses	1, 2, 3, 4, 6, 8, 9, 10, 11, 12

Game	*Kinect Joy Ride*
Age appropriate	Age 7, contains some violence
Content	Control your avatar driving a car in a variety of races
Language content	Minimal (instructions, and some chance to customise car, eg colour)
Kids think it is…	Fun; controls can be a bit difficult
Boring adult thinks it is…	Frenetic, beginner kids might get confused; not very physical
Possible uses	1, 2, 3, 8

Game	*Dance Central*
Age appropriate	Age 12, sex and bad language; well, that's what it says on the box, but it's because the music is "real" music (eg Lady Gaga), and the dancers are cool and sexy.
Content	Control your avatar learning to dance
Language content	Song lyrics; instructions
Kids think it is…	Very cool!
Boring adult thinks it is…	Very cool! Maybe a bit too raunchy.
Possible uses	1, 2, 3, 4, 6

Game	*Kinect Sports*
Age appropriate	Age 12, violence (very minimal – only boxing!)
Content	Control your avatar through a variety of sports, including: boxing, track and field, football, table tennis, beach volleyball and bowling
Language content	Instructions; results sheets
Kids think it is…	Fun, challenging
Boring adult thinks it is…	Fun and challenging; very physical
Possible uses	1, 2, 3, 4, 7, 8, 10

Some implementation issues

The approach set out above is somewhat idealistic. There are doubtless many issues and challenges which will need to be overcome by the teachers who are engaging in this study. Two key issues which will need to be addressed early in the process are as follows.

Class size

With an average class size of 42 learners, management of the Xbox, and specifically the Kinect, will be a major challenge. As part of the implementation, teachers will be invited to brainstorm and develop solutions to this. However, some ideas are:

- Learners are placed in teams, and work together, with one member chosen to be the Kinect leader; record is kept of who does the Kinect control for a particular activity. This role might need to be retained for a worthwhile duration, so as to minimise calibration and face recognition issues.
- For a whole group activity, one person can be selected as the Kinect leader; all others in the whole class can follow by performing the same actions. This would work well in *Dance Central.*
- As part of a team experience, the Kinect player can be guided by others who explain what needs to be done, possible with the player blindfolded or limited in some other way that creates a communicative gap.
- An Xbox Club can be established. This would allow for after school activity in smaller groups on a rotational basis. This obviously has implications for school management as there would need to be supervision.

Parental involvement

As the school undertakes this radically different approach, it would probably be a good idea to invite parents to come to the school to observe what is happening, and to hear from teachers how they intend to use this to boost education, thereby allaying fears that parents may have.

This would also be a good opportunity to encourage parental involvement. One could organise a fun games evening for parents who might feel unwilling to take part in a “boring” parents meeting which might make them feel inadequate if they are not very competent in English.

Building on this, parents could possibly be encouraged to be part of the Xbox Club, and perform supervision duties if they are available during afternoons.

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