

Using game-based learning to improve second language English skills in South Africa

Abstract

One of the most challenging issues facing teachers is the use of English as the language of teaching and learning (LoLT) in South Africa, a country with eleven official languages where low levels of English language competence characterise many rural primary schools. In the schools making up this study, instruction was in mother tongue throughout Foundation Phase (Grades 1 – 3) but with a switch to English in Grade 4. The Learning Gains through Play Project was designed to test the hypothesis that foundational literacies of primary school learners could improve through the effective use of game-based learning using innovative technologies. Two cohorts of Foundation Phase learners in ten schools were tracked over a four year period. Each school received an Xbox Kinect and a bank of Intel tablets for use in Grade R and Grade 1 classrooms. Teachers used carefully-selected tablet apps and Xbox games to create teachable moments and stealth learning opportunities that targeted specific literacies. The added benefit was that learners acquired oral English skills, almost subliminally, because the apps and games used the medium of English. The findings were that Grade 4 students in the project achieved at a far higher level than the control school students, not only in English, but across all Grade 4 subjects of Mathematics, Natural Sciences & Technology, Social Sciences and Life Skills. The Learning Gains through Play study supports the theory that successful language acquisition occurs through understanding messages and that oral English skills can be improved simply by engaging with English tablet apps and video games. This research project provided a perfect opportunity to prepare non-English-speaking, early grade learners in South Africa to make the difficult transition to Grade 4.

A Brief Overview of the Learning Gains through Play Project 2014 – 2018

The DG Murray Trust funded an innovative longitudinal study of Grade R to Grade 4 learners. Known as the Learning Gains through Play Project, digital learning was integrated in Foundation Phase classrooms. SchoolNet South Africa (SNSA) implemented the project in primary schools in the provinces of KwaZulu-Natal and the Western Cape over the period from 2014 to 2017 and an extension enabled data to be collected and analysed through 2018/2019. The focus of the Learning Gains through Play project was to:

- employ new and innovative teaching strategies and pedagogies which promote learner-centred activities;
- involve digital learning in the classroom; and
- facilitate meaningful learning through play.

Learning Gains through Play was undertaken as a research project, based on empirical evidence of learner performance to track academic progress. Two cohorts of Foundation Phase learners in the ten schools were tracked over a three year period after each school was provided with an Xbox Kinect, a bank of Intel tablets and digital resources for use in Grade R and Grade 1 classrooms. SNSA provided professional development to teachers on the effective use and integration of digital learning activities and games-based learning. Five schools in two provinces of South Africa (Western Cape and KwaZulu-Natal) participated in the project and a control school in each province enabled comparison to measure learning gains across five foundational literacies: gross motor skills, fine motor skills, visual literacy, numeracy and oral English skills. While learning gains were evident in all five literacies after the three years, it was in the acquisition of oral English skills that unexpectedly large gains were recorded. To understand these better, DG Murray Trust funded a further year of gathering data as the first cohort of learners completed Grade 3 of Foundation Phase. The extent of the positive learning gains recorded in Grade 3, fuelled another year of research to track the progress of the first cohort of learners as they entered Grade 4 in the Intermediate Phase while completing the study of Foundation Phase with the second cohort of learners.

Introduction to the Oral English Language Acquisition Extension

Research has shown that oral language skills have a profound impact on children's preparedness for Foundation Phase and on their success throughout their academic career. Children typically enter school with a wide range of background knowledge and oral language ability, attributable in part to factors such as their experiences in the home and their socio-economic status (SES). Any gap in their academic ability tends to persist or grow throughout their school experience (Fielding, Kerr, & Rosier, 2007; Juel, Biancarosa, Coker, & Deffes, 2003).

In South Africa "learners who speak English as a second-language clearly perform worse on average than their first-language English counterparts" (Van der Berg, Taylor, Gustafsson, Spaul, & Armstrong, 2011). The NEEDU National Report of 2012 (National Education, Evaluation and Development Unit, 2013) noted that many

school principals face demands from parents to offer English as the Language of Learning and Teaching (LoLT) even though all the learners speak African languages at home. The report makes the recommendation that “schools must make a special effort to improve the proficiency of learners and teachers in both Language of Learning and Teaching (LoLT) and First Additional Language (FAL)” (p.73). It is noted that evaluators across the country encountered the view that English is the preferred language of instruction for Mathematics from Grade 1 and that some schools had already unofficially adopted this strategy.

Research has shown that oral language skills have a profound impact on children’s preparedness for Foundation Phase and on their subsequent success throughout their academic career. In the Learning Gains through Play project and control schools in which English oral skills were assessed, Foundation Phase learners were taught and learnt in their mother tongue (isiZulu and isiXhosa). In all of these schools, at the start of Grade 4, learners switch to English as their Language of Learning and Teaching (LoLT). This change is accompanied by the expansion from three subjects to six subjects in Grade 4, as they enter Intermediate Phase. It is for this reason that schools assign their most able teachers to tackle the challenges faced by learners transitioning to Grade 4.

Stephen Krashen is a pioneer in the field of language acquisition. Krashen’s Second Language Acquisition (SLA) stages of development and his teaching approach, called the Natural Approach, is based on decades of research and his central hypothesis of the theory is that “language acquisition occurs in only one way: by understanding messages. We acquire language when we obtain comprehensible input, when we understand what we hear or read in another language.” According to Krashen, students learning a second language move through five predictable stages: Pre-production, Early Production, Speech Emergence, Intermediate Fluency, and Advanced Fluency (Krashen & Terrell, 1995).

James Paul Gee (a literacy specialist, who in more recent times is known as a gaming expert focusing on the learning principles in video games) proposed that settings which focus on acquisition rather than learning should be stressed if the goal is to help non-mainstream children (low-income, minority children) attain mastery of literacies. In other words, mastery is by subconscious acquisition rather than conscious learning (Gee, 1998). An assumption was made that playing games with the Xbox Kinect and tablet technology would enable English language acquisition and therefore it was decided to assess acquired English oral communication skills in the Learning Gains through Play project.

Measuring Oral English Language Acquisition and its Impact on Grade 4 Competency

The Learning Gains through Play project involved the implementation of an innovative programme model and therefore, some content and processes were adapted over the course of the three years that the project unfolded. The evaluation followed a similarly developmental approach. Data was tracked and analysed as the project developed, with documenting, interpreting and sharing of observations and assessments as the project progressed. Schools expressed appreciation of being included in the analysis of their own learner performance data and the opportunity to workshop strategies for improvements. A mixed-methods approach was taken with quantitative data collected from learners in both project and control schools. Quantitative and qualitative data was collected from teachers involved in the project schools. Data was also collected from a control school. The control school was not provided with any LGP inputs at all. The only activity at this school was that their learners were assessed in the same manner and at the same time each year as those learners in the project schools. Results from the control school were compared with the project schools to establish any learning gains achieved by the LGP intervention and its inputs.

Assessment tool design was based on the LGP theory of change, the assumptions about the impact of playing digital games on the acquisition of oral English skills and the Language policy and requirements of the CAPS curriculum for Foundation Phase. An oral English scripted interview test was designed specifically for South African Foundation Phase children for whom English was not the Home Language. The same assessment was conducted with all Foundation Phase learners no matter which Grade they were in, as language acquisition rather than language learning is independent of grade-level learning. The Acquisition of Oral English Skills Test was conducted as a scripted interview, one-on-one with each learner outside of their classroom. All verbal responses and non-verbal actions were recorded on task scripts and scored.

Rubric scores were collected in MS Excel and an average percentage (out of a total score of 16) calculated for each learner in each school, each province and an overall average for all project schools. An average percentage for each of Listening Skills (out of a total score of 6) and Speaking Skills (out of a total score of 10) were also recorded. The control school data was treated in the same way.

Table 1. Data Sample.

COHORT 1	2014	2015	2016	2017	2018	
LGP Project	Grade R	Grade 1	Grade 2	Grade 3	Grade 4	Same 136 learners tracked over 5 years.
Control	Grade R	Grade 1	Grade 2	Grade 3	Grade 4	Same 37 learners tracked over 5 years.
COHORT 2		2015	2016	2017	2018	
LGP Project		Grade R	Grade 1	Grade 2	Grade 3	Same 94 learners tracked over 4 years.
Control		Grade R	Grade 1	Grade 2	Grade 3	Same 35 learners tracked over 4 years.

The Acquisition of Oral English Skills test also enabled the LGP team to identify at which of Krashen’s Second Language Acquisition Stages each learner was positioned when testing was conducted each year. These SLA stages are:

Stage 1 – The Silent Period

Learners express no verbal expression except their name and may respond by nodding, pointing, gesturing or performing an act.

Stage 2 – The Early Production Stage

Learners can speak in one- or two-word phrases. Can demonstrate comprehension by short answers to simple yes/no, either/or, or who/what/where questions. They nod and shake heads and may say “I don’t know”.

Stage 3 – The Speech Emergence Stage

Learners begin to use dialogue and can ask and answer simple questions. Learners use basic and repetitive patterns of speech. They may produce longer sentences but often with grammatical errors that interfere with communication.

Stage 4 – The Intermediate Language Proficiency Stage

Learners start to make complex statements, state opinions, ask for clarification, share thoughts and voluntarily speak at greater length.

Stage 5 – The Advanced Language Proficiency Stage – Advanced Language Fluency

Learners are now equipped to participate fully in grade-level classroom activities. They may need occasional support but they use grammar and vocabulary comparable to a native speaker.

Table 2. Oral English Acquisition Test Score Conversion to SLA Stage.

1 st Step Check Action Identification Questions Score	2 nd Step Check Introduction Speaking Skills Score	Score Options →	SLA Stage
If score = 0 then	-	(0,0)(0,1)(0,2)(0,3)	SLA stage = 1
If score = 1 and	If score = 0 then	(1,0)	SLA stage = 1
	If score = 1 or 2 or 3 then	(1,1)(1,2)(1,3)	SLA stage = 2
If score = 2 and	If score = 0 or 1 then	(2,0)(2,1)	SLA stage = 2
	If score = 2 or 3 then	(2,2)(2,3)	SLA stage = 2
If score = 3 and	If score = 0 or 1	(3,0)(3,1)	SLA stage = 2
	If score = 2 or 3 then	(3,1)(3,2)(3,3)	SLA stage = 3
If score = 4 and	If score = 0 or 1 or 2 then	(4,0)(4,1)(4,2)	SLA stage = 3
	If score = 3 then	(4,3)	SLA stage = 4

Learners were mapped to each stage according to their scores on the speaking skills i.e. speaking engagement in the introduction of the scripted interview test and speaking comprehension in the action identification questions of the scripted interview test. The percentage of learners on each SLA Stage was calculated and recorded each year to track progress in oral English skills. The control school data was treated in the same way.

The motivation to extend the LGP project to include further testing of Cohort 1 learners in Grade 4 in 2018 was based on the larger than expected gains in oral English skills already measured over the Foundation Phase period and the assumption that learners with higher levels of oral English skills would achieve better results in Grade 4, not only in English, but in all subjects as these are taught in English in Grade 4.

The majority of these Cohort 1 learners started in Grade 4 of Intermediate Phase in 2018. All learners experienced a switch from learning in their home language of isiZulu or isiXhosa to learning in English. Their array of subjects also expanded from the four Foundation Phase subjects (Home Language, English First Additional Language, Mathematics and Life Skills) to the six Intermediate Phase subjects (Home Language, English First Additional Language, Mathematics, Natural Sciences & Technology, Social Sciences and Life Skills).

In August 2018, Cohort 1 learners in Grade 4 at both LGP project and control schools were tested by the project team, using the same standardised Grade 4 test assessing five of their six subjects (Home Language of isiZulu or isiXhosa was not included).

Oral English Language Measures – Results and Discussion

Assessment of the learners was conducted in July and August from 2014 to 2018. Two cohorts of learners were assessed: the 2014 Grade R learners who were tested in Grade 1 in 2015, were tested in Grade 2 in 2016, and in Grade 3 in 2017 (referred to as Cohort 1); and the 2015 Grade R learners who were tested in Grade 1 in 2016, were tested in Grade 2 in 2017 and in Grade 3 in 2018 (referred to as Cohort 2). Results were collected, processed, analysed and compared to the previous year. Results were as follows.

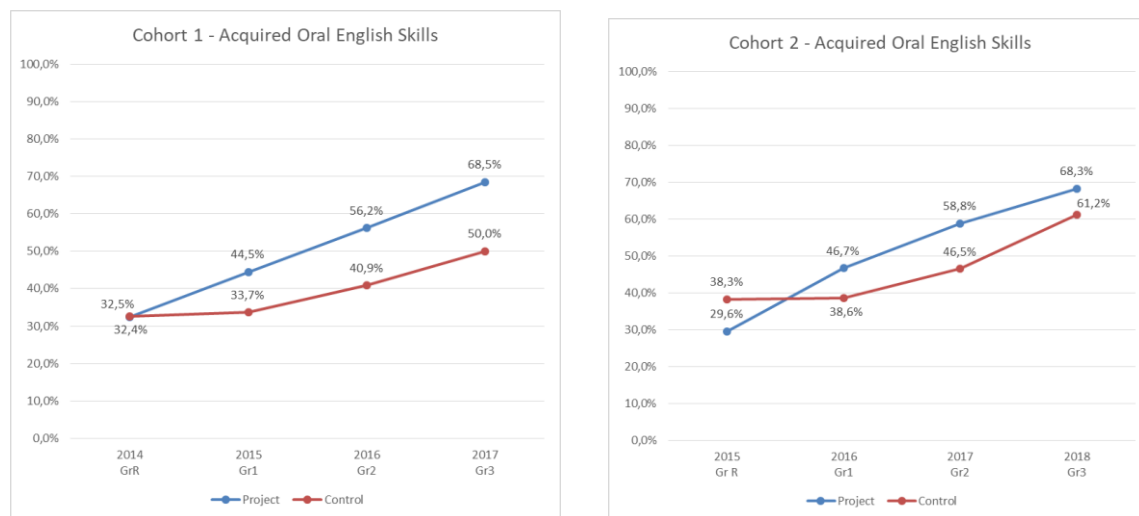


Figure 1. Oral English Skills Development for each cohort over time.

With both cohorts it was clear that although the control learners started the programme either ahead or equal to the project learners, it was the project learners who outperformed the control learners by the end of each testing period.

In the control school, the Grade R to Grade 1 transition of the Cohort 1 control group learners mirrored that of the Grade R to Grade 1 transition of the Cohort 2 control group learners (less than 1% improvement). Interestingly, Grade R learners do not learn English formally. English is introduced as a formal subject in Grade 1 as First Additional Language. The lack of progress over this period as shown by the control learners was therefore expected. The assumption can also thus be made that the significant improvement in English among the LGP project learners is as a result of the inputs of the project.

While the project learners of Cohort 2 were initially weaker than the control learners and weaker than the Cohort 1 learners of the year before, they were able to “catch-up” on the same improved trajectory as the Cohort 1 over

the transition from Grade R to Grade 1. Most interestingly, the improvement of both cohorts was maintained from Grade 1 to Grade 2 and from Grade 2 to Grade 3. When the learner assessments of the Second Language Acquisition Stages is considered, their progress became even more evident.

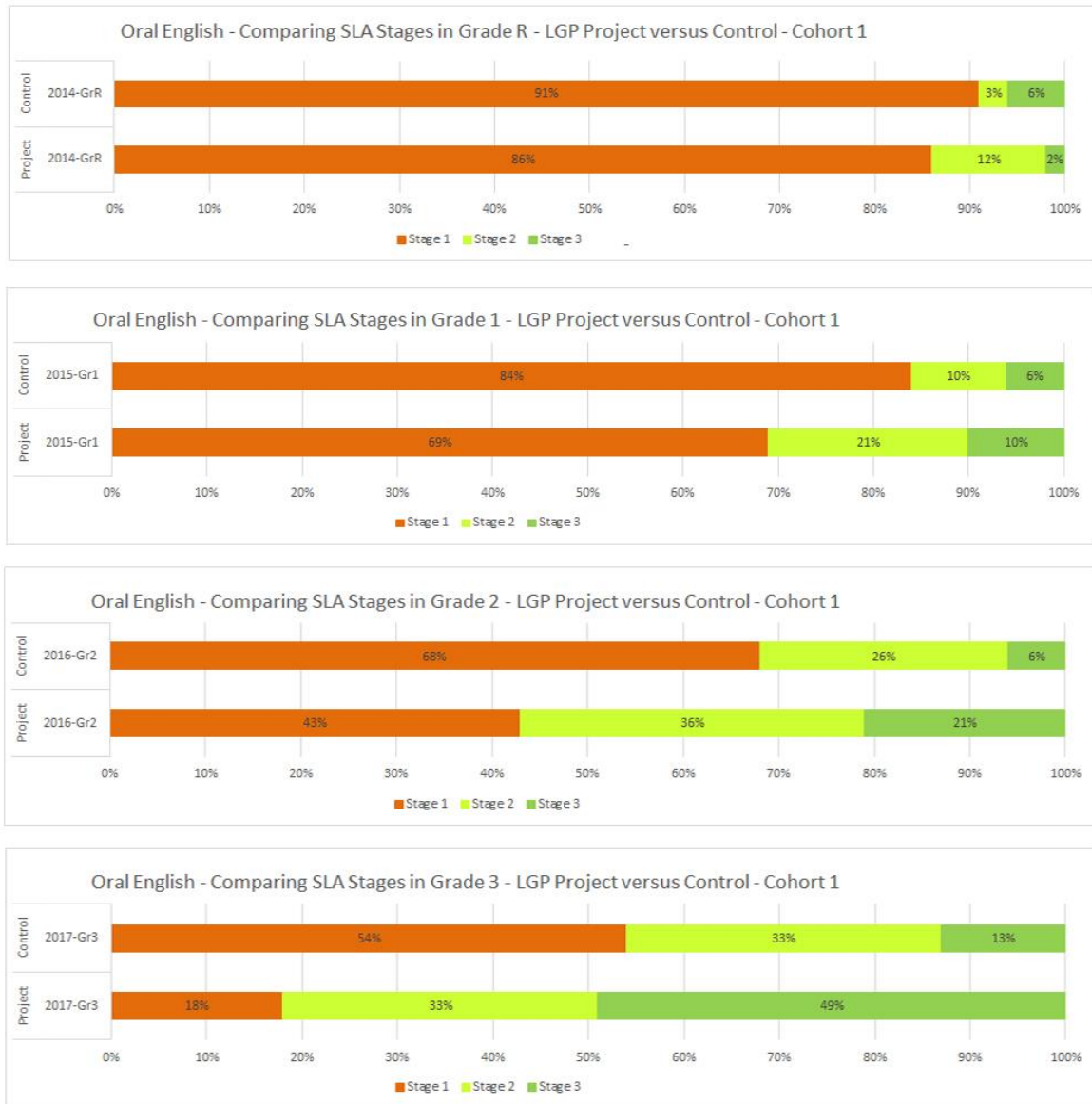


Figure 2. Cohort 1 – Percentage of Learners on each SLA Stage over Time.

When considering Cohort 1’s control group, it could be seen that in Grade R, 91% of learners were on Stage 1 (also known as the Silent Stage), with 3% of learners already on Stage 2 and 6% of learners on Stage 3. After one year, now in Grade 1, 7% of learners progressed to Stage 2 leaving 84% of learners still on Stage 1. The Stage 3 learners had not made any progress. After the next year, a further 16% of learners had progressed from Stage 1 to Stage 2. This correlates with the start of formal English classes introduced in Grade 1. The original Stage 3 learners had still not made any progress. At the end of the test period, more than half of the control group learners were still on Stage 1.

When comparing the control learners with the performance of the Cohort 1’s project group, we see at the start that 86% of learners were on Stage 1. 12% of learners were on Stage 2 and 2% were at Stage 3. After one year, now in Grade 1, 17% of project learners progressed to Stage 2 (more than double the number in the control group), while 8% of learners that were on Stage 2 progressed further to Stage 3. After the following year, a further 26% of learners progressed from Stage 1 to Stage 2. A further 11% were able to progress from Stage 2 to Stage 3. At

the end of the test period, 82% of the project learners were above Stage 1, with the majority of learners at Stage 3.

Cohort 2 data showed a similar pattern of a much larger improvement among project schools learners compared to control school learners.

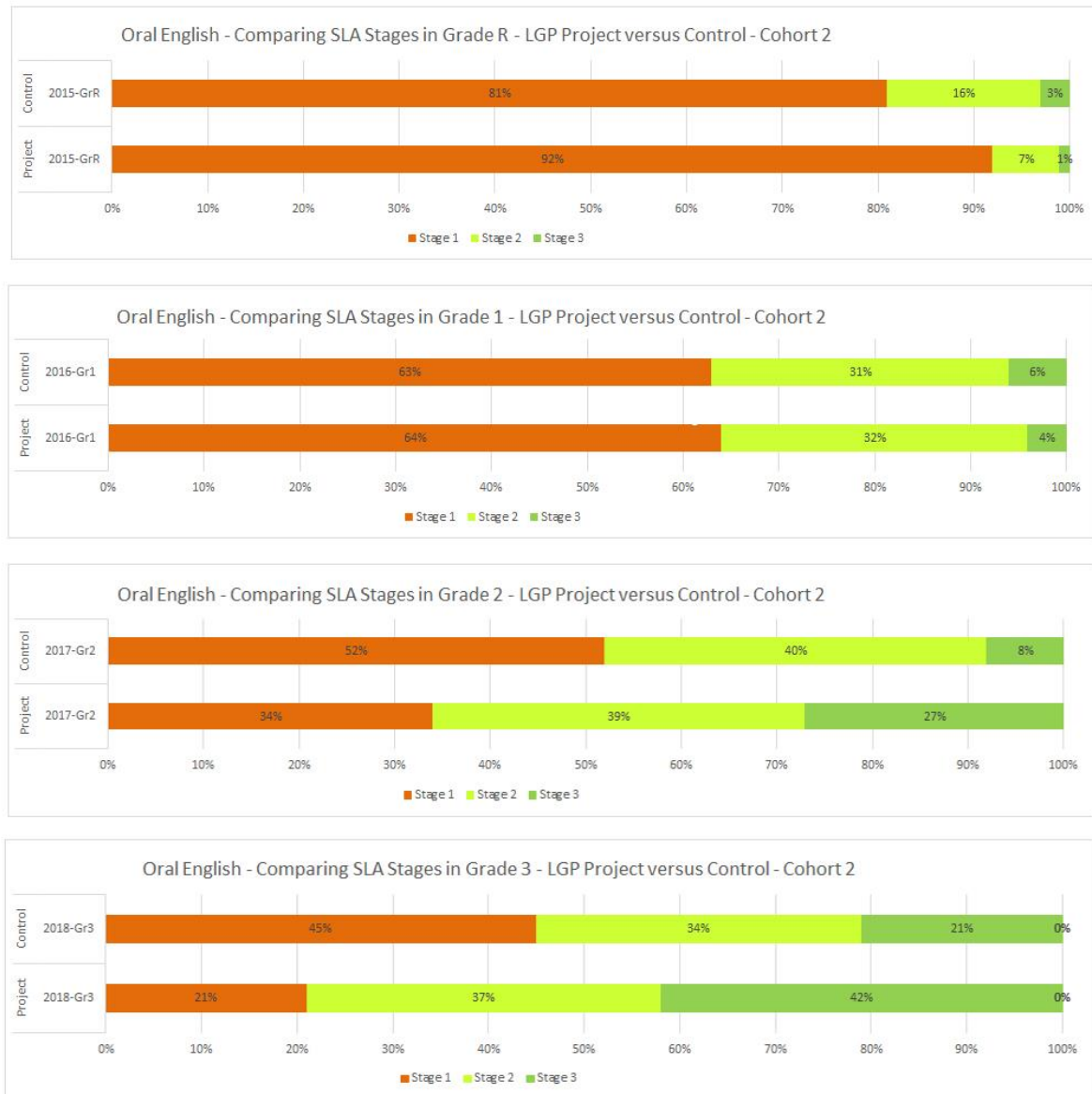


Figure 3. Cohort 2 – Percentage of Learners on each SLA Stage over Time.

The starting situation for the control school group in Cohort 2 was much stronger than those in Cohort 1 with 81% of learners on Stage 1, 16% of learners on Stage 2 and 3% of learners on Stage 3. After one year, now in Grade 1, 18% of learners had progressed from Stage 1 to Stage 2 and 3% of learners had progressed from Stage 2 to Stage 3.

The starting situation for the project school group in Cohort 2 was much weaker than the control school group with 92% of learners on Stage 1. After one year, now in Grade 1, 28% of learners progressed from Stage 1 to Stage 2 and 3% progressed from Stage 2 to Stage 3.

While the Cohort 2 project and control groups appear in similar positions in year 2 of the Learning Gains through Play project, this situation changes significantly over the following two years. The control group shows 11% of learners moving beyond Stage 1 in Grade 2 and then another 7% progressing in Grade 3. Overall 45% of learners

remain on Stage 1 as they head to Grade 4 in 2019. The project group show a larger movement of 30% of learners beyond Stage 1 in Grade 2 and then another 13% progressing in Grade 3. This results in almost 80% of learners improving beyond Stage 1 despite the cohort having been much weaker at the start when compared to the control group.

Plotting the percentage of learners on SLA Stage 1 over the time of the project showed the same trajectory of improvement off this bottom SLA Stage 1 to higher SLA stages for both cohorts.

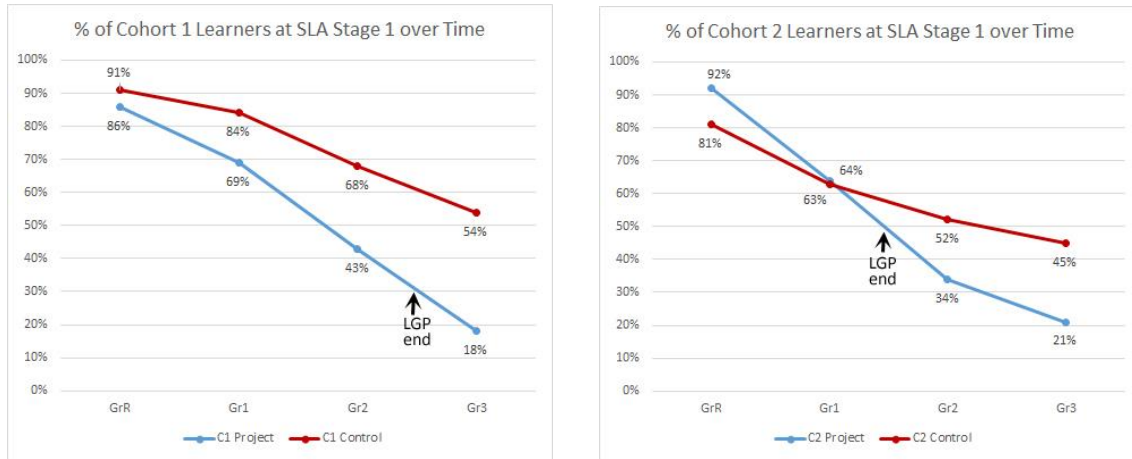


Figure 4. Comparison of Cohort 1 and 2 Learners on SLA Stage 1 over Time.

Grade 4 Competency Measures – Results and Discussion

By Grade 4, results showed a significant difference between LGP Project learners’ achievement and control learners’ achievement.

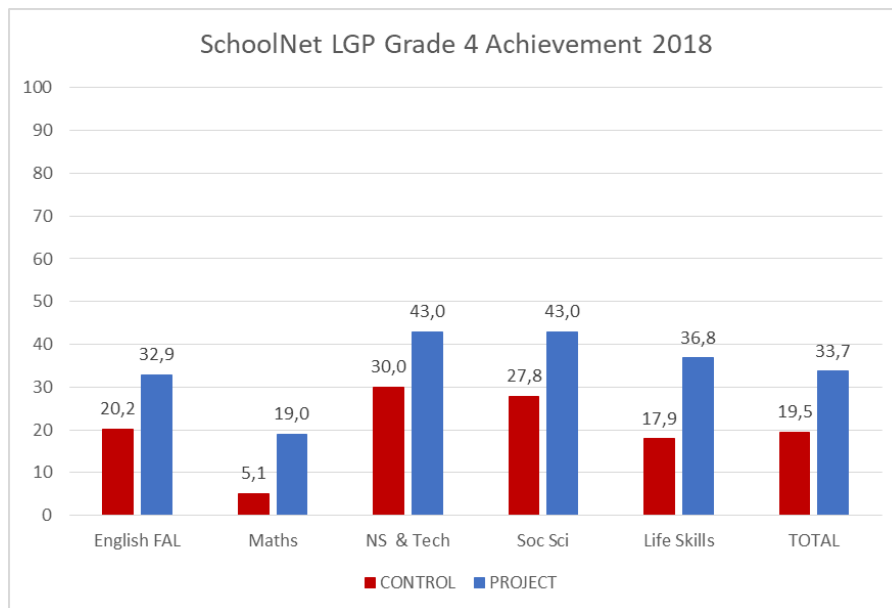


Figure 5. Comparison of Grade 4 LGP Project and Control Learners

The LGP project learners outperformed the control learners in all subjects. The standardised test was administered by the LGP team under very strict and equivalent conditions in all schools. Most interesting is to plot each school’s achievement across the different subjects and compare with the average language acquisition stage (ALAS) of their learners.

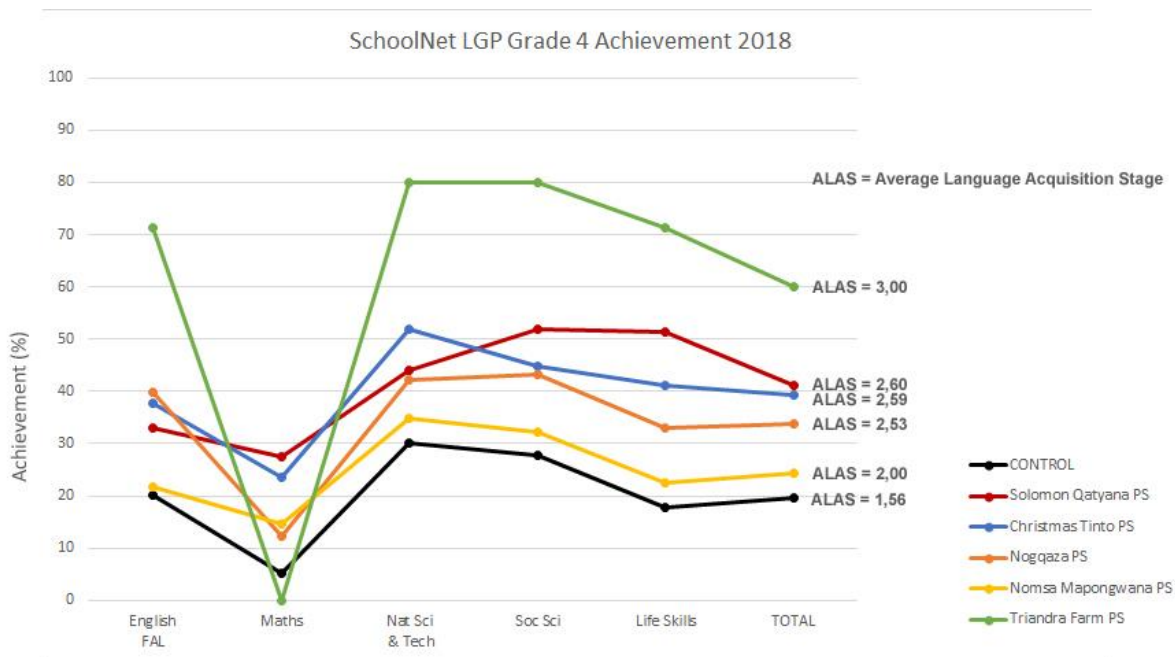


Figure 6. Comparison of Grade 4 Achievement and ALAS

A first comment is to note that Triandra Farm School comprises of only one learner. As this tiny farm school was part of the LGP project from the start, it was decided to include this remaining learner even though his results represent the whole school while other schools are represented by between 20 and 40 learners in each.

It can be clearly seen that as average language acquisition increases, so too does Grade 4 achievement in all subjects.

Conclusions & Recommendations

Evaluating the first three years of the Learning gains through Play project raised some interesting questions:

- i) **With further use of the technology in Grade 3 classrooms, can all of the learners escape up off SLA Stage 1 and progress beyond the silent stage, by the end of Foundation Phase?**

The answer to this question is that it is possible for all learners to move beyond SLA Stage 1 by the end of Foundation Phase. While the project learners as a group did not achieve this, one school, Solomon Qatyana Primary School in the Western Cape, did achieve this remarkable milestone, despite being the weakest school in the sample at the start of the programme.

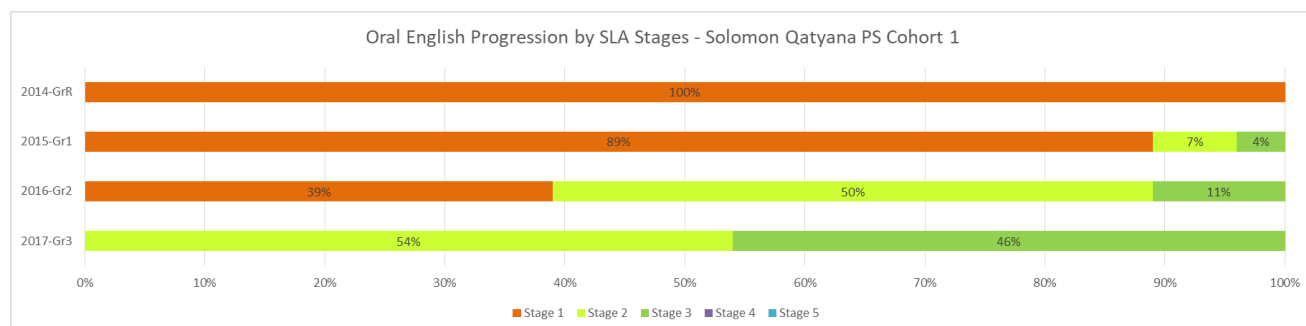


Figure 7. Solomon Qatyana Primary – Percentage of Learners on each SLA Stage over Time.

This school was the ground-breaking front runner of the LGP project, achieving more than the other schools in all spheres of the project. The leadership of the school played a pivotal role in supporting the teachers involved in the project and in maintaining a disciplined learning environment.

ii) Can the method of language acquisition raise Zulu and Xhosa learners' English skills beyond Stage 3 or is this the ceiling for acquisition and formal learning is required for further progress?

It appears as if SLA Stage 3 is the ceiling for acquisition of English. Even formal learning at English First Additional Language level seems unable to elevate any learners' oral English skills beyond SLA Stage 3.

iii) Is English at Stage 3 level sufficient to cope with the Grade 4 shift to LoLT in English in South African schools?

This is a difficult question to answer. Despite the low overall achievement of the LGP learners (33,7%), this is a significant improvement when compared with the control learners (19,5%). There is some hope in the lone Triandra Farm school learner who, at SLA stage 3 was able to achieve 60% overall (and this despite achieving 0% for Maths).

iv) Will the Learning Gains through Play project learners with their improved English oral skills achieve better results than the control learners in Grade 4 in English First Additional Language (FAL) and in their other subjects?

This question can be answered in the affirmative. The LGP project learners with their improved English oral skills achieved much better results in all subjects than the control school learners.

Finally, this research supports the theory that successful language acquisition occurs through understanding messages – that making understanding of English in order to play engaging games on a tablet or Xbox console creates the necessary comprehensible input. As Stephen Krashen went further to say: “Language acquisition proceeds best when the input is not just comprehensible, but really interesting, even compelling; so interesting that you forget you are listening to or reading another language.” Our project learners certainly found digital games compelling. Our most important finding for the Learning Gains through Play project is that Oral English skills can be improved simply by engaging in play with the tablet apps and video games which use English as the medium of communication. From this study, the recommendation can be made to leverage the interest and enjoyment of young children for digital tools and resources, so as to develop their oral English skills through language acquisition, to better prepare them for the transition in Grade 4 to English as the LoLT. This model could be scaled up to offer all South African primary school learners this advantage.

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