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Exploring the Effects of Using Smartphones for Teaching Secondary School Learners English Composition Writing

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Abstract

There are well known requisites for further studies after Ordinary Level in Zimbabwe that are negatively impacted by traditional pedagogical practices, giving rise to the need for new methods for mitigation. For Zimbabwean learners, a full O level certificate must include English language, yet it is the most failed subject. Through the lens of the theory of Network Society, this study explored the effects of integrating smartphones for technology integration on high school learners' performance and affective learning in English composition writing. A quasi-experimental case study design with a three-step process was followed. In Step 1, a pre-test was administered to 104 purposively selected learners as well as a questionnaire on attitude. In Step 2, 52 learners became the control class and 52 the experimental class, who were subjected to smartphone-integration learning in English composition writing. Step 3 involved administering a post-test to both groups. Data was analysed using thematic analysis, ANOVA, ANCOVA and t-tests with results revealing that the experimental class developed positively affectively and in performance. The smartphone method improved performance regardless of gender. With an above 84% smartphone penetration and an information and communication technology (ICT) tools shortages in public schools. In line with these findings, teachers of English composition writing may adapt the smartphone for integration to improve learner performance.

Keywords: Affective, Attitude, Gender Neutral, Integration, Performance, Smartphone

INTRODUCTION

The greater majority of schools globally are battling with the prevalence of a variety of technology gadgets as to what to allow for use in the classroom by learners. Efforts to separate teenagers from their smartphones are generally futile (Lenhart et al., 2010), forcing schools to make decisions on them. Some have banned them, while others embraced them for pedagogy (Barnwell, 2016). However, whatever decisions schools take, evidently, smartphones have become a necessity for all age groups in today's society.

Despite the shift from the traditional, entirely face-to-face classroom instruction to integrated models to meet 21st century demands, most schools in some parts of the world continue to ban digital devices such as

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smartphones from the classroom, labelling them as disruptors (Thomas & Muñoz, 2016). This is in the face of inability to provide technological tools for public school classrooms, yet most learners have access to them even in Zimbabwe (Dzinotyiweyi & Taddese, 2020). Given such a scenario, which is compounded by other variables such as poverty and teacher efficacy (Kangara, et al., 2022; Musarurwa, 2011), the global call for the integration of pedagogy with technology as the backbone of 21st century education becomes a pipedream. Practical application of smartphones in research studies in Zimbabwe is a new phenomenon. Literature on technology integration in the country is more on teacher training than classroom practice (Chitiyo & Harmon, 2010; Musarurwa, 2011; Zindi & Ruparanganda, 2011). In this regard, Manyeredzi and Mpofu's (2022) research on smartphones and education comes closest, although they focused on remote learning. They found that teachers preferred using smartphones for remote classrooms only and not for day-to-day teaching and learning integration in the classroom. Other studies on ICT for pedagogy relate to teacher training for computer literacy (Chirume & Ofori-Attah, 2016; UNICEF, 2017).

Of all these studies, none have experimented to determine what smartphones in the classroom actually do when used as ICT tools for pedagogy in English composition writing in high school, considering their ubiquity among learners and the technology infrastructure resource shortages in public schools. Thus, the purpose of this study was to find out how using smartphones as an instructional mode impacts learner performance and attitude towards teaching and learning of the composition writing.

Passing English language is compulsory at Form 4 (O level) for Zimbabwean citizens without which one is incapacitated to either go to college or to qualify for university admission after Form 6 (Zimbabwe MoPSE, n.d.). English language is perennially failed and many pass only after several sittings. The most difficult section is composition writing, and its weighting is 50% of the whole subject (ZIMSEC, 2017). There is a need, therefore, to try out new methods in a bid to improve pass rate and learner prospects in the 21st century globalised society.

Integrating technology with pedagogy is not an implausible concept with today's learners, let alone the use of smartphones. Most children come to school from backgrounds where technologies are common therefore, the dearth in schools would be an inconsistence (Kolikant, 2010). Any modern home may be characterised by devices such as televisions, laptops, smartphones, tablets or digital games (Barnwell, 2016; Kolikant, 2010). Statistics show that about 85% of households in Zimbabwe own a phone (World Bank, 2020).

Adopting smartphones as instructional tools is consistent with the idea of school being a microcosm of society. It is the most common device and is relatively easy to access from their immediate environments for the development of all language aspects (Hung, 2017). Literature indicates that performance in language is made easy by learners' active interaction with first language speakers of English (Chun, 2016; Hung, 2017). The

applications that smartphones come with, such as YouTube, are a source of experiential exposure to English and its culture within the four walls of the classroom (Bachore, 2015).

Worldwide, the education system has recently undergone a complete paradigm shift to fully meet the needs of today's global village, which has shrunk significantly due to the Fourth Industrial Revolution (4IR). If education is preparatory for real life in the society, it must therefore be fashioned to meet the real needs of that society, and for the 21st century, society has moved to the ICT platform (Rasheed et al., 2019). The smartphone has become the all-in-all for business and social networking to the extent that all and sundry must at least be connected to the rest of the world for existence and survival (Phillips, 2014).

The ability to use the smartphone has become a critical contemporary competency, as it has become a tool used for every aspect of life, including health, critical issues like weather forecasts, and directions to new places, just to name a few (Phillips, 2014). The continued ban of the smartphone from schools disconnects teaching and learning with everyday realities for learners (Lenhart et al., 2010). School should be the place where learners acquire the skills to use their phones profitably, in preparation for functional citizenship in the global 4IR village (Kangara et al., 2022). On the contrary, research has shown that teachers are averse to smartphones in their classroom for various reasons, some of which have to do with their effect on time-on-task. With that being the case, the generality of schools do not have a replacement technology for the classroom (Dondofema & Shumba, 2018).

The prevalence of smartphones among teenagers is a global phenomenon and literature shows that schools in the Global North are re-evaluating blanket bans on smartphones and engaging them for teaching and learning, especially for English language learning (Madden et al., 2013; Thomas & Muñoz, 2016). Their portability and high connectivity give them a greater advantage over desktop computers and laptops. Scholars have argued that smartphones are convenient, easy to use tools with high transferability of learning content, dynamic learning and multitasking facilities (Barnwell, 2016; Thomas & Muñoz, 2016; Verona et al., 2018).

Adopting smartphones would help learners learn the composition concept faster and more pleasurably (UNESCO, 2012). Technology integration in teaching and learning enhances personalised learning. This key characteristic of composition writing learning is sadly missing in Zimbabwean secondary schools, compounded by overcrowding and poor infrastructure (Dzinotyiweyi & Taddese, 2020). Integrating ICT, especially through mobile phones, would improve motivation and help teachers reach each learner, resulting in a substantial difference in such situations (Mbofana & Banda, 2022). Mbofana and Banda (2022) established that overcrowding negatively impacts both teacher and learner attitudes towards educational processes in secondary schools in Zimbabwe, therefore the need for improved learning experiences. This study attempts to answer the following questions:

1. What impact does the smartphone have on learners as an integration tool on performance and attitude in English composition writing?
2. How does gender and the smartphone-integrated method of teaching

impact performance and attitude in English composition writing?

Theoretical Framework

The study used Manuel Castells' theory of network society, which alludes to an evolving social structure in which there is an increase of organization of human relationships around technologically assisted information streams (Stalder, 2006). The theory can be defined as explaining a society in which major aspects of the societal activities, such as education, economics, politics and health, are organized around information networks that are electronically processed (Verona et al., 2018). Digital electronic networks have become basic to life in the 21st century 4IR society. The relevance of this theory for this study is its explanation of basic characteristics of the network society as a mobile lifestyle, individualised and connected outside geographical limitations demanding digitalised education (UNICEF, 2020). The theory helps to demystify the processes of life now being obtained due to the digitalised lifestyle that has become the norm globally (Peng et al., 2017).

METHOD

Research Design

The study is a quasi-experimental case study design. The quasi-experiment entailed randomly assigning one whole group to treatment and one whole group to control in the experiment using simple random sampling (Creswell, 2014). The methodology sought to understand phenomena according to the outcomes of the participants' behaviours (Creswell, 2014). The design employed the sequential explanatory strategy, where quantitative data were collected and analysed as the first phase. The second phase involved the collection and analysis of qualitative data that built on the data from the first, quantitative phase (McKim, 2017). The qualitative phase served as the follow-up on the quantitative analysis. This was done for clarification of quantitative results, for triangulation and validation, and for general robustness and applicability of the findings.

The design was ideal for this research, with its straightforward nature being lauded as its strength (Creswell, 2009). We wanted to investigate impact to attitude and performance when smartphones are integrated when writing compositions in English (Creswell & Plano Clark, 2007). After the experiment, the experimental class was asked to explain how they felt towards composition writing lessons and smartphone activities they did. Qualitative data obtained here were triangulated with the questionnaire data to assess attitude. According to research, generally, females write better creative stories than males (Al-Saadi & Heidari-Shahreza, 2020). Analysis of quantitative data also provided answers to issues of gender and technique.

Population and Sampling Techniques

The population was all the secondary school learners in one District in Zimbabwe. Simple random sampling was used to select one high school, where two classes, both form 2 were purposively selected. There were 104

learners, 52 for the experiment and the other as a control. Experimentation was administered in the learners' natural everyday learning state. Their usual teacher taught both classes and we observed teaching and learning processes.

Data Collection Procedure

The experiment ran for six weeks. Learners were exposed to the experiment once per week as the usual timetable requirement in the school. The lesson was a double period of 70 minutes for each class (Sengei, 2021). The same concepts were taught to both classes using teaching aids in the form of charts, work cards, still pictures and textbooks, which was how they had been learning the subject, except for smartphones in the class for the experiment. Before the commencement of the experiment, the teacher and the experimental class learners agreed on class phone policy.

The two classes wrote a pre-test in the form of a composition titled, *The day I will never forget*. It was marked using a standardized marking guide (ZIMSEC, 2019). The same topic was given as post-test after the six experiment weeks, including a questionnaire to collect both quantitative and qualitative data for attitude and performance.

A pilot study was carried out to ensure validity and reliability. Regarding controlling data contamination, the research site was a boarding school in Zimbabwe where learners were not allowed to bring phones. For the purposes of the study, parents were asked to allow their children to bring their smartphones, and these were kept in the school strongroom and accessed only during the experimental lessons. After the experiment period, the phones remained with the school until the end of term, when learners took them home at closing.

Availability of Data for Learners

The Zimbabwe government in partnership with Portraz Zimbabwe and liquid telecom availed free internet for schools across the country beginning with rural schools -Sunday Mail, 24 July, 2022. The study site benefited from the program, thus the computer teacher was incorporated to make Wi-Fi available every time the study was in progress. However, students' phones were kept in the strongroom and only availed when used directly for the study or lesson to reduce screen time and ensure that disruptions through phone use are kept at a minimum.

Ethical Considerations

The process to obtain ethical clearance was duly followed. The researchers got approval from the relevant gatekeepers for the quasi-experiment. We thoroughly explained to all the participants clearly and honestly without misleading information and informed consent sought. Confidentiality was stressed and participants were informed that they could opt out at any time and stage of the study without the need for any explanation. Parents were also informed through the school head of the study and about what the study entailed. Throughout the research, we adhered meticulously to standard ethical guidelines which included confidentiality and anonymity as a way of conducting the study ethically.

RESULTS AND DISCUSSION

Results

Impact of Smartphone-Integrated Method on Performance and Attitude

The first research question was aimed at finding out how smartphone-integrated pedagogy impacted overall performance and attitude of learners in English composition writing on a comparative basis with the control class. This can be better answered by first reviewing the summary of marks learners obtained first in pretest and then in postest compositions that learners wrote for comparison of performance before the intervention of the quasi-experiment. The pre-experiment attitude of learners towards writing lessons in composition is also reviewed first to gain comprehensive answers.

Table 1. Comparative summary of pre-test: both groups.

	Grouping	N	Mean	Std. deviation	Std. error mean
Pre-test	Experimental	52	10.63	3.258	.443
	Control	52	11.86	2.836	.397

The mean scores of learners through the use of descriptive statistics, indicate homogeneity of the two groups, 10.63 and 11.86 respectively for experiment and control groups. However, there was a small difference of 1.23 which was statistically insignificant. Learner performance could be described as equal, their general performance in the writing of composition was comparative, with no significant difference, therefore making the two groups satisfactory as subjects for a quasi-experiment (Creswell & Plano Clark, 2007). Any changes after the intervention was administered can be safely attributed to the change of method to the smartphone-integrated approach.

Table 2 is showing correlation using statistics through a t-test methodology for the groups under study, whether there were similarities or not, p is indicated as equalling 154 greater than .05 (p=.154 >.05). The difference in attitude between the two groups in the study is again presented as not significant at all. This result is consistent with the findings in the descriptive statistics on performance of the learners when they wrote the study composition as pretest whether they were in either of the two groups. Literature supports findings from the *t*-test results indicating that poor attitude towards a subject is a precursor to low motivation and a lack of zeal to perform (Bakar et al., 2010; Mensah, et al., 2013).

Table 2. Pre-test attitude scores.

Independent samples test

	Levene's test for equality of variances		*t*-test for equality of mean scores						
	F	Sig.	*t*	Df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
								Lower	Upper

Pretest attitude scores	Equal variances assumed	5.580	.020	-1.44	102	.154	-.0833	.05798	-.1983	.03167
	Equal variances not assumed			-1.44	75.782	.155	-.0833	.05798	-.1988	.03215

Here, as in the descriptive statistics, attitude towards composition writing was negative in both classes before the experiment. Predictably, learners did not perform well in the pre-test. This is reflective of their attitude and on why learners were failing to perform well to obtain full certificates and O level results have been low year after year.

Table 3 is showing post-test results of the groupings, whether attitudes have been impacted or not.

Table 3. Posttest attitude scores.

		Grouping	**N**	**Mean**	**Std. deviation**	**Std. error mean**
Posttest scores	attitude	Experimental	52	3.6962	.51027	.07076
		Control	52	2.2192	.77789	.10787

The results show a profound and considerable attitudinal shift from negative to positive in the group under experiment as a result of the technological intervention with smartphones. There is an above average mean record of 3.6962 in the class with technology together with .51027 as SD indicating a low count. The responses of learners in that class can be described as homogeneous, technology has impacted them more or less the same with a few deviations from the rest of the class. The attitude of the experimental class changed dramatically, from negative to positive. The results are showing that when technology in the form of smartphones is integrated pedagogically when teaching composition writing in English, learners develop a positive attitudes towards the subject.

Findings from the qualitative data analysis from the experimental class synchronized with the findings in Table 3. The learners expressed feelings of joy and a new love for the subject.

L1: *I feel happy using my smartphone for composition writing. It won't be hard for us to write compositions.*

L2: *I find it easier than before. Since we use our phones, we can write what we see on our screens, unlike writing what you totally do not know. I am enjoying my lessons very much.*

L3: *About my composition writing lessons, I feel very happy because when using phones, I gain more new words to write my compositions.*

The change from negative to positive attitude was also reflected by the analysis of post-test results. Table 4 proffers post-test statistical ANCOVA results.

Table 4. Post-test: ANCOVA results.

Source	Type III sum of squares	Df	Mean square	F	Sig.
Corrected model	469.634[a]	2	234.817	44.734	.000
Intercept	797.368	1	797.368	151.904	.000
Pre-test	74.078	1	74.078	14.112	.000
Grouping	449.641	1	449.641	85.660	.000
Error	535.413	102	5.249		
Total	20891.000	105			
Corrected total	1005.048	104			

a. R squared = .467 (adjusted R squared = .457)

The *p* value denotes polarity between the classes indicated as groups in the statistical report (p=.000< .05). This is the after intervention reading as comparison in performance. As they began the six weeks treatment, there was homogeneity in the correlation, the process maintained the source of treatment howbeit with differing tools. There is a significant statistical significant difference between the mean counts of the two classes after post-test, indicative of the effect of technology on teaching and learning with smartphones. There is a dramatic rise from 10.63 to 15.65 for experiment class while the control site almost maintained its level as it indicated a drop from 11.86 to 11.76.

The resultant achievement in the post-test presented by the class after technology intervention through integration with teaching and learning, corresponds with findings from other studies that confirm the importance of choosing models that motivate learners to develop positive attitudes towards study areas for better achievements in academic studies (Bakar et al., 2010; Mensah et al., 2013). It can be safely concluded that smartphones when used as ICT integration tools to teach writing of compositions in English, can enable learners to improve performance through the development of positive attitudes.

There is a correlation between this statistical finding and the aforementioned qualitative responses from the learners towards learning how to write compositions through smartphone integration of learning content for better production of creative work. A theme of fear and negativity ran through learner responses prior to the mediation of smartphones. With the introduction of a novel method where they could use a familiar tool for learning, a decided change was witnessed. Findings corroborate literature (Bakar et al., 2010; Mensah et al., 2013; Teig & Nilsen, 2022), who posit that teachers should always experiment with different models of concepts presentation if teaching and learning has to be effective and produce favourable results and this can only happen in a motivated class.

Gender, Method, and Performance

In the 21st century global village, issues of gender especially in education have become critical as equality and equity are a must address (UNICEF, 2020). This study also looked at how gender and smartphone integrated teaching and learning impact performance and attitude in English composition writing. This was so that this way of technology mediated learning could be used with mixed classes or not. Quantitative data was

thus treated to a two-way ANOVA for purposes of ascertaining gender compatibility of using smartphones when teaching writing composition in English. Table 5 is the resultant product

Table 5. Interactive effect of method on gender.

Source	Type III sum of squares	Df	Mean square	F	Sig.
Corrected model	398.795[a]	3	132.932	22.146	.000
Intercept	19434.847	1	19434.847	3237.792	.000
Grouping	392.538	1	392.538	65.396	.000
Gender	2.094	1	2.094	0.349	.556
Grouping * gender	1.204	1	1.204	0.201	.655
Error	606.252	101	6.002		
Total	20891.000	105			
Corrected total	1005.048	104			

a. R squared = .397 (adjusted R squared = .379)

The results of the two-way ANOVA showed that the value of p equals .655>.05, an indication of non-interactive influence. This finding is saying that a learners' gender does not impede the process of learning resultant in poor achievement when smartphones are used as ICT tools to mediate the learning of composition writing in English. On the Levine's test, homogeneity is evident for the learners. Therefore, teaching and learning of English composition when smartphones mediate, performance improves.

These findings negated research by Reilly et al. (2018), who posits that composition writing in English is performed better by females than by males of the same age.

This has been a generally accepted proposition, proving that instruction mediated by smartphone integration has unique potential to level the playing field in the classroom for all learners when teaching composition writing in English. It is important to note that digital technologies are a motivator for the young generation who are learners in high schools and methods that incorporate them tend to motivate them towards better performance (Joyce-Gibbons, 2017; Teig & Nilsen, 2022). Models of learning, motivation and attitude are critical in academic achievement among high school learners.

Qualitative data complement these quantitative data findings. Data analysis showed that all learners, without exception, indicated positive feelings towards English composition lessons mediated by smartphones. Randomly selected responses indicate thus:

L6: I really felt great. It was amazing and fun.
L8: It was like a daydream experience.
L20: I was so excited because I really enjoyed the lesson.

These responses and many more like them explain the upsurge in performance in post-tests amongst learners who were in the experiment group.

Discussion

Research in Zimbabwe has established that secondary schools lack readiness for the integration of ICTs in teaching and learning (Dzinotyiweyi & Taddese, 2020; Kangara et al., 2022). The generality of public secondary schools in Zimbabwe have no ICT infrastructure and limited learning space, resulting in overcrowding. Given such a context, it would be sensible to embrace the readily available innovation of smartphones to ensure integration takes place. This study has proved the benefits of the smartphone for the classroom.

The new version of Bloom's Taxonomy has six constructs and the sixth the highest termed, 'create' and indicated by scholars in educational psychology as the highest level or the toughest mental function on the pyramid (Armstrong, 2016). Digital technologies in general are espoused as enabling learners to execute this function with minimum difficulties. Findings of this study thus, encourage teachers in resource constrained environments to be innovative and adapt smartphones where they are readily available like in Zimbabwe, to provide effective education for the 21st century generation (Barnwell, 2016; Sung et al., 2016). Constructing learning environments that foster creativity and innovation in pedagogy develop in learners requisite skills for participatory existence in the global village.

Prasad (2021), posits that teachers must provide chances for improvement of cognition in the classroom and following Bloom's revised taxonomy especially with technology mediation tend to improve learner performance generally. Findings from this study agree with these assertions as learners' achievement shifted and there was realisation of better grades. The study focused on achievement and attitude, which are critical elements when the purpose is that of improving grades (Chun, 2016) and the research results showed also that technology engages all domains at the same time which increases cognitive development as learners manipulate machines as they search for information, creating stories for compositions demands collaboration and critical thinking (Kangara et al, 2022; Manyeredzi & Mpofu, 2022). The results of which were evident in posttest report.

Using smartphones has indicated that learners get a chance at modern education where technology infrastructure is not readily available making a must-try for teachers when teaching composition writing in English to probe learners' creativity as this is a basic element in composition writing (Bachore, 2015). It is every government's mandate to provide adequate learning material for its citizens, however, for Zimbabwe, there are huge economic challenges that may not be overcome soon. The prevalence of smartphones in households as indicated by data (World Bank, 2020), is a window to a relevant education that teachers are encouraged to grab for the benefit of their learners (Manyeredzi & Mpofu, 2022).

Findings of this study corroborates Rasheed et al (2019), that smartphones in the classroom are motivators for today's learners on their own before they are put to use for concepts. On the other hand, Mbofana & Banda (2022) lauded technology for its ability to personalise teaching and learning even with huge classes as it brings innovation with group

collaboration. With overcrowded classes as a common phenomenon of public secondary schools across Zimbabwe, smartphone-integrated learning would level the field for learners in the 4IR global environment (Dzinotyiweyi & Taddese, 2020). Literature alludes to the conclusion that retention is high if engagement is high and the learning environment, which is a true propound when ICT is mediating learning (AlTameemy, 2017; Joyce-Gibbons, 2017), seen in experimental class's post-test results.

One issue that cannot be ignored when advocating for mobile phones in education is the issue of the digital divide among learners. For Zimbabwe, recent statistics have shown that smartphones are prevalent among teenagers as opposed to other devices such as desktop computers, radios or televisions, which are the common school ICT tools in the country (FinScope, n.d.). 93% access through phones was stated as opposed to 12% access through other forms of computer devices. For Midlands, where this study was carried out, 84% mobile phone access was reported as opposed to 13% for other devices. This indicates the feasibility and sustainability of adopting the smartphone for integration when engaged in teaching and learning of writing compositions in secondary schools, without significantly widening the digital divide.

The other issue that begs attention is that of control of the smartphone while using it for lessons. In the study, allowing learners to formulate their own class phone use code of conduct as a form of policy and devising their own rules went a long way in controlling phone use. After each lesson, phones were taken and kept in the teacher's custody until schools closed as this was a boarding school. The composition lesson was done once a week as a double period, which meant that learners used the phones only once a week. For schools with day scholars, phones can be brought to school once a week. These are some of the methods that could be used to enhance control, while providing learners with a 4IR-relevant education.

The results of the study show a sudden improvement in both performance and attitude of the learners in English composition writing. This finding is a call that teaching and learning is more meaningful to learners if it is aligned to everyday-life experiences (Barnwell, 2016). Banning smartphones from the classroom is a disconnection in the life of learners as they constitute part of their everyday use of technology. Using smartphones for pedagogy would prepare both learners and teachers for smooth transitioning into remote learning in the event of disasters and pandemics such as experienced with Cyclone Idai and COVID-19 in recent history. Smartphone use in the classroom can also foster active participation in the 4IR (UNICEF, 2020).

According to Barnwell (2016), alludes to the fact that relevance for the 21st century education means integration of pedagogy and technology. This a huge challenge for sub-Saharan African schools as the region is grappling with technological gaps in education (World Bank, 2020) and the ubiquity of smartphones in the region especially in Zimbabwe serves a long term and sustainable impact in the improvement process of availing digital educational tools for classrooms. There are clear and undisputed indicators that the smartphone is here to stay and also that technology in education is the norm after COVID-19, thus enabling active participation by educational

graduates in the global village, the number one characteristic of the fourth Industrial Revolution. For developing countries like Zimbabwe in the sub-Saharan African region, smartphone use is sustainable and allows for long term projection by educators as they endeavour to maintain relevance for the 21st century education (Mbofana & Banda, 2022).

CONCLUSIONS

Zimbabwe secondary school learners need to be helped to obtain a full O level certificate, which is their gateway to further studies or employment, seeing that there is a high failure rate in this area of study. The component that contributes most to the high failure rate is the composition writing component. The results of this study have shown that secondary school learners present general negativity where traditional methods of teaching are used for writing composition in English. After administering a new method where smartphones were integrated into composition writing lessons, learners made a dramatic improvement in both their attitude and performance. Statistics for the district in which the study was conducted indicate a dearth of ICT tools in secondary schools and a ubiquity of smartphones among learners.

Smartphones could therefore be easily and sustainably integrated for classroom use in teaching and learning, with favourable outcomes. Caution may be taken by using them once a week at first as learners do the lessons and gradually increasing use as they become used to them as learning tools. Policy makers from school level may begin by engaging all stakeholders that include parents, teachers and students to formulate guidelines on how they can be incorporated and use. These guidelines should include teacher in-servicing on integration of the smartphone for effective use. Further research may on smartphones may include investigating training requirements for effective smartphone use for the classroom.

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