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Smartphones in public secondary schools: Views of matric graduates

Abstract

Many schools in South Africa ban smartphones. The decision does not take into account the views of the learners. The purpose of this paper was to elicit learners' views regarding smartphones in schools. A survey design was used and data were collected from 93 learners using a questionnaire consisting of closed- and open-ended items. Data were analysed using descriptive statistics for the closed-ended items and taxonomical analysis was used for the open-ended items. The results indicate that 55.9% of learners are of the view that smartphones should be allowed in schools. The results from the open-ended items show that information searching and processing were the most prevalent views among learners. While the learners acknowledged possible distractions using smartphones in classrooms, their views included setting rules to limit any misuse of smartphones in schools. This study recommends further study on learners' views regarding smartphones in schools.

Keywords: *Information communication technology (ICT), digital divide, smartphones, policy, academic benefit*

1. Introduction

Smartphones are a recent technological development that pervades communication at many levels of society. Smartphones, tablets and iPads are all computers that are specialised for different purposes (Vermaat *et al.*, 2014) and their use has recently increased in many African countries (Calandro, Stork & Gilwald, 2012) including South Africa (Dalvit & Gunzo, 2014). In most cases, learners have smartphones that they use for social purposes. These smartphones have generated high social impetus among learners, which leads to the view that such gadgets could assist them in learning. Thus, there is a need to explore the learners' views on smartphones in schools.

2. Literature review

Cell phones appeared on the global market in the mid-1980s for communication by the middle and upper class (Lacohee, Wakeford & Pearson, 2003), a gadget too expensive for the low-income class. However, cell phones have since become cheaper, more sophisticated and widespread in all countries. Cell phones now based on operating systems that allow Internet, video, touch screen and several other applications

are called smartphones (Ballagas *et al.*, 2006). Today, smartphones are used in a variety of assistive contexts including teaching and learning and knowledge sharing (Yu, 2012). Many institutions worldwide have now realised the importance of smartphones in learning (Dewah & Mutula, 2013). However, the emergent technology presents a natural conflict where learners quickly adopt the new assistive technology while teachers resist it because it challenges their established way of doing things. Thus, many school leaders will not consider learners' views about smartphones and instead seek to prohibit them encroaching into the educational space.

While many learning programmes appear online (Dringus, 2000), many learners in South Africa access the Internet through smartphones (Statistics South Africa, 2014) because schools lack adequate computers. However, they can only use the smartphones outside school or risk having them confiscated if they take them to school. We believe there is practical utility in several smartphone functions: Cameras, sound recording, Internet access, GPS and a wide variety of applications. Research acknowledges that smartphones are now part of the education space (Tustin *et al.*, 2012; Kreutzer, 2008). Hence, there is a need to consider learners' views regarding smartphones use for schoolwork.

3. Theoretical framework

The technological pedagogic content knowledge (TPACK) (Mishra & Koehler, 2006; Koehler & Mishra, 2008, 2009) and the stakeholder theory (ST) (Mitchell, Agle & Wood 1997) were used as the theoretical frameworks. TPACK was chosen because it includes using technology in teaching and ST was relevant as it deals with relationships in school. Since teachers ban smartphone technology, it may imply that they do not fully understand its role in teaching yet learners understand it as a necessary tool in learning. This dilemma can be explained by using TPACK, built on Shulman's process content knowledge concept (1986). TPACK is the intersection among technology, content and pedagogical knowledge (Koehler, 2012; Koehler Mishra *et al.*, 2014). The TPACK framework links technology, pedagogy and content knowledge so that technology may be integrated in teaching. Thus, TPACK involves teachers knowing when, where and how to use information and communication technology (ICT) in the classroom. ICT in education includes the Internet, smartphones and other hand-held devices (Yusuf, 2005; Olapiriyakul & Scher, 2006).

Research has found that ICTs enhance learning (Burkholder *et al.*, 2015). Despite this benefit, Africa and the Western World have not developed at the same pace regarding Internet access and computer usage resulting in the "digital divide" (Fuchs & Horak, 2006). This divide suggests much more widespread use of ICT in developed than in developing countries. South Africa needs to improve Internet penetration, which currently stands at 52.6% compared to North America at 89.0% (Internet World Statistics, 2016). Considering this low penetration rate of Internet using computers, smartphones provide the cheapest and quickest access to the Internet for the majority of people in South Africa. Statistics also indicate that most South African citizens do not have desktop computers or laptops in their homes (Statistics South Africa, 2015). This implies that more citizens access the Internet though smartphones and yet many schools ban them, which may widen the "digital divide".

The ST regards that the shared sense of values from all stakeholders of a social group constitutes the policies that govern it. In our case, the views of learners in a school articulate such values and they should be considered in making decisions concerning smartphones. ST states that stakeholders possess power to influence decisions, legitimise relationships

and provide urgency for action (Mitchell *et al.*, 1997). Therefore, it is a lens through which to understand the learners' views to incorporate them in policy decisions. In a school setting, learners are definitive stakeholders whose views should be considered when making policies such as banning smartphones. Therefore, this study explored learners' views regarding smartphones. It also poses the following question: what are the learners' views about smartphones in schools? This question is necessary because the voice of the learner is silent in the unilateral policies that ban smartphones. Some researchers consider learners as key stakeholders in the school (Dlamini, 2004; van der Berg *et al.*, 2011). Thus, this study extends the current literature on the use of technology in the classroom to include the views of learners. We believe smartphones are necessary for access to information, its storage, processing and communication. Unlike other studies, this study explores learners' views regarding smartphones and it advances the debate on learners as definitive stakeholders in the schools.

4. Methodology

A survey design was used to determine the views of learners regarding smartphones in schools. This design was used because of its breadth in collecting people's views and therefore can be generalised to a larger population (Kelly, Clark & Vivienne, 2003; Okibo & Makanga, 2014). The questionnaire consisted of two parts: a Likert type section and five open-ended items. The researchers constructed a 4-point Likert scale (Likert, 1932) questionnaire consisting of 146 items with responses coded as never = 1, low-never = 2, low-often = 3 and often = 4. For construct validity, five experts were used to examine items of the Likert and the open-ended questions. Their recommendations were effected before a pilot study was done to determine the reliability. The reliability of the Likert items in the questionnaire was found to have a Cronbach Alpha, which equalled 0.88. The Cronbach Alpha is a measure of internal consistency that ranges between 0 and 1, where 0 signifies minimum (none) and 1 signifies maximum (perfect). The acceptable alpha value ranges from 0.70 to 0.95 (Nunnaly, 1978; Tavakol & Dennick, 2011). This implies that our Cronbach Alpha of 0.88 is good and the instrument is reliable. In addition, five open-ended items elicited clarity on the participants' choices from the closed-ended part of the questionnaire (Gay, Mills & Airasian 2011; Best & Kahn, 2003). The inter-rater reliability of the open-ended items from five raters was Kappa = 0.605 (p <.0.05), suggesting substantial agreement (McHugh, 2012).

The population was 280 new learners from different secondary schools in the province admitted to the Department of Mathematics, Science and Technology Education at the University of Limpopo. The sample consisted of 93 learners randomly selected (31 from Mathematics, 31 from Science and 31 from the Technology sections) to take part in the study. This sample had an 8.32% margin of error at confidence level of 95%, suggesting that the sample was a fair representation of the population for the study. The study was conducted during the registration week because learners were able to reflect on their high school experiences better than those who had already experienced university life. The researchers administered the questionnaire to 93 learners and collected them after half an hour in order to solicit their views. This was necessary because these learners were part of the social school set up. The Likert type items sought the learners' views on how smartphones must be used in and out of school and how they can be integrated in classroom activities. In addition, participants answered open-ended items to express their views on rules to control the use of smartphones (Best & Kahn, 2003). The questionnaire also included a sincerity check

(Hewson & Laurent, 2008) on the respondents. For example, items on cyberbullying were strewn around the questionnaire to check if respondents would answer the item consistently or thoughtlessly.

Descriptive statistics (frequencies, percentages, means and Standard Deviation – SD) were used to analyse the close-ended items (Ary, Jacobs & Sorensen, 2010). For qualitative open-ended items, 5 steps from the taxonomic analysis (Spradley, 1979) were used namely, 1) selecting domains for taxonomic analysis, 2) substitution frame searching for subsets, 3) formation of tentative taxonomy, 4) asking questions to verify taxonomic relationships, 5) construction of completed taxonomy and finally categories (Cohen, Manion & Morrison 2007) were developed from completed taxonomies.

5. Results

Learners felt that smartphones must be allowed in school because they use them out of school for information searching, processing and communication. They viewed smartphones as convenient, provided there are conditions to prevent distraction of other users. In order to optimise utility in school, learners suggested design changes to make large screens and to lower the cost of smartphones.

The open-ended items

The results show that the most popular learners' view was to allow smartphones in school for academic purposes. Learners' views were categorised into advantages of allowing phones, disadvantages and noncommittal (table 1).

Table 1:   Learner's views and their reasons to have smartphones in school

Learners' view	Learners' reason	Number of learners who chose a reason	
Allow smartphones	Information searching Communication	37	55.9%
		15	
Ban smartphones	Cheating	12	38.7%
	Distraction	24	
Views not stated	No reason	5	5.4%
Total		93	100%

The results in table1 show that 55.9% of the learners considered smartphones in schools as an advantage in searching for information and for communication. However, 38.7% opted for banning smartphones, citing cheating and distractions, which are disadvantageous, while 5.4% were non-committal.

Frequencies of learners' views on five smartphone applications in school are shown in table 2.

Table 2:   Learners' views on five smartphone applications in school

Application	Number of supportive learners	Purpose for usage
Internet	89	
Dictionary	11	Information processing
Calculator	6	
Social platforms	19	Communication
Calls and SMS	7	

According to learners' views in table 2, information processing has the highest frequency being the Internet (89) while the least used application was the calculator with a frequency of (6).

Rules for smartphone use in class

Any activity that is not controlled in any organisation can cause chaos. Learners realised this and therefore in their views included ways of controlling smartphones in school (table 3).

Table 3:   Learners' views on how smartphones may be controlled in school.

Learner's view	Number of supportive learners
Smartphone should be on silent	31
No smartphone in any examinations and tests	24
No music in class	19
No texting in class	12
No pornographic material	12
No pictures taken in class	9
Keep smartphone off in class	8
No games	2
Expel learner if found cheating	4
Confiscate smartphones if misused	13

From the results in table 3, learners' views on how smartphones may be controlled in school ranged from smartphone on silent (31) to no games (2).

Likert type items

Internet access

Results from the Likert items show that most participants use smartphones to access the Internet (Mean = 3.80, SD = 0. 46). This trend was also evident for the views on banning smartphones in examinations and tests (Means 3.90; SD = 0. 41). The experiences of using social networks such as WhatsApp (Means 3.53; SD = 1.001) and a wide range of views on pedagogy (Means 3.53; SD = 0.90).

In addition, there are practical considerations in the use of phones for schoolwork: screen size, cost of purchasing, using phones, optimising phones and utilities of smartphones in schoolwork (figure 1).
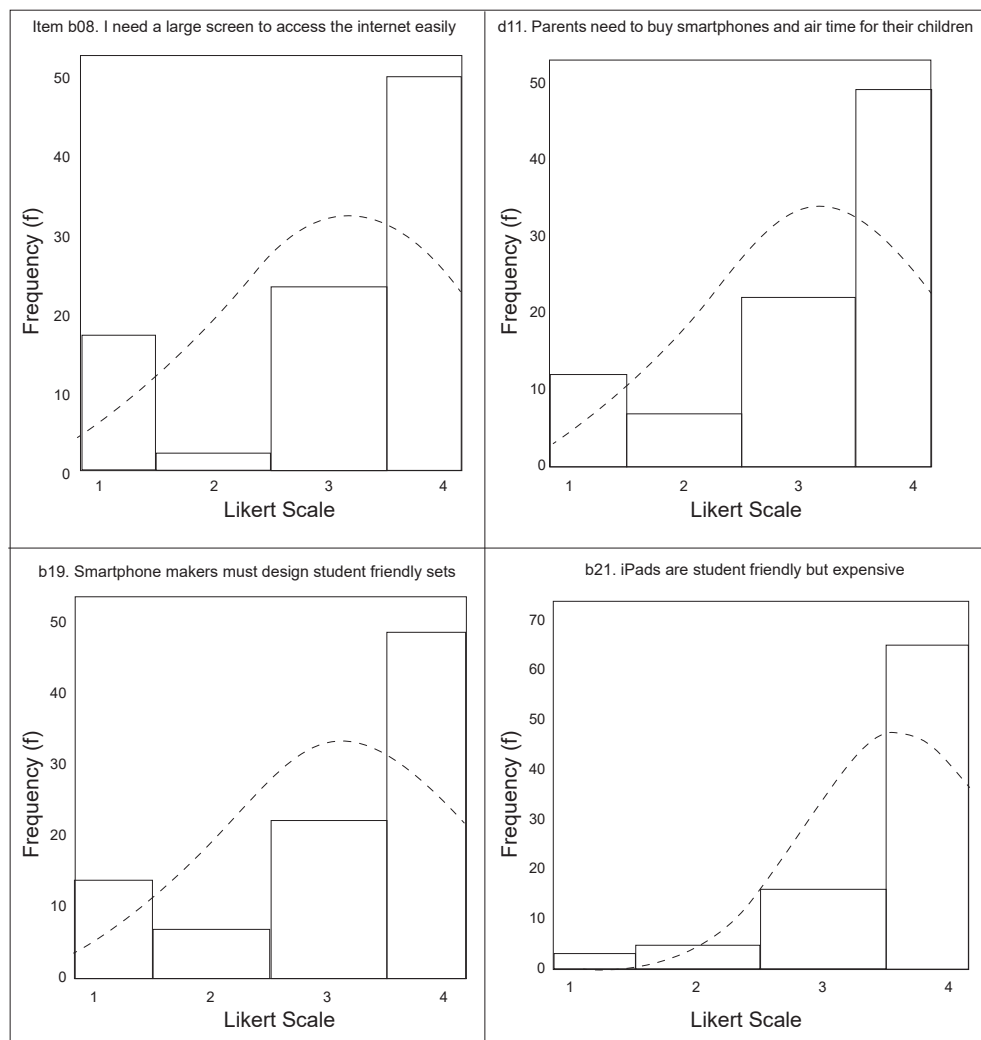

Figure 1: Learners' views about enhancing access to the Internet (d11, b08, b19 and b21)

All histograms in figure 1, b08 (Mean = 3.15, SD = 1.14), d11 (Mean = 3.20, SD = 1.06) and b19 (Mean = 3.14, SD = 1.10), b21 (Mean = 3.81, SD = 0. 75) indicate a general leaning of choices in favour of agree.

6. Discussion

The study set out to establish learners' views regarding smartphones in secondary schools. The social constructivism is the paradigm that underlies learners' views about smartphones in learning. If learners' views were incorporated in school policy, it would be interpreted as a

gesture of accepting learners as stakeholders. This would be in line with what the stakeholder theory shows, that all members in the school should be consulted in making decisions, which was when smartphones were banned. Results from open-ended items are discussed first, followed by the Likert (closed) items.

Open-ended item responses

More than half (55.9%) of the learners were of the view that smartphones are useful in schools. When the stakeholder theory is used to view this result, it means that the views of learners as stakeholders must be taken into consideration in policymaking. This gives a voice to the learners as key stakeholders to influence the decisions taken on smartphones in schools. Hamzah, Ismail and Embi (2010) emphasise learners' strong affinity for smartphones and the importance of learners' views. This study shows conflicting views between learners and school management concerning smartphones. This may create discord (Yüksel & Yüksel, 2001; Westbrook & Reilly, 1983) between learners and the school management because learners' views about smartphones in school are not sought or considered. A 5.4% item non-response introduces marginal bias into the data because the overall response rate is higher than 70% (Standards and Guidelines for Statistical Surveys, 2014). The reasons for non-response may include time limitations, indecision and language difficulty.

While 55.9% of the learners viewed smartphones as useful for information searching and communication, various reasons for opposing smartphones in schools were also given. These included the possibility of cheating in examinations, distractions by different ringtones and using sites that are not relevant to academic work. These may be valid arguments but they do not diminish the cogency of information searching and processing, which can be harnessed to improve teaching and learning in the classroom. Distractions may arise from human misuse and not from the smartphone itself. Therefore, it is not surprising that smartphones are banned from examination rooms.

The majority of learners view smartphones as what Peters and Bell (2013: 52) called a "The Hand held library" because people use their hand held phones to access different subject content. Smartphones enhance the use of ICT (Sun *et al.*, 2016) and pervade all spheres of life, including schools (Peters & Bell, 2013). Therefore, banning smartphones in school hinders the flow of ICT in general. This may create a generational conflict where adults ban technology that younger people view as profitable. In fact, the action to ban smartphones increases the "digital divide" in the country (Burkholder *et al.*, 2015) and one wonders when the country will start narrowing this divide? Teachers and principals advanced three arguments for banning smartphones namely distraction, time wasting (Hawi & Samaha, 2016) and cyberbullying (Popovac & Leoschut, 2012). This is in sharp contrast with research that acknowledges the use of mobile devices in education (Tustin *et al.*, 2012; Kreutzer, 2008). It also disagrees with the learners' views because information-processing (table 2) had the highest frequency in terms of smartphone use in general. Similarly, values of learners' views on how smartphones may be controlled in school ranging from smartphones on silent (31) to no games (2) suggest positive learners' views to incorporate technology in the teaching and learning in schools. In addition, it implies that learners are willing to be part of setting the rules on smartphones since they regard themselves as stakeholders in the schools.

Smartphone technology is evolving rapidly yet the integration of technology into the curriculum is at a slower pace (Hawi & Samaha, 2016). It is understandable that teachers and principals are opposed to smartphones because learners may engage in distractions

such as social media and fail to concentrate on their studies. This may be one view for banning smartphones in the classrooms. It agrees with studies from the USA, which reported a negative effect of using WhatsApp on academic performance (Junco & Cotton, 2012). Moreover, learners also copy answers from the Internet (Corrigan-Gibbs *et al.,* 2015; Billic-Zulle *et al.*, 2008). Jantjies and Joy (2015) also found that older teachers are less competent in smartphone use than younger teachers are. This may explain, in part, why teachers resist smartphones.

Most smartphones' features are not optimised for educational purposes. These include the Internet, short message service, cameras, calculators and social media. Learners expressed the view that the Internet, calling, dictionary and calculators are necessary features on smartphones. However, smartphones on the market do not support programmable calculators, high-resolution cameras and high-speed processors (O'Connell, 2013). Currently, many features on phones are not useful in school, such as games, music, movies and others. Such functions could be dropped in the optimisation of phones for school. Smartphone manufacturers do not generally produce 'student-friendly' phones. Student friendly phones would need high processing speed, good connectivity and a long battery life. It should also cost less. The concept of personalising and customising phones for a particular client is already underway with Motorola (The Telegraph, 2015) and other smartphone manufacturers may follow suit. This implies that phones that are optimised for educational purposes will require the education authorities to design policies to guide the use of smartphones in school in order to minimise distractions.

Smartphones can be quite distracting to other people; therefore, learners are of the view that clear policies are needed to regulate their use. In this regard, learners are of the view that smartphones should be used in silent mode. At the same time, they also agreed to ban smartphones from examinations and tests. For use in classrooms, they suggested that there should be no texting, games or music, pornography or taking pictures and videos. Learners indicated that they wished to avoid distracting each other when using their smartphones. However, most schools cannot control how learners use these devices outside of school. This leads one to ask, what is the purpose of banning smartphones in schools? How effective is the ban? Since learners in secondary schools use smartphones outside of school, banning them at school means the school system resists evolving along with technology whereas this could otherwise offer a useful opportunity for learners to learn to use their phones effectively and productively. The learners' views regarding the regulation of smartphone use in the classroom seems practical and workable. Their views imply a positive attitude towards ICT, unlike the views of the older generations who perpetuate negative attitudes in this respect (Kibirige, 2011). Research has shown that when learners are involved in making rules to govern themselves, they feel that they are obliged to obey such rules (Mncube & Harber, 2013). Therefore, it makes sense for them to enforce such rules in order to inculcate acceptable behaviour in every student (Schoeman, 2006). It is also an opportunity for learners to suggest corrective actions if rules are not obeyed. Nilson (2016: 111) supports this observation, reporting that if they are involved in making the rules "learners pretty much police themselves, keeping even minor violations to a minimum". This implies that if learners are involved in designing a policy on smartphones, they can regulate themselves on how to select functions necessary for schoolwork.

For information processing, Internet access was viewed as an important feature on smartphones (table 2). This suggests that learners consider an information processing

application important for their social and educational life. This finding agrees with Asher's (2015) finding that social media can enhance learning by connecting the classrooms with the world in real time and that social media goes beyond mere discussion groups and sharing thoughts. Thus, a smartphone is in effect a library and a communication platform. It is also important to consider that smartphones have evolved on a platform of telephony and many of the desired functions are additional. Therefore, for smartphones to run functions needed in schools, such as programmable calculators, they need to be redesigned to supply more power and processing speed.

The closed-ended items

The views of learners regarding Internet use is skewed towards agree (Mean = 3.8; SD = 0. 46) (figure 1) suggesting that this technology is popular. There are many smartphones among learners; unlike computers which are quite limited (Kibirige, 2011). This observation concurs with the findings of Burkholder *et al.* (2015) who contend that smartphones can be useful in schools. Smartphones have been banned in schools despite their availability to learners. It is no wonder that the "digital divide" (Fuchs & Horak, 2006) is still as big as it was a decade ago when these devices were not as popular among learners as they are in 2016. Several reasons underlie the popularity of smartphones namely chat messages are instant, cheap and can consist of voice, text, picture or video (CIO, 2014). Other functions such as GPS, clock, music store, dictionary, calculator and social platforms make the smartphone highly useful. Learners also view smartphones as able to compromise examinations and tests because of the possibility of examination leaks and learners sharing answers. For instance, WhatsApp was used to leak the life sciences examination paper to other learners in Limpopo in 2015 (Themba, 2015).

Many learners share the view that smartphones enable information searching because they are more accessible than desktop computers or laptops. This view may be driven by the general lack of books, libraries and reading material that is common in developing countries (Jantjies & Joy, 2015; Muwanga-Zake, 2007). Computer illiteracy and limited access to computers compromises teachers and learners' abilities to handle information in South African schools (Jantjies & Joy, 2015).

In the TPACK framework, educators may have limited technological knowledge due to this lack of familiarity with computers. This realisation led the Gauteng Department of Education to train teachers to teach through Internet-ready tablets (Msila, 2015). The success of the innovation to digital education depended on teacher competence in using information technology. Therefore, for rural and small town schools, learners view that the transformation to full use of digital devices will grow at the pace that teachers become more competent and confident in using smartphones. This requires educators to be knowledgeable with computer hardware and software, pedagogical knowledge and subject content. In order to accomplish this, there is a need to integrate technology into pre- and in-service teacher training to make them adept with graphic calculators, iPads, tablets, blackboard, the Internet and other educational applications (Bell, 2001; Camera, 2015). Many pedagogical opportunities are made possible by smartphones, for instance a life sciences class can use their cameras to photograph the germination of a bean seed and watch epigeal and hypogeal germination; they can also measure rates of growth. In this case, a large screen would be preferred (figure 1). Learners can make short films using smartphones for learning, entertainment or reporting crime (Savides, 2016; Rodrigues, 2016).

Often, learners are regarded as non-stakeholders and are excluded from the decision-making processes such as in the banning of smartphones. This ban means teachers may not be ready to integrate smartphone technology into teaching and learning in schools. Several reasons may explain this decision. These include teachers not being confident with smartphones, it may be for fear of biasing learning opportunities in favour of learners who can afford smartphones and it could be that teachers are unwilling to engage in a new tool without guidance on how to use it. This implies that technology integration necessitates changes in the teacher training programmes to include ICT into pedagogics and content knowledge.

The banning of smartphones also means that integration of technology into teaching and learning and consultation of learners in the decision making process are inadequate. If they were involved, there would be no smartphones banned in schools. Besides improving access to information and all other benefits, learners would have learnt how change could be democratically achieved. Therefore, the decision to lift the ban on smartphones will enable teachers to integrate technology in teaching and learning in consultation with the learners. This is likely to improve learners' attitudes since they expressed their views that smartphones could help them in school.

7. Recommendations

The debate of smartphones in schools reveals a major gap in the conceptualisation of policy and practice in South African schools. The rapid expansion of knowledge, technology and globalisation underscores the need for changes in the education enterprise; roles, approaches, content and resources. The DoE therefore needs to support teachers in integrating learning new technologies into teaching and learning, recognising learners as critical stakeholders and transforming educational policies, curricula and practices. Thus, it is recommended that educational systems invest in planning for digital strategies in all schools. Learners would academically benefit and would be able to participate in national and international debates. Furthermore, considering that the majority of learners use smartphones outside school, it would be prudent to recommend the following:

- Allow the integration of smartphones into teaching and learning in schools with a regulatory framework.

- In poorly resourced schools, find alternative means to increase the number of tablets and laptops.

- There is need for further research to investigate the effects of smartphones in the teaching and learning process.

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