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SMARTPHONES TO SUPPORT LEARNING AND TEACHING: DIVERGENT PERSPECTIVES

Abstract:

Learning-teaching support media for the subject Consumer Studies are scarce. This subject offers great entrepreneurship potential for learners, is growing in popularity and is being expanded to more school phases in the South African school system. In addition, Consumer Studies includes a broad variation of topics, which obliges these subject teachers to have a broad and deep knowledge of all the diverse topics. It is therefore imperative to provide teachers with media they can use to support them in the teaching, and learners in the learning, of Consumer Studies. After a recent survey indicated that digital technologies such as smartphones abound in South Africa, the potential of these devices to serve as learning-teaching support media for the subject Consumer Studies in particular, was explored. To gain deeper insight into how smartphones can contribute to learning and teaching – particularly in Consumer Studies – with the ultimate purpose of enhancing the preparation of Consumer Studies student teachers, qualitative exploratory desktop research was employed. The findings indicated that, despite numerous ways in which smartphones could serve as learning-teaching support media, particularly for Consumer Studies, using these devices for learning and teaching is not uncomplicated. Several pitfalls associated with the use of smartphones also emerged. The divergent perspectives that emerged from the findings were used to make recommendations that could be used in the preparation of student teachers to teach the subject and to which practising teachers could refer when utilising smartphones as learning-teaching support media.

Keywords:

Consumer Studies, learning-teaching support media, smartphones, student teachers, teacher training, teaching technologies

JEL Classification: O33

1 Introduction and problem statement

An increasing number of learners are selecting Consumer Studies as one of their elective subjects in the Further Education and Training (FET) Phase of the South African school curriculum (Umalusi, 2018). Plans being implemented to expand Consumer Studies to the Senior Phase, which precedes the FET Phase in the South African school system, will present younger learners with opportunities to experience the valuable learning linked to the subject (Department of Basic Education [DBE], 2019) and will significantly expand the number of learners accommodated in this elective subject.

The potential value of the learning embedded in Consumer Studies is extensive. Consumer Studies can contribute positively to the development of South African learners, particularly through the entrepreneurship education embedded in the subject (Booyse, Du Randt & Koekemoer, 2013:92; Du Toit & Kempen, 2018a), which can help to reduce the severe unemployment faced in this country. In fact, Consumer Studies includes more and better structured entrepreneurship education than any other subject in the South African school curriculum and is unique in its explicit combination of practical production with entrepreneurship knowledge (Du Toit & Kempen, 2018b). Another fundamental focus of Consumer Studies is the preparation of learners to become responsible and well-informed consumers (Booyse et al., 2013:92; DBE, 2011:8). The topic 'The consumer' is viewed as the "golden thread underlying the Consumer Studies curriculum" (Booyse et al., 2013:92), appearing throughout all other topics in the subject. In addition to 'The consumer' and 'Entrepreneurship', Consumer Studies learners also develop knowledge and skills constructed around five other core topics, namely: 'Food and nutrition'; 'Design elements and principles'; 'Fibres and fabrics'; 'Clothing'; and 'Housing' (DBE, 2011:8). Each of the seven topics are dealt with in depth, where "depth refers to the complexity and extent of cognitive challenge associated with the topic" (Umalusi, 2014:46).

To support teachers with the implementation of this broad and diverse content, the DBE has approved two sets of textbooks that were developed specifically for the Consumer Studies curriculum. Schools usually select one or the other for learners to work with, but most teachers have both sets as the final exit-level examination is set from both sets of textbooks. A recent investigation into South African Consumer Studies teachers' implementation of the curriculum in practice (Du Toit, 2018) included enquiries about their use of learning-teaching support media (LTSM) in the subject. It emerged that teachers rely heavily on the two sets of textbooks as LTSM, with limited alternative resources being utilised (Du Toit, 2018:191). Despite this being teachers' primary learning-teaching resource, several participating teachers in the study voiced

their dissatisfaction with different sections of content in the textbooks (Du Toit, 2018:195). The same study also highlighted that almost a third of the learners in Consumer Studies classes do not have access to their own textbook and in some cases, learners do not have access to the textbooks at all (Du Toit, 2018:192). In conjunction with the additional finding that no supplementary LTSM have been made available for Consumer Studies by the DBE (Du Toit, 2018:195), the resulting problem is that these subject teachers have little support to convey the important learning contained in Consumer Studies and are mostly left to source additional resources on their own. This need to search for and develop additional resources "requires a vast investment in time, research and skill [which] erodes time that teachers should [rather] be spending teaching and marking" (Dada et al., 2009:52). As the subject has so much potential to contribute positively to the lives of learners, this state of affairs is unacceptable and it is therefore imperative to provide teachers with alternative and accessible media and other resources that can be utilised to support them in the teaching, and learners in the learning, of Consumer Studies.

Informed by the scarcity of LTSM available for the subject Consumer Studies, the need to identify and develop such media and materials is highlighted as part of a course used for the preparation of Consumer Studies student teachers at the university where I teach. Amid several other preparatory elements of learning and teaching, students identify, investigate and evaluate various types of media that they consider to be useful to teach the subject at school level. The class as a whole also debate the benefits and challenges associated with each type of media, such as posters, PowerPoint presentations, realia, cartoons, etcetera. Lately, smartphones have appeared recurrently in my students' discussions on LTSM. A recent survey by the International Telecommunication Union (ITU, 2018) also found that there are 153.2 cell/mobile phone subscriptions for every 100 South Africans. Despite the fact that all of the subscriptions might not be for smartphones, it does point toward many (if not most) South Africans having access to such devices. My students' interest in these devices, together with the proliferation of smartphones in our society, suggested that smartphones might be useful to serve as LTSM as they are so widespread in our country.

Cognisant of the fact that smartphones are developing faster than what we can keep up with, and being a bit of a neophyte in the use of smartphones, I recognised that this resource needed to be investigated in more depth for its potential to support learning and teaching of Consumer Studies at school level. The limited time available in the Consumer Studies student teacher preparation course meant that I (as lecturer of the course) would have to research smartphones as a tool for their potential pedagogical use in Consumer Studies in order to inform my student teachers about and prepare them for the advantages and challenges of smartphones so that they could better

utilise these devices as an additional (to textbooks) and effective learning-teaching support resource in their own classrooms in the future.

Against the background of the scarcity of LTSM for Consumer Studies and the abundance of mobile phones used by South Africans, and with the purpose of enhancing the preparation of student teachers in this regard, the following question was formulated to guide this exploratory qualitative desktop investigation: 'How can smartphones be utilised to support teaching and learning of Consumer Studies in South African schools?' Such an investigation would be consistent with the recommendations by Baran (2014:29), who suggested that teacher educators have to "explore pedagogical benefits of mobile learning within their own content areas", as doing so would move such investigations beyond the limitations of only the potential of a device and would benefit not only student teachers but also in-service teachers who want to utilise such devices to support learning and teaching in particular subjects. Moreover, as South Africa is viewed by many as a developing (rather than a developed) country, the current study is also in keeping with the suggestion by Valk, Rashid and Elder (2010:118) that evidence of the "educational benefits that mobile phones provide in the developing world" need to be investigated.

The goal of this article is report on the investigation and findings regarding the potential of smartphones to support teaching and learning in Consumer Studies education by bridging the gap created by the limited LTSM available for this subject.

2 Methodology

Desktop investigations based on systematic literature reviews are becoming more commonplace as researchers lament a lack of time and resources to move investigations to the field. The current study was an introductory effort to systematically delineate the findings of research on smartphones as pedagogically effective (or not) learning-teaching tools as well as how smartphones might be utilised as LTSM in the subject Consumer Studies.

Rather than viewing smartphones as a 'tool of instruction' (Begum, 2011), which seems overly teacher-centred, a more learner-centred view of smartphones as learning-AND-teaching devices was preferred for this investigation. It was also the motivation for referring to these devices as LTSM, where the term 'learning' is placed before the term 'teaching' to signify the importance of learners as active participants in the education process.

A constructivist lens was used for this investigation. Bartley et al. (2018:35) report that teachers will "more readily adopt a broader range of approaches with technology into their teaching practice" and that more student needs are met when constructivist approaches to teaching and

learning are used. Constructivism is valid and suitable as a lens “where learners can control and monitor their learning process through active interactions with realistic and virtual environments” (Elfeky & Elbyaly, 2018:1), such as when they are using smartphones in the learning process. Teachers and learners (or students) are seen as co-constructors of the knowledge developed in the learning-teaching process that utilises smartphones as support media.

2.1. Data collection

After framing the research question (‘How can smartphones be utilised to support teaching and learning of Consumer Studies in South African schools?’), the PICO framework described by Borrego, Foster and Froyd (2014:53) was used to define the different elements that were investigated. The population investigated focussed on schoolteachers and learners using smartphones in the learning-teaching process, preferably at secondary-school level. Smartphones were viewed as the ‘intervention’ in comparison to other LTSM such as textbooks, and the outcomes or potential effects of utilising these devices to support learning and teaching in the subject Consumer Studies were explored.

A systematic review was undertaken of accessible literature in the university’s libraries and on the internet, including Google Scholar as well as the databases for African Journals, ERIC, EBSCOhost, E-Journals, and the Teacher Reference Center, chosen based on their inclusion of various high-impact, full-text journals and conference proceedings. The key terms [‘smartphone*’] was searched for in the abstracts AND [‘teaching-learning’] OR [‘learning-teaching’] AND [‘school’] anywhere in the article or chapter, resulting in 3 334 items. Adding [‘tertiary’] and [‘university’] as exclusion criteria to narrow the focus to schools, left 1 010 results. Informed by Jackson’s (2015:22) timeline, which indicates that smartphones were introduced from the year 2007, this date was used to exclude prior research, further reducing the titles to 510. Excluding sources that were not peer reviewed and for which the full text was unavailable, as well as research not reported in English, subsequently left 231 items to analyse. Scant information could be found on the utilisation of smartphones, particularly in Consumer Studies, and it was decided to deduce their potential and suitability for use in Consumer Studies from the analysis of the available data.

2.2. Data analysis

In the first round of analysis, the title of each of the 231 items were analysed to determine whether they might be relevant to the study or not. In cases where relevance seemed ambiguous from only the title, the abstract for that item was carefully analysed before deciding to include or

exclude the item in the analysis. The abstracts for each of the relevant items were then read and details, such as the focus of the article, author(s), date of publication and any points of particular interest, were then dismantled in an MS Excel document. The purpose of this initial analysis was twofold: to develop codes and themes for the in-depth analysis of items; and to assess the quality of the items, for example, sources of bias or missing or incomplete details, in line with the suggestions of Borrego et al. (2014:58). Several codes were developed and these codes were categorised and eventually grouped into four broad themes to align with the exploratory character of the investigation. The following emerging themes were used for the subsequent reading and analysis of the full items: (1) advantages of using smartphones in learning; (2) advantages of using smartphones in teaching; (3) indirect positive contributions of smartphones to the learning-teaching process; and (4) concerns associated with learning and teaching with smartphones. Where unusual or interesting elements were found in the items, the references lists were used to explore the original sources for that information in more detail.

In recognition of the limitations of systematic reviews, the following procedures, as recommended by Borrego et al. (2014:63), were implemented in the current investigation in an effort to overcome those limitations. The initial round of analysis was done with meticulous attention to any form of bias reported in the studies that were analysed. Care was taken to select only items that were peer reviewed and published in well-indexed journals or conference proceedings. For items published in languages other than English, such as Korean or Mandarin, the abstracts were analysed if available in English so as to not exclude those studies. The review procedures, inclusion and exclusion criteria, as well as reporting decisions and processes, have been described in detail in an effort to address concerns regarding validity and reliability.

3 Review findings and discussion

The findings of the systematic review indicated that, despite numerous positive practices associated with both learning and teaching when using smartphones in school environments, there are also several pitfalls associated with the use of such devices in this context. Furthermore, it emerged that little research has been published on using smartphones in particular as LTSM in Consumer Studies. The findings are discussed according to the main themes that were identified for the review, namely: (1) advantages of using smartphones in learning; (2) advantages of using smartphones in teaching; (3) indirect positive contributions of smartphones to the learning-teaching process; and (4) concerns associated with learning and teaching with smartphones. Each section includes discussions on how the findings might impact opportunities for using smartphones as suitable LTSM in the subject Consumer Studies.

1.1 Advantages of using smartphones in learning

The most obvious advantage of using smartphones rather than cell phones is possibly the access they provide to searching the internet, providing learners with a **world of information** at their fingertips (Begum, 2011:110; Kaimara et al., 2018:3; Mavhunga et al., 2016:75; Nikolopoudou & Gialamas, 2018:2822; Sparrow et al., 2011:778). This advantage is amplified if learners are taught how to effectively use the internet (Miyake, Takeuchi & Toda, 2018). The internet offers almost unlimited resources that might effectively contribute to learning and teaching of the content and skills required by the South African DBE's Consumer Studies curriculum, as described in the following few examples. Photographs and detailed descriptions of products, such as what a successful Swiss roll or éclair might look like (DBE, 2011:40, 41), would be useful as these products are not indigenous. Many of the food products that learners have to learn how to make have Western influences (Du Toit, 2018:198) and are therefore unfamiliar to countless learners. Videos of production processes abound on the internet, such as insertion techniques for zippers in trousers (DBE, 2011:45) or other sewing techniques (Tanaka & Yamamoto, 2016:448), which learners have to be able to do in the Clothing Production part of Consumer Studies. The wide variety of videos available means that such processes can be viewed from different angles or different techniques can be viewed and evaluated for effectiveness and as often as required. The internet offers valuable research, investigations or descriptions of complex or unusual procedures, such as calendaring, embossing and sanforising fabric finishes (DBE, 2011:26), which learners have to learn about and teachers might not be able to describe effectively. Despite the vast access to information on smartphones via the internet, Valk et al. (2010:117) caution that limited "evidence exists as to how mobiles promote new learning". In other words, our understanding of how these devices contribute to learning is still limited.

Several authors report that using smartphones can **improve learners' learning achievements** (Hasanah et al., 2018:164; Mamba & Kohda, 2017; Nikolopoulou, 2018:500; Setiawan et al., 2015:208; Smith, Stair, Blackburn & Easley, 2018:240). Reasons provided for the improvement is that alternative learning processes – or so-called new learning – and changes in the character of learning are facilitated and supported by these devices (Setiyadi et al., 2019:2; Valk et al., 2010:119). Smartphones contribute to "efficient and inventive methods" through which learners' understanding of particular content is deepened rather than information just being memorised (Valk et al., 2010:121). Deeper learning takes place when learning is linked to reality or learners' everyday lives (Du Toit & Kempen, 2018a:205) and smartphones offer ample opportunities to foster such links. In view of the infinite potential value that the learning and skills embedded in

Consumer Studies can contribute to the lives of learners (Du Toit & Kempen, 2018a:211), improved understanding and deeper learning would add even more value to the lives of learners.

Also advantageous is the **learner-centred nature of learning** with smartphones (Baran, 2014:28; Kaimara et al., 2018:2; Valk et al., 2010:120), which allows learners to set their own learning goals, access resources individually and contribute to the building of knowledge and skills. Learners' involvement in and engagement with their own learning is therefore improved (Begum, 2011:110; Jones, 2018:75; Nadelson et al., 2018:9; Ngesi et al., 2018:2). Giving learners opportunities to meaningfully engage in and make choices regarding their own learning – like when they are allowed to sensibly use smartphones to support their learning – enable them to better adapt and change their learning (United States Department of Education [USDE], 2017:10). Even though learner-centred learning is a key requirement of the school curriculum (Umalusi, 2014:9), learner-centred learning unfortunately does not realise in many South African Consumer Studies classrooms (Du Toit, 2018:215). Utilising smartphones in the learning and teaching of the subject will involve learners in the learning process to a greater extent, thereby fostering learning. The characteristics of learner-centred learning closely conform with the requirements for self-directed learning described by Knowles (1975:18) – a learning skill considered to be essential for learners in the 21st century.

Often closely associated with self-directed learning is the fostering of a culture of **lifelong learning**, which the World Economic Forum (2017:10, 11) recommends as one of the approaches needed in Africa to strengthen education systems and prepare learners on this continent for the Fourth Industrial Revolution. The fact that lifelong learning is also one of the goals of the Global Education 2030 Agenda of UNESCO (2017:7) further emphasises the development of such learning. Smartphones enable and facilitate lifelong learning on the move, making everyday learning possible in many different contexts (Ford & Batchelor, 2007:12; Gu, Gu & Laffertey, 2011:205; Malloy, 2019:6; Valk et al., 2010:120). The learning content in the Consumer Studies curriculum is dynamic and should be constantly updated with changes that emerge from new research, new laws or policies, and more (DBE, 2011:30; Du Toit, 2014:47). Smartphones offer teachers and learners opportunities to instantly search for the latest developments in almost any field at any time and will therefore support lifelong learning. These devices bring the outside world or 'real life' to the classroom (Baran, 2014:26; Kaimara et al., 2018:3; Mupinga, 2017:70), connecting learners' learning to their own lives and thereby making learning more authentic.

It also emerged from the reviewed literature that two other important 21st-century learner skills are often linked to learning with smartphones, namely creativity and communication. As regards

creativity, smartphones support the development or creation of content, through which innovation and creativity are fostered in learners (Kaimara et al., 2018:4; Malloy, 2019:92; Oliveira, 2018:35). Learners and teachers can use smartphones to search for new ideas, such as creative ways in which to present or package the products they make in class (DBE, 2011:40; Ngwenya & Shange, 2019:8) or innovative ways to support sustainable consumption (DBE, 2011:18), which will inspire them to develop their own creative ideas. According to the World Economic Forum (2017:11), creativity should be fostered to better prepare learners in Africa for jobs and skills requirements of the future, and smartphones can therefore contribute to developing such learning. Creativity is also viewed as essential to foster entrepreneurship (Du Toit, 2018:166; Ngwenya & Shange, 2019:8). As entrepreneurship is one of the core foci of Consumer Studies, creativity should therefore be actively supported in the learning and teaching processes in the subject, and smartphones can contribute to such endeavours. Entrepreneurship education requires that mistakes are used to enhance the learning process (Du Toit, 2018:241) and therefore, through brief but efficient 'trial and error' cycles and chances to correct mistakes, smartphones offer opportunities to further develop learners' creativity (Jones, 2018:12).

Seeing that phones were originally developed as a tool for **communication**, it was not surprising that the development of this 21st-century skill emerged as the most recurrent advantage of learning with smartphones. The social interaction made possible by smartphones fosters communication between learners and their peers, between learners and teachers, as well as with people in the world outside the classroom (Begum, 2011:105; Jones, 2018:11; Kaimara et al., 2018:3; Kreutzer, 2009:54; Mavhunga et al., 2016:75; Miyake et al., 2018:143; Ngesi et al., 2018:3; Nikolopoulou, 2018:500; Oliveira, 2018:31; Pedro, De Oliveira Barbosa & Das Neves Santos, 2018:12; Valk et al., 2010:121). The instant and wireless communication capabilities of smartphones, in combination with communication applications such as WhatsApp or Instagram, support opportunities for faster and broader knowledge development regardless of where the learner is or what time it is. Smartphones broaden communication capabilities from one-on-one (found in lecture-type learning) to 'many-to-many', which will complement and expand learning (Baran, 2014:26; Pedro et al., 2018:12). Communication can be as private or open as required (Oliveira, 2018:33), and shy learners or learners who do not prefer face-to-face interaction are therefore more easily included in learning interactions (Begum, 2011:110). Real-time collaboration and communication opportunities exist when using smartphones (Jones, 2018:12). According to Jones (2018:12), communication in learning involves (among other elements) "thinking about the subject, purpose, sender, receiver, medium and context of a message". The South African school curriculum (which includes Consumer Studies) envisions learners who

would be able to “communicate effectively using visual, symbolic and/or language skills in various modes” (DBE, 2011:4), and smartphones can contribute to attaining this goal. Many different ways of communication are supported – for example, learners can communicate using applications, wikis (Lai & Lum, 2012:58) or with (or through) virtual avatars or other imagery (Elfeky & Elbyaly, 2018:3) such as videos or photographs.

Being able to take, copy, adjust or develop **images and photographs** is another key advantage of smartphones that supports learning (Begum, 2011:107; Diehl, Zauberman & Barasch, 2016:138; Obringer & Coffey, 2007:41; Oliveira, 2018:25; Kaimara et al., 2018:3; Kreutzer, 2009:54; Nikolopoudou & Gialamas, 2018:2822; Schaffhauser & Nagel, 2016:12). These images or photographs can be taken or developed anywhere and at any time, inside or outside the classroom, and can be stored on the device itself, or shared to and stored on other devices. In turn, the images can support and foster memories, information retention, data collection or -analysis, reporting of data, communication, creativity, critical thinking and many other skills that form part of the learning process. The learner (and teacher) population in South Africa is exceedingly diverse, owing to (amongst other elements) eleven official languages, various cultures, vast differences in prior knowledge, levels of development, and access to resources (Du Toit, 2018:68). Accessing existing images or photographs on the internet via smartphones – for example, images showing good kitchen hygiene practices (DBE, 2011:20) – would contribute to shared understandings of reality and expectations on that particular topic for both Consumer Studies learners and teachers. In addition, photographs can be taken in class as part of the lesson to be analysed or annotated later or at home.

Other types of **recordings** made possible with smartphones, such as voice- or video recordings, contribute similar advantages to learning. Few Consumer Studies teachers report that they utilise video clips to support their teaching (Du Toit, 2018:191), indicating that this resource is undervalued. For example, Consumer Studies teachers could record themselves (using a smartphone) executing a process that learners have to learn, such as methods to sterilise bottles to make jam (DBE, 2011:40) rather than having to plan and execute a physical demonstration in class, which tend to take more time. By completing the process themselves outside class time, teachers can ensure that all the underlying principles and rules are addressed as part of the recording, that subject-specific terminology is used, incorrect methods are avoided (or pointed out), unnecessary steps can be cut out and the video recording can be paused and discussed where extensive information needs to be given. Utilising different applications, such as images and recordings, contributes to a more enjoyable and interesting learning experience (Diehl et al., 2018:138; Oliveira, 2018:34; Tamir et al., 2018:167), which supports learner motivation (Kaimara

et al., 2018:3). Increased learner motivation is often associated with using smartphones for learning, especially for learners who previously struggled with more traditional ways of learning (Nikolopoulou, 2018:500; Valk et al., 2010:121).

The advantages of smartphones are not limited to learning and learners: teachers also have much to gain from using these devices as part of their teaching, as described in the next section.

1.2 Advantages of using smartphones in teaching

The effective use of smartphones for teaching have been investigated in several individual **subjects**, for example, Agricultural education (Smith et al., 2018), Biology (Setiawan et al., 2017), Physics (Svensson, 2018), Applied Chemistry (Stanley & Ymele-Leki, 2017), Science (Hasanah et al., 2018), Mathematics (Farozin et al., 2019; Setiyadi et al., 2019), and English education (Ngesi et al., 2018; Sarhandi, Bajnaid & Elyas, 2017; Wu & Lo, 2017), to name but a few. No studies were found that reported on using smartphones particularly for Consumer Studies, or even for Home Economics, the more common name of the comparable subject in several other countries (Umalusi, 2014:18).

The most obvious advantage of using smartphones in teaching is the increased opportunities for **communication**. Teaching can become multidirectional (that is, between learners and peers, learners and teachers, learners and others, teachers and peers, and teachers and others outside the classroom, such as the community) and expanded opportunities are available for communication to support teaching. Smartphone communication as part of teaching includes directional contact with learners via devices inside and outside the classroom and also allows teachers to easily connect and collaborate with other teachers, ask for and provide feedback, and create and join online communities or access applications and services (UNESCO, 2017:9). This ease of communication also supports flipped-classroom teaching approaches and thus extends teaching beyond the classroom or school (Baran, 2014:26). A recent survey revealed that few teachers were employing collaborative teaching methods in Consumer Studies and even fewer teachers collaborated with others outside the classroom to enhance their teaching (Du Toit, 2018:218). Smartphones can therefore definitely contribute to the expansion of Consumer Studies teachers' communication and collaboration in their teaching efforts.

In their profession, teachers do not only use smartphones for teaching, but also for classroom **management** (Nadelson et al., 2018:9; Schaffhauser & Nagel, 2016:13), **administrative** purposes and teacher-directed activities and responsibilities (Begum, 2011:107; Nadelson et al., 2018:3; Smith et al., 2018:239, 249). Baran (2014:26, 27) explains how smartphones may be

used by teachers to: develop lesson plans; access and complete forms and other electronic documentation; scan QR codes or capture real-life phenomena to support their lessons; and reflect on, share or give feedback on lessons or assignments. Smartphones can contribute to management and administration in Consumer Studies in many ways. For example, teachers may utilise applications for stock control or budgeting, complete school forms online, keep classroom registers, and so on. With smartphones, immediate feedback as part of the learning-teaching process is possible and reflection-in-action is also supported (Baran, 2014:24), which contributes to more meaningful feedback. Smartphones have also been used as a tool to support electronic assessment of practical tasks (Fukutani, Ando, Itagaki & Abiko, 2015:235). In Consumer Studies we often use interactive tools such as Kahoot!® on smartphones to contribute to fun and interesting ways in which immediate feedback is provided and to conduct formative informal assessments.

What also clearly emerged from the literature analysis is that teachers view smartphones as a useful tool, **complementary** to the range of other educational tools they employ in teaching (Baran, 2014:19; Kaimara et al., 2018:2; Nikolopoudou & Gialamas, 2018:2837; Oliveira, 2018:4; Schaffhauser & Nagel, 2016:14; Smith et al., 2018:240). Smartphones can be used to access additional learning and teaching resources (such as worksheets, the internet, videos or online assessments) (Baran, 2014:23). Smartphones can be useful in situations where other learning-teaching resources, such as textbooks, are not readily available – as is unfortunately still the case in some South African schools (Du Toit, 2018:191; Ford & Batchelor, 2007:2). In addition, smartphones may be used to add to or complement inadequate or outdated textbook content, which was reported in the Consumer Studies textbooks currently available to teachers (Du Toit, 2018:194). Many of the pictures included in the available Consumer Studies textbooks are in black and white, lacking colour which would make the content more interesting to learners. Smartphones can be used to provide colourful images to contribute to learning enjoyment as well as understanding.

A few notable additional advantages of smartphones, indirectly related to the learning-teaching process, also emerged in the investigation and is briefly discussed in the next section.

1.3 Indirect positive contributions of smartphones to the learning-teaching process

As was mentioned in the previous section, many South African schools still face difficulties with access to LTSM, leaving teachers with a huge responsibility of filling the gap to support learning and teaching in their subjects (Booyse & Du Plessis, 2014:74; Du Toit, 2018:192; Ngwenya & Shange, 2019:3). Smartphones provide access to information and other resources via the internet

and application software, which teachers could use to fill this gap. Adding to the benefits is the fact that smartphones are **portable and take up little space** (Begum, 2011:110; Resnick, 2018) when, for example, compared to laptops or a stack of textbooks. Teachers could therefore have a world of knowledge and resources 'in their pocket' when they have a smartphone on hand. Especially in cases where learners do not have their own textbook to take home, which is still a problem in some South African Consumer Studies classrooms (Du Toit, 2018:192), having notes, images or recordings on a phone (which most learners have) would support learners in continued learning and homework outside the classroom environment.

It is reported that **access to education** is improved when using smartphones, without lowering the quality of the education (Jantjies & Joy, 2015:309; Mavhunga et al., 2016:81; Setiawan et al., 2015:209; Schaffhauser & Nagel, 2016:12; Valk et al., 2010:119). This is advantageous in a country such as South Africa, which comprises many secluded or rural communities, as it would give teachers and learners access to similar levels of quality education than what is available in the rest of the country, or even the world.

Smartphones are also being utilised to conduct **vision screening** in schools in some African countries such as Botswana (Andersen, Jeremiah & Thamane, 2019) and Kenya (Rono et al., 2018). This application helps to identify learners who need optometric or ophthalmic support, which can have a knock-on positive effect on enabling or improving their reading and learning capabilities once their vision needs have been addressed. Learners would benefit from this application when smartphones are used similarly in South African schools.

There are probably many more advantages of using smartphones in the learning-teaching process than what emerged from this initial explorative study, and at the rate of development of technology and software applications, the benefits for Consumer Studies learners and teachers are undoubtedly growing exponentially. However, a number of concerns or pitfalls linked to the use of smartphones also emerged from the investigation, and these are reported in the next section so as to provide a balanced view for Consumer Studies student teachers and practising teachers who want to utilise smartphones in their classes.

1.4 Concerns associated with learning and teaching with smartphones

It is reported that teachers are often faced with a difficult choice between wanting to use smartphones in learning-teaching contexts and the **policies** in place at schools to limit or obstruct learners' use of smartphones in class (Baran, 2014:25; Begum, 2011:112; Kamimara et al., 2014:4; Mupinga, 2017:70; Obringer & Coffey, 2007:41; Schaffhauser & Nagel, 2016:9; Smith et

al., 2018:248). It seems that the potential advantages of including smartphones in the learning-teaching process is still being eclipsed by policies denying learners the use thereof in schools. Mavhunga et al. (2016:74) report that, despite countless South African learners having smartphones, many schools' policies still ban the use of these devices in classrooms. Several of my Consumer Studies student teachers have also reported this problem, mentioning that they had planned interactive lessons that included the use of smartphones, but the schools where they were practising did not allow learners to use smartphones in class and consequently, the student teachers had to adapt their lessons to continue without the integration of the devices.

The limitation placed on learners using smartphones is almost certainly based (even if only partially) on an enduring perception that these devices are a **distraction**. Numerous authors in the reviewed literature (Begum, 2011:110; Diehl et al., 2016:138; Mavhunga et al., 2016:38; Nadelson et al., 2018:10; Pedro et al., 2018:10) reported similar negative perceptions. Distractions are blamed on non-educational functions and applications of the smartphones (Begum, 2011:109; Nadelson et al., 2018:10; Smith et al., 2018:241). One suggestion to limit learners' use of non-educational functions and keep them on task is to instruct them to keep their smartphones flat on their desks so that the teacher can see what is on the device screen at any time (Nadelson et al., 2018:10; Oliveira, 2018:72). Another way of curbing distractions is to give only one learner the responsibility of recording the image or process in the classroom and then having that learner share the recording with all the other Consumer Studies learners after class. Conversely, Sarhandi et al. (2017:109) found that learners using smartphones were less distracted than learners doing the same activity without smartphones. The distraction debate is therefore still open. What is resolved is that if learning is the goal, learners' use of smartphones have to be closely monitored in class to keep them on task and engaged in the intended learning (Nadelson et al., 2018:10; Oliveira, 2018:81; Sarhandi et al., 2017:104).

Linked to the distraction which smartphone usage could cause, is the **photo-taking-impairment effect**. Henkel (2013:396) describes how taking photographs or videos might impair the accuracy with which a person remembers what was photographed. She reported that the participants in her study remembered "fewer details about the objects they had photographed compared with objects they had observed" (Henkel, 2013:399). Tamir et al. (2018:162) found similar impairment when their participants used media (such as smartphones) to record or share their experiences with others. This impairment is caused by the distraction or divided attention created when a person tries to capture, adjust the focus of, or delineate an image (Henkel, 2013:399; Tamir et al., 2018:164), which narrows their attention to taking the image, rather than focussing on the actual item or process (Resnick, 2018). Since many people use captured images or recordings to

support their memory and reconstruct information (Resnick, 2018; Tamir et al., 2018:161), the distraction caused by taking or recording the image or process might impair or alter the memory. The potential negative impact that this might have when smartphones are used to take pictures or recordings as part of the learning process, is clear. To overcome the photo-taking-impairment effect when using smartphones in the learning-teaching process, it would be important to have learners first observe or pay focussed attention to the actual product or process, followed by a brief interval during which photographs or recordings may be taken.

More gravely, several studies report **teenage addiction to or dependence on** smartphones in cases where these devices are excessively used (Gezgin, 2018; Hartanto & Yang, 2016; Kim, 2017; Malloy, 2019:76; Nikolopoudou & Gialamas, 2018:2822), which has serious psychological consequences, including depression, anxiety, indolence, unsuitable sleeping patterns, and more (Gezgin, 2018:2; Hartanto & Yang, 2016:329). Since teachers do not have control over how much time learners spend on these devices outside their classrooms, it would be difficult to manage this aspect in Consumer Studies classrooms, but teachers could make their learners aware of abovementioned dangers in an effort to try to limit their occurrence.

Further concerns include that learners might use smartphones to **cheat** during tests or other formal assessments, or that they might use the devices for cyberbullying or sexting (Begum, 2011:109; Kaimara et al., 2014:3; Malloy, 2019:3; Mahvunga et al., 2016:78; Mupinga, 2017:73; Nadelson, 2018:10; Nikolopoulou, 2018:500; Obringer & Coffey, 2007:41; Oliveira, 2018:2; Pedro et al., 2018:12; Schaffhauser & Nagel, 2016:8; Smith et al., 2018:241; Van Broekhuizen, 2016:8). The need to monitor what learners are actually busy with when they are using their smartphones in class is therefore imperative and policies and controls have to be devised to protect all learners in the school.

Several concerns emerged on unsuitable mobile **infrastructure** that hampers the effectiveness of using smartphones. For example, UNESCO (2017:9) found that mobile networks were unreliable in several cases, and that operating systems and technical specifications varied greatly between different devices, complicating the learning-teaching process. Smith et al. (2018:239) as well as Valk et al. (2010:134) further mention that technical issues and poor infrastructure negatively impacts learning with smartphones. Begum (2011:110) reports that a simple issue, such as not being able to charge a phone with low battery power, will significantly hinder the learning process. In South Africa, where several schools still do not have electricity (Du Toit, 2018:70) and where the internet is not always accessible or reliable in all schools (Du Toit, 2018:189), such

inadequate infrastructure will also be a serious problem that will hinder effective utilisation of smartphones during lessons.

Learners not having equal access to smartphones is a concern of some teachers, which they believe can negatively impact the teaching potential of these devices (Nadelson et al., 2018:10). **Unequal access** to digital devices and technology (including, but not limited to, smartphones) is still a grim reality in schools across South Africa and especially in rural areas (Du Toit, 2018:189; Timmis & Muhuro, 2019:2), which definitely increases the digital divide, hinders the learning of many learners, and hampers those learners' transition to further education. This social issue will not be easily resolved but might be limited by having learners work in pairs or small groups where at least one learner has a smartphone.

Trying to keep up with the **rate of change** in technology is another concern. UNESCO (2017:9) reports that in their studies, "mobile technology changed so quickly that educational services developed for hardware that was relevant when a project began" were less relevant or even sometimes unsuitable at the end of the same project. Changes in the technology (hardware and software) of devices, as well as the development of new applications and knowledge, make it difficult to stay abreast of all these developments. Every year, I ask my Consumer Studies student teachers to investigate new applications available in the Google Play Store that might be relevant to our subject, and every year we are surprised by the number of new applications that might be useful. Sharing the exploring of potential teaching support media lightens the load a little. However, we still feel as if we are not keeping up with the changes.

Lastly, several studies report a concern that teachers and student teachers **lack sufficient support or training** to enable them to use smartphones effectively in teaching (Baran, 2014:17; Begum, 2011:110; Smith et al., 2018:239; UNESCO, 20179; Valk et al., 2010:134). It emerged that especially older teachers, or teachers trained before the proliferation of smartphones, lack the training and enthusiasm needed to try to include these devices in their teaching (Jones, 2018:27; Mavhunga et al., 2016:79; Van Broekhuizen, 2016:8). To enable such teachers to benefit to the fullest from the many advantages linked to technology-rich environments (including smartphones), they need to develop the skills and knowledge needed for such transformative teaching (USDE, 2017:5). Supporting these sentiments, it is recommended that professional development programmes for teachers (both qualified and in training) include a focus on and methods for utilising modern technologies (Jones, 2018:75; Nadelson et al., 2018:13). Similarly, continued training and professional development opportunities need to be developed for Consumer Studies teachers and student teachers. Such training would enable them to

increasingly include and implement new technologies in Consumer Studies to bridge the gap left by the scarcity of LTSM, making learning more enjoyable and effective for their learners and advancing teachers' own teaching praxis.

4 Conclusions and recommendations

Considering the findings of the current study, the scarcity of LTSM for Consumer Studies and a recent finding that newly qualified Home Economics teachers indicated that the ability to develop quality learning materials is one of their highest professional development needs (Lee, 2018:15), it can be concluded that smartphones definitely have many potential advantages and beneficial uses for Consumer Studies education. Despite the limitation of being literature-based, this study contributed insights into how smartphones can benefit learners and teachers as part of the learning and teaching of knowledge and skills in Consumer Studies and these findings should be explored in greater depth in subsequent investigations. For example, future research might focus on particular techniques to support Consumer Studies skills development using smartphones; might investigate how to overcome some of the challenges associated with smartphone usage, such as the photo-taking-impairment effect or unequal access of South African learners to such devices; or could develop training programmes to support teachers and learners in effectively utilising smartphones as part of the learning process in Consumer Studies. The preparation of teachers and student teachers for an ever-changing future continues to be critical and we need to do as much as we can to support them, such as providing additional LTSM which they can use in practice.

In line with the findings and conclusions of the current study, it is recommended that suitable training and professional development opportunities be developed for Consumer Studies teachers and student teachers to enable and support them in the effective utilisation of smartphones as LTSM in this subject. It is also recommended that such training or development opportunities include cognisance of not only the potential benefits, but also the pitfalls or concerns, that emerged from this investigation when smartphones are used in educational contexts. The development of training opportunities for utilising smartphones will help to address the recent recommendation made in the Report on the State of Education in South Africa (Equal Education Law Centre, 2019:33) that "there must be extensive investment in infrastructure and learning and teaching support material" […].

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