

ICT and Gamified Learning in Tourism Education
A Case of South African Secondary Schools

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Executive summary

Tourism is often introduced as a subject in formal education curricula because of the increasing and significant economic contribution of the tourism industry to the private and public sector. This is especially the case in emerging economies in Asia and Africa (Hsu, 2015; Mayaka & Akama, 2015; Cuffy et al., 2012). Tourism in South Africa – which is the geographical setting of this research – is recognised as a key economic sector with potential for continuous growth. With its supply chain crossing various sectors, tourism is considered one of the most important employment sectors in the country. Tourism growth in South Africa therefore demands a skilled and professional workforce. This implies that the local workforce should be aware of the nature and role of tourism, and should be able to evaluate its potential. Various strategies could be introduced to raise tourism awareness (Van Niekerk & Saayman, 2013); one of them is the introduction of tourism as a school subject. At secondary level, tourism has been widely introduced at schools throughout South Africa since 2000. Since the subject's inception, it has experienced significant growth in terms of the number of schools where it is taught, as well as the number of learners selecting it. Currently it is one of the most popular electives in high schools: up to 20% of all students select the subject (Allais, 2014). Despite this, there is limited academic research on tourism education in South African high schools. According to Chili (2013:34), there is a “total disquiet with a particular literature in South African tourism education in schools. [...] it's so scarce that it's an area for concern [...]”

Furthermore, coupled with the widespread impact of the South African tourism industry, information and communication technology (ICT) has rapidly penetrated public and private sectors of the country. ICT affords novel opportunities for social and economic development, and this has especially been observed in the fields of both tourism and education (Anwar et al., 2014; Vandeyar, 2015). Yet, the many uses and implications of ICT for tourism education in South Africa are unclear and under-theorised as a research area (Adukaite, Van Zyl, & Cantoni, 2016). Currently there are no studies on ICT usage for tourism education in South African high schools.

Moreover, *engagement* has been identified as a significant indicator of student success in South Africa (Council for Higher Education, 2010). Lack of engagement contributes to poor graduation rates at secondary and tertiary institutions in South Africa (Strydom et al., 2010; Titus & Ng'ambi, 2014). Conversely, increased engagement can help mitigate apathy for a specific subject and even improve academic performance (Fitzgerald, 2012). A common strategy to address lack of student engagement is introducing game elements into the learning process: the so-called gamification of learning (Kapp, 2012). The literature review of gamification studies in educational settings provided an overview of the usage of different game mechanics. However, the majority of studies on gamification

are conducted in the higher education context, and generally with information technology and computer science students. Studies in different application fields such as high schools or related to other disciplines such as mathematics and science, are emerging but are in infancy. The researcher was not able to identify a study of gamification in the area of tourism education. Moreover, considering the geographical areas where gamification studies are conducted, North America and Europe tend to feature more. There are few studies in developing and emerging country contexts. As argued by Titus and Ng'ambi (2014:743), "To date, there is paucity of evidence within South African education system with regards to games and its impact on student engagement".

This study aims to contribute in this respect: firstly, by investigating the extent to which ICT supports tourism education in South African high schools. Secondly, the study aims to examine gamified learning acceptance within tourism education in a developing country context (i.e. South Africa), specifically at a secondary level. This study has the following research objectives:

1. Determine the extent to which ICT supports tourism education in South African high schools.
2. Identify the barriers for ICT integration in tourism education.
3. Assess students' user experiences in terms of engagement with a gamified application.
4. Identify factors that influence tourism teachers' behavioural intention to accept a gamified learning application.

This research assimilates three separate studies addressing the above aims and objectives:

Study 1. The Role of Digital Technology in Tourism Education: A Case Study of South African Secondary Schools

A qualitative study was undertaken to determine the extent that ICT supports tourism education in South African high schools. The study was designed as an exploratory analysis, based on 24 in-depth interviews with high school tourism teachers (n=19), as well as tourism subject planners and advisors at the governmental level (n=5). Furthermore, the main barriers of ICT integration for tourism education in South African high schools were identified.

Study 2. Raising Awareness and Promoting Informal Learning on World Heritage in Southern Africa. The Case of WHACY, a Gamified ICT-enhanced Tool

The goal of the study was to describe the *World Heritage Awareness Campaign for Youth (WHACY) in SADC*. This is a campaign dedicated to raise awareness and foster informal learning among Southern African youth about the heritage in their region as well as the value of sustainable tourism and the importance of ICT. For the evaluation of the campaign, a mixed methods approach was used: focus groups with students (n=9), interviews (n=19) and a survey with teachers (n=209). The study attempted to assess user experience in terms of engagement and conduciveness to learning. The study also explored the possibility of a gamified application to be integrated into the existing high school tourism curriculum. The perspectives of South African tourism students and teachers were here considered.

Study 3. Teacher perceptions on the use of digital gamified learning in tourism education: The case of South African secondary schools.

The study is quantitative in nature and investigated the behavioural intention of South African tourism teachers to integrate a gamified application within secondary tourism education. Data collected from 209 teachers were tested against the research model using a structural equation modelling approach. The study investigated the extent to which six determined predictors (perceptions about playfulness, curriculum relatedness, learning opportunities, challenge, self-efficacy and computer anxiety) influence the acceptance of a gamified application by South African tourism teachers.

The following sections present the research context, with specific focus on tourism education as well as ICT integration in the South African education system. The author conducts a literature review and discusses the underlying theoretical frameworks related to gamification and learning, as well as gamified learning acceptance within formal education. Following this, the three studies are reported in detail. Finally, conclusions are drawn.

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Acronyms

CAPS	Curriculum Assessment Policy Statement
DBE	South African Department of Basic Education
GDP	Gross Domestic Product
ICT	Information and Communication Technology
ITU	International Telecommunication Union
OBE	Outcomes-based Education
SADC	South African Development Community
TAM	Technology Acceptance Model
UNESCO	United Nations Educational, Scientific and Cultural Organization
VRF	Visiting Friends and Relatives
WHACY	World Heritage Awareness Campaign for Youth
WHS	World Heritage Site
WTTC	World Travel and Tourism Council

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1 Geo-political and socio-economic context: South Africa

The empirical part of the research was conducted in the Republic of South Africa, which is considered an emerging and developing economy (UNDP, 2015; IMF, 2015) located in the southernmost part of the African continent. According to Statistics South Africa (Stats SA (a), 2015), the country has almost 55 million inhabitants across nine provinces. From 1948 until 1994, South Africa was under ‘apartheid’: a system of racial segregation, ruled by a white minority. Following the abolishment of apartheid, multiparty democracy was established in the country in 1994. A new constitution was instituted in 1997, and it protects equality, freedom of expression and association, addresses the right to property, housing, health care, education, access to information, and access to courts (Constitution of the Republic of South Africa, 1997).

South Africa is a multi-ethnic society with 11 official languages and a diversity of cultural groups and religions. The most spoken languages are isiZulu (22,7%), followed by isiXhosa (16%), Afrikaans (13,5%) and English (9,6%) (Stats SA, 2012). The majority of South Africans are multilingual and speak English, which is the lingua franca.

The country has nine provinces that vary considerably in geographic size and socio-economic development. Since the dawn of democracy, the country’s urbanized provinces (e.g. Gauteng and Western Cape) have experienced remarkable growth in population. The smallest (1.5% of total area) but the most populated (24% of total population) province is Gauteng, with its capital Johannesburg (Stats SA, 2012).

South Africa’s economy was initially rooted in primary sectors and developed because of rich natural resources and favourable conditions for agriculture. However, since the 1990s, the country’s economic growth is driven mainly by the tertiary sector such as communication, tourism and retail trade. Currently, the key sectors contributing to the country’s GDP include financial services, manufacturing, mining, communication, and tourism (Stats SA (b), 2015). Despite being an emerging economy, South Africa suffers from high unemployment – 25,5% (Stats SA (c), 2015), increasing public debt, income inequality, high crime rates, unreliable electricity access, low levels of education, and political mismanagement (Herbst & Mills, 2015).

1.1 ICT penetration

The National Development Plan (NDP) 2030 of South Africa acknowledges that Information Communication Technology (ICT) is a vehicle of economic growth and poverty reduction (National Planning Commission, 2011).

According to recent data from the International Communication Union (ITU, 2013), among 52 million South Africans, 49% used the internet in 2013. However, only 3% of households had fixed-broadband subscriptions. The provincial governments of Gauteng and the Western Cape, with the major metropolitan areas of Johannesburg and Cape Town, have instituted broadband plans and are actively developing metropolitan networks and e-services. However, smaller towns and rural areas lack sufficient broadband access.

80% of internet users in South Africa access it only through their mobile phones through pre-paid data packages. Mobile technology continues to experience tremendous progress in the country due to rapid expansion of pre-paid telephony. In 2013, mobile subscriptions were as high as 147.5% (ITU, 2013). The penetration is so high due to the tendency to own multiple SIM cards and devices. South Africa has a higher subscription rate than the rest of Africa, the US and the world on average (Figure 1). The rapid penetration of mobile technology has positively contributed to social and economic development in South Africa. Beneficial impacts are observed in the areas of health and safety, and access to education and financial services, especially concerning the previously disadvantaged population (Gabriels & Horn, 2014).

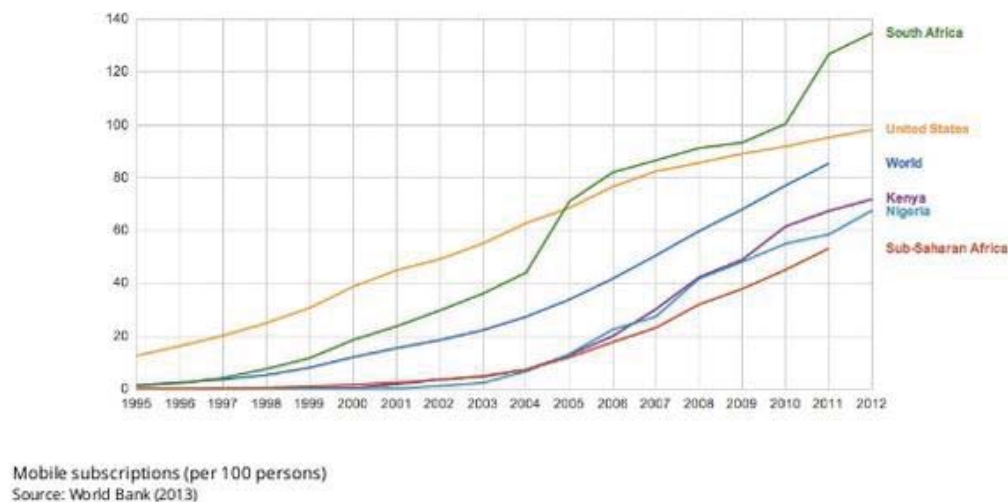


Figure 1. Mobile subscription rates in South Africa

However, other type of ICTs, especially services that require broadband infrastructure, did not experience significant uptake over the past decade (Gabriels & Horn, 2014).

According to the Global Web Index (2014), social media is among the most popular activities of mobile internet users in South Africa. The most popular activities related to mobile internet usage are social media applications (29%), watching videos (23%), mobile banking (21%), location-based search (16%) and games (14%) (ibid.).

According to World Wide Worx (2015), the most popular social media platform in South Africa is Facebook with 11.8 million active users (22% penetration). 8,8 million of these users access the network on their mobile phones. The highest penetration of Facebook is within the three economic hubs: Johannesburg (55%), Pretoria (49%) and Cape Town (44%). The second most popular social media platform is YouTube with 7.2 million active users, followed by Instagram (6.6 million), and LinkedIn (3.8 million). Mxit – a once popular South African social network – is experiencing a decrease in users: from 6,5 million in 2013 to 4,9 million in 2014. However, Mxit has the most engaged user-base of all social networks in South Africa. On average, a user signs in 5 times a day and spends around 105 minutes on the network (World Wide Worx, 2015).

1.2 Tourism industry

Following the institution of democracy in South Africa, tourism was officially recognised as an economic opportunity for the country. This was because it offered great potential for growth, employment generation (especially for previously disadvantaged communities), entrepreneurial opportunities, development for rural areas, and was considered a force for national and international cultural exchange and peace (Tourism White Paper, 1996). Moreover, tourism as export sector is less volatile than the commodity sector and its promotion was recognised by the South African government as a way to diversify the economy and sustain the long-term development of the country (ibid.).

According to the World Travel and Tourism Council (WTTC, 2013), the impact of the travel and tourism industries on GDP between 1990 and 2013 increased by 200%, while the overall economy expanded by 74%, positioning tourism among the fastest growing industries in the country (Figure 2).

South Africa GDP Growth by Sector (1990=100)

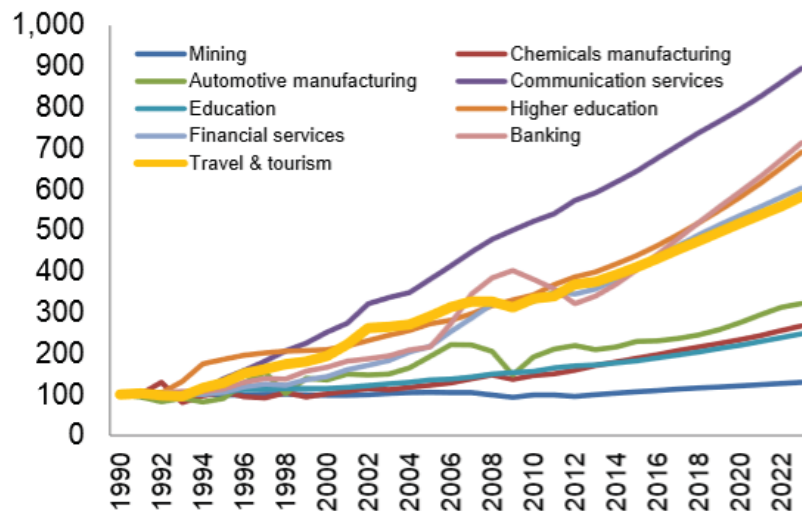


Figure 2: South Africa DGP growth by sector (1990-2022)

Moreover, tourism is an important source of export revenue for the country. In 2013, it accounted for USD11.9 billion, which is 72% of all service exports and 10% of all goods and services exports (Figure 3; WTTC, 2013). Furthermore, the growth of tourism exports between 2000 and 2013 is also significant. During this period, it increased by 272% and outpaced total exports of services and goods, which demonstrated 211% growth for the same period (ibid.)

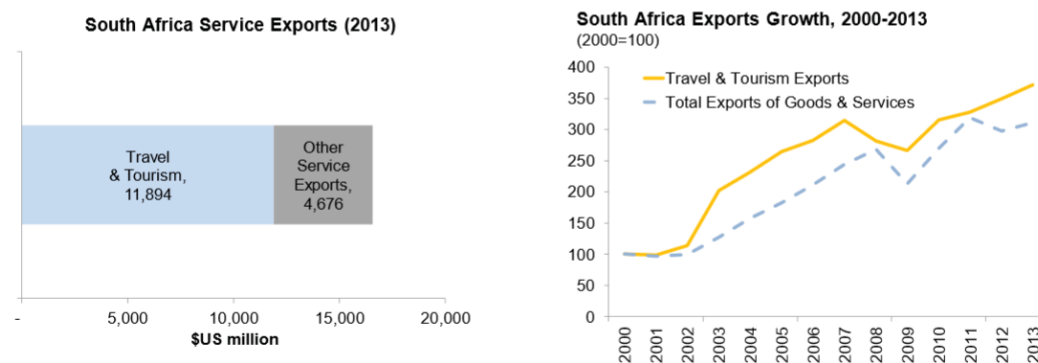


Figure 3: South Africa exports and tourism

According to WTTC (2015), the total contribution of travel and tourism to South Africa's GDP in 2014 was 9.4%, and it is estimated to grow up to 10.4% by 2025. Moreover, travel and tourism in the country accounts for 9.9% of total employment (1,497,500 jobs) and it is expected to grow up to 11.5% by 2025 (WTTC, 2015).

According to the South African Department of Tourism, the country welcomed a record number of foreign tourists in 2013 (10 million visitors): a 4.7% increase compared to the previous year. South Africa reported a much higher tourist arrival growth (7.4%) compared to the global average (4.5%) for the period between 2011 and 2013 (South African Tourism, 2014).

South African touristic offer

Various features of South Africa make it an attractive tourism destination: diverse cultural groups, accessible wildlife, pleasant climate, varied and unspoiled scenery, developed infrastructure, and a vast range of special interest activities such as whale-watching, bird watching, diving, surfing, hiking, and hunting (Tourism White Paper, 1996). Furthermore, metropolitan cities such as Cape Town, Johannesburg and Durban are investing in conference and exhibition facilities in order to attract business related conferences and business travellers.

The geographical focus of this research was on three provinces in the country:

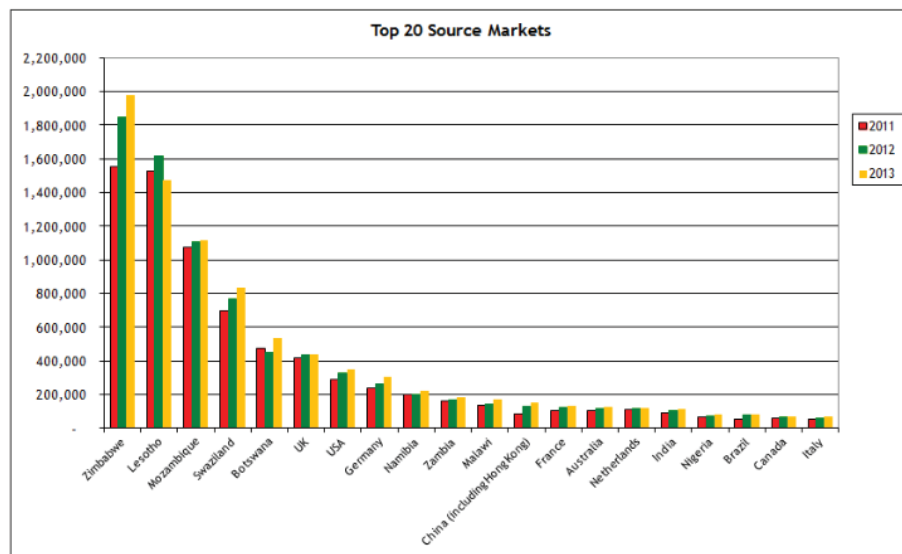
1. *Gauteng*, which is the province with the biggest share of foreign tourists – 41.6% (South African Tourism, 2014). It is the main business hub in the country and one of the most important business gateways on the African continent. Thus, it is an important destination for business travellers. Touristic attractions in Gauteng include the Apartheid museum; Soweto – the biggest informal settlement in the country, which played an important role in anti-apartheid movement and where President Nelson Mandela lived; and the Cradle of Human Kind – an archaeological site where human fossils are found dating back some 3.3 million years, which is also recognised as a UNESCO Cultural World Heritage Site (WHS) (Gauteng Tourism Authority, 2016).
2. *Western Cape* is the second most-visited province in the country (16.3% of total international arrivals) (South African Tourism, 2014). The Western Cape Province is located in the south-western part of the country. Two thirds of the province's population (5.8m) live in the metropolitan area of Cape Town, which is also the capital of the province. The province is a popular touristic destination because of the iconic Table Mountain, which in 2011 was recognised as one of the new seven natural wonders. Table Mountain is surrounded by a national park with extraordinarily high diversity and density of plants and flowers, recognised by UNESCO as Natural World Heritage Site. Another UNESCO WHS and popular

tourist attraction is Robben Island, which served as a prison for anti-apartheid activists. The province also boasts many vineyards and wineries, which attract gastronomy enthusiasts (Tourism, Trade & Investment Promotion Agency for Cape Town & Western Cape, 2016).

3. *Eastern Cape*, one of the poorest provinces in the country due to its impoverished former homelands (territories set aside for black people during apartheid) where subsistence agriculture dominated. The province attracts 3.4% of international arrivals and 8% of domestic trips (South African Tourism, 2014). However, the province possesses rich touristic potential and the tourism industry is considered as the major driver for the province's economic development. The province has 800 km of pristine coastline along the Indian Ocean. It also has the only ski resort in South Africa in the Drakensberg Mountains, which is also a UNESCO Natural World Heritage Site. Moreover, the province is the birthplace of Nelson Mandela and hosts the biggest cultural festival in the country, the Grahamstown Festival. Furthermore, it is an entirely malaria free province, and hosts "the Big 7" (African lion, African elephant, Cape buffalo, African leopard, and White/Black rhinoceros, whales and great white sharks) in its natural parks and habitats (Eastern Cape Parks & Tourism Agency, 2016).

International tourism

Regarding tourist arrivals, neighbouring Southern African Development Community (SADC) countries are a major source of arrivals with Zimbabwe being the biggest, followed by Lesotho. The other main sources outside the African continent are the UK, USA and Germany (Figure 4, South African Tourism, 2014).



Source: Tourism & Migration releases, Statistics SA

2013 Annual Tourism Performance Report_v8_01102014
Strategic Research Unit, September 2014

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Figure 4: Source markets of tourist arrivals to South Africa

According to South African tourism statistics (2014), tourists primarily visit the country for leisure purposes (64% of total), which include visiting friends and relatives (VFR), holidays, shopping and other. Almost 26% come for business reasons and the remaining visit for religious, medical and other purposes (Figure 5).

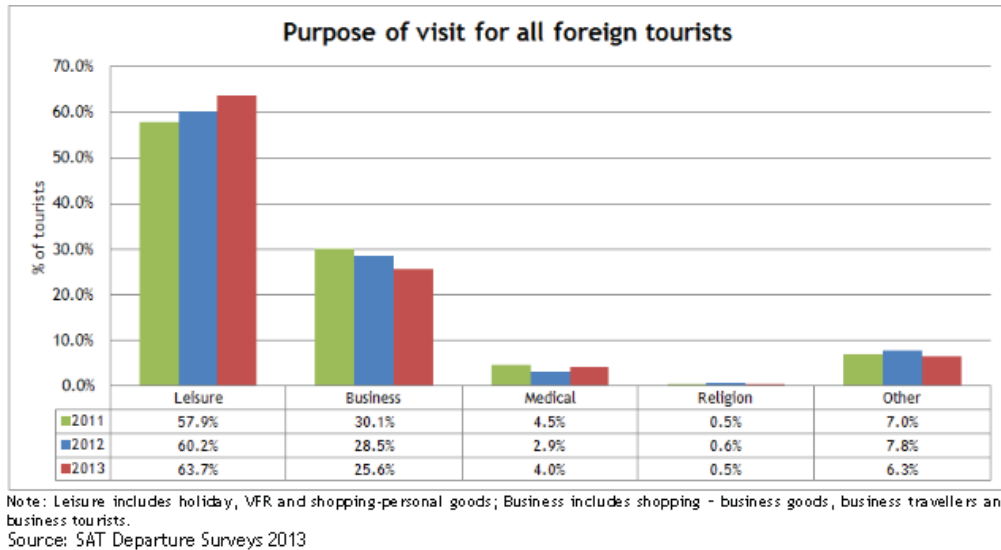


Figure 5: Purpose of visit for foreign tourists in South Africa

The most popular activities of foreign tourists while in South Africa include shopping, nightlife, social activities as well as visiting natural and cultural heritage sites (Figure 6).

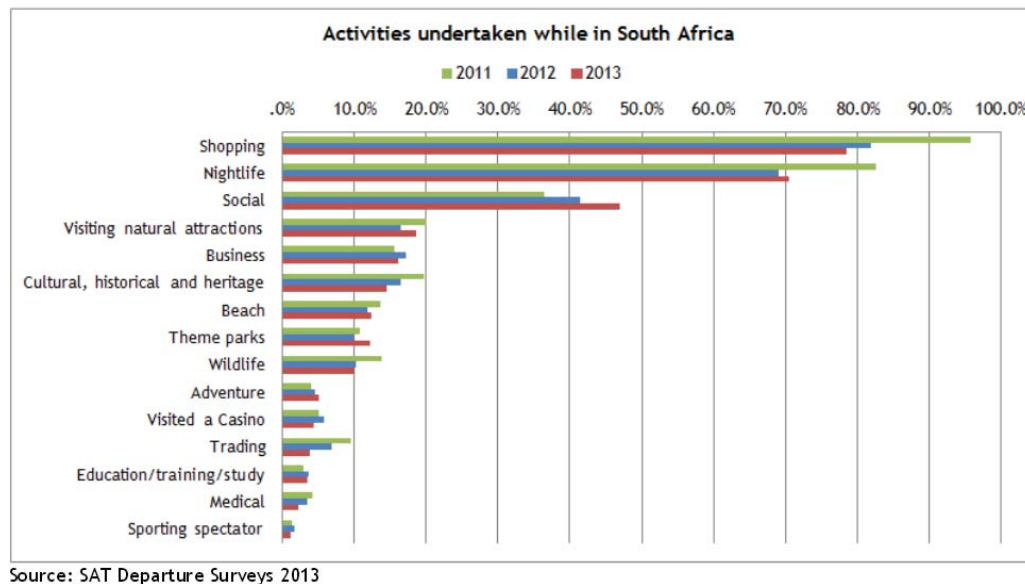


Figure 6: Most popular activities by foreign travellers in South Africa

Domestic tourism

According to the latest available data (South African Tourism, 2014), there were 25.2 million domestic trips taken by 12 million domestic travellers in South Africa in 2013. Visiting friends and relatives is the most common reason for domestic travelling (70.2% out of all trips were taken for VFR reasons). The peak times of domestic travelling are during the school/university holidays. The most popular destinations for domestic tourism are KwaZulu-Natal province (27% total market share), Limpopo (20%) and Gauteng (16%). Interestingly, 90% of trips taken by KwaZulu-Natal travellers are taken within the province itself. Conversely, 76% of Gauteng travellers visit other provinces. The most popular activity undertaken during domestic trips is shopping (77%), following by socialising with friends and relatives (40%), visiting the beach (9%), visits to natural attractions (9%) and partaking in cultural activities (3%) (Figure 7).

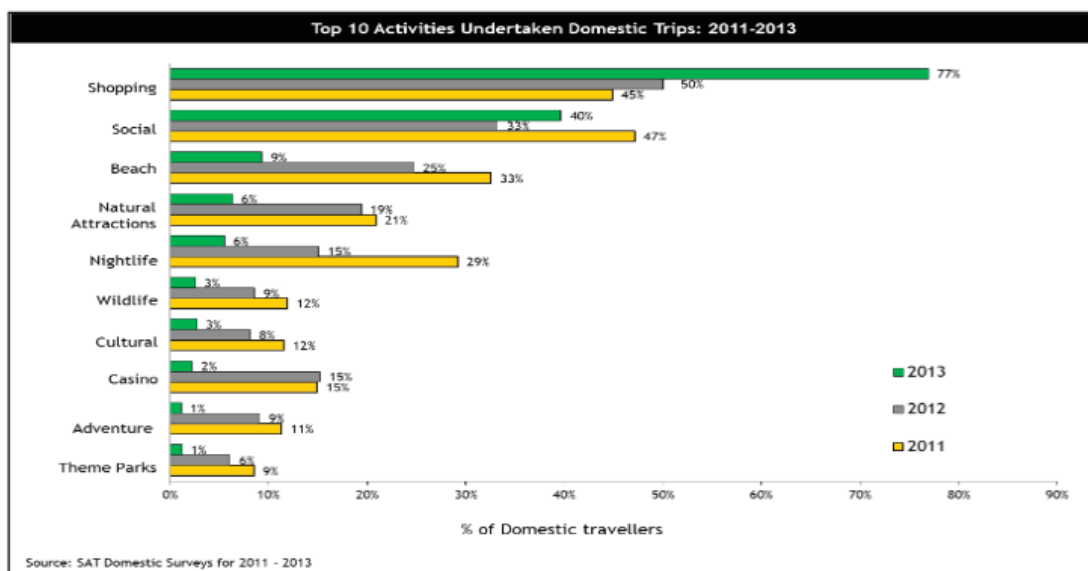


Figure 7: Most popular activities of domestic travellers in South Africa

Domestic tourism in the country is experiencing a slight decrease since 2009. The main identified obstacle for domestic travelling is a lack of financial resources: 38% of the population identified affordability as the main barrier for travelling (ibid.).

In summation, the tourism sector with its diverse supply chain is considered a priority area in South Africa's social and economic development. However, in its Tourism White Paper (1996:V.), the national government recognised a key constraint to tourism being the "absence of adequate tourism education, training and awareness". Thus, it is recognised

that creating awareness among South African citizens is crucial in order to mobilise them in strengthening the industry as well as in promoting domestic tourism. Various strategies can be employed to raise tourism awareness in the country (Van Niekerk & Saayman, 2013); one of them is introducing tourism as a secondary school subject, which has been done in South Africa. The following chapters will provide insights on the South African education system and the introduction of tourism as a subject.

2 Education in South Africa

Since the institution of democracy in South Africa in 1994, various sectors and especially education have undergone significant transformations. Curriculum frameworks and teacher development programmes faced major changes in the country as the new education system set out to provide equal access to education (Mouton et al., 2012). Until 1994, the education system in South Africa was based on ethnic identity; different racial groups were subject to separate education policies and educational facilities. The black majority received inferior access to qualified teachers, textbooks, funding, and facilities. Following the abolition of apartheid and the introduction of a democratic constitution, segregated education was made unconstitutional and was restructured.

In 1997, then National Department of Education (DoE) announced a new and ambitious curriculum, based on the principals of outcomes-based education (OBE). Pedagogical and content approaches were strongly oriented toward *outcome* (observable change in learners), which was promulgated as a learner-centred approach. Teachers were given great autonomy and flexibility to plan lessons to suit the individual needs of the students. Teachers were regarded as “facilitators” by recognising learners’ existing knowledge, values and needs, and adapting learning and teaching strategies accordingly. However, this approach was problematic because many teachers were trained to teach a very prescriptive curriculum, and were not knowledgeable in outcomes-based education (Fiske & Ladd, 2004; Jansen, 1999). The new curriculum was expected to be among the most progressive in the world and would help alleviate poverty and unemployment, and contribute to South Africa’s reconstruction (Janks, 2014). However, in 2006, it was clear that the outcomes-based “experiment” had failed and that a new curriculum was needed. Christie (1999) argued that OBE implementation was poorly planned and executed; the language was ambitious and challenging to understand for ordinary teachers. Coleman et al. (2003) state that the environment for such a curriculum in South Africa was not conducive and that the conditions of teaching and learning in the majority of national schools were not adequately considered. OBE implementation was generally met with resistance because of these challenges (Botha, 2002). Curriculum amendments followed in 2006 and again in 2011.

2.1 Current education system

Currently there are two national bodies responsible for governing education and training in the country: (i) the Department of Basic Education (DBE), which is responsible for primary and secondary schools; and (ii) The Department of Higher Education and Training, which is responsible for tertiary education and vocational training. Moreover, all nine provinces have their own educational departments with responsibilities of implementing national policies at provincial level. In 2013, there were 30’027 established public (93%), independent/private schools (4%), early childhood development and special

schools (3%), with more than 447'000 educators and more than 12 million learners in the overall system (Department of Basic Education, 2015).

Schooling is compulsory up to grade 9. Students who successfully complete 9th grade can obtain a General Education and Training Certificate and either further their education (e.g., grades 10-12) or pursue employment. From grade 10 onwards, students must take 7 subjects, 4 of which are compulsory: English, a second national language, Mathematics and Life Orientation; the remaining 3 subjects are selected from 27 electives, such as Art, Accounting, Computer Technology, Economics, Tourism and others. Students who continue to 12th grade have to sit the national matriculation exam.

Spaull (2013) argues that even though South Africa's segregated regime ended more than two decades ago and accessibility to basic education (up to 9th grade) has reached almost 100%, the country still has a dual education system: there are still dramatic differences between rich and poor schools. The apartheid regime has left a legacy of an unequal system (Janks, 2014; Spaull, 2015): where previously the disparity in schooling was based on race, currently it is based on capital. This means poor schooling quality for children from poor communities and rural areas, and exclusive elite education for children from affluent backgrounds. According to Janks (2014), the current system fails to meet the challenges posed by globalisation. The system does not adequately prepare students for dynamic and unpredictable work environments that require broad general knowledge, deep specialised knowledge and the ability to think critically and creatively. In his publication *"Education in SA: A tale of two systems"*, Spaull (2012) states that around 75% of South African schools are dysfunctional. The reasons for this are various and complex, and include inadequate infrastructure, limited teacher skills and pedagogic knowledge, "trial and error curriculum reform", issues with schools leadership, low work ethic, strong unions, short term planning and misappropriation of funds and corruption (Janks, 2014; Chigona et al., 2012). In response to these constraints, the South African government has made an effort to harness the potential of digital technologies.

2.2 ICT in education

South Africa's efforts to provide education for all have been coupled with the use and adoption of digital technology at all levels of the education system. The implementation of technology has strongly permeated national discourses and approaches around learning and teaching. Stakeholders – managers, teachers, learners, and administrators – are widely encouraged to use and adopt information and communication technology to enhance educational practice and improve learning (DoE, 2004). These directives are strongly "embedded in the broader pragmatism of ICT for development (ICT4D), in which digital technologies support social and economic priorities" (Van Zyl, 2013:ii).

In their recent report "Digital services for Education in Africa", the Agence Française de Développement, the Agence Universitaire de la Francophonie, Orange and UNESCO

(2015) present a global historical overview of the use of media and technology for education. During the 1960s and 1970s, the international community of educators showed increased interest in radio and television for teaching, and this contributed to the provision of mass education in Africa. Between 1990 and 2000, numerous initiatives aimed at equipping schools with computer hardware and establishing computer labs. This was followed by the trend of providing each individual learner with IT devices, promoting the personalisation of computer technology (e.g. the One Laptop per Child Project). Recently, due to the prevalence of mobile technology on the continent, there has been an increased interest in mobile learning for education (mLearning). As illustrated in Figure 8, mobile devices (laptops, mobile phones, tablets) cross the boundaries of time and space and erase the distinction between formal and informal learning: a mobile device (e.g. tablet) acquired with public funds and used within a school setting can easily enter a student's home. Similarly, a student or teacher's personal mobile device can and is being used within the school environment (AFD, AUF, UNESCO & Orange, 2015)

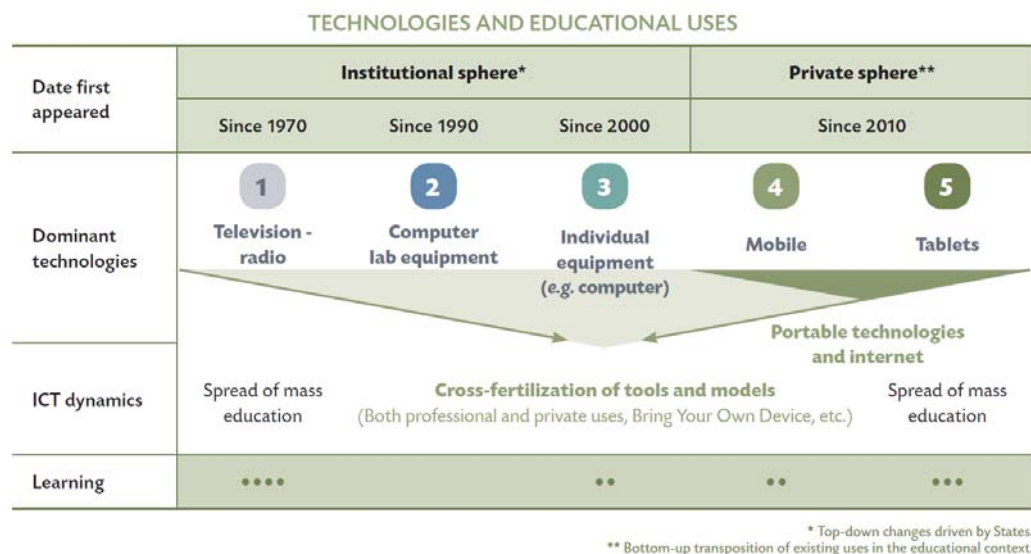


Figure 8: Technologies for Education in Africa

The notion of technology-enhanced education gained momentum in South African national policies. In 2004, then National Department of Education released the White Paper on e-Education and in 2007, the Guidelines for Teacher Training and Professional Development in ICT. The goals of these policies are to develop educators, learners and managers who are ICT capable. Furthermore, because South Africa suffers from a shortage of qualified teachers at all levels of the system, ICT provides opportunities for improving teachers' skills and knowledge. Moreover, ICT can be harnessed for combating

demotivation of the students, which often leads to high dropout levels (Strydom et al., 2010).

The recognised potential of ICT to enhance curriculum delivery has led to an increase of government and donor funded initiatives to equip disadvantaged communities with ICT, especially addressing ICT accessibility within disadvantaged schools (Chigona et al., 2010; Cantrell & Visser, 2011). A range of technology initiatives have since been implemented at primary, secondary and tertiary levels across the country. These have notably included the Khanya Project, initiated in the Western Cape Province in 2001, that aimed to install computer laboratories at all primary schools in the province within a decade. Through this initiative, around 1'500 computer laboratories have been installed across the province with more than 50'000 computers granting access to nearly 1 million learners and 30'000 educators (Chigona et al., 2012). A more recent initiative was launched in Gauteng in July 2015 called 'the paperless classroom': the provincial Department of Education set out to equip around 400 schools (mainly in disadvantaged communities) with interactive whiteboards, laptops, internet connectivity and tablets for grade 12 students. The Department plans to distribute 17'000 tablets in total (Gauteng Education Department, 2015).

Mobile learning has also been identified as having the potential to complement and improve formal schooling and make learning more accessible, flexible and equitable in South Africa. mLearning can unfold in various ways: accessing educational resources, creating and sharing content, connecting with others, and the like (Traxler, 2013). There are various initiatives in this area in South Africa, one of which is Dr. Math. South African high school students fare exceptionally poorly on the subject of mathematics. Thus, the "Dr. Math" was launched in 2007 as a mobile learning project. Dr. Math provides free assistance for mathematics homework through mobile phones. Dr. Math uses mobile phones text messaging technology via the free application, MXit (popular social media platform in South Africa) to help primary and secondary school students with their math homework (Botha & Butgereit, 2013). The project is managed by volunteers – mathematics tutors – who are primarily South African University students. According to TNS Global (2013), there are around 32'000 users of Dr Math in South Africa¹. However, the program does have some drawbacks: it does not support graphical functionalities; thus, geometry and graph related questions can only be addressed in a textual format.

Results of the Pan African Research Agenda (2008-2011) reported that ICT policies are poorly implemented especially in previously disadvantaged schools. These schools were expected to be the main beneficiaries of such policies. Initially, digital technology was mainly used for administrative tasks (Chigona et al., 2010; Obijiofor, 2009). However,

¹ http://www.slideshare.net/OnDevice/south-africa-mobile-consumer-trends/28-Dr_MathDr_Math_launched_in2007

with the continuous penetration and advancement of technology, ICT usage is shifting toward interactive instructional platforms and tools. It is recognised that modern technology has the potential to create authentic and innovative learning experiences for students. This, in turn, poses a challenge for educators. They are under constant pressure to learn new approaches and tools, and to become confident with their integration into educational practice. Sole physical access to technology is not sufficient to influence integration for teaching purposes or to increase student engagement (UNESCO, 2015; Weston & Bain, 2010). Jaffer et al. (2007) argue that contextualised education needs have to drive ICT interventions instead of technology itself. Despite the opportunities of ICT to strengthen education and to address previous inequalities, the many purported benefits of ICTs have not been effectively realised (Cantrell & Visser, 2011). Teachers are mainly using ICT to transmit or “dump” content rather than enhancing teaching and learning experiences (Walls et al., 2015).

2.3 Challenges for ICT integration

There are several obstacles to the effective integration of ICT in education (Jaffer et al., 2007; Cantrell & Visser, 2011; Hennessy et al., 2010; Gudmundsdottir, 2010; Howie & Blignaut, 2009; Vandeyar, 2013, 2015; Walls et al., 2015; Adu & Galloway, 2015). General challenges in the South African context include the constant pressure to address inequality and to meet social transformation and skills needs for a democratic South Africa. There is also pressure to improve on delivery, performance and throughput, and to maintain demographic representation. The reasons for inefficient ICT integration in South African schools are today well recognised, although, have increased in complexity over time. Vandeyar (2013, 2015) describes some of the significant issues that continue to influence the integration of ICT into teaching and learning practice. Some of the critical issues are at a systemic level, including matters of access, policy guidelines, policy overload, support, national curricula, and teacher training. Other critical issues are at meso-micro level such as school leadership, institutional culture, teacher competence, teacher professionalism and teacher pedagogy (2013:249).

These obstacles may be either context related (e.g., socio-economic circumstances), individual (e.g., teachers’ self-efficacy with ICT), or institutional (e.g., organisational culture).

Individual factors

The willingness to integrate ICT into teaching practices depend on the individual level of teachers and on factors such as age, skills and experience (Cox & Marshall, 2007) or fear to adopt new practices. One of the primary factors inhibiting ICT integration is a lack of skills and diminished self-confidence of teachers’. Researchers have highlighted the direct link between teachers’ self-efficacy and their actual adoption of ICT (Fanni et al., 2013). However, other factors also inhibit positive attitudes toward technology such as technology anxiety, which may be caused by a lack of training and expertise.

Infrastructure and large classes

Although the individual role of teachers in adopting technology is significant, not all determinants influencing this process exist at the teacher level. The teacher is always embedded in a broader context, that is, a specific school with specific organisational characteristics as well as a wider socio-cultural community with different socio-economic characteristics.

Infrastructural factors often influence ICT integration, including physical space, device functionality, electricity, and internet connectivity (Cantrell & Visser, 2011; Obijiofor, 2009). Schools that are more affluent may possess the necessary infrastructure. However, the situation is often not the same in previously disadvantaged settings, especially in rural areas. Even in cases where schools have computer lab facilities available, the student-computer ratio is challenging to manage because of exceptionally large classes (up to 50-60 students in township schools) (Jaffer et al., 2007).

Socio-economic context

The socio-economic contexts of teachers and learners can also influence ICT usage for teaching and learning purposes. In settings that are more affluent, students and educators might have access to computer and internet connections at home, which may increase their confidence to use technology in the school environment (Muller et al., 2007). Conversely, the propensity to use ICT in disadvantaged areas may be lower due to lacking resources at home (Chigona et al., 2012; Cantrell & Visser, 2011).

Institutional management

Organisational vision and culture also play a significant role in the adoption of ICT (Czerniewicz & Brown, 2009). Pedagogical assistance and supportive leadership might lead to increased and more effective usage of ICT for administrative and pedagogical tasks (Howie & Blignaut, 2009). Secondly, supportive leadership and technical assistance to teachers have the potential to encourage teachers to integrate ICT largely for pedagogical and administrative purposes (Cantrell & Visser, 2011; Czerniewicz & Brown, 2009).

Multilingualism

Language and academic success are closely related. The first three grades in the South African education system are taught in mother tongue; from grade 4 onwards, learners are generally instructed in English or Afrikaans. Research on language as medium of instruction in South Africa indicates that there is a strong relationship between the learning process of students and their home language (Brock-Utne et al., 2006). This ultimately contributes to academic performance and success. There has historically been a lack of learning material in all official languages, and lack of training in addressing complex linguistic identities in education (Gudmundsdottir, 2010). Gudmundsdottir (2010) illustrated that English is the predominant medium of instruction in many educational

settings and this especially pertains to ICT platforms and interfaces. Students who were not native speakers of English found it more challenging to use ICT in these cases.

2.4 “Vocationalising” the secondary education curriculum

The outcomes-based curriculum of 1997 introduced new vocational subjects at grades 10-12 such as Tourism, Hospitality, Business studies, Agriculture, Informational Technology, and Engineering. Because post-apartheid South Africa experienced a lack of skilled human resources and faced high unemployment rates, “vocationalising” the high school curriculum was expected to serve as a strategy to address those issues (Allais, 2012; Chili, 2013).

Tourism is often introduced within formal education curricula because of the increasing and significant economic contribution of the tourism industry to private and public sectors, and this is especially the case in emerging economies in Asia and Africa (Hsu, 2015; Mayaka & Amaka, 2015). The introduction of tourism education also intended to address historical imbalances among South Africans by encouraging students to make informed career choices, identify entrepreneurial opportunities within the tourism industry, become responsible tourist-consumers, and to get involved in community development programs related to tourism. Furthermore, it was hoped that the introduction of tourism education would instil national pride by developing an appreciation of national heritage and cultural diversity (Umalusi, 2014).

Tourism in South Africa is recognised as a sector with great potential for job creation. The tourism curriculum aims to help learners start a career in tourism after high school, or to help learners continue with further education at tertiary level. Furthermore, raising awareness about tourism among the South African population was expected to stimulate domestic as well as international tourism markets. This was because awareness would be created among both students and their parents, the latter of which play a major role in the travel decision-making process (Van Niekerk & Saayman, 2013).

As argued by Chili (2014), tourism was perceived as a lost opportunity by policy makers to expand the local economy. As a result, the inclusion of the subject into the high school system was rushed and various challenges were overlooked.

2.5 Introduction of Tourism as a subject

Tourism as a secondary level subject was introduced in South Africa in 1994, funded by the American Express Foundation of New York. The initial goals of the subject were to familiarise students with the tourism phenomenon, and to trigger curiosity and interest in the field (Umalusi, 2014). The program was launched having in mind learners from disadvantaged backgrounds, who have never been exposed to travel and tourism before. The first Travel and Tourism curriculum was conceived by a non-governmental organization, Reach and Teach, which piloted the subject in 14 schools in Gauteng. By

early 2000, tourism was recognised as a full matriculation subject and was rolled out nationwide (Umalusi, 2014).

The tourism subject curriculum has been revised and amended several times, reflecting the changes taking place in the national education system. Currently the principal document guiding tourism education in South African secondary education is the Curriculum and Assessment Policy Statement (“CAPS”) for Tourism, which was gazetted in September 2011. The “CAPS” document features ten main topics covered within the curriculum, and is grouped into subtopics indicating weekly layouts, specific content, revisions and assessment activities.

Since 2000, tourism has experienced considerable growth in terms of the number of schools and learners that have adopted the subject. Figures 9 and 10 illustrate the rate of growth in the 14 years since the national rollout of the subject. To date, tourism is one of the more popular electives in South African high schools: up to 20% of all secondary students select the subject; only “Business Studies” is more popular (Allais, 2014).

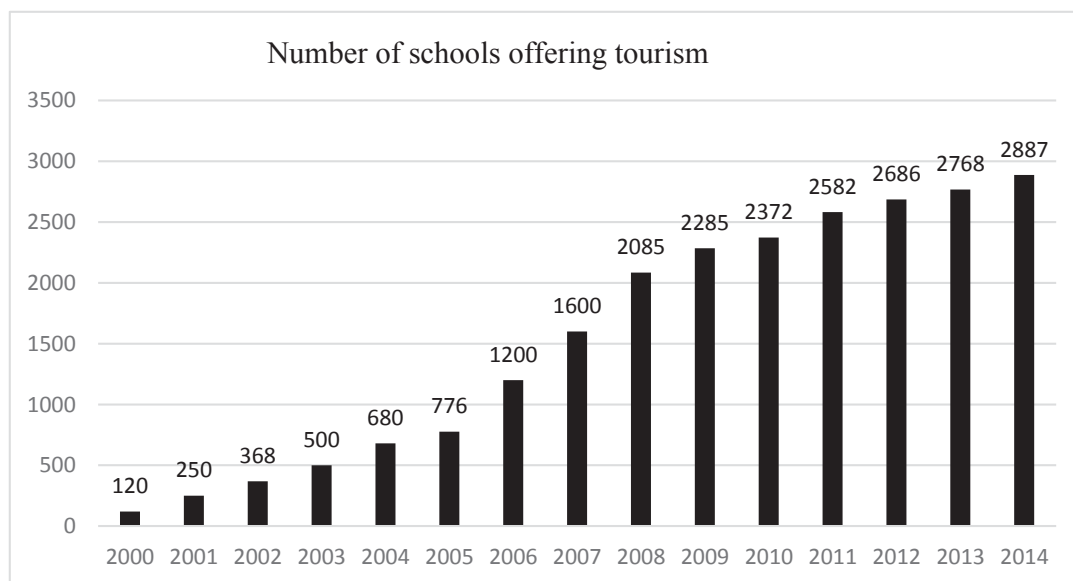


Figure 9. Number of schools offering tourism in Grade 12 (Source: Umalusi, 2014)

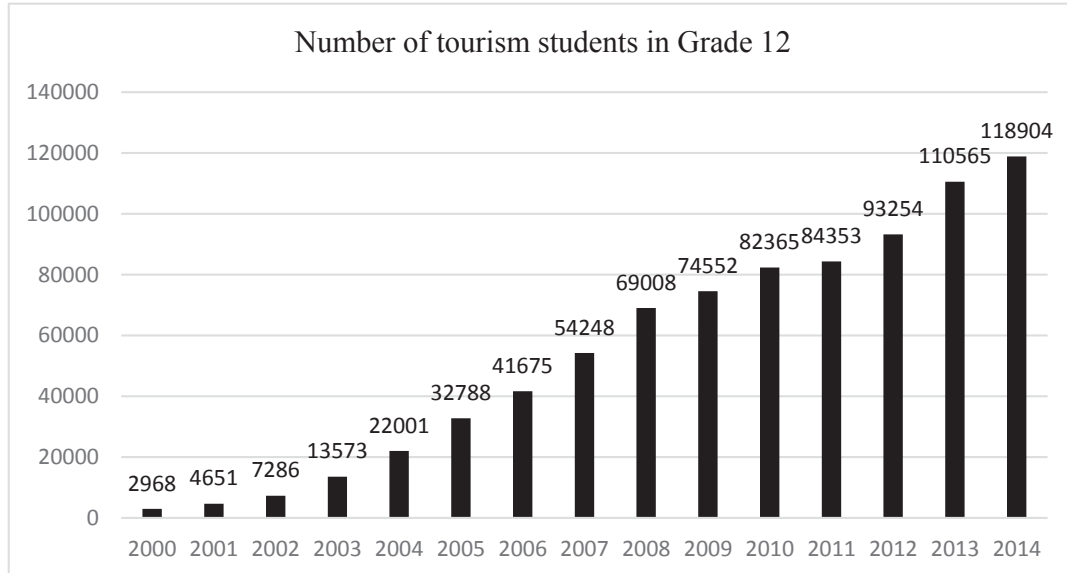


Figure 10. Number of tourism students in Grade 12 (Source: Umalusi, 2014)

All nine provinces of South Africa offer tourism, and the subject is most diffuse in KwaZulu-Natal, Gauteng and the Eastern Cape (Figure 11).

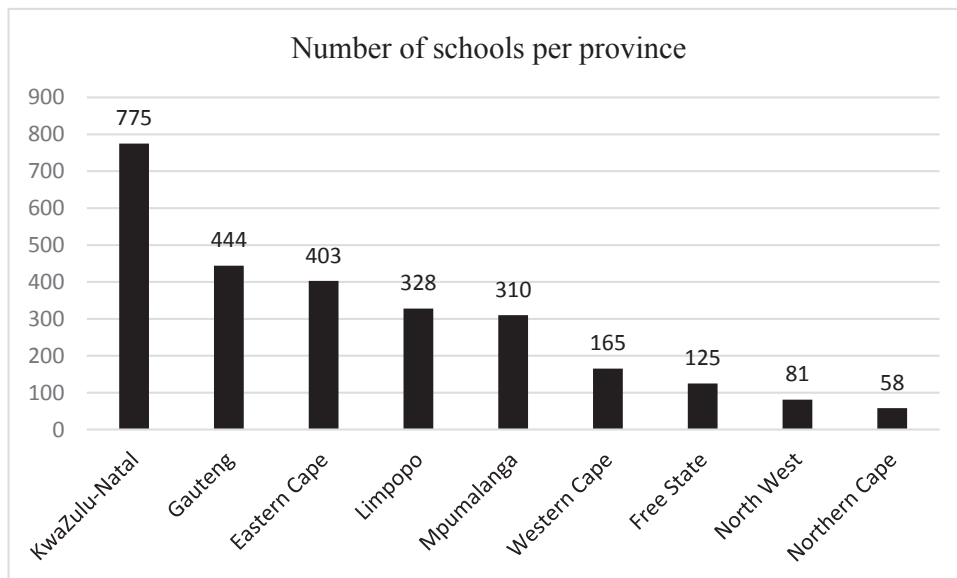


Figure 11. Number of Schools per province (Source: Umalusi, 2014)

Tourism is taught in all types of schools, from well-resourced private schools to under resourced rural, township and farm schools (Allais, 2014). However, vocational subjects are generally seen as “weaker” subjects or as being less academic. For this reason, it is commonly believed, the subject is popular in poorer schools. However, enrolments are

relatively evenly distributed throughout the five school quintiles, which determine the socio-economic status of the school (Allais, 2014).

The introduction of more vocationally oriented subjects into the secondary curriculum proved to be challenging. For one, it came under fire from educationalists for having little capacity to prepare students for the workplace. Shalem and Allais (2014) argue that tourism and other more vocationally oriented subjects are popular because it is believed that they will prepare learners for the “real world” and it will be easier to find employment. However, the authors argue that such subjects cannot be called practical because it is not constructed in relation to a specific occupational area, but more as a broadly imagined area of possible employment. It therefore teaches only separate pieces of information about specific elements of the world but does not prepare students for work. According to the authors, tourism is presented as a social phenomenon in terms of its impact on economic, environmental and social conditions (ibid.). The authors argue that the subject is weak in scholarly foundation, compared to disciplines such as geography, political science or history (Shalem & Allais, 2014). This also corresponds to a broader international discussion about tourism education: to what extent should education take an instrumental standpoint in preparing students for employment compared to having a knowledgeable citizenry (Tribe, 2007; Cuffy et al., 2012; Caton, 2015)? Another critical point from the literature is that effective tourism education at different levels should be relevant to its context, i.e. cultural, economic and social environments should be prudently and sensibly considered (Smith & Cooper, 2000; Lewis, 2005).

Thus, the recent report (Umalusi, 2014) clarified that the aim of the Tourism subject is not to prepare learners for the world of work but to provide broader knowledge about the tourism sector. Thus, learners exiting Grade 12 should enter the tourism domain with a basic knowledge of the industry (Umalusi, 2014).

2.5.1 Tourism curriculum content

Tourism is an elective subject and is taught through grades 10-12, on a weekly basis for four hours. Ten main topics are covered in the curriculum (Department of Basic Education, 2011):

1. *Tourism sectors*: various tourism sectors and their services and facilities; main motivations for people to travel; influences of global events on the tourism industry; types of transportation; career and entrepreneurial opportunities.
2. *Map work and tour planning*: continents, oceans, islands; electronic maps (e.g. Google Maps and Street View); location of tourism attractions in local and regional (SADC) areas; tour planning; time zones; travel documents and regulations.

3. *Tourism attractions*: South African provinces and their attractions; regional (SADC) tourism attractions; world icons.
4. *Culture and heritage*: elements of culture; cultural diversity; heritage conservation, UNESCO World Heritage Sites as touristic attractions.
5. *Green tourism*: sustainable and responsible tourism concepts; strategies to protect the environment; environmental, social and economic factors; corporate social responsibility.
6. *Foreign exchange*: major foreign currencies and their buying power; effects of exchange rates on the tourism industry; currency conversions.
7. *Communication and customer care*: cross cultural communication; service excellence; customer satisfaction and feedback.
8. *Tourism trends*: tourism statistics; technology in hotels; communication equipment in tourism businesses; global distribution systems; central reservation systems; hosting global events; technology for payments.
9. *Regional and domestic tourism*: intra- and inter-provincial tourism; domestic tourism growth strategy; regional tourism in SADC advantages.
10. *Marketing of tourism products*: principles and strategies; international marketing opportunities.

In the latest available report on 12th grade tourism examinations (Department of Basic Education, 2015), it was found that students struggle with two major content areas: time zone calculations and foreign currency calculations. However, the Western Cape Education Department also reported that students struggled with questions related to World Heritage Sites, Branding/Marketing and Sustainable tourism (ibid.).

The official document issued by the Department of Basic Education identifies minimum content that has to be covered during the specified terms. Teachers have flexibility to cover the content in the sequence they prefer and can design their own work schedules. Tourism teachers are also requested to incorporate the following aspects throughout the curriculum: 1. Awareness on career opportunities; 2. Awareness on service excellence; 3. Awareness on South Africa as a unique touristic destination; and 4. Promotion of national pride.

The assessment of the tourism subject comprises two activities:

1. *Informal daily assessment* incorporated with the planned teaching and learning activities that take place in the classroom. Learners' progress is monitored by the teacher. It is suggested that this monitoring could be done through questions and answers, open book tests, and other exercises in the classroom. Self- or peer assessment activities could also be incorporated.

2. *Formal assessment* consists of six formal assessment tasks per year, which constitute 25% of the total final mark. For grades 10 and 11, assessment is done internally, while for grade 12, assessments are marked externally. Moreover, the subject involves a practical project, which makes up 25% of the final certification mark. The final examination for Grade 12 is set according to four levels of Bloom's taxonomy for the cognitive challenges of: Remembering: 30%; Understanding & Applying: 50%; and Creating: 20%.

The Education Department requires that schools supply their learners with the necessary textbooks, maps, brochures and travel magazines for use in the classroom. Tourism teachers are requested to have access to internet resources in order to keep up with dynamic industry developments. Access to audio-visual resources such as data projectors, computers, and DVD players are also recommended (Department of Basic Education, 2011).

2.5.2 Challenges in tourism education

The implementation of a new curriculum is usually coupled with a number of challenges (Chisholm, 2000) such as shortages of qualified personnel, inadequate teacher training programs, insufficient support for teachers, tight periods, lack of resources and insufficient learning support materials. Some challenges presented below are similar to those the education sector is experiencing both in South Africa and in the context of ICT integration in teaching and learning.

Lack of qualified teachers

Even though the tourism subject has experienced (and is still experiencing) immense interest and uptake in South African high schools, teachers have not been adequately trained in either subject content or instructional approaches. Since the rollout of the curriculum, it was debatable if the national education system had the necessary expertise and capacity to facilitate the subject at high school level (Umalusi, 2014). It was a new subject, and unlike other subjects such as Geography or Mathematics, which had a cohort of trained teachers at the tertiary level, this was not the case for tourism teachers. The Basic Education Department acknowledged this issue and organised the first official training sessions in 2008 in Johannesburg. Despite this, after nearly two decades since inception, there is no formal pre-service or in-service tourism teachers' course for qualification upgrade. While the University of South Africa (UNISA) did introduce an Advanced Certificate in Tourism Education, dedicated to in-service teachers, it is currently suspended (Umalusi, 2014). The National Education Department assigned provincial departments to undertake in-service tourism training through subject coordinators and

advisors in order to improve teachers' training capacity. However, this seems to occur sporadically and is insufficient (ibid.).

High schools in South Africa range from highly affluent and well-resourced schools to poor rural and township schools. Similarly, there are vast differences in the knowledge and skills of local teachers. Teacher development thus becomes a highly complex process. Moreover, the national and global tourism sector is dynamic, especially concerning the adoption and integration of ICT. This environment necessitates the continuous professional development of tourism teachers.

Lack of experience and exposure to tourism

Another challenge of tourism education in South Africa is a lack of touristic exposure on part of both students and teachers. This is especially the case in disadvantaged or rural schools, where learners and their teachers have seldom enjoyed touristic experiences. A lack of touristic exposure makes it challenging to relate to the subject's content. This is a common challenge in developing or emerging countries, for example in the South Pacific, where tourism plays a significant economic role but is not easily accessible for poor local groups (Harrison, 2015).

Lack of resources

Furthermore, when the subject was introduced nationwide, the Learning and Teaching Support Materials such as textbooks and guides have not yet been developed. It was therefore difficult for teachers to deliver the curriculum and to provide meaningful teaching and learning (Smith & Cooper, 2000). To implement the officially designed curriculum, governmental departments need to commit to supply schools with adequate materials such as textbooks and teaching aids. Moreover, the curriculum also references numerous web-based resources – access to these should be ensured through internet-enabled devices in classrooms or specialised computer labs. Other challenges include a lack of electricity supply, limited space, and inadequate funding (see Kuze, 2012).

Big classes

As discussed previously, South African classrooms vary in size across different schools. In urban areas, the teacher-learner ratio is 1:30, while in rural and township areas, the ratio is 1:50 or even higher. Around half of South Africa's public school learners attend classes with more than 40 learners, and around 15% sit in classes with over 50 learners (Kuze, 2012). Understandably, big and overcrowded classes make teaching and learning exceptionally difficult. The Review Task Team (2009, taken from Kuze, 2012) identified three main reasons for large classrooms: 1. the challenge of attracting teachers to certain

areas such as remote or rural schools; 2. Inefficient timetable management; and 3. the shortage or lack of physical classroom space.

Subject image

Despite its popularity, tourism still suffers from the perception that it is an “easy” subject. Headmasters, students and parents often consider tourism as a subject that does not require intensive commitment compared to other subjects. Moreover, tourism is not designated, which means that it does not count towards matriculation exemption. Therefore, students who plan to pursue tertiary education avoid taking the subject. Research also indicates that headmasters randomly select teachers to instruct the subject, and that learners are often moved to tourism in Grades 11 or 12 because they failed other subjects (Kuze, 2012).

The Department of Basic Education recognised and attempted to address these challenges through (Umalusi, 2014):

- Focused and personalised teacher training
- Provision of industry exposure to tourism teachers and learners
- Provision of resources to tourism classrooms
- Advocacy for and awareness around the subject’s image

2.5.3 Research on tourism education in South African high schools

A few academic papers (Van Niekerk & Sayman, 2013; Chili 2013, 2014) and PhD theses (Pawson, 2002; Van Niekerk, 2003; Punt, 2010; Kuze, 2013) are available on tourism education in South African schools.

Van Niekerk and Sayman (2013) hypothesised that awareness and implementation of the tourism curriculum can influence travel patterns of students and their parents. The authors also maintain that such students will be more likely to pursue careers in tourism. Scholars have conducted an experiment and findings indicated that the subject stimulated awareness about tourism among students. Moreover, the results revealed that travel patterns of the families with children studying tourism were influenced, and that students studying tourism were likely to peruse career in travel and tourism sector.

In their qualitative study, Chili (2013, 214) interviewed principals, tourism teachers and tourism learners from seven South African township schools with the goal of identifying the main factors affecting tourism education. Chili (2013) argues that government officials anticipated that the subject would meet the needs of the industry itself. The fact that there was a great shortage of qualified tourism teachers was overlooked or underestimated. Tourism was expected to prepare students to enter the industry immediately after school.

Unfortunately, reflecting on almost two decades since the subject was introduced, the impact of the subject is undetermined (Chili, 2013).

There is no existing official data on how many students pursue careers in tourism, or how many of them continue studying tourism at tertiary level. Although the subject was introduced to generate awareness and positive attitudes towards the tourism industry, Chili (2013:36) argues that “too few students coming out of the public school system view tourism as a viable career option”. Serious concerns are raised by the scholar over the perceptions regarding tourism education at high schools. It is often perceived as an easy subject and that any teacher could teach it; many educators do not regard tourism as a discipline.

In his PhD thesis, Punt (2010) tackled the issue of quality assurance in the assessment of the tourism subject. He argues that, in the process of continuous curriculum changes in South Africa, teachers struggle to keep up. Resultantly, quality assurance of assessment does not receive substantial attention. Punt (2010) studied 15 schools that offer tourism in the Western Cape Province. He interviewed 15 tourism teachers and found that only one had formal tourism related training. The other teachers specialised in other subjects (e.g., geography, history, and the like). Punt argues that the lack of training in tourism instruction may contribute to insufficient subject knowledge and ineffective pedagogical methods.

In her doctoral research, Kuze (2012) investigated whether what is taught in the tourism curriculum is what is expected in the tourism industry. She conducted qualitative research in 10 secondary schools in the Fort Beaufort district in the Eastern Cape. Her study illustrated the many factors that inhibited the successful implementation of the tourism: lacking managerial and professional capacity, inappropriate assessment and teaching methods, and inadequate resources (textbooks, maps, magazines, brochures).

In summation, tourism education at high school level in South Africa (and on the continent more broadly) is an under-researched area compared to other regions like Western Europe or Australia.

3 Gamification

Digital games have evolved into a significant global business and have become a common phenomenon in contemporary culture. However, beyond their use as entertainment, game mechanics and game thinking have also been applied in different industries for different purposes: this trend is called gamification. Indeed, the idea of introducing game elements in non-entertainment environments is not novel; it has its roots in marketing activities such as reward systems, points collection, loyalty or frequent flyer programs. (Seaborn & Fels, 2015; McGonigal, 2011). Game elements are also found in various simulations in the fields of education and training (Zichermann & Cunningham, 2011). The current re-

emergence of gamification is influenced by factors such as cheaper and more accessible technologies, personal data tracking, and the popularity of games in individuals' everyday lives (Deterding, 2012).

Firstly, the term “game” must be conceptualised in order to define gamification. Various definitions are proposed in the literature. Huizinga (1955) in his seminal work, *Homo Ludens*, defines play and games as not-serious, voluntary and intensively engaging practices, which are structured by rules and private social boundaries. Salen and Zimmerman (2004:80) define a game as a “system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome”. Thus, games typically incorporate these common features: voluntary participation, engagement, uncertain but quantifiable outcomes, rules, conflict and structure.

Hereafter, gamification is defined as the selective integration of various game elements into a specific system without a goal of producing a fully-fledged game as the end-product (Deterding, 2012; Deterding et al., 2011). A frequently cited definition is introduced by Deterding et al. (2011:10), who describe gamification as “the use of game design elements in non-game contexts”. Another definition provided by Huotari and Hamari (2012:19) is as follows: “a process of enhancing a service with (motivational) affordance in order to invoke gameful experiences and further behavioural outcomes”. The latter authors underline the experience element in their definition as opposed to highlighting the game element as per the definition of Deterding et al. (2011). Gamification is usually based on technology, and is applied on desktop, web or smartphone applications. Gamification has been very successfully incorporated into social media platforms as a way to drive viral behaviours.

In light of its purported benefits beyond pure entertainment, gamification has seen applications in other fields. Xu et al. (2014) explored whether gamification could enhance touristic experiences of visitors and/or promote informal learning and more responsible, sustainable touristic behaviour. In education, researchers explored the use of gamification as a strategy to increase engagement and drive expected learning behaviours (Lee & Hammer, 2011; Kapp, 2012).

It is important to clarify the terminology used in this research. The basic differentiation between a digital game and gamification is that the latter is not developed as a complete game (Deterding, 2011). However, some gamification and learning researchers, for example Kapp (2012), refer to gamification as encompassing both complete games and practices of playful design (game elements) for learning. Another term used extensively in the literature is “serious games”; this category tends to highlight the characteristics of specific game elements such as avatars and fully immersive virtual reality. Serious games are likely to emphasise learning content, while gamification can be applied for learner engagement and motivation (Hamari et al., 2014). Nevertheless, there is not always a clear

distinction between gamification practice and fully-fledged digital games. Within this research, the author refers to gamification and the use of game elements for engagement and motivation. Serious games, simulation and fully immersive games are not the focus.

This research examines the application of gamification for learning in the domain of tourism. In what follows, the researcher presents a literature overview on gamification in tourism, followed by an in-depth presentation of gamification in education with its underlying theoretical concepts.

3.1 Gamification and tourism

Gamified applications are being introduced in various sectors – healthcare, fitness, education as well as in the tourism industry (Bulencea & Egger, 2015; Xu et al., 2013, 2015; Weber, 2014). As argued by Xu et al. (2015), tourism companies use it as a marketing tool and facilitator of deeper engagement with tourists. The so-called trend of gamification, i.e. gaming elements or gaming in non-gaming contexts, is being developed as persuasive technologies to affect and change users' attitudes and behaviours through social influence and persuasion (Bogot, 2007). It can be used as a strategy to promote a tourism organisation or destination with an opportunity to construct entertaining and informative venues for brand awareness and communication (Xu et al., 2015). Tourism is an attractive area for gamification applications because it is principally an experience industry (Pine & Gilmore, 2011) and the use of experiential information in marketing is strongly supported by researchers. Digital gaming elements have the potential to support dynamic interactions with users, and offer opportunities for co-creation of personalised services and experiences (Neuhofer et al., 2012).

Xu et al., (2014) described the benefits of gamification in tourism, which included:

1. *Tourist engagement*: game play is characterised by dimensions of enjoyment, immersion, pleasure, motivation, and state of flow. They also are capable of evoking different emotions (happiness, excitement, fear, frustration) or even elicit calls for action (Zichermann & Cunningham, 2011).
2. *Experience enhancement*: tourism is an experience economy and offers multifaceted and multidimensional experiences (Neuhofer et al., 2012) characterised by intrinsic and extrinsic motivations, which are also dimensions of game thinking and game design elements (Deterding et al., 2011);
3. *Building loyalty*: gamification can contribute to creating more dynamic and interactive models for building customer loyalty, which is often a strategic goal in the relationship marketing of tourism firms.
4. *Brand awareness* can be achieved in different ways (Celtek, 2010). It can be designed as a branded game with the purpose to advertise and strengthen the brand with the aim of strong game recall. It can also be in-game placement of the brand, where a company's logo is imbedded into an existing game, for example

Starwood's loyalty programme in Foursquare. Eventually, it could be done as on-site advertisement by placing banners on game websites.

There are two types of tourism-related gaming (Xu et al., 2014):

1. *Social games*. These games are based on social media (e.g. Facebook) and are usually played by users before a trip. Such games typically raise brand awareness and generate favourable images of a destination, e.g. Thailand². The games in Thailand's case are offered by destination management organisations as a destination marketing initiative. Airlines like Virgin Atlantic and KLM also invest in similar initiatives. Social games can stimulate the development of online communities, which can influence brand awareness, facilitate better understanding on part of travellers, and even counteract negative word of mouth (Fong & Frost, 2009).
2. *Location-based mobile games*. These games are typically played during the stay at a destination to engage visitors on-site. The purpose of location-based games is to enhance the touristic experience by making it more informative and fun (Waltz & Ballagas, 2007). Current location-based games are mainly based on the concept of a treasure hunt, for example, *REXplorer*. Here the purpose is to make visitors visit UNESCO World Heritage Sites in Regensburg, Germany while engaging with the mobile game. There are also games that involve visitors in knowledge competitions by solving clues and completing tasks at various touristic points of interest, e.g. the *Amazing City Game* in Trondheim, Norway. A recent trend is mobile games with augmented reality features that blend virtual and real environments (Yovcheva et al., 2014).

However, despite the recent hype around gamified touristic applications, many of them fail to engage visitors successfully. For example, such applications may lack significant information about the destination (Celtek, 2010), or may lack an understanding of tourist needs. Moreover, location-based games that are based on augmented reality pose various technical issues such as "real time calibration" (Xu et al., 2015:2). Tourism-related games necessitate explicit, particular destination information, which can be challenging to integrate into games. Moreover, tourists play games in unfamiliar environments as opposed to traditional gamers at home. Tourists are usually bound by limited time at the destination and they may be more interested in the actual, surrounding environment than digital games (Fernandes et al., 2013). Thus, the needs and motivations of tourists and traditional digital game players may differ considerably. Designers have to understand and incorporate both groups' needs within gamified applications to deliver memorable experiences in a seamless manner (Bulencea & Egger, 2015).

² www.smilelandgame.com

Various researchers (Xu et al., 2014; Werbach & Hunter, 2011) are cautious about the over-gamification of life and the “pointifying” of experiences by introducing scoring systems and badges as incentives. This can lead to user fatigue and annoyance, and such applications may fail to portray meaningful experiences. As argued by Xu et al. (2015), gamification in tourism is in its infancy, and there are limited examples of its successful implementation. This is barring successful applications like location-based treasure hunts and applications related to cultural heritage.

Xu et al. (2015) also argue that gamification is a potential marketing opportunity for tourism because games have a dimension of pleasure (Zichermann & Linder, 2010), which can translate into a powerful marketing element. Mobile gaming has the potential to augment visitor interest in the destination, enhance knowledge about the place, and to help co-create their personal experiences on the site.

In their focus group research with Chinese students, Xu et al. (2015) elicited six motivations for tourism to incorporate mobile games:

1. *Curiosity*: mobile games invoke interest and curiosity.
2. *Exploration*: games enable travellers to discover peculiarities about a destination in a fun way.
3. *Virtual experiences*: a blended experience of virtual and actual reality.
4. *Socialising*: through various game activities, tourists might get to know local people who live in the destination or other fellow travellers.
5. *Fun*: games are a fun and interactive way to engage with the destination.
6. *Challenge and achievement*: games satisfy intrinsic motivations like feeling rewarded when correctly completing tasks.

Moreover, the motivation to learn, explore and discover was highlighted as an important driver for visitors to play touristic games (Xu et al., 2015). Bulencea and Egger (2015) argue that in the experience economy (Pine & Gilmore, 2011), memorable experience is a key economic driver. Thus, intentionally designing memorable experiences is a critical component for the economic sustainability of tourism. According to Boswijk et al. (2012), memorable experiences encompass various aspects such as: (1) *Concentration and focus*; (2) *Involvement of all senses*; (3) *Altered time awareness*; (4) *Emotional connection*; (5) *Unique process with intrinsic value*; and (6) *Element of playfulness and challenge*. Bulencea and Egger (2015) further argue that games and touristic experiences share similar characteristics of memorable experiences. The researchers propose to combine approaches in game (gamification) and experience design in building toward more nuanced and memorable touristic experiences.

3.2 Case study: World Heritage Awareness Campaign for Youth in SADC

The gamified application called WHACY (World Heritage Awareness Campaign for Youth) in Southern African Development Community (SADC) (www.whacy.org) constitutes the case study for this research. In 2013, *UNESCO Chair in ICT to develop and promote sustainable tourism in World Heritage Sites* based at Università della Svizzera italiana in Lugano, Switzerland together with the Hospitality Youth Initiative (HYI), a South African NGO, and the Regional Tourism Organisation of Southern Africa (RETOSA), designed an awareness campaign around the 39 WHSs in the SADC region.

The Southern African Development Community (SADC) is a strategically important region in economic and geographic terms. It is located in Southern Africa and includes 15 countries: Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe. The SADC region is considered a developing or emerging area, undergoing various sustainable development challenges. The SADC region is rich in touristic resources in terms of cultural and natural sights, which attract increasing numbers of tourists annually. According to the World Travel and Tourism Council (WTTC) and the Regional Organisation of Tourism in Southern Africa (RETOSA), tourist international arrivals grew from 13 million to approximately 23 million between 2002 and 2012. These numbers are positively influence Gross Domestic Product, employment, and investment. Therefore, tourism development in SADC is critical to economic growth and hence, to alleviate poverty, advance security, and enable the promotion of local attractions (WTTC, 2013). The 15 countries of SADC host 39 World Heritage Sites (WHSs) – 17 cultural, 19 natural, 3 mixed – properties of outstanding universal value representing the cultural and natural richness of the region, which at the same time attract very high interest from the tourism perspective.

The debate about tourism sustainability and its contribution to local development has been very active, especially concerning the critical preservation of UNESCO World Heritage Sites. In recent times, the pervasiveness of Information and Communication Technologies (ICTs) in tourism has led to calls for more research on the use of technology to support sustainable tourism.

The following section presents existing literature with regard to WHSs and tourism, sustainable tourism, as well as the potential usage of ICTs for sustainable tourism practices.

3.3 UNESCO World Heritage Sites and tourism

In 1972, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) adopted a *Convention Concerning the Protection of the World Cultural and Natural Heritage*, aimed at the “identification, protection, conservation, presentation and transmission to future generations” (UNESCO, 1972:3) of the world’s cultural and natural heritage of Outstanding Universal Value (OUV). As of July 2016, the World Heritage Committee has included 1052 properties in the World Heritage List: 814 cultural, 203 natural, and 35 mixed sites in 165 countries.

The World Heritage Convention clearly states that, apart from conservation and protection of world heritage of OUV, its “presentation” (UNESCO, 1972:3) is among its primary goals. Presentation implies formation of public awareness and communication about the importance of heritage protection among international travellers (Pedersen, 2002) as well as local population (ibid.). This points to a certain dilemma UNESCO and countries hosting WHSs have to deal with (Ashworth, 2012). On one side, world heritage has to be protected and preserved for future generations and not be exposed to the potentially detrimental influence of tourists. However, these sites by definition are of universal value and should therefore be made accessible to travellers (ibid.), who also provide necessary income for heritage preservation. Thus, the involved stakeholders face a challenge of reconciling tourism and the preservation on the WHSs. The question of how to transfer sites’ heritage value, and to foster responsible behaviour among visitors is commonly debated. The main strategy adopted by UNESCO to address mentioned challenges is through development of sustainable tourism (Kausar, 2012), as is illustrated in its first *Practical Manual for World Heritage Site Managers* (Pedersen, 2002).

3.4 Sustainable tourism and ICT

The UNWTO (2013a) provides a tourism-specific definition of sustainability and defines sustainable tourism as a form of “tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities”. The greatest aim of sustainable tourism is to harmonize socio-cultural, economic and environmental aspects of tourism industry. The strategies of achieving are following:

1. Promoting intercultural dialogue and valorising authenticity of local communities.
2. Implementing viable economic practices that would have potential to benefit all involved stakeholders.
3. Consuming natural resources optimally and responsibly.

Moreover, sustainable tourism also implies the provision of meaningful tourist experiences and the increase of visitor awareness around sustainability issues (ibid.). The

Sustainable Tourism for Development Guidebook (UNWTO, 2013b) is dedicated to enhancing the capacity for sustainable tourism development in developing countries. It identifies five pillars to be considered for the evaluation of tourism performance: (1) tourism policy and governance; (2) economic performance, investment and competitiveness; (3) employment, decent work and human capital; (4) poverty reduction and social inclusion; and (5) sustainability of the natural and cultural environment.

Undoubtedly, tourism companies and destinations are more and more challenged to commit to practices of sustainable tourism development (Ali & Frew, 2013; Choi & Sirakaya, 2006). Tourism is continuously growing industry worldwide (UNWTO, 2013c). In particular, the number of travellers from BRIC (Brazil, Russia, India, China) countries is expected to surge in the coming years. Already in 2013, Chinese tourists were reported as the biggest spenders worldwide (UNWTO, 2013d). Weaver (2012) cautions that travellers from emerging economies may still lack awareness of the need for responsible and sustainable tourism behaviour. Ali and Frew (2013) argue that increasing numbers travellers from these emerging markets could contribute to further aggravation of environmental problems in the tourism industry. Therefore, there is a growing pressure on tourism businesses and destinations to be considerate of the ecological and socio-cultural environment in their operations (Ali & Frew, 2013).

Furthermore, it has become crucial for managers of WHSs to implement sustainable tourism policies. These help to ensure the long-term viability of their heritage, may benefit the local community, and ultimately contribute to high-quality touristic experiences. It is widely accepted that the “brand” UNESCO and the prestige associated with it can help to increase international visibility (Kausar, 2012) and attract more visitors to a site (Pedersen, 2002; Yang, Lin & Han, 2010; Marcotte & Bourdeau, 2012). Yet, some researchers (Lo Piccolo, Leone & Pizzuto, 2012; Cellini, 2011) caution that it is responsible and future-oriented site management that is more effective in the long term. Scholars Marcotte and Bourdeau (2012) also highlight that promotional efforts regarding world heritage should not be restricted to the sole display of the UNESCO label, but that a site’s actual outstanding universal value and related sustainability practices should be communicated to visitors to increase their awareness, knowledge and appreciation.

Furthermore, ICT has the potential to facilitate sustainable tourism through awareness raising, valorisation, sensitisation, and guidance for locals and tourists (Touray & Jung, 2010; Scott & Frew, 2013; Ali & Frew, 2013; Schieder, Adukaite & Cantoni, 2014; Gretzel, 2011). Several other authors have put forward argument that ICTs have potential in raising tourists’ awareness, and ultimately in prompting them to behave more sustainably. Ashworth (2012) and Wheeler (2012) emphasise that travellers often lack contextual sensitivity as well as knowledge. Therefore, information and communication are both needed to facilitate tourists’ understanding of the importance of a place and help them to appreciate its value. ICTs can also be used simultaneously by site managers as an

tool of control to dissuade other tourists from behaving irresponsibly. Ali and Frew (2013), Marcote and Bourdeau (2012) and Liburd (2005) all agree that a well-informed tourist is empowered to make conscious sustainable choices. Such a tourist is better equipped to interact with local cultural groups and resources, and is more likely to have an interest in preserving them. Thus, awareness, education, and motivation, according to Ali and Frew (2013), regard as the main drivers prompting tourists to behave in a responsible and sustainable manner. Ali and Frew (2013) have extensively investigated the applications of ICTs for sustainable tourism, and identified the areas where technology can be most effective: information management, interpretation, community participation, tourists' satisfaction, effective partnerships, and energy consumption.

Furthermore, recent studies (Schieder et al., 2014; Lamsfus et al., 2013; Dickinson et al., 2012; Wang & Fesenmaier, 2013) have also shed light on how mobile technologies, and in particular mobile applications, mediate or affect tourist experience and behaviour. These findings are of particular interest for the emerging field of ICTs and sustainable tourism. In fact, mobile technologies could assist in making tourists valorise a specific place, while triggering more responsible and sustainable on-site behaviour (Dickinson et al., 2012; Schieder et al., 2014). This potential of smartphone (or tablet) and mobile app usage in tourism could be of great value for the management of UNESCO World Heritage Sites. With regard to the latter, the *UNESCO Chair in ICT to develop and promote sustainable tourism in WHS*³ underlines that ICT can widen access to information and enrich the experience of tourists, dis-intermediate some relationships between them and local tourism players, and help upgrade knowledge of the latter. Moreover, in developing areas, tourism narratives are quite often shaped by external (foreign) views: ICT can be a fundamental tool to integrate local voices and interpretations by implementing a local community's sense of ownership, mostly through digital storytelling.

In the context of heritage, the convergence of education and tourism is a present phenomenon. Concerning UNESCO's general commitment to education (UNESCO, 2013), ICT can play a significant role. Indeed, the Convention evidently states the need for "educational and information programmes to strengthen appreciation and respect" (UNESCO, 1972:13) among visitors for cultural and natural heritage sites. Thus, ICT can play a crucial role in increasing awareness around the values and responsibilities linked to heritage places and attractions.

One of the potential strategies to contribute to this reconciliation of tourism and preservation of heritage places is harnessing technologies for learning purposes (Cantoni, Botturi & Succi, 2007; Cantoni, Kalbaska & Inversini, 2009) and possibly introducing gamification features. Gamification applications can already be found in the tourism sector, used for increasing motivation of tourists, in co-creation of touristic experiences,

³ www.unescochair.usi.ch/outline

for marketing purposes, in client engagement, human resources training and other (Xu et al., 2015; Weber, 2014; Cantoni & Kalbaska, 2010).

3.5 The campaign

The WHACY (World Heritage Awareness Campaign for Youth) campaign serves as the case study of this research. The campaign aimed to raise awareness and foster informal learning about the universal value of 39 World Heritage Sites located in the SADC region, primarily among 16-19 year-old students studying in SADC countries, as well as among the wider public.

The concept of the campaign was built on three main pillars:

1. *Awareness.* Firstly, the gamified online/offline quiz tool, supported by online outlets as a dedicated website, wiki, and Facebook page, were designed to spread awareness among local students and young adults in Southern Africa around the unique and universally valuable heritage in their region.
2. *Informal learning.* Participants become aware and gain knowledge about the outstanding value of the heritage in their region, and about the importance of sustainable tourism to ensure development at those sites. Participants also learn how new information and communication technologies could contribute to promote and develop sustainable tourism at the heritage places in an efficient way.
3. *Empowerment.* The promotion of a sense of ownership among youth of such heritage. The youth become aware of heritage as a relevant asset for their professional future, as well as for local development.

The project addressed the following audiences:

1. Schools in the SADC region were invited to participate in the project, but the actual game was played by individual students with a foreseen age from 16 to 19.
2. Any other individual participant interested in the topic.

Campaign development: ICT tools

The principal tool for the campaign was an online/offline quiz platform. The programming language used for the online game development was PHP/HTML/JAVASCRIPT and DATABASE MYSQL. During the design and development phase (January – March 2014), the quiz was hosted on a Swiss server. Before the launch, the game was migrated to a South African server to allow for a faster connection and improved data transmission. Additionally, an offline version was developed in CD-ROM format. The designed platform is based on an algorithm that randomly retrieves questions from a previously developed database. It presents a unique collection of multiple-choice quizzes to the user.

An adhoc database of 470 questions was created and distributed according to four categories:

- 390 questions on 39 World Heritage Sites (10 for each site divided into 5 difficult and 5 easy questions)
- 40 questions about sustainable tourism development
- 20 questions about UNESCO
- 20 questions about eTourism (information and communication technologies and tourism)

The questions were created with the support of a class of 24 master students of the eGovernment course at Università della Svizzera italiana as part of their course work. In order to adapt the content to the audience (second or third English language speakers), all questions were revised by a panel of experts convened by the South African partner. The goal for the user is to collect the highest score by correctly answering the questions. By reaching the end, the user obtains a personalised certificate with their final score in printable PDF format (Figure 12). While for offline playing – using the CD-ROM or copying it on a hard disk/USB-key – no log file is produced, but only the final printable certificate.



Figure 12. Awareness campaign interface example and final certificate

Gamification features of WHACY

Firstly, *Rules* are provided in a designated section of the platform, specifying all the necessary information on how to proceed with the game. The *Reward structure* of WHACY consisted of a point system: the user collected points after answering questions. At the end of the quiz, a certificate was available to download, indicating participation and the result achieved. All these can be considered as extrinsic motivators for players to answer the questions correctly. However, there is no leader board provided in the quiz. This feature could further increase player motivation and engagement. *Feedback* is another gamification element present in the WHACY platform. Every time a player submits their answer, they receive immediate feedback if the answer was correct, partially correct or incorrect. Moreover, players receive complimentary information related to a question to facilitate learning about the topic. In addition, a progress bar is displayed to players to indicate the remaining questions to finish the game. In order to enhance the *aesthetic* user experience various photos were used for each question (corresponding to the WHSs described in the questions) as well as videos for some questions. *Time* is a common gaming element and it is important to mention the first round of the quiz did not restrict players with time. Nonetheless, a restriction of 30 seconds to answer each question was introduced in the second round of the quiz with the aim to make the game more intense by pressuring players to provide the answer within a limited period. The *replay* functionality upon the completion of the quiz allowing the players to improve on their performance and to further increase their knowledge regarding the covered topics.

The game was organised along two main phases:

1. *First Phase (May – August 2014)*. The first round contained 28 questions: 16 questions on 4 out of 39 WHSs selected by the users; 4 questions about UNESCO, 4 about Sustainable Tourism Development, and 4 about eTourism. Questions were randomly selected among the pool of available questions, which means that different playing instances were possible without being exposed to the same questions.

The link to the first round game is:

www.whacygame.org/round1/welcome.

Participants could either play offline (which was preferred by the majority of schools) or online.

2. *Second Phase (September – November 2014)*. This round contained 42 questions about all 39 WHS and other topics without a possibility to preselect WHS as in the first round. Each question had a 30-second time restriction.

The link to the second round game: www.whacygame.org/round2/welcome.

The offline tool did not support this second phase.

The initial plan of the campaign also envisioned a third phase: a residential workshop together with top performing students from each SADC country. However, due to various challenges, it was cancelled.

Ultimately, the campaign employed an online and offline gamified learning platform, which was reinforced by a dedicated website, a Facebook page, a wiki and offline materials. In one year of operation (2014/2015), the campaign has reached an audience of more than 100 000 people.

Table 1 summarises the other ICT platforms used for the campaign.

Platform	Description
Dedicated website: www.whacy.org	The website was created using Wordpress with the main goal of presenting the project, its partners and purpose to the wider public.
Dedicated wiki: http://wiki.africaheritagetourism.org	A wiki was created as a content support repository about all WHSs and other topics: UNESCO, sustainable tourism development, and eTourism. The wiki platform was selected because it is easily manageable in terms of content creation and editing without any HTML or other coding prerequisite.
Facebook page: www.facebook.com/africaheritagetourism	A Facebook page was created to help promote the project. It received more than 4700 likes (April 2016) mainly from Madagascar, Lesotho, Mozambique, Tanzania, Mauritius, Zambia, Malawi, Democratic Republic of Congo, South Africa and Botswana.

Table 1: Supporting ICT platforms of the WHACY campaign.

Alignment to the South African tourism curriculum

The WHACY campaign was primarily created as an informal type of learning activity. However, it has received extensive interest from formal education stakeholders. The purpose of this study was to explore the acceptance of such a gamified application in formal learning settings, i.e. by tourism students and teachers in one SADC country. Tourism students and teachers were selected because topics of World Heritage Sites and sustainable tourism are covered within the South African high school tourism curriculum. Thus, the participants have background knowledge about the content used within the platform. To serve the purpose of this research, the content of the existing platform was

aligned with the tourism curriculum. An exemplary quiz (17 questions) about heritage sites and sustainable tourism was created (www.whacygame.org/test).

4 Gamification and learning

Playing and learning is not a new phenomenon; the belief that children learn while playing is well recognised (Sutton-Smith, 2001). While playing, children practice skills and develop social attitudes that are central to their social, motoric, emotional and intellectual development (Sutton-Smith, 2001). Due to the characteristics of play, such as development and socialisation, it has received extensive attention from various fields such as psychology, sociology and educational studies (ibid.). However, the recent arrival and growing acceptance of digital games has generated new interest on how to harness and take advantage of them for educational goals (Gee, 2003, 2008; Prensky, 2005). The relationship between games and learning has been approached from various theoretical perspectives: examining the informal learning that occurs during play (Williams, 2006; Sefton-Green, 2003) or the exploring the incorporation of games in formal learning activities (De Freitas & Oliver, 2006). Games, simulations, and gamification bridge the distinction between formal and informal learning. Introducing something that is considered an informal activity (gaming) into formal learning settings provides opportunities for better understanding on how formal and informal learning could reinforce each other in order to support cognitive development and promote learning (Sefton-Green, 2003; De Freitas et al., 2010; Koutromanos & Avraamidou, 2014). Some authors primarily focus on cognitive aspects (Shute et al., 2014; Mayer, 2014) underlining that games are capable to generate new information that is processed by the player. Others highlight socio-cultural characteristics (De Freitas et al., 2010; Squire, 2008) and the importance of rich contextual information that is essential for learning to happen. De Freitas (2006) proposes a framework aiding practitioners to assess what kind of games would be effective to introduce in specific educational environments. The author proposes four dimensions that should be addressed: (1) pedagogic considerations (learning models used); (2) learner specifications (learning background, profile); (3) context (technical support, accesses to equipment); and (4) mode of representations (level of immersion, interactivity).

Many positive claims have been put forward regarding digitally mediated play and its educational affordances such as increased motivation and engagement (Paraskeva et al., 2010; Prensky, 2005; Turkay et al., 2014); as well as the empowerment of students with low self-efficacy and their ability to control their learning process (Sitzmann, 2011; Kebritchi et al., 2010). Moreover, critical thinking can be reinforced because games can provide various opportunities to be creative and to examine problems from multiple perspectives (Paraskeva et al., 2010; Eow & Baki, 2009; Egenfeldt-Nielsen, 2007). A meta-analysis published by Connolly et al. (2012), based on 129 papers, reported evidence

for all learning and behavioural outcomes, including “knowledge acquisition, perceptual and cognitive, behavioural, affective, motivational, physiological and social outcomes, but with the exception of soft skills” (p. 671).

For the purpose of this research, the most recent empirical studies were reviewed, and specifically those that applied gamification methods for learning purposes, excluding studies that involved fully-fledged games (Table 2). Compared to research dedicated to fully-fledged games in education, studies on the integration of gamification in learning are sparse (Hew et al., 2016; Hamari et al., 2014).

Through examining current conceptual publications on gamification, it can be reported that there is no consensus on the classification of game design elements (Dicheva et al., 2015). For example, popular and common gamification element “badges” is considered game interface design by Deterding et al. (2011), game mechanics by Zichermann and Cunningham (2011), motivational affordances by Hamari et al. (2014), game dynamics by Iosup and Epema (2014) and game components by Werbach and Hunter (2012).

Following traditional computer game theorists, Zichermann and Cunningham (2011) classify gamification elements into: (i) mechanics: the way gamified systems convert inputs to outputs, (ii) dynamics: interaction between game mechanics and the player, and (iii) aesthetics: interaction between game mechanics, dynamics and designers’ creativity to produce an artefact that provides emotional outcomes.

Dicheva et al. (2015) conducted an empirical study on gamification in education, employing a systematics mapping approach. According to the researchers, from the 34 studies analysed, the following are the most common game mechanics used in education: points, badges, leader boards, levels, virtual currency, progress bars, and avatars. Regarding the field of application, gamification studies are mainly conducted for blended learning courses. Only two of the 34 studies were conducted in K-12 education while the others in higher education and training and mainly within computer science or information technology related courses. More than half of the evaluated studies reported positive results, such as increased engagement, course attendance and participation. However, seven studies reported mixed evaluations regarding gamification usage for learning such as marginal positive outcomes compared to monetary and time investment needed to develop successful gamification systems (O’Donovan et al., 2013). The majority of the studies describe selected game mechanics and dynamics and “true empirical research on the effectiveness of incorporating game elements in learning environments is still scarce” (Dicheva et al., 2015:10).

Nah et al. (2014) also conducted a literature review on gamification in education and examined 15 studies. The scholars identified the eight most popular and common gamification design elements: points, levels/stages, badges, leader boards, prizes and rewards, progress bars, storyline and feedback. These were primarily employed for the

following learning outcomes: engagement, participation, motivation, enjoyment, productive learning experience, sense of achievement, status, sense of accomplishment, performance, recognition, and interest in the course.

Hamari et al. (2014) posed a research question: “Does gamification work?” and conducted a literature review examining empirical research in various fields of gamification. The authors define gamification elements as motivational affordances (independent variables) and psychological/behavioural outcomes (dependent variables). In total, the researchers examined 24 studies, the majority of which (n=9) concerned the education/learning field. The authors identified the 10 most common motivational affordances: points, leader boards, achievements/badges, levels, story/theme, clear goals, feedback, rewards, progress, and challenge. They further identified the methodological limitations of the studies: small sample sizes, experiments lacking control groups, only descriptive statistics, and short experimental timeframes. Gamification as an academic topic of research is still relatively new and lacks established theoretical frameworks and unified discourses (Hamari et al., 2014). Dicheva et al. (2015) and Hamari et al. (2014) highlighted that due to the lack of proper evaluation studies, it is challenging to conduct a meta-analysis of the results of gamification studies in education.

Thus, three recent literature review papers on gamification in education: Hamari et al. (2014) identified nine articles, Nah et al. (2014) analysed 15 studies, and Dicheva et al. (2015) reviewed 34 cases. For this research, 16 of the most recent studies were selected (Table 2): 12 (Hew et al., 2016; de-Marcos et al., 2016; Hanus & Fox, 2015; Attali & Arieli-Attali, 2015; Coetzee et al., 2014; da Rocha Seixas et al., 2016; Davis & Singh; Mekler et al., 2013 ; Su & Cheng, 2014 ; Christy & Fox, 2014 ; Ibanez et al., 2014 ; Abramovich et al., 2013 ; Hamari et al., 2016) were not analysed in the three identified literature review mapping studies. The criteria to include papers for literature review included full peer reviewed paper published in international journal or conference proceedings; empirical study with explicit methodology; study researches gamification impact rather than fully-fledged games.

<i>Study</i>	<i>Area of application</i>	<i>Informing theory</i>	<i>Country, audience and sample</i>	<i>Evaluation method</i>	<i>Gamification design features</i>	<i>Measure</i>	<i>Main findings/evaluation</i>
Hew, K.F., Huang, B., Chu, K.W.S., Chiu, D. K.W. (2016). Engaging Asian students through game mechanics: Findings from two experiment studies.	University course “Designing questionnaire”	Self-Determination Theory of motivation (Deci & Ryan, 2004)	Asian University students (n=64)	2 controlled experiments: Study 1 (n=11 experiment; n=11 control), Study 2 (n=20 experiment; n=22 control)	Points, badges, leader boards	Students’ cognitive and behavioural engagement	<ul style="list-style-type: none"> – Gamification influenced students’ contribution to discussion forums. – No significant difference in recalling information. – Experimental group produced artefact of high quality compared to control group.
de-Marcos, L., Garcia-Lopez, E., Garcia-Cabot, A. (2016). On the effectiveness of game-like and social approaches in learning: Comparing educational gaming, gamification & social networking.	10-week undergraduate blended-learning course “Qualification for ICT Users”		Spain, University students (n=379)	Quasi-experimental design, 4 experimental conditions: (1) Educational game, (2) Gamification plug in, (3) Social networking website, (4) Social gamification website. Comparative analysis	Challenge, narrative, levels, trophies, badges, leader board	Course academic performance	<ul style="list-style-type: none"> – All experimental conditions significantly affected learning performance. – At the beginning of the course, social gamification and social networking provided better results. – Final examination designed using innovative approach did not produce any significant benefit compared to control group. – Users of gamification plugin and educational game demonstrated poorer results compared to blended learning and social gamification groups.
Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: a longitudinal study on intrinsic motivation, social comparison, effort, and academic performance.	Two university communication courses	Cognitive evaluation theory (Deci & Ryan, 1985)	USA, University students (n=80)	Completed surveys 4 times during the course	Leader boards and badges	Motivational, psychological and behavioural variables	<ul style="list-style-type: none"> – Students in non-gamified course demonstrated more motivation, empowerment and satisfaction than students in gamified course. – Students in gamified course received lower final exam scores than the non-gamified class. – Caution when introducing certain gamification features to instructional settings.

Attali, Y., & Arieli-Attali, M. (2015). Gamification in assessment: do points affect test performance?	Online mathematical test	Feedback as psychological intervention, locus of attention (Butler, 1987), intrinsic and extrinsic motivators	USA, adults (n=1218) and 6-8 grade middle schoolers (n=693)	Experiment	Points	Speed and accuracy of responses	<ul style="list-style-type: none"> - Point manipulation on adult participants increased the speed of responses but had no effect on the accuracy of responses - For middle school participants: no effect on accuracy and only minor effect on speed.
Denny, P. (2013). The effect of virtual achievements on student engagement.	PeerWise online repository of students generated multiple choice questions, used for undergraduate course		New Zealand, University students (n=1031)	Randomised, controlled experiment	Virtual achievement: badges	Level of participation (number of questions created and answered). Students' perceptions on the badges	<ul style="list-style-type: none"> - Positive motivational effect: increase in the number of questions answered and period engaged with the platform. - No impact on the number of questions that were authored. - Students testified enjoyment when earning badges and expressed strong preference for their availability in the user interface.
Coetzee, D., Fox, A., Hearst, M. A., & Hartmann, B. (2014). Should your MOOC forum use a reputation system.	7-week, open enrolment MOOC on edX platform "Software as a service", University of California	Extrinsic and intrinsic motivations	MOOC participants (n=1101)	Field experiment: one platform with basic forum (control) another with reputation system (experiment)	Reputation system: rewards with reputation points	Course outcomes: final grades and retention; forum participation; sense of community (self-reported)	<ul style="list-style-type: none"> - Reputation systems proved to produce real but limited benefits for MOOC forums. - Reputation systems can result in quicker answer times and higher numbers of answers per post. - Results reported that students evaluated reputation features as useful and enhancing their forum experience. - No significant difference was identified in students' subjective sense of community and final grades.
da Rocha Seixas, L., Gomes, A.S., de Melo Filho, I.J. (2016). Effectiveness of gamification in the engagement of students.	Two badging platforms: ClassDojo & ClassBadges, for Geometry subject	Behavioural, emotional and cognitive engagement (Fredricks et al., 2004)	Brazil, 8 th year elementary school students (n=61)	Field research: observations, semi-structured interviews and questionnaires	Badges	Students engagement	<ul style="list-style-type: none"> - Significantly better performance was demonstrated by those students who received more rewards from the teacher. - Gamification had positive effects on the students' engagement. - Students with the highest levels of engagement where the ones with more rewards.

Davis, K., & Singh, S. (2015). Digital badges in afterschool learning: documenting the perspectives and experiences of students and educators.	Digital badge award system for high school credits for students participation in afterschool programs serving non-dominant youth	Situated theories of learning, communities of practice (Lave & Wenger, 1991)	USA, high school students (n=43)	Interviews and focus groups with students, teachers and afterschool mentors	Digital badges	Extent of opportunities and challenges of digital badges	<ul style="list-style-type: none"> - Conversely, students with lower indexes on the indicators were those with fewer badges. - Digital badges – a way to document informal learning experiences. - Badges have potential to establish students' credibility outside the setting in which the badges were earned. - Badges can be a trustworthy record of the achievements and skills students gain in extra curriculum activities. - Yet, credibility is the main challenge associated with digital badges: in order to prove one's credibility to external audiences, e.g. to employers or higher education institution, they must be aware of badges and recognise their validity, which is not currently the case.
Domínguez, A., Saenz-de-Navarrete, J., de-Marcos, L., Fernández-Sanz, L., Pages, C., & Martínez-Herranz, J.-J. (2013). Gamifying learning experiences: practical implications and outcomes.	Gamification plug in eLearning platform Blackboard for university IT related course	Motivation theories	Spain, university students (n=196)	Controlled experiment	Trophies, badges, leader board	Course final grade and participants' attitudes	<ul style="list-style-type: none"> - Common principles about the gamification benefits in education were challenged. - Students who completed gamified experience had higher initial motivation, got higher scores in practical assignment but performed poorly on written exercise and demonstrated lower participation rates in class activities.
Mekler, E. D., Brühlmann, F., Opwis, K., & Tuch, A. N. (2013). Do points, levels and leader boards harm intrinsic motivation?: an empirical analysis of common gamification elements.	Image tagging platform	Intrinsic and extrinsic motivations (Ryan & Deci, 2000)	European University students	Online experiment	Points, levels, leader board	Users' performance (amount of tags, time spent on task), intrinsic motivation, perceived autonomy and competence	<ul style="list-style-type: none"> - Gamification elements significantly increased performance. - No effect on intrinsic motivation, perceived autonomy and competence. - Points, leaderboards, levels act as progress indicators, enhancing and guiding user performance. - Gamification features themselves neither make nor break users' intrinsic motivation in non-game contexts. - Caution for short vs. long-term impact. - Call for more research on contextual factors, which could mediate the effects of

Su, C. H., & Cheng, C. H. (2014). A mobile gamification learning system for improving the learning motivation and achievements.	Context-aware mobile learning environment in elementary school science curriculum	Social constructivists theory, Self-determination theory, ARCS (Attention, Relevance, Confidence, Satisfaction) motivational design model (Keller, 1983)	Taiwan, 4 th grade classes (n=102)	Controlled experiment, Pre and post test	Leader boards, badges and missions	Students' motivation and engagement with learning activities; learning achievements.	<ul style="list-style-type: none"> - Integrating gamification and mobile technologies into one harmonious learning process can result in increased performance and higher levels of motivation - There is a positive relationship between gamification and learning achievement as well as motivation. 	gamification elements on intrinsic motivation.
Christy, K. R., & Fox, J. (2014). Leader boards in academic contexts: A test of stereotype threat and social comparison explanations for women's math performance.	Virtual math test	Stereotype threat phenomenon, social comparison theory (Festinger, 1954)	USA, university female students (n=80)	Controlled experiment. 3 conditions: male dominant leader board, female dominant leader board, and no leader board. Pre- and post- test.	Leader boards	Math test performance; math and general academic identification	<ul style="list-style-type: none"> - Participants with female dominant leader boards performed poorly on the math test compared to those in the male leader board condition - Participants with female dominant leader boards demonstrated a higher level of academic identification than those in the male and control conditions. - Inclusion of leader boards within instructional environments can produce unexpected impacts, which can negatively affect student performance. 	
Ibanez, M.-B., Di-Serio, A., & Delgado-Kloos, C. (2014). Gamification for engaging computer science students in learning activities: a case study.	University course on C-programming language	Extrinsic and intrinsic motivations, Behavioural, affective and cognitive engagement	Spain, university students (n=22)	Mixed methods sequential explanatory protocol: logs, questionnaires, pre- and post- tests	Leader board, points, badges, phrases (from leaders in computer science) showcase area	Learning effectiveness and students' cognitive engagement	<ul style="list-style-type: none"> - Positive impact on students engagement towards gamified learning activities. - Moderate enhancement in learning outcomes. - The preferences for different gamified activities were conditioned by academic milestones. 	
Abramovich, S., Schunn, C., & Higashi, R. M. (2013). Are badges useful in education?: it depends	Intelligent tutor system for applied mathematics	Achievement goal theory (Elliot 1999).	USA, Middle school students (n=51)	Pre post surveys	Badges	Pre-ability and pre and post motivation.	<ul style="list-style-type: none"> - Learners with different levels of prior knowledge demonstrated different badges acquisition patterns. - Different badge types affected different learners' motivation. 	

upon the type of badge and expertise of learner.							<ul style="list-style-type: none">– Extrinsic motivators have a negative influence on learning.– Learners’ abilities and motivations must be considered when deciding which badges to introduce into curriculum.
O’Donovan, S., Gain, J., Marais, P. (2013). A case study in the gamification of a university-level games development course.	University course on Computer Science	Fogg’s Behaviour Model (Fogg, 2009)	South Africa, university students (n=44)	Surveys	Reward structure with badges and points, progress bars and leader boards, a storyline with visuals	Students’ final marks, attendance and a questionnaire as well as lecturer evaluation	<ul style="list-style-type: none">– All the measures were reported as positive and successful– Effective in the university environment, student marks were improved as well as their understanding of course concepts and engagement was significantly increased– Cautioned on the costs involved, both time and money, which were needed to introduce successful gamification interventions– Leader boards proved to be the highest motivator as well as experience points, the end prize and badges were least motivating

Table 2: Reviewed empirical studies in the field of gamification and learning

Considering *the area of application*, 10 studies were conducted in the higher education setting and four studies at the K-12 school level. One study examined post-curriculum learning of high school students (Davis & Singh, 2015). Within the higher education environment, gamification studies involved Information Technology disciplines (n=5), which echoes Dicheva et al.'s (2015) literature review study, reporting that gamification in education research is mainly conducted at universities involving computer science subjects and their students. However, recent gamification in education studies include more varied areas of application such as communication courses (Hanus & Fox, 2015), questionnaire design courses (Hew et al., 2016), and math tests (Christy & Fox, 2014).

Concerning *geographical context*, six studies were conducted in North America, Europe (n=4), Asia (n=2), New Zealand (n=1), Brazil (n=1), and South Africa (n=1). This corresponds to similar findings of Hew et al. (2016) who reported that gamification studies are mainly conducted in the USA and Europe.

Summarising the gamification features deployed in the analysed studies, the most common features were badges (n=11), leader boards (n=9), and points (n=5). Other gamification mechanics were also used but not that frequently: narrative (n=2), levels (n=2), trophies (n=2), challenge (n=1), reputation points (n=1), missions (n=1), progress bar (n=1), and visuals (n=1).

The most popular evaluation method among the examined studies is controlled experiments (n=8). The sample size varied among the studies, ranging from n=22 (Ibanez et al., 2014) to n=1'218 (Attali & Arieli-Attali, 2015) subjects. The methods and data used for evaluation included students' self-reported data on their experiences (Denny, 2013). Several studies employed objective measures: log files, rates of task completion, test scores and pre and post-tests (e.g., Mekler et al., 2013, Attali & Arieli-Attali, 2015; Dominguez et al., 2013; Coetzee et al., 2014; Hanus & Fox, 2015) as well as observations, interviews and focus groups (Davis & Singh, 2015; Da Rocha Seixas et al., 2016).

Regarding outcomes, the examined studies mainly attempted to measure student engagement at various levels: behavioural (n=6); cognitive (n=3), and emotional (n=2); as well as academic performance (n=4); motivation (n=2); perceptions (n=2); retention (n=1); and sense of community (n=1).

As pointed out by Hamari et al. (2014), early gamification studies mainly reported positive outcomes. Studies that are more recent provide contrasting evidence that gamified learning experiences do not always result in positive outcomes and long-term impact. This argument also reflects the current analysis of 15 studies, as only 4 of them report fully positive results (Denny, 2013; Da Rocha Seixas, 2016; Su & Cheng, 2014; Ibanez et al.,

2014), while one study reported negative outcomes (Hanus & Fox, 2015). The remaining 10 studies reported mixed findings.

Several studies did not find significant differences between control and experimental groups. Gamified learning and non-gamified learning groups tended to perform similarly (e.g., Attali & Arieli-Attali, 2015; Hanus & Fox, 2015; Coetzee et al., 2014).

Gamification on students' behavioural engagement was generally positive. Game mechanics such as badges, leader boards and points significantly affected behavioural engagement, for example in terms of the number of messages posted (Denny, 2013; Coetzee et al., 2014), and tags produced (Mekler et al., 2013). However, Dominguez et al. (2013) reported contrasting results, where the experimental (gamified) group performed better in practical tasks but poorly in the final written exam, which tested conceptual concepts explained in the course.

Hew et al. (2016) reported that the use of gamification mechanics increased participation in student discussion forums. However, there was no observed difference in terms of students' recall of information. Moreover, the authors report that gamification can have a positive effect in motivating students to engage with more intellectually challenging tasks. The quality of their artefact (questionnaire) was higher compared to the control group, which did not use gamification.

Moreover, extrinsic motivators such as rewards or feedback can affect intrinsic motivation if the individual perceives them as controlling (Deci et al., 1999). In other words, even if the feedback is positive but perceived by the person as controlling, this may decrease intrinsic motivation. However, if the reward is perceived as informational, it will contribute to the person's feelings of competence, leading to higher intrinsic motivation. Studies have illustrated that rewarding players for tasks they already find interesting may have a negative impact on the motivation for completing the task (Deci et al., 1999, 2001; Lepper, Greene, & Nisbett, 1973). In their study, Hanus and Fox (2015) found that while students from both groups (gamified and non-gamified) started with the same level of intrinsic motivation, social comparison, effort, empowerment and satisfaction, the level of motivation, empowerment and satisfaction of students in the gamified course decreased over time. However, the course type did not affect students' final grade. Hanus and Fox (2015) conclude that the use of a combination of badges, leader boards, and competition mechanisms does not improve educational outcomes. In fact, it can negatively affect motivation, empowerment and satisfaction. A study by Mekler et al. (2013) found that the game mechanics of points and leader boards did not affect participants' intrinsic motivation needs for autonomy and competence. In other words, an individual's intrinsic

motivation remains unaffected by the presence of points or leader boards (Mekler et al., 2013).

Attali and Arieli-Attali (2015) conducted a study with point manipulation in an online math test, where points were awarded for speed and accuracy of the responses. The manipulation demonstrated only minor impact on response speed but not on response accuracy. The researchers argue that they tested only one gamification feature in isolation – points – and that introducing other elements such as attractive narrative or elements of competition may influence results.

An interesting study was conducted by Davis and Sigh (2015), who argue that the external environment – e.g. beyond the education institution – offers rich context for learning (Bell et al., 2013). However, learning which takes place in informal settings is usually undocumented and not recognised beyond the environment in which it occurred (Davis & Sigh, 2015). It is a missed opportunity to connect informal and formal learning experiences (Ito et al., 2013) and to use skills and knowledge gained in informal settings to unlock further job-related or educational experiences. Davis and Sigh (2015:72) propose to use digital badges as “web-enabled digital icons containing metadata associated with specific learning goals, practices, and outcomes”, which has potential to recognise learning across different settings. The researchers interviewed and conducted focus groups with students, teachers and after-school mentors and identified the potential of badges for establishing learner credibility outside the environment in which the badges were obtained. This aspect can become a trustworthy record of the skills and achievements that students gain in after-curriculum (or after-school) programs. However, at the same time, the credibility of badges emerged as a primary challenge because in order to prove person’s credibility to outside audiences, such as potential employers or higher education admission commissions, they must recognise the validity of badges, which is not currently the case.

Thus, the effects of different gamification features are mixed. Moreover, as reported by Hamari et al. (2014), many studies related to gamification suffer from methodology related issues such as short treatment, singular evaluations, lack of comparison groups and the existence of limited validated measures. While many studies do find positive effects related to gamification, such increased enjoyment and engagement, results often depend on context and on the characteristics of participants (Hanus & Fox, 2015). As stated by Hanus and Fox (2015:160), “gamification in the classroom may be a double-edged sword”. That is, it can lower down intrinsic motivation for learners who are interested in the subject and motivated to learn. Conversely, it can increase intrinsic motivation for bored or uninterested students.

While gamification recently became popular as a pedagogical tool (Kapp, 2012), an emerging body of research suggests that gamifying learning is not always beneficial and effective (e.g., De-Marcos et al., 2016; Domínguez et al., 2013; Hamari et al. 2014; Christy & Fox, 2014). Several researchers argue that the positive claims of gamification in education are the result of a ‘novelty effect’ and that its impacts taper off over time (Hamari, 2013). More importantly, some studies demonstrated that gamification could decrease class participation and result in poorer performance in the final academic evaluation (Domínguez et al., 2013; De-Marcos et al., 2014). Contradicting evidence reported by Hanus and Fox (2015) and De Marcos et al. (2016) result in doubt as to the effectiveness of gamification. These studies caution that shallow gamification might promote superficial learning.

Theoretical perspectives informing the analysed case studies mainly rely on motivational theories such as self-determination theory, cognitive evaluation theory, extrinsic and intrinsic motivations, engagement (behavioural, cognitive and emotional), situated learning theories and communities of practice. The following chapter will provide an overview of most common theories in the field gamification and education.

5 Theoretical background

Digital games embody many aspects of contemporary learning theories and educational approaches, such as situational learning in specific meaningful contexts, promotion of inquiry-based and discovery learning, learner autonomy and self-regulation, presentation of ill-structured problems, and integration of various knowledge domains (Gee, 2003; 2008). The element of play makes games and gamification special when compared to traditional learning methodologies. Play is ubiquitous and relates to positive social behaviours (Weisberg et al., 2013). Game-based learning is usually considered as constructivist learning and is supported by theories such as (i) situated learning: games are played in a specific context and setting, the environment where learning is happening cannot be separated from the learner, and it is a social process whereby knowledge is co-constructed (Lave & Wenger, 1991), (ii) experiential learning: games support learning by doing (Itin, 1999), and (iii) activity theory: games allow learners to participate in various, complex, socially situated activities, where learning is seen to occur in exchanges that can involve humans and non-human tools and devices. The analysis of learning focuses on the activity system comprised of the subject (the learner), object, mediating artefacts, the context, control and communication (Engeström, 2000).

Engagement and motivation are usually the ultimate goals of gamification practices (Muntean, 2011). Student engagement is often considered as an essential requirement for participation and learning (Appleton et al., 2008). The construct of student engagement

encompasses multiple elements (Appleton et al., 2008; Fredricks et al., 2004), including behavioural (actual participation, attendance of courses and completing activities); emotional (interest, enthusiasm) and cognitive (understanding of the topic or subject) engagement. Despite this, student engagement is still considered one of the main challenges of educational institutions today (Lee & Hammer, 2011; Strydom et al., 2010; Hew et al., 2016). One popular suggestion of tackling this problem is the introduction of digital game elements (Gee, 2003; Prensky, 2005). However, developing dedicated digital games can be very expensive and time-consuming. Thus instead of developing fully-fledged digital games, scholars and practitioners suggest to use combinations of separate game mechanics to support engagement in real world learning (Kapp, 2012; Denny, 2013; Ibanez et al., 2014).

Thus, it is important to uncover what makes games and gamification engaging to its users and which theories support these practices specifically for learning. It is critical to understand the intrinsic (driven from within the user, mainly for the enjoyment the activity provides) and extrinsic (driven by external factors, such as incentives, higher grades, and praise from the teacher) motivations of the learner while engaged with gamified experiences (Kapp, 2012). Intrinsic motivation is experienced when the individual undertakes an activity (e.g., playing a certain game) for its own sake, and mainly for the enjoyment the activity provides. That is, the feeling of reward is experienced mainly while carrying out the activity and does not concern the outcome of the activity. Conversely, extrinsic motivation stems from external rewards, such as incentives for completing the activity. The majority of the theoretical frameworks of motivation address both types of motivations. Educators generally desire that students would be intrinsically motivated to learn, meaning that the need or ambition to learn would stem from within the students (Deci & Ryan, 2000). Intrinsically motivated students are believed to be more engaged and better able to retain information (Deci & Ryan, 2000;2004). Thus, supporters of gamification in the classroom suggest that, because of its elements of fun and entertainment, it can contribute to the intrinsic motivation to learn (McGonigal, 2011). Similarly, a considerable body of research cautions against applying gamification for learning because competition, incentives and rewards have been proved to decrease intrinsic motivation (Deci et al., 2001).

The following sections specifically discuss four theories that commonly inform gamification activities in the field of education: (i) Malone's theory of intrinsically motivating instruction, (ii) the taxonomy of intrinsic motivations for learning, (iii) self-determination theory, and (iv) flow theory.

Malone's theory of intrinsically motivating instruction

Malone (1981) investigated what makes games fun and motivating to play. He identified three principal elements that make games intrinsically motivating: (i) challenge, (ii) fantasy, (iii) curiosity.

- *Challenge* concerns the uncertainty of outcome. If the learner knows the outcome of using an application or that they will not achieve a certain goal, they will not feel challenged. In order to make an outcome uncertain, variables such as hidden information, various difficulty levels, or randomness could be introduced. Challenge is also related to individual perceptions of the user. The goals of using a certain application should become personally meaningful to the learner and obtained knowledge during the challenge should empower the learner and enhance their self-esteem.
- *Fantasy* concerns an environment that evokes vivid mental images of things related to learning materials. Such an environment has the capacity to make instructional application more engaging and provides emotional and cognitive advantages. It can also help improve a learner's memory of the material. In terms of cognitive advantage, instruments such as metaphors can help learners to apply existing knowledge to understand new things.
- *Curiosity*. The gaming environment should provide optimal informational complexity, which would evoke learner curiosity throughout the process. Curiosity, according to Malone (1981), can be sensory or cognitive. Cognitive curiosity can help learners understand that their knowledge structures are inconsistent and incomplete. This motivates them to improve their cognitive structures. Sensory curiosity highlights the maintaining interest in the senses by presenting rich sensory environment and engaging as many as possible sensory modalities.

The taxonomy of intrinsic motivations for learning

In 1987, Stanford University researcher Lepper elaborated on Malone's theory, and proposed design principles such as: (i) control, (ii) challenge, (iii) curiosity, and (iv) contextualisation. These principles invoke intrinsic motivation within games and avoid relying on extrinsic motivational drivers. Later, Malone and Lepper combined their research findings and proposed the "Taxonomy of Intrinsic Motivations" (Figure 13). The taxonomy is composed of two sections. The first includes intrinsic motivations such as (i) challenge, (ii) curiosity, (iii) control, and (iv) fantasy, and the second includes interpersonal motivations such as (i) cooperation, (ii) competition, and (iii) recognition (Figure 13).

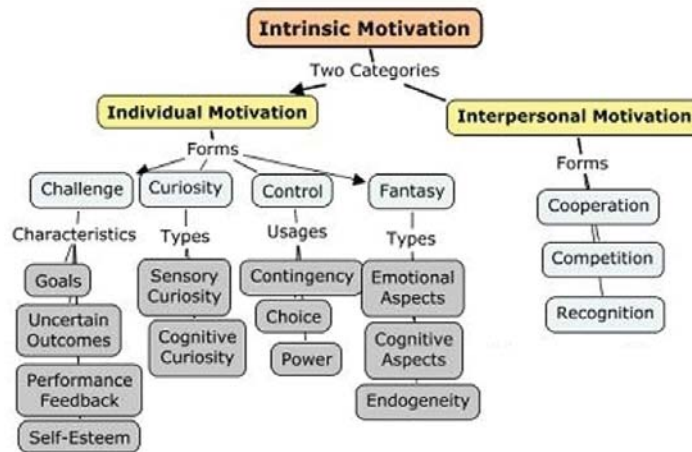


Figure 13: Taxonomy of intrinsic motivations for learning (Malone & Lepper, 1987)

Self-Determination Theory (SDT)

Furthermore, *Self-Determination Theory of motivation (SDT)* is often used to explain human motivations to perform an activity or task. It is widely accepted theory that has been applied in a range of social science domains such as education, healthcare, and sports. SDT explains the intrinsic motivations of performing activities or tasks. The theory examines the extent to which individual behaviour is self-determined and self-motivated (Deci & Ryan, 2002). The theory argues that individuals have certain basic needs. When these needs are met by certain conditions or activities, individuals will find them meaningful and continue to partake in them (Skinner & Pitzer, 2012). Conversely, if the setting or activity does not meet these needs, individuals may become dissatisfied and will abandon the activity (ibid.) According to Deci and Ryan (2004), three psychological innate needs motivate individuals to initiate behaviour:

- *Competence*: the need of a human being to be challenged and to attain ‘mastery’ through acquiring new skills. Competence is a strong predictor of a person’s cognitive and behavioural engagement (Hew, 2016; Wigfield et al., 2006).
- *Autonomy*: the feeling that a person has control and determines the outcomes of their actions. Persons with greater sense of autonomy enjoy more and have higher levels of behavioural engagement when partaking in activities (Skinner et al., 2008).
- *Psychological Relatedness*: the individual needs to interact and connect with others. People who have a greater sense of relatedness will demonstrate higher levels of enjoyment when performing activities (Hew, 2016; Skinner et al., 2008).

Flow Theory

Flow Theory significantly informs gamification design. Flow is a mental state of full immersion with complete focus on the task (e.g., playing a video game) (Csikszentmihalyi, 1990). Flow concerns full mental involvement with an activity with continuous engagement during the process: the perfect state between anxiety and boredom (Figure 14). Flow also concerns the balanced state between players' abilities and skills compared to the challenge level of the tasks. While it is challenging for game designers to incorporate flow elements, video games typically strive to include aspects of flow. According to Csikszentmihalyi (1990), eight components enable a state of flow:

1. *Achievable task* – individuals must believe that it is possible for them to accomplish the task/activity with a certain degree of effort.
2. *Concentration* – the human in a flow state is so focused that surrounding distractions disappear.
3. *Clear goals* – the person knows what they must do in order to achieve the goal.
4. *Feedback* – immediacy and continuity of feedback are essential, so that the engaged person constantly knows if they are moving in the right direction.
5. *Effortless involvement* – if different tasks correspond well to respective skills and abilities in the flow state, the person should perceive it as effortless.
6. *Control over actions* – players feels in absolute control of their actions and believe that every move has purposeful and immediate results.
7. *Concern for self disappears* – in the state of absorption, a player thinks only about the activity and nothing else.
8. *Loss of senses of time* – the person is so engaged with the activity that they lose the perception of time.

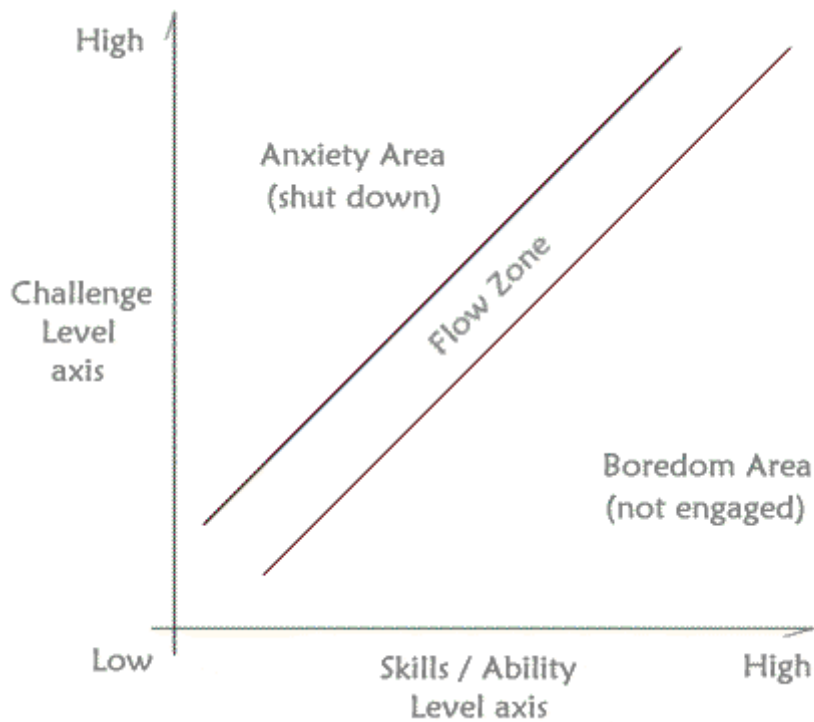


Figure 14: Flow theory: the state between anxiety and boredom (Csikszentmihalyi, 1990).

Overview of gamification related theories:

<i>Theory</i>	<i>Impact on gamified experiences design</i>
Theory of intrinsically motivating instruction (Malone, 1981)	Includes elements of: challenge, fantasy, and curiosity.
Taxonomy of intrinsic motivations for learning (Malone & Lepper, 1997)	Includes internal (challenge, curiosity, control, fantasy) and external (cooperation, competition, recognition) motivation elements.
Self-Determination Theory (Deci & Ryan, 2002)	Includes human needs for feelings of competence, opportunities for autonomy, and relatedness with others.
Flow Theory (Csikszentmihalyi, 1990)	Underlines the importance of finding the right balance between difficulty of tasks and skills of the player to keep them in constant state of interest.

Table 3: Overview of gamification related theories and their impact on gamified experiences design.

5.1 Gamification elements

Based on the abovementioned theories, various authors (Kapp, 2012; Nah et al., 2014; Lee & Hammer, 2011) identified and listed the most common gamification elements used in education:

- *Rewards*. This concept describes the feedback and/or incentive arrangement within the gamified application that encourages users to continue and that can support a high level of motivation. Even negative rewards, which could be considered as punishment within the game, can facilitate learning. In their study, Yusoff et al. (2010) revealed a strong correlation between reward and the transfer of learnt skills: reward supported the transfer of skills and the transfer of skills was in turn rewarding. As argued by Kapp (2012), it is better to provide the user with smaller multiple rewards, distributed throughout the game instead of one big prize. Thus, *points and badges* are common gamification features, and serve as a form of rewards while progressing through the game and measuring gradual achievements and success.
- *Challenge* is the extent to which user skills match the challenges presented by the digital game (Kiili, 2005; Csikszentmihalyi, 1990). Appropriate challenges will keep the player engaged and motivated throughout the game and the playfulness of the experience will be higher (Woszczynski et al., 2002). Thus, if the application is too challenging the user may become frustrated quickly. On the contrary, if the application is not challenging enough the user may become disinterested. Elements of challenge within games are often supported by different difficulty *levels*.
- *Feedback* is a typical game feature, which is usually instant, clear and direct. Based on feedback, players can make certain decisions, that is, change or correct their playing behaviour. Educational gamification researchers argue that the immediacy and frequency of feedback contributes to greater learner engagement, effectiveness and attainment of the flow state (Nah, 2014; Kapp, 2012; Csikszentmihalyi, 1990).
- *Competition* among players is a common game element, where each participant strives to optimise their performance and to attain the best possible achievement against the other participants. The competition is often intensified with another gamification feature: *leader boards*. The leader board is a social component embedded into the digital game, consisting of a list of players with top scores. All game participants are able to see the leader board. According to game designers, leader boards can be powerful motivators for players, pushing them to play repeatedly in order to get to the top of the list. Humans, by nature, tend to judge themselves and others via comparison. Social comparison theory suggests that people compare themselves to other individuals in order to validate opinion,

reduce uncertainty or to make judgment (Festinger, 1954). Social comparison can be downward: we compare ourselves to those who are worse, or upward: with those who are better. Downward comparison can invoke positive effects and feelings of superiority, whereas upward comparison can have negative effects and lower self-confidence (Dijkstra et al., 2008).

Social comparison leads to competition. When social comparison is presented on a mutually relevant dimension (e.g. exposed leader board) and of equal status, it facilitates competition. The element of competition is often used in educational settings to invoke motivation. However, some scholars caution that competition can also diminish academic performance, skills of collaboration and problem solving (Orosz et al., 2013). There are two identified types of competition: 1. Constructive: structured in a way to achieve and cultivate interpersonal relationships; and 2. Destructive: least one participant experiences harmful consequences. There are different opinions regarding leader boards to facilitate constructive competition because they typically emphasise the achievements of single participants, which may facilitate destructive competition.

- *Replay* is also a common characteristic of games, allowing participants to try again and better their score.
- *Visual aesthetics*, which include visual elements and the overall look and feel that create an appealing and immersive environment, also influences the overall user experience.
- *Time or timer*: a motivator that puts players under pressure and makes them focus and take action.
- *Narrative* is the story line behind the game application, which serves to pique learner interest and motivation. Narrative contextualises the learning process and problem-solving task, and can illustrate the real world applicability of learnt concepts.

5.2 Gamification research in South Africa

In their 2012 report “*South African entertainment and media outlook: 2013-2017*”, PricewaterhouseCoopers stated that video games (including consoles, personal computers, online and mobile games) have generated R2.2 billion (USD176 million) revenue in South Africa and is estimated to grow another 9% until 2017. Although video games is a growing industry in the country, online gaming, consoles and PC games lag behind mature markets such as Western Europe. This is mainly due to the low level of broadband access in the country as well as stark socio-economic inequalities among the South African population. South Africans mainly access the internet through their mobile devices; and it is forecast to remain the leading outlet for gaming due to high penetration of mobile technology in

the country. While broadband limitations constrain the growth of online games in the country, this has had a positive impact on the older console market. For example, the PS3 or Xbox360 gaming experience is equally good, regardless of whether users are connected. For newer console and PC games, however, decent connectivity is essential. Conversely, the console market tends to cater to higher income consumers.

Because the empirical part of this research was conducted in South Africa, the author performed an in-depth review on digital play and gamification literature in the country.

Non-digital play

Digital games are still considered a minority practice in South Africa (Walton & Pallitt, 2012), given the country's socio-economic inequalities. Therefore, it remains important to acknowledge non-digital play as it constitutes the present-day reality of many young learners. Three considered authors (Prinsloo, 2004; Janks, 2006; Harrop-Allin, 2011) documented non-digital gameplay in South Africa mainly as a form of literacy.

For example, Harrop-Allin (2011) studied the use of games for music education in primary schools. The author documented the influence of music games as rich cultural practices, embodying children's identities that have the potential to develop children's musicality. Prinsloo (2004) observed and analysed South African children in an economically disadvantaged area and examined playing as evolving literacy practices. During gameplay, children were able to model and mediate semiotic practices with available resources. This allowed them to experiment and create meaning in a situated context. Janks (2006) described a case study of multilingual and multimodal pedagogy, on how children from grade 4 in a South African disadvantaged area produced a video archive and a book about their games. The author argues for the importance and ability of using games for learning in the context of limited material resources. The presented scholars see play and games as constructive practices and appropriate games as a form of literacy, involving the perspective of play as development and progress.

Digital play in South Africa

Thinyane (2010) raised the question of whether digital natives are a worldwide phenomenon. The notion of "digital natives" was first proposed by Prensky (2001), who referred to a new generation of youth that have been exposed to technology since their birth. He described them as "native speakers of technology, fluent in the digital language of computers, video games, and the Internet" (2005:8). Thinyane (2010) surveyed 290 first-year students in two South African universities, asking about their access and use of technology. Results indicated that the student population is heterogeneous and that the

assumption that students entering university had a similar digital upbringing is false. Students who complete their secondary education in disadvantaged and under-resourced areas of South Africa only tend to gain computer exposure once they enrol at universities. The author argues that local university students may have similar experiences as their global peers, but that there is not enough research on technology usage at the secondary school level. The author concludes that digital natives do not use technology in the same manner in South Africa as Prensky described (2001; 2005).

In 2009, Kreutzer surveyed 422 Grade 11 students from disadvantaged areas in Cape Town. 94% of the respondents stated that they played games on their mobile phones. More than half of them played daily and 43% said that it is their most frequent activity on their cell phone. The most popular games were free and pre-installed, like Snake. Other popular games were low-cost and mainly copied via Bluetooth or from WAP.

Walton and Pallitt (2012) argue that while play and games are universal, studying them in South Africa requires a more context-sensitive approach. In their game research, they focused on the diversity of the youth in the country and their highly differentiated use of technologies for gaming. They build their research on existing data that describes income inequalities and its influence on consumption patterns, which as a result shapes engagement with digital games. The authors presented two case studies: two groups of children from different socio-economic backgrounds in Cape Town. Researchers observed interesting dynamics when narratives of global games are appropriated in the cultural context of South Africa among highly fragmented groups. The authors suggest addressing different identification practices in the processes of playing games such as status, prestige, and shame. According to Walton and Pallitt (2012), the South African context calls for consideration of three separate matters: (1) gaming infrastructures: the access to digital gaming infrastructure is unequal; (2) strength of mediatisation: daily playing practices in South Africa involve “multiliteracies”, i.e. the use of various semiotic modes such as multilingual communication, gestures, and dance; and (3) assumptions about play as progress, i.e. the notion of play as cognitive development. The research revealed that play is mediated in both less and more advantaged contexts: arcade-type mobile games in townships, and console games with elaborate narratives in more affluent suburban schools.

Digital educational games

Another stream of research identified in the South African context was the use of digital educational games. In his study, Amory (2010) used activity theory to investigate educational computer games and observed cultural and social interaction during play. The focus of this analysis was not the game itself but the kind of engagement the game would create. Amory (2010) conducted the study with 12 teenage orphans from disadvantaged

areas in South Africa. The students participated by playing a complex video game on health related concepts for more than 6 hours, by keeping personal diaries and answering knowledge tests. The author concluded that the digital game mediated learning, that participants were able to gain new knowledge, and that they recognised how this knowledge could help them in their communities. Amory stated that knowledge construction happened when digital games operated as mediating tools. He concluded that video games should be used as tools, which mediate learning by collaboration, discussion and questioning in a setting of social constructivist learning.

In their study, Verkijika and De Wet (2015:114) examined the “serious crisis of mathematics education” in South Africa. According to the authors, some learning components such as math anxiety were often overlooked in previous research. They provide empirical evidence of other studies proving that math anxiety significantly affects math performance; and that previous research demonstrated that math anxiety could be mitigated through training provided by skilled professionals. The authors tested a commercial brain-computer interface (BCI) device, which captures human emotions, and evaluated its potential for reducing math anxiety. A longitudinal research design with eight data collection moments was employed to determine changes in participants’ math anxiety levels. Two sessions took place on different days and data was gathered using an educational math game for training. 36 children aged between 9 and 16 participated in the study. The researchers found evidence that math anxiety could be managed and reduced with the aid of a BCI-based mathematics educational game. While authors promote the BCI math-mind game as a potential home-based solution, they do not address wider socio-economic challenges that could hamper the diffusion of such a solution. The researchers further suggest that computer anxiety must also be addressed, as many South African students are not computer literate.

Gamification

Regarding the use of gamification in education, only one study was identified in the South African context. O’Donovan et al. (2013) conducted a case study on the gamification of a university Computer Science course. The course was gamified to improve content understanding, engagement, lecture attendance as well as problem solving skills. The authors problematize the lack of engagement at the university level; an area they claim to be neglected. They decided to experiment with the introduction of gamification elements in the course to address lacking engagement. Various techniques were introduced throughout the course: reward structure with badges and points, progress bars and leader boards, and a storyline with visuals. The measures for impact evaluation were students’ final marks, attendance, a questionnaire, as well as a lecturer evaluation. All the measures were reported as positive and successful. However, the authors cautioned on the costs and

resources needed to introduce successful gamification interventions. The reported results showed that gamification could be effective in the university environment: students' marks improved as well as their understanding of course concepts. Student engagement was also shown to increase. Concerning specific gamification techniques, leader boards proved to be the highest motivator as well as experience points. The end prize and badges were least motivating.

Ultimately, there is a paucity of scientific literature on play and digital gaming in the South African context, with the exception of a few empirical studies. The literature on play and games in South Africa mainly focuses on children in disadvantaged and under-resourced areas of the country. Regarding gamification applications in education, only one study was identified. Thus, further research in this area is needed.

6 Technology acceptance in education

Policymakers and leaders invest a great deal of energy and funds to equip schools with ICT. These stakeholders recognise ICT as a vital resource and infrastructure, especially for emerging countries such as South Africa. ICT contributes to economic development and underpins the capability to compete in a globalised world (AFD, AUF, UNESCO & Orange, 2015). Initially, when technology was introduced into education, it was mainly for administrative tasks. Yet, with the continuous penetration and advancement of technology, ICT use has shifted toward interactive instructional platforms and tools, which facilitate more self-regulated learning and engagement (ibid.). Technology can potentially create various authentic and innovative learning opportunities for students. However, this can pose a challenge for educators, as they need to be skilled and confident to apply technology for teaching and learning. Furthermore, material access to technology is not solely sufficient to improve technology uptake for teaching purposes or to increase student engagement (Weston & Bain, 2010).

The majority of the conceptual frameworks in the area of technology adoption originate from the *Theory of Reasoned Action (TRA)*, which derives from social psychology and describes human social behaviour (Fishbein & Ajzen, 1975). The core assumption of TRA is that behavioural intention is rooted in a person's attitudes and subjective norms. Eventually, such intentions lead to actual behaviour (Figure 15). Hereafter, behavioural intention is the weighted sum of beliefs concerning particular behaviour (attitudes) and weighted perceived social norms, that is, the influence of people in one's surroundings (subjective norm), on the related specific behaviour.

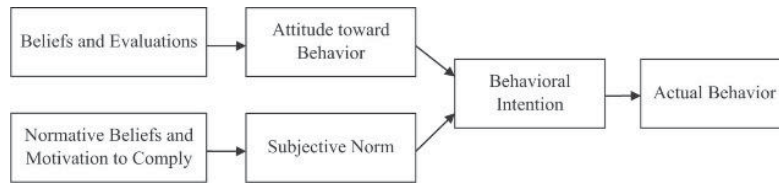


Figure 15: Theory of reasoned action (Fishbein & Ajzen, 1975).

Building on the foundations of TRA, Ajzen (1991) introduced the *Theory of Planned Behaviour (TPB)*, adding the component of “perceived behavioural control”. This concept originated from self-efficacy studies (Bandura, 1977), and more specifically from Social Cognitive Theory. Perceived behavioural control refers to person’s belief in their ability to perform a particular behaviour successfully. Bandura (1977) states that self-efficacy is the most important prerequisite for behaviour change. Hence, TPB explains behavioural intention through the contribution of attitudes towards behaviour, subjective norms and perceived behavioural control (Figure 16).

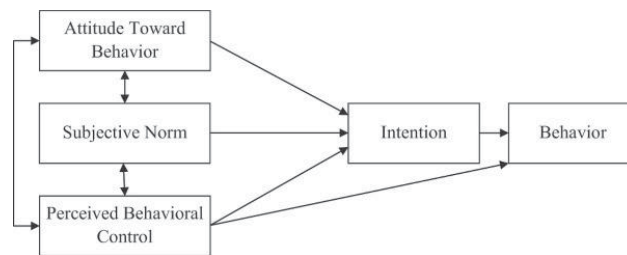


Figure16: Theory of Planned Behaviour (Ajzen, 1991)

In 1989, Fred Davis introduced the *Technology Acceptance Model (TAM)*. TAM is based on many of the assumptions underlying TRA, and aims to explain how users adopt and use technology. TAM explains behavioural intention in terms of perceived usefulness (“the degree to which a person believes that using a particular system would enhance his or her job performance”) and ease of use (“the degree to which a person believes that using a particular system would be free from effort”) (Davis, 1989:230). The model has proved to be robust and efficient with the ability to explain about 40% (on average) of the variance in intention to use and actual behaviour around specific technology (Venkatesh & Davis, 2000). In the field of information systems, TAM became one of the most applied and empirically validated models, and has been used to study different technologies in various different contexts (Legris et al., 2003).

TAM has also been the subject of much critique, including for containing too few elements, which consequently limits its ability to explain the intentions to adopt certain

technologies. According to Legris et al. (2003), TAM findings are not always consistent and this is due to the model's incapability to address contextual, organisational, individual, technological, and task characteristics. One way of responding to this criticism and increasing TAM's predictive power was the introduction of other variables and expansion of the model. Sumak et al. (2011) conducted a meta-analysis on TAM studies in the field of eLearning adoption and extracted a list of more than 14 antecedents of perceived ease of use and usefulness.

The original TAM model was extended by introducing additional variables (Figure 17). TAM2 (Venkatesh & Davis, 2000) included cognitive instrumental and social influence processes. In 2003, Venkatesh and colleagues attempted to unify technology acceptance related theories (TAM, TRA, TPB, model of personal computer utilisation, and innovation diffusion theory), which resulted in the Unified Theory of Acceptance and Use of Technology (UTAUT). TAM3 theorises new theoretical links among variables such as the moderating impact of experience (Venkatesh & Bala, 2008).

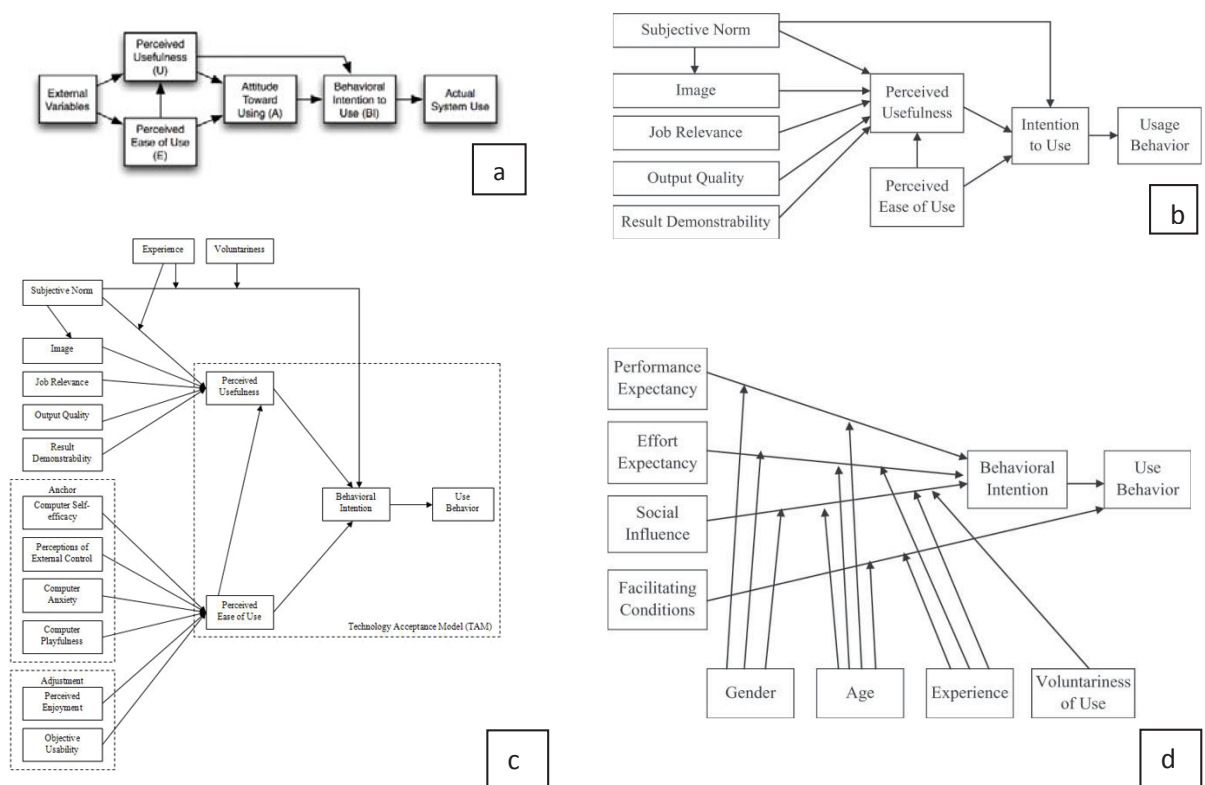


Figure 17: Modification of technology acceptance model: a) TAM, b) TAM2, c) TAM3, d) UTAUT

TAM was criticised mainly for its parsimony and exclusion of important factors in the technology adoption process. Conversely, UTAUT has been criticised for including too many variables and for its lack of parsimony. Thus, the biggest challenge when applying TAM related approaches lies in identifying and selecting relevant determinants in the research context. Moreover, TAM originated in the business environment, which has different goals compared to those of education. Therefore, various researchers have argued that TAM variables do not really reflect the motivations of educators to accept certain technologies for instruction (Teo, 2011). For instance, the variable of ‘usefulness’ in TAM refers to job performance rather than teaching practices. Scholars argue that technology acceptance in the classroom depends on teachers’ beliefs that it will better fulfil curriculum objectives (De Smet et al., 2011; Teo, 2011).

7 Gamified learning acceptance

Various scholars have argued that individuals play an essential role in ICT adoption decision; the teacher’s role is therefore critical in adopting ICT and related gamified applications in the school (De Grove et al., 2012; Li & Huang, 2016; Bourgonjon et al., 2013). In order to identify the main factors that influence teacher acceptance of gamified learning, 12 studies were compiled as part of a literature review (Table 4). The main criteria for inclusion were quantitative studies in the education field, with teachers as subjects assessing their behavioural intention to use gamified applications. However, there is a paucity of quantitative studies on the gamification acceptance of educators. The criteria to include only studies on gamification were expanded to include studies that tested acceptance of commercial digital games for learning as well as the adoption of teaching blogs, digital and interactive learning environments, and blended learning. These studies included constructs of playfulness, flow, and innovativeness, which are strong determinants in gamification.

<i>Study</i>	<i>Country, subjects, sample</i>	<i>Analysis method</i>	<i>Dependant variable</i>	<i>Constructs</i>	<i>Main findings</i>
F. De Grove, J. Bourgonjon, and J. Van Looy (2012). "Digital Games in the Classroom? A Contextual Approach to Teachers' Adoption Intention of Digital Games in Formal Education"	Belgium; Secondary school teachers (n=409), principals (n=60)	Structural equation model (SEM)	Behavioural intention to use digital games in formal education	(1) Usefulness (2) Ease of use (3) Experience (4) Learning opportunities (5) Curriculum-relatedness	<ul style="list-style-type: none"> Factors on the school level showed no effect. Previous experience and curriculum-relatedness were the main determinants influencing adoption intention.
J. Bourgonjon, F. De Grove, C. De Smet, J. Van Looy, R. Soetaert, and M. Valeke (2013) "Acceptance of Game-Based Learning by Secondary School Teachers"	Belgium; Secondary School teachers (n=505)	SEM	Behavioural intention to use game-based learning	(1) Usefulness (2) Complexity (3) Experience (4) Learning opportunities (5) Personal innovativeness in the domain of IT (6) Subjective norms (7) Critical mass	<ul style="list-style-type: none"> Strongest predictor for teachers' behavioural intention to use video games in the classroom was usefulness. Complexity did not yield a significant effect on teachers behavioural intention.
Hamari, J., & Nousiainen, T. (2015). "Why Do Teachers Use Game-Based Learning Technologies? The Role of Individual and Institutional ICT Readiness."	Finland; Primary and secondary school teachers (n=1668)	SEM	Game-based learning value and use	(1) Openness towards ICT (2) Supportive organisational ICT culture (3) Educational ICT self-efficacy (4) Attitude towards ICTs (5) Perceived compatibility of ICT with teaching	<ul style="list-style-type: none"> ICT attitude, openness towards ICT and ICT compatibility with teaching positively influenced the perceived value of game-based learning technologies. The actual use of game-based learning technologies was positively influenced by teachers' ICT self-efficacy, openness towards ICT, supportive organisational culture, and ICT compatibility with teaching. The model explained little of the variance of the dependent variables suggesting that the selected predictors might not be the most relevant.
Li, S.-C.S., Huang, W.-C. (2016). "Lifestyles, innovation attributes, and teachers' adoption of game-based learning: Comparing non-adopters with early adopters, adopters and likely adopters in Taiwan."	Taiwan; Elementary school teachers (n=15) for interviews & (n=307) survey	Factor analysis	Adoption of game-based learning	(1) Being fashionable (2) Life expansionists (3) Non-media sceptics (4) Enhance teaching (5) Ease of use (6) Social norm (7) Compatibility and interactive (8) Age (9) Seniority	<ul style="list-style-type: none"> Lifestyles, perceived attributes of game-based learning and demographics are significant predictors of adoption. Non-adopters were more likely to be older, better educated males with more teaching experience, but no experience with video games.

Proctor, M., & Marks, Y. (2013). "A survey of exemplar teachers' perceptions, use, and access of computer-based games and technology for classroom instruction."	USA, primary and secondary school teachers (n=259)	Descriptive statistics; chi-square test, Wilcoxon signed rank test	Perceptions, usage and access to computer games for instruction	(1) Usefulness (2) Ease of use	<ul style="list-style-type: none"> Teachers believe games are easy to implement and useful. Teachers gave higher mean values for the construct of ease of use than on usefulness scale. Games were perceived as more useful by K-5 teachers than by the K6-12 educators. Teachers' belief about games' usefulness as well as teachers' level of access to digital games were reported as the best predictors classroom game adoption.
Jagger, S., Siala, H., & Sloan, D. (2015). "It's All in the Game: A 3D Learning Model for Business Ethics."	UK; Students of business ethics (n=100)	Descriptive statistics, multiple regression analysis; focus group	Situated learning	(1) Ease of use (2) Perceived playfulness (3) Perceived practicability of learnt skills and knowledge (4) Reward (5) Situated learning (6) Transfer of learnt skills (7) Perceived usefulness	<ul style="list-style-type: none"> Students reported that the game was beneficial to their ethics learning with potential to develop skills and knowledge which are applicable to the real world. Rewards as well as students' perceived practicability of learnt skills and knowledge had significant positive influence on game driven situated learning.
Lai, H.-M., and Chen C.-P. (2011) "Factors Influencing Secondary School Teachers' Adoption of Teaching Blogs"	Taiwan; Secondary school teachers (n=325)	Discriminant analysis	Adoption of teaching blogs	<i>Individual Characteristics:</i> (1) Codification effort (2) Loss of knowledge power (3) Reputation (4) Enjoyment in helping others (5) Knowledge self-efficacy (6) Personal innovativeness <i>Technological characteristics:</i> (1) Perceived usefulness (2) Perceived ease of use (3) Compatibility (4) Perceived enjoyment <i>School characteristics:</i> (1) School support (2) School incentives <i>Environmental characteristics:</i> (1) Supervisor influence (2) Peer influence	<ul style="list-style-type: none"> The main drives strongly associated with teachers' decisions to adopt teaching blogs: perceived enjoyment, perceived ease of use, codification effort, compatibility, personal innovativeness, enjoyment in helping others, school support and perceived usefulness.
De Smet, C., Bourgonjon, J., De Wever, B., Schellens, T., & Valcke, M. (2011). "Researching instructional use and the technology	Belgium; Secondary school teachers (n=505)	SEM	Instructional and communicational use of	(1) Perceived usefulness (2) Perceived ease of use (3) Subjective norm	<ul style="list-style-type: none"> Informational use is precursor for communicational use.

acceptation of learning management systems by secondary school teachers.”		learning management systems	(4) Personal innovativeness toward IT (5) Internal ICT support (6) Experience	<ul style="list-style-type: none"> – Perceived ease of use of the learning management systems is the strongest predictor in their acceptance. – Internal ICT support has a direct influence on subjective norm as well as on the informational use of LMS. – In order to assess LMS adoption high school managers have to take into consideration the required teachers’ efforts, their performance perceptions as well as impact of internal ICT support.
Pynoo, B., Devolder, P., Tondeur, J., van Braak, J., Duyck, W., & Duyck, P. (2011). “Predicting secondary school teachers’ acceptance and use of a digital learning environment: a cross-sectional study.”	Belgium; Secondary school teachers (n=72/64/55)	Path analysis and logs	(1) Performance expectancy (2) Effort expectancy (3) Social influence (4) Facilitating conditions (5) Attitude (6) Self-reported use	<ul style="list-style-type: none"> – Performance expectancy and social influence by superiors were identified as the main predictors of digital learning environment acceptance. – Facilitating conditions and effort expectancy were identified of minor importance. – To maximise the use of digital learning, its usefulness should be demonstrated.
Padilla-Meléndez, A., del Aguila-Obra, A. R., & Garrido-Moreno, A. (2013). “Perceived playfulness, gender differences and technology acceptance model in a blended learning scenario.”	Spain; University students (n=484)	Intention to use Moodle as blended learning	(1) Perceived playfulness (2) Perceived usefulness (3) Perceived ease of use (4) Attitude	<ul style="list-style-type: none"> – No significant difference was found in perceived ease of use and usefulness with relation to gender. – Students from non-technical faculties had higher ratings on playfulness than those from technical faculties. – Students from technical faculties demonstrated greater intention to use the system.
Agbatogun, A. O. (2010). “Self-concept, computer anxiety, gender and attitude towards interactive computer technologies: A predictive study among Nigerian teachers.”	Nigeria, secondary school teachers (n=454)	Attitudes towards ICTs	(1) Self-concept (2) Computer anxiety (3) Attitudes towards ICT (4) Gender	<ul style="list-style-type: none"> – Self-concept and computer anxiety significantly predicted the attitudes towards ICTs. – Gender did not prove to be a significant contributor to the prediction of the attitudes towards ICTs.
Sánchez-Franco, M. J., Martínez-López, F. J., & Martín-Velicia, F. A. (2009).” Exploring the impact of individualism and uncertainty avoidance in Web-based electronic learning: An empirical analysis in European higher education.”	European educators. Nordic (n=304), Mediterranean (n=376)	Behavioural intention to use web-based eLearning	(1) Usefulness (2) Flow (3) Attitudes (4) Ease of use	<ul style="list-style-type: none"> – Attitudes and behaviours towards using web-based applications were significantly impacted by cultural differences. – The Nordic culture is driven more by instrumental factors and intrinsic enjoyment-based factors.

							– Mediterranean culture (Portugal, Spain and Greece) regarded web more as a means to a social end.
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Table 4: Reviewed quantitative studies in the field of teachers’ acceptance of gamified learning

The literature review on teachers' acceptance of technology, with specific focus on digital games and gamified applications for teaching purposes, has demonstrated that the determinants impacting the adoption process can be categorised into: 1. factors at individual teacher level: attitudes, experience, skills (technological know-how); 2. system related matters: playfulness, appropriate challenge, relatedness to the curriculum, offered learning opportunities; 3. context related aspects: organisational culture and support, and student preparedness. Because the majority of the reviewed studies originate from TAM research, the main constructs such as ease of use and usefulness will not be discussed in detail. The goal of the current research was not to augment the TAM model but to identify other common determinants underlying teachers' behavioural intention to accept digital gamified learning.

7.1 Individual differences

Various individual differences related to ICT usage receive extensive attention in the research related to technology and gamified learning adoption. These refer to individual personality traits, demographics as well as factors such as training and experience. The following aspects recurred frequently in the reviewed studies.

Skills and prior experience

Scholars argue that technological skills related to operating digital games are an important determinant (De Grove et al., 2012; Bourgonjon et al., 2013; De Smet et al., 2011). Prior experience can influence technology acceptance in several ways (Thompson et al., 1991): (1) directly, (2) indirectly through attitudes, and (3) as a moderating factor between the intention to adopt and the antecedent construct. Venkatesh et al. (2003) reasoned that once people gain experience with a certain technology, their attitudes are adjusted toward that technology, and that individuals with no experience will reason on general information regarding that technology. Moreover, the more a person has experience with a particular technology, the better their assessment of the provided benefits of that technology (ibid.). Similarly, prior experience with digital games for teaching can potentially affect the acceptance of other digital games in education (Bourgonjon, 2010). Becker (2007) argued that teachers' prior experience with playing games influenced their willingness to adopt games in the classroom. Thus, to integrate digital games into education successfully, teachers need to be trained accordingly (Ketelhut & Schifter, 2011; De Grove et al., 2012).

Personal innovativeness in the domain of information technology

Personal innovativeness in the domain of information technology is a construct introduced by Agarwal and Prasad (1998: 206), which is defined as “the willingness of an individual to try out any new information technology”) or as an openness to change. The researchers examined this construct in business and management, as well as in education, by studying teachers’ acceptance of game-based learning (Li & Huang, 2016; Bourgonjon et al., 2013; Hamari & Nousiainen, 2015), and teachers’ adoption of learning management systems (De Smet et al., 2011). Lai and Chen (2011) demonstrated that personal innovativeness is one of the key determinants influencing teachers’ decisions to adopt a teaching blog for educational purposes. Generally, game-based learning is still considered a new strategy for teaching and learning in formal education, and many teachers do not have experience with it (Hamari & Nousiainen, 2015; Bourgonjon, 2013). This can impede the adoption process. Moreover, games constantly change and evolve; it is highly dynamic field, which requires willingness to experiment and explore. Therefore, it is assumed that the more teachers are willing to experiment and are open to new technology, the higher the rate of adoption.

Self-efficacy

Another common determinant identified is self-efficacy (Hamari & Nousiainen, 2015; Lai & Chen, 2011; Agbatogun, 2010). The construct of self-efficacy originated from social cognitive theory (Bandura, 1977), which refers to a person’s belief in their ability to perform a particular behaviour successfully. Bandura (1986) proposed the theory of human functioning, which is a dynamic interplay of personal, behavioural and environmental factors; it offers an agentic perspective, which means that humans can determine the course of their actions. Self-efficacy is argued as an important determinant of individual motivation, action and affect (Bandura, 1986). Moreover, it plays a major role in how challenges, goals and tasks are approached. Thus, people with high self-efficacy tend to believe that they can handle challenging issues and are able to recuperate faster from setbacks. Conversely, people with low self-efficacy do not believe that they can perform complex and challenging tasks well, and are less confident in approaching them (Bandura, 1986; Schunk & Pajares, 2009). Because of its significance in predicting human behaviour, self-efficacy has been extensively investigated in the education field (Klassen et al., 2011, Fanni et al., 2013). For example, technology acceptance by teachers is influenced by teachers’ computer self-efficacy (teachers’ perception of their ability to use computers) (Teo, 2011). ICT self-efficacy was found to influence the actual use of game-based learning technologies in a positive manner (Hamari & Nousiainen, 2015).

Technology anxiety

The fear or anxiety of using of using computer related technologies (Leso & Peck, 1992) defines the concept of computer anxiety, which is also a common factor inhibiting ICT integration in educational settings (Agbatogun, 2010; Azarfam & Jabbari, 2012). Scholars have found that technology experience and skills are inversely related to technology anxiety (Shah et al., 2012; Ekizoglu & Ozcinar, 2010). However, some researchers argue that the increasing use of technology for teaching may in turn increase technology anxiety, as teachers become more aware of the multiple possibilities technology can offer (Cotten et al., 2011). Computer anxiety can influence the use of computer related applications because it is an affective response. Agbatogun (2010) reported that computer anxiety affected the attitudes of Nigerian teachers toward interactive computer technologies in a negative sense.

7.2 System related characteristics

Various authors have identified the characteristics of gamified applications that facilitate the learning process, such as playfulness, immediate feedback, and adequate challenges. (Kapp, 2012).

Perceived playfulness

It is argued that emotions also play a role in the acceptance of a particular technology. Scholars have proposed several variables such as perceived playfulness, perceived enjoyment, and flow to assess this (Lai & Chen, 2011; Padilla-Melendez et al., 2013; Jagger et al., 2015; Sánchez-Franco et al., 2009). Perceived playfulness is a complex construct because it is an intrinsic motivation related to the usage of a system (Wang & Wang, 2008; Venkatesh & Bala, 2008), which is influenced by personal experience with the setting (Moon & Kim, 2001). It also encompasses physiological interest and stimulation (Csikszentmihalyi, 1990). Thus, when users are in a playful state they feel that interaction with the application is intrinsically motivating, their attention is focused, and they feel curious (Moon & Kim, 2001). Intrinsic motivation, which refers to satisfaction and enjoyment in performing certain behaviour, affects the behavioural intention to play digital games (Wang and Wang, 2008). Furthermore, research in education has identified that playfulness is among the key drivers behind university students' intention to adopt and use blended learning (Padilla-Melendez et al., 2013); and behind teachers' intention to adopt teaching blogs (Lai & Chen, 2011). Huang et al. (2012) tested and found that playfulness positively influences English learning on mobile devices. Wang et al. (2009)

identified positive links between users' perceived playfulness and behavioural intention to use eLearning platforms and digital games for learning (Jagger et al., 2015).

Curriculum relatedness

Secondary school teachers are bound to teach pre-planned curricula within a defined period. This can influence the acceptance of a new teaching practice such as gamified applications in the formal educational environment (Becker, 2007; De Grove et al., 2012). However, if the new practice (such as digital games) is related to the curriculum and can facilitate the achievement of the curriculum requirements, it can influence the adoption decision by teachers (Da Rocha Seixas et al., 2016; Ketelhut & Schifter, 2011; De Grove et al., 2012). Thus, curriculum relatedness is an important determinant in the behavioural intention to accept certain games or gamified applications in teaching activities (Ketelhut & Schifter, 2011; Baek, 2008). De Grove et al. (2012) validated the construct of curriculum relatedness and analysed teachers' adoption intention of digital games in the classroom. Their study revealed that curriculum relatedness and previous experience were the most important determinants in the intention to adopt digital games for formal education purposes. Because of formal curriculum requirements, curriculum relatedness will directly affect the intention to use gamified applications.

Learning opportunities

In the field of digital games acceptance in education, Bourgonjon et al. (2010) introduced the construct of perceived learning opportunities, which investigates if educators believe that games offer learning affordances. The construct of learning opportunities reflects the benefits and advantages of digital games (Prensky, 2005; Egenfeldt-Nielsen et al., 2008; Li & Huang, 2016). The researchers hypothesised that if teachers perceive that gamified application could offer learning opportunities, they will consider its acceptance for teaching practice (Bourgonjon et al., 2013). Moreover, it can be expected that perceived learning opportunities are positively associated with curriculum relatedness. This is because achieving respective curriculum requirements is related to knowledge transfer (De Grove et al., 2012). Bourgonjon et al. (2010) demonstrated that learning opportunities offered by digital games positively relate to teachers' perceived usefulness, which implies higher productivity and performance in the classroom. Thus, if teachers perceive that games offer learning possibilities for students, they will also perceive them as beneficial to their job performance. This can ultimately increase teachers' willingness to adopt games for teaching practice (De Grove et al., 2012; Bourgonjon et al., 2013). The digital quiz about heritage and tourism used within this study was designed mainly to foster awareness and enhance knowledge about World Heritage Sites in Southern Africa. The use of gamified applications in a formal setting is expected to motivate students to learn about

heritage, can increase their sense of pride, and can increase their interest in the subject of tourism.

7.3 Contextual characteristics

Teachers role in decision making process to adopt certain technology is undoubtable, however, as argued by De Grove et al. (2012) not all determinants influencing this process exist at the teacher level because the teacher is embedded in a broader context i.e. specific school with specific organizational characteristics.

Pynoo et al. (2011) conducted a cross-sectional study in secondary schools on teacher acceptance and use of digital learning environments. The authors applied the unified theory of acceptance and use of technology (UTAUT) model. They identified that the social influence of the superiors at school were the main determinants in the acceptance of digital learning environments for teaching purposes. Similarly, De Smet et al. (2012) investigated the acceptance of learning management systems (LMS) by secondary school teachers. The researchers used an extended TAM model adding variables such as teachers' internal ICT support, which was found to affect LMS acceptance significantly. De Smet et al. (2012) concluded by recommending that school managers consider the importance of teacher efforts and the influence of ICT internal support when introducing an LMS for formal instruction. Lai and Chen (2011) also identified school support as an important determinant for adopting teaching blogs.

Hamari & Nousiainen (2015) found a positive relation between supportive organisational ICT culture and actual use of game-based learning technologies by teachers. De Grove et al. (2012), on the other hand, did not find a significant influence of school related factors (ICT related support, headmasters approval, and the like) towards teachers' behavioural intention to use digital games in the classroom.

8 Research overview

Despite the fact that tourism is one of the most popular elective in South African high school, there is limited academic research on tourism education in South African high schools. According to Chili (2013:34), there is a "total disquiet with a particular literature in South African tourism education in schools. [...] it's so scarce that it's an area for concern [...]"

Furthermore, coupled with the widespread impact of the South African tourism industry, information and communication technology (ICT) has rapidly penetrated public and

private sectors of the country. Yet, the many uses and implications of ICT for tourism education in South Africa are unclear and under-theorised as a research area (Adukaite, Van Zyl, & Cantoni, 2016). Currently there are no studies on ICT usage for tourism education in South African high schools.

The literature review of previous gamification studies in educational settings provided an overview of the use of different game mechanics. However, majority of the gamification studies are conducted in the higher education institutions specifically with information technology and computer science students. Studies in different application fields such as high school environment of after curriculum activities related to other disciplines such as mathematics, science etc. are emerging but are still quite at infancy stage. The researcher was not able to identify a study of gamification in tourism education area. Moreover, looking at the geographical area where gamification studies were conducted, North America and Europe are the most common settings and rarely developing and emerging countries. Only two out of investigated 15 studies were in Asia (Hew et al., 2016; Su & Cheng, 2014), one on Brazil (daRocha Seixas et al., 2016) and one in South Africa (O'Donovan et al., 2013).

This study aims to make contribution in this respect: firstly, investigating the extent to which ICT supports tourism education in South African high schools. Secondly, examination of gamified learning acceptance within education in developing country context i.e. South Africa, specifically within the tourism subject contents of the secondary education level.

Table 5 provides an overview of this research.

Overall aim			
To examine the role of ICT and gamified learning within tourism education in South African High Schools.			
Research objectives			
RO1. To determine the extent ICT supports tourism education.	RO2. To identify the barriers for ICT integration in tourism education.	RO3. To assess students’ user experience in terms of engagement with gamified application.	RO3. To identify factors that influence tourism teachers’ behavioural intention to accept gamified learning application.
Research design			
<ul style="list-style-type: none">– In-depth semi-structured interviews (n=24), 30-75’– Tourism teachers (n=19) and government officials (n=5)– Non-randomized sampling– 2 districts, schools ranging from urban to township– Inductive thematic coding NVivo10– Intercoder reliability test on 30% of transcript sample, 83% agreement	<ul style="list-style-type: none">– 213 tourism students (grades 11-12) played WHACY, 30-45’– 9 focus groups (75 students: 5-10 per gr.)– Non-randomized sampling– 2 districts, schools ranging from urban to township– Thematic coding NVivo 10	<ul style="list-style-type: none">– Online Questionnaire (n=209)– In-service tourism teachers– Non randomized sampling– 3 provinces– Tested WHACY, exemplary version aligned to tourism curriculum– Descriptive statistics (SPSS); SEM (lavaan: An R package)	
Informing theoretical framework			
Technology Domestication (Habib, 2005); Social Cognitive Theory (Bandura, 1977)	Theory of Intrinsically Motivating Instruction (Malone, 1981); Flow Theory (Csikszentmihalyi, 1990)	Technology acceptance and integration; 7 constructs	
Main findings			
<ul style="list-style-type: none">– ICT is recognised as essential especially in poorly resourced schools for providing exposure to the tourism industry.– ICT integration is still limited.– Major obstacles: teachers’ technology anxiety due to lack of training, availability of technical resources, resistance on the side of learners to use their mobile phones, both for economic reasons (cost of data transfer), as well as for lack of skills.	<ul style="list-style-type: none">– The most engaging gamification features: competition (through the scoring system), immediacy of feedback, visual aesthetics and challenge.– Gamified application triggered curiosity and willingness to learn more about the related topics.– Insights into affordances of gamification to facilitate engagement and potential knowledge enhancement.	<ul style="list-style-type: none">– Perceived application’s playfulness, curriculum relatedness, and self-efficacy were identified as having direct impact of behavioural intention.– Teachers’ technology training strongly correlated with levels of behavioural intention to adopt gamified learning.	

Table 5: Research overview

This PhD thesis resulted in 4 publications:

- Adukaite A., Van Zyl I., Cantoni L. The Role of Digital Technology in Tourism Education: A Case Study of South African Secondary Schools. *Journal of Hospitality, Leisure, Sports and Tourism Education (JoHLSTE)*. Status: Accepted.
- Adukaite A., Van Zyl I., Cantoni L. (2016). The Role of ICT in Tourism Education: A Case Study of South African Secondary Schools. *eReview of Tourism Research (eRTR)*. ENTER 2016 Conference of Information and Communication Technologies in Tourism: Volume 7 Research Notes. Access online:
http://ertr.tamu.edu/files/2016/01/ENTER2016_submission_123.pdf
- Adukaite, A., Cantoni, L. (2016). Raising Awareness and Promoting Informal Learning on World Heritage in Southern Africa. The Case of WHACY, a Gamified ICT-enhanced Tool. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 12(2).
- Adukaite A., Er Ş., Van Zyl I., Cantoni L. Teacher perceptions on the use of digital gamified learning in tourism education: The case of South African secondary schools. *Computers and Education*. Status: Revised and re-submitted.

Publication 1: The Role of Digital Technology in Tourism Education: A Case Study of South African Secondary Schools.

- Adukaite A., Van Zyl I., Cantoni L. The Role of Digital Technology in Tourism Education: A Case Study of South African Secondary Schools. *Journal of Hospitality, Leisure, Sports and Tourism Education (JoHLSTE)*.

Status: Accepted.

The study was also published as a short paper:

- Adukaite A., Van Zyl I., Cantoni L. (2016). The Role of ICT in Tourism Education: A Case Study of South African Secondary Schools. *eReview of Tourism Research (eRTR)*. ENTER 2016 Conference of Information and Communication Technologies in Tourism: Volume 7 Research Notes. Access online:
http://ertr.tamu.edu/files/2016/01/ENTER2016_submission_123.pdf

The Role of Digital Technology in Tourism Education: A Case Study of South African Secondary Schools

Abstract

This paper discusses how Information and Communication Technology (ICT) supports tourism teaching in South African secondary schools. The researchers conducted an in-depth case study with 24 participants. An analysis reveals that teachers recognise ICT as essential in exposing students to the tourism industry. This is especially the case in under-resourced schools, where learners do not have the financial means to participate in tourism activities. However, ICT is still limited in its integration as a pedagogical support tool. The major obstacles toward integration include: technology anxiety, lack of training, availability of resources, and learner resistance to use their personal mobile devices.

Keywords: Tourism Education, Secondary Schools, Information and Communication Technology, South Africa.

1. Introduction

Tourism is often introduced as a subject in formal education curricula because of the significant economic contribution of the tourism industry to the private and public sectors. This is especially the case in emerging economies in Asia and Africa (Hsu, 2015; Mayaka & Akama, 2015; Cuffy et al., 2012). The setting for this study is South Africa, an emerging/developing country with a growing tourism industry. According to the World Travel and Tourism Council (2015), the total contribution of travel and tourism to South Africa's GDP in 2014 was 9.4%; a figure estimated to increase to 10.4% by 2025. Moreover, travel and tourism in the country now accounts for 9.9% of total employment (1,497,500 jobs) and is expected to increase to 11.5% by 2025 (WTTC, 2015). According to the South African Department of Tourism, the country welcomed a record number of foreign tourists in 2013 (10 million visitors): a 4.7% increase compared to the previous year. South Africa reports a much higher tourist arrival growth (7.4%) compared to the global average (4.5%) for the period between 2011 and 2013 (South African Tourism, 2014).

Ultimately, tourism in South Africa is recognised as a key economic sector with potential for continuous growth. With its multi-sectoral supply chain, tourism is considered one of the most important sources of job creation in the country. Tourism growth in South Africa therefore demands a skilled and professional workforce. This implies that the local workforce should be aware of the nature and role of tourism, and should be able to evaluate its potential critically. Various strategies could be initiated to raise tourism awareness (Van Niekerk & Saayman, 2013); one of them is the introduction of tourism as a school subject. At secondary level, tourism has been widely introduced at schools throughout South Africa since 2000.

Furthermore, coupled with the widespread impact of the South African tourism industry, information and communication technology (ICT)⁴ has rapidly penetrated the public sectors of the country. ICT affords novel opportunities for social and economic development, and this has especially been observed in the fields of both tourism and education (Anwar et al., 2014; Vandeyar, 2015). Yet, the many uses and implications of ICT for tourism education in South Africa are unclear and under-theorized as a research area (Adukaite, Van Zyl & Cantoni, 2016; Adukaite & Cantoni, 2016). Tourism education alone warrants sufficient research attention. For these reasons, the authors undertook a qualitative case study to determine the extent to which ICT supports tourism education in South African high schools. Additionally, the authors aimed to identify the barriers of ICT integration in tourism education. The study was designed as an exploratory analysis, based on 24 in-depth interviews with high school tourism teachers (n=19), as well as tourism subject planners and advisors at the governmental level (n=5).

The following sections present the research context, with specific focus on tourism education as well as ICT integration in the South African education system. The authors then present their theoretical framework and methodology, followed by a discussion of the most significant findings. Finally, conclusions are drawn, before stating some limitations, policy implications, and future research directions.

2. Context

2.1. Tourism as a high school subject in South Africa

With the advent of constitutional democracy in 1994, the South African government gradually introduced more practical and vocationally oriented subjects such as Tourism, Hospitality, Business Studies, Agriculture, Information Technology and related subjects for grades 10, 11 and 12. Post-apartheid South Africa lacked skilled human resources and faced major unemployment; more vocationally oriented high school subjects were expected to help address such issues (Chili, 2013). Furthermore, tourism as a subject was expected to stimulate domestic as well as international tourism markets. This was because tourism awareness would be created among both students and their parents. Indeed, children can play an important role in the travel decision making process within a family (Van Niekerk & Saayman, 2013). Pilot studies had been introduced in several schools as early as 1996, but gradual roll out at the national level happened from 2000 onwards (Umalusi, 2014).

Since 2000, tourism as a subject has seen significant growth in terms of the number of schools where it is taught, as well as the number of learners selecting it. The subject has grown from 120 schools and 2'968 learners in 2000 to 2'887 schools and 118'904 grade 12 learners in 2014 (Umalusi, 2014). To date, tourism is one of the most popular electives in high schools: up to 20% of all high school students select the subject (Allais, 2014).

⁴ While there are some variations of the term, we use it interchangeably with digital technology, to refer to the array of electronic technologies that afford rapid information transfer and multimodal communication.

Furthermore, tourism is taught in all types of schools: from well-resourced private schools to under-resourced rural and township schools, even if it was expected that the subject would mainly benefit learners from (previously) disadvantaged communities (Shalem & Allais, 2014).

Tourism is an elective subject and is taught through grades 10 to 12, for four hours per week. Ten main topics are covered in the three years: (1) Tourism Sectors, (2) Map Work and Tour Planning, (3) Tourism Attractions, (4) Culture and Heritage, (5) Green Tourism, (6) Foreign Exchange, (7) Tourism Trends, (8) Communication and Customer Care, (9) Regional and Domestic tourism, and (10) Marketing of Tourism Products. Moreover, the subject involves a practical project (Practical Assessment Task or PAT), which makes up 25% of the final certification mark. The National Department of Basic Education requires that the host school supplies the learners with necessary textbooks, maps, brochures and travel magazines in the classroom. Tourism teachers are requested to have access to internet resources in order to keep up with dynamic industry developments. The Department also recommends access to audio-visual resources and computers (Department of Basic Education, 2011).

2.2. Academic research on tourism education in South African high schools

There is limited academic research on tourism education in South African high schools (Van Niekerk & Saayman, 2013; Chili 2013, 2014; Pawson, 2002; Van Niekerk, 2004; Punt, 2010; Kuze, 2013). According to Chili (2013:34), there is a “total disquiet with a particular literature in South African tourism education in schools. [...] it’s so scarce that it’s an area for concern [...]”

Van Niekerk and Saayman (2013) conducted a controlled experiment with two high school student groups: the research group contained students and parents that had tourism as a subject, while in the control group, no students or parents had the subject. Results indicated that the travel patterns of families with children studying tourism were influenced; moreover, students who opted for the subject were likely to pursue a career in the travel and tourism sector. Chili (2013, 2014) conducted qualitative research with principals, teachers and learners from South African township schools. He observed a significant shortage of qualified tourism teachers, and claimed that “too few students coming out of the public school system view tourism as a viable career option” (Chili 2013:36). Chili raises serious concerns over the perceptions of tourism as a subject. He found that both learners and teachers perceived it as an “easy” subject. Some teachers also did not regard tourism as a discipline. Education scholars Shalem and Allais (2014) expressed their concern that a vocationally oriented curriculum of tourism is weak, and that it offers little to learners.

2.3. ICT and education in South Africa

Since the institution of democracy in 1994, the South African government has made important strides in both policy and practice to provide education for all. This has

gradually been coupled with the use and adoption of digital technology at all levels of the education system. The implementation of technology has strongly permeated national discourses and approaches around learning and teaching. Stakeholders – managers, teachers, learners, and administrators – are widely encouraged to use and adopt information and communication technology to enhance educational practice and improve learning. These directives are strongly “embedded in the broader pragmatism of ICT for development (ICT4D), in which digital technologies support social and economic priorities” (Van Zyl, 2013:ii).

The notion of technology-enhanced education gained momentum in national policies such as the White Paper on e-Education (2004). Since then, a range of technology initiatives have been implemented at primary, secondary and tertiary level across the country. These have notably included the Khanya Project, initiated in the Western Cape Province in 2001, that aimed to install computer laboratories at all primary schools in the province within a decade. Today, there is a voluminous and growing body of research dedicated to the study of technology at all levels of education in South Africa. Cantrell and Visser (2011) offer a fairly recent discussion of the domestication of ICTs in provincial schools. They conclude that, despite its vast potential, the many purported benefits of ICTs have not been effectively realised.

The reasons for this are today well recognised, although, increase in complexity over time. Vandeyar (2013, 2015) describes some of the significant issues that continue to influence the integration of ICT into teaching and learning practice. Some of the critical issues are “systemic (access, policy guidelines, policy overload, systemic support, national curricula, teacher training) and others are meso-micro level issues such as school leadership, institutional culture, teacher competence, teacher professionalism and teacher pedagogy” (2013:249). While there is abundant research on these aspects in the African context (see Harris, 2015), there is little to no research on the use and impact of ICT to facilitate the learning and teaching of tourism, especially at secondary level. In this paper, we address this gap by conducting a qualitative study on the role of ICT in South African tourism education.

3. Conceptual-theoretical framework

A great deal of energy and funds are dedicated to equipping South African schools with ICT, since it is recognised as a vital tool for educational development. Initially, digital technology was mainly used for administrative tasks (Chigona et al., 2010; Obijiofor, 2009). However, with the continuous penetration and advancement of technology, ICT usage is shifting toward interactive instructional platforms and tools. These facilitate more self-regulated learning and engagement (De Freitas et al., 2010). Modern technology has the potential to create authentic and innovative learning experiences for students. This, in turn, poses a challenge for educators. They are under constant pressure to learn new approaches and tools, and to become confident with their integration into educational

practice. Sole physical access to technology is not sufficient to influence integration for teaching purposes or to increase student engagement (Weston & Bain, 2010).

3.1. Technology self-efficacy and anxiety

Scholars have argued that the role of teachers is critical in adopting ICT (Sumak et al., 2011). The individual determinants of adoption can include attitudes, culture, skills (technical expertise), experience, as well as micro social interactions (Teo, 2011; Sumak et al., 2011; Van Zyl, 2013).

The construct of self-efficacy originates from Social Cognitive Theory (Bandura, 1977) and refers to a person's belief in their ability to perform a particular behaviour successfully. Bandura (1986) proposed the theory of human functioning, which regards the dynamic interplay of personal, behavioural and environmental impacts; it presents an agentic perspective, which means that humans can determine the course of their actions. Self-efficacy is argued as an important determinant of motivation, action and affect (Bandura, 1986). Moreover, it plays a major role in how challenges, goals and tasks are approached. Thus, people with high self-efficacy tend to believe that they can handle challenging issues and are able to recuperate faster from setbacks. Conversely, individuals with low self-efficacy do not believe that they can perform complex and challenging tasks well and are less confident in approaching these tasks (Bandura, 1986; Schunk & Pajares, 2009). Because of its significance in predicting human behaviour, the construct of self-efficacy has been studied extensively in the education field (Klassen et al., 2011, Fanni et al., 2013). For example, concerning ICT, technology acceptance by teachers is influenced by teachers' computer self-efficacy (perceived ability to use computers, Teo, 2011) or their technology self-efficacy (perceived ability to use a specific technology, Holden & Rada, 2011).

The fear of using computer related technologies (Leso & Peck, 1992) defines the concept of computer anxiety: a common factor that inhibits ICT integration into the educational setting (Azarfam & Jabbari, 2012). Scholars have found that technology experience and skills are inversely related to technology anxiety (Shah et al., 2012; Ekizoglu & Ozcinar, 2010). However, some researchers argue that the increased use of ICT for teaching may inadvertently lead to an increase in technology anxiety (Cotten et al., 2011).

3.2. Technology domestication and barriers to integration

Further to the above, not all determinants that influence adoption exist at the teacher level. Indeed, the teacher is always embedded within a broader context; that is, in a specific school with specific organisational characteristics, as well as within a wider community with different socio-economic characteristics. Firstly, a lack of resources and infrastructure, such as electricity, internet access, and physical space, remain key challenges in disadvantaged South African schools (Cantrell & Visser, 2011; Obijiofor, 2009). Secondly, factors such as supportive leadership as well as technological assistance are needed to encourage teachers to integrate ICT for pedagogical and administrative

purposes (Cantrell & Visser, 2011; Czerniewicz & Brown, 2009). Thirdly, the socio-economic contexts of teachers and learners can influence ICT usage for teaching and learning. In more affluent settings for example, students and educators might have access to computers and the internet at home. This might increase their confidence to use technology in the school environment (Muller et al., 2007). Similarly, in disadvantaged areas, the resource limitations to integrating ICT are far greater (Bladergroen et al., 2012).

Theories of technology domestication describe how people adopt technology in everyday life, with a focus on the role and use of technology, individual experiences, social behaviour and the function of acceptance and rejection (Haddon, 2006). The three main phases of domestication include (Habib, 2005; Haddon, 2006; Chigona et al, 2010):

- (i) *Commodification*: the process of technology acquisition, expression of its symbolic and functional values, and evaluation of how it can fulfil specific needs.
- (ii) *Appropriation*: users change their environment to adapt accordingly; technology is actively used and is integrated into formal (e.g., timetables) and informal structures (e.g., routines and habits). However, at this stage, technology is not necessarily accepted; potential adopters can yet reject it.
- (iii) *Conversion*: the user-person wholly adopts the technology and displays it to the outside world physically or symbolically.

The conceptual framework of this research departs from the constructs of technology self-efficacy and anxiety, which serve as a lens to assess teachers' individual characteristics in adopting ICT for tourism education. Moreover, technology domestication theory is a useful perspective to investigate the complex factors that affect ICT integration for tourism education in South African high schools.

4. Design and methodology

The research reported in this article is an exploratory comparative case study. Fieldwork was conducted between April and June 2015 with ten high schools in the Metro North District of the Western Cape, and six schools in Western District in the Eastern Cape of South Africa. These districts were selected because of the diversity of their schools, ranging from urban to township institutions. Rural schools were not included in the study due to accessibility constraints experienced by the field researcher.

The main criterion for selecting schools was that they offer tourism as a subject. The names of high schools offering tourism were obtained from the Department of Basic Education. A convenient, non-probability sample was selected to include different types of schools in respect of their socio-economic characteristics. Tourism is taught in all types of schools – from well-resourced private to poorly-resourced public schools. Table 1 provides an outline of the sample.

INTERVIEWEES		
WESTERN CAPE	EASTERN CAPE	TYPE OF INSTITUTION / ROLE
6 (5 schools)	5 (4 schools)	Public schools (Township). Previously, before 1994, only black or coloured schools, inadequately resourced.
4 (3 schools)	2 (2 schools)	Public schools (ex-model C). Previously, before 1994, only white schools, well resourced, now integrated.
2 (2 schools)	-	Private schools. Independent, well resourced.
1	-	Tourism curriculum coordinator
2	1	Tourism subject advisor
1		National tourism curriculum coordinator
19 interviewed teachers (from 16 schools) 5 other interviewees (from other institutions)		Total: 24 interviewees

Table1: Outline of the sample

In this article, the authors report qualitative data that resulted from in-depth semi-structured interviews with tourism teachers (n=19) at the 16 visited schools. In addition, 5 interviews were conducted with government officials involved in tourism subject planning and coordination. These persons included a national tourism curriculum coordinator, a Western Cape tourism curriculum coordinator, two tourism subject advisors in the Western Cape, and one tourism subject advisor in the Eastern Cape.

In total, 19 tourism teachers were interviewed (12 in the Western Cape and 7 in the Eastern Cape), of which 16 were female and 3 were male. On average, respondents reported 6 years and 4 months (M: 6, SD: 3.6) of tourism teaching experience, ranging from 15 years to only one year of experience. Only two teachers were fully dedicated to tourism subjects; all others taught additional subjects like geography, business studies, languages, consumer studies, and history. Only three respondents had formal education related to tourism.

4.1. Instrument

The researchers used a semi-structured questioning approach to ensure consistency among respondents, while allowing for flexibility. Interviews lasted from 30 to 75 minutes and

were conducted in English. All interviews were audio recorded and later transcribed. Transcripts were analysed using inductive thematic coding (Corbin & Strauss, 2008), assisted by analysis software NVivo 10. Using the same coding scheme, an intercoder reliability test was conducted on 30% of the data to assess the extent of agreement on analysis of the content (Cho, 2008). A second coder was trained on the coding scheme and annotated the randomly selected sample of interview transcripts. The coders reached 83% agreement, which proved to be sufficient for social science studies, where .80 or 80% pairwise agreement is considered appropriate (Joyce, 2013).

4.2. Ethical considerations

Firstly, research approval was obtained from the Western and Eastern Cape Education Departments. Secondly, principals of the visited schools were contacted to obtain their permission to interview the respective tourism teachers. Thirdly, all respondents gave their written consent to be interviewed. They were informed that their participation was voluntary, anonymous and confidential. The main researcher commenced with fieldwork after becoming familiar with the context and environment (Sherry, 2008).

5. Results

5.1. ICT access, ownership and management

Even though all interviewed teachers had some kind of material access to technology, less than half of the respondents integrated technology for tourism teaching on a regular basis. The majority of schools where ICT was integrated within the teaching experience were either private or ex model C (previously advantaged schools). When discussing ICT for tourism teaching, interviewees primarily referred to hardware requirements and limitations, such as data projectors, computers, televisions, and interactive whiteboards. Furthermore, they described the most used software and media for tourism teaching purposes. Microsoft PowerPoint, YouTube, Google search engine, Google Maps and Google Earth were listed as the most used and perceived as the most valuable programs for tourism instruction. Additionally, teachers described software that they used for sharing among colleagues, including Dropbox, WhatsApp and Google Drive. Other than hardware and software, teachers perceived the availability of a stable internet connection as a necessity:

Other than just sitting in front of that computer, you need to be able to access internet, because all the technologies are based there (Teacher, EC township school).

Respondents in the Eastern Cape had very limited access to internet at schools. Conversely, teachers in the Western Cape reported much better access to the internet. However, they commented on its slow speed. Teachers in schools with computers but limited or no internet reported on using CDs and DVDs with presentations, as well as videos and images obtained from the Department of Education or from other teachers.

I don't bring kids to the computer lab because we don't have internet. We have two data projectors in the school that they travel around the school. Mostly we show DVDs (Teacher, EC township school).

Interesting insights emerged related to the ownership and management of ICT in the schools. Only six interviewed teachers reported consistent access to schools' computer labs and classroom-installed technology. Three schools employed a sharing model (e.g. two projectors and/or TV set for the entire school); two teachers reported on buying their own hardware (data projectors); three teachers occasionally brought their own laptops to the classroom; and four teachers were using their own internet devices and data.

At the beginning we didn't have projector and that made my life very difficult so I went and bought my own projector and life became easier. I've got a dongle and my laptop that I use in the classroom and I put it through the projector and it works well. [...] The nice thing about teaching tourism is if you are computer literate you can get a lot of information from internet (Teacher, WC township school).

All interviewed teachers reported that their schools have mobile phone policies that disallow their use in the classroom. However, some teachers made an exception for tourism classes and occasionally allowed students to use their phones, because this would be the only type of technology available to them. In three cases (all in the Eastern Cape), teachers reported that students are encouraged to use community libraries.

Most of the referral resources in the curriculum are to the websites and we cannot access them because we don't have internet. If they [students] need to do research for their projects they use community libraries, or their phones (Teacher, EC township school).

5.2. The value of ICT for learning: access, engagement, and authenticity

A common issue that emerged through the interviews, especially in disadvantaged schools, is the fact that many students have never had touristic experiences. It is often challenging for them to relate to the content delivered through the subject. The National Department of Education suggests overcoming this by introducing various teaching strategies, educational trips, practical projects and technology supported teaching. However, the resources to facilitate this are scarce, especially in township and rural schools. The majority of respondents agreed that ICT (especially multimedia content such as videos and pictures) play a major role in overcoming learners' (and teachers') lack of tourism exposure:

Technology is our only hope to give a child some kind of experience of a tourism industry [...] be it movies, or showing video clips, PowerPoints, that kind of thing. But it needs to be interactive like 3D hotel room. This exposure is much better than nothing at all (Teacher, EC township school).

Furthermore, ICT also facilitates more authentic learning experiences:

We did the Colosseum in Rome with Grade 12 and I showed them a portion of “Gladiator”, because I wanted them to realise that it’s not another boring building. What is the value of this building? Because if you think what actually happened there and how much that is of history [...] (Teacher, WC private school).

Tourism has a reputation of being an “easy” subject, which in some ways becomes a “dumping ground” for academically weak students or those who try to but eventually cannot cope with other subjects. According to interviewed teachers, students rarely choose the subject because they are interested in it. Interviewees revealed that ICT has the potential increase their interest in the tourism subject:

They love it a lot, these sessions in computer lab, even the atmosphere in these lessons would change, because they are so interested and they are so excited, and even if the bell rings they don’t want to leave (Teacher, EC township school).

Several teachers reported that, due to the nature of the subject, they need to look for creative didactic methods. ICT assists them in this regard:

I could stand and talk about bullfights in Spain but if you show them a video and they can visually see it makes such a big difference [...] I log in on Google Earth and tell them where in the world do you want to go? It pops up on the screen and it’s amazing how they enjoy something like that (Teacher, EC, ex model C school).

Besides facilitating better delivery of the tourism curriculum, ICT literacy is important for students’ future career paths:

If they go out there and they haven’t done anything on the computers they are behind the rest of the workforce (Teacher, WC township school).

The ability to know how to use computer and especially how to do research on the internet were acknowledged as the most important skills that students would need after leaving school:

We don’t stop talking about how we have to find ways in which we can use more electronic equipment. You cannot run away from it, cave men didn’t run away from a wheel, so we have to embrace the technology and use it, it will only make things easier for us and students (Teacher, WC, ex model C school).

5.3. The value of ICT for teaching: knowledge and interaction

While uptake of tourism as a subject is rising at South African high schools, teachers who were and are supposed to teach the subject have not been trained sufficiently in subject content or in subject delivery. Tourism teachers are mainly self-taught with the help of short courses offered by subject advisors from the Department of Education.

Different teachers applied different techniques in gaining knowledge about the tourism subject such as travelling themselves, going through travel magazines, and studying

textbooks. Six teachers emphasised the importance of online search engines, mainly for information research, and YouTube videos, for gaining knowledge:

It's been nerve-racking at the beginning. I started with a textbook; fortunately it had a CD in the back. [...] Just reading and going, taking module by module and researching them on the internet. For example, when they talk about in-room technology, what do they mean? [...] the internet has been invaluable (Teacher, WC private school).

ICT seemed particularly important for teachers to connect with other colleagues and share materials and knowledge. The most frequently mentioned ICT for this purpose was WhatsApp, email (mailing lists), Dropbox and Facebook. WhatsApp was particularly popular among interviewees:

I WhatsApp a lot with other tourism teachers in the area. We do exchange a lot, they know I am the strongest in the world icons and time zones. The other teacher is stronger on currencies so we exchange" (Teacher, EC township school).

An interesting initiative was introduced by a group of tourism teachers in an Eastern Cape township. The group created a Dropbox account and started storing additional materials related to the curriculum such as presentations, tests, and worksheets in order to empower their colleagues in similarly disadvantaged areas:

We introduced this concept of Dropbox. It's a very good way of spreading stuff [...] it took us hours and hours of research. It's not the best but for the learners in the rural areas who never had access to any kind of technology it is at least something. Every teacher even in a rural area has a cell phone, so if they put Dropbox on their cell phones they can access all the information (Teacher, EC township school).

At the time of the interview (June 2015), around 60 users were subscribed to this particular Dropbox account.

5.4. Technology anxiety

As mentioned, the majority of tourism teachers have no formal training in the subject or in appropriate instructional approaches. Moreover, none of the interviewed teachers had any ICT training. Technology anxiety emerged as a major impediment for ICT integration into tourism teaching. Respondents were uncomfortable and intimidated to use ICT because of a perceived lack of skills and experience. As noted by a national tourism subject coordinator:

One of the reasons why the teachers are not using the technologies is because they themselves feel uncomfortable.

This argument emerged during the interviews with teachers as well, regardless of the type of school. For instance, one teacher reported:

I teach in the traditional method and it proved to be quite difficult when somebody suggests you can do this x, y and z with technology and I said 'oops', I don't know how to use this kind of media and I am just going to be in my little comfort zone and just, you know, do my work (Teacher, WC private school).

Furthermore, the availability of different ICT tools and platforms overwhelms teachers:

I don't know if it's good or bad but technology moves so fast, if you don't stay with it you are gone and there are so many, for example, different platforms. Many teachers feel overwhelmed. Where do I start? Which one do I use? Which one is better, which one is worse? And until we get to that stage, that unfortunately lies in teacher development (National subject coordinator).

Thus, a lack of skills and training on the integration of ICT in tourism teaching was recognised as a main source of resistance. However, training also requires resources (time and funding), and even in cases where teachers have access to such resources, usage is still limited:

I don't have time also for ICT training; obviously I am not using smart board to its full potential. There were talks about smart board training, but my board is nearly outdated and it's not happening. We just learn ourselves (Teacher, WC Model C school).

5.5.Lack of resources

Besides technology anxiety, another important finding related to the lack of ICT resources, as well as to logistical challenges to use available resources due to big classes, especially in township schools.

We have computer lab but you have to have special arrangements to go there, I do it twice a year I would say. It's difficult logistically because of our class sizes. All three my classes are 50+ [students] (Teacher, WC township school).

Only a minority of interviewed teachers had access to in-classroom technology. The majority of teachers were required to use their schools' computer labs. However, computer labs are mainly booked for IT-related subjects. As a result, tourism teachers have to be creative and flexible:

If I have a tourism topic that I know that the kids must see it, I try to arrange with CAT [Computer Application Technology] teacher and take them to computer lab, but it's very difficult for me to do that because of overlapping schedules and very often during my tourism period the lab is occupied by CAT students. What I would do either early in the morning or late afternoon or on the weekend I would take my kids and teach them with computers (Teacher, EC township school).

Furthermore, teachers are also constrained with time. Most classes are only 50 minutes long. By the time a teacher has helped 50 odd students with logging on the computer, the

class would nearly be over. This has also been reported as a challenge in primary school environments (Van Zyl, 2013).

5.6. Policies on mobile technology

All interviewed teachers report that their schools have policies that disallow the use of mobile technology in the classroom. However, because it is a highly pervasive technology – “*All the kids have smart phones; even the child from a squatter camp has got a smart phone*” (Teacher, WC township school) – many respondents acknowledged the potential of mobile learning, and even making exceptions for tourism classes.

It's part of the rules, that kids cannot have cell phones in the classroom, but in the direction we are moving I cannot see how you can say that the kids cannot use cell phones. For educational purposes I allow them, if we don't have computers in the classrooms, that's our next best thing. The other day I had to take out my phone, because we were doing Kalahari Desert, I was trying to demonstrate to them, it's easy as this, just Google “Kalahari”. I told this to my principal, what other way I could do? In my class I totally allow it. I am for cell phones in the classroom (Teacher, WC township school).

Tourism subject planners and advisors also agreed that mobile phones could be used for teaching and learning purposes:

[...] the cell phones are usually banned in the schools although you could use them as a way of teaching. I attended some of these training sessions where the teacher has a computer in the classroom and then she links to everyone's cell phone that is Wi-Fi connected and then she sends them 3 questions on their cell phones and then they have to answer those questions and they immediately can see what the responses are (WC subject advisor).

However, the use of mobile technology is further constrained because of students' and teachers' limited knowledge around its pedagogical applications.

We have free Wi-Fi at school and I would love to see mobile friendly programs for educational purposes, I would promote that to the kids. At the moment I use mainly Google to search information (Teacher, WC township school).

5.7. Unfulfilled potential

Several teachers raised concerns that students lack know-how in using their mobile phones for learning:

When it comes to our kids, they are coming from disadvantaged backgrounds, but many of them have smartphones, however, I still noticed even those who have smartphones would struggle using it for learning purposes. I ask them to open the internet and certain website; they don't know how to do it. When I say let's Google, they don't understand what I mean, even those with smart phones (Teacher, EC township school).

Students are hesitant to use their own internet data for learning mainly due to its cost. As stated by some respondents, students mainly prefer to use their cell phones for socialising, principally WhatsApp and Facebook, and for listening to music.

Two teachers reported that they made arrangements to allow students to work independently on their projects in the computer lab. However, they had to discontinue this practice:

I've asked IT lab but it didn't work because they end up playing games and using Facebook, so I've allowed them to bring in their own laptops and tablets, we set up our own IT lab over here (Teacher, WC private school).

Moreover, in disadvantaged schools, students' exposure to other technologies besides their mobile phones is limited. Therefore, according to one teacher:

[...] if you bring technology into the rural school, the kids are not used to it, they get very distracted by it and for certain time you don't have their focus. They are not used to that kind of medium (Teacher, WC township school).

Lastly, one teacher explained that in certain instances, technology works against the teacher. This is counter-productive to the learning environment:

With technology it became very easy to copy and paste information [...] I asked to hand it [project] in handwritten not typed because when if it's typed they send to each other, change a couple of words and hand it in as theirs, therefore, I changed it to handwritten. In this case technology is working against the teacher (Teacher, WC township school).

5.8. Addressing challenges

Respondents also offered suggestions for overcoming technology anxiety and for harnessing the potential of ICT for tourism education. The principal reason for high technology anxiety seemed to be a lack of skills. Thus, the foremost suggestion was to receive increased training on subject content as well as teaching methods. Increased collaboration with more experienced tourism teachers and creation of opportunities for demonstrations and observations were acknowledged as potential strategies as well. This especially related to using digital technologies for content delivery, such as time zones or foreign currency exchange, which were identified as the most challenging for tourism students.

There are topics in curriculum such as time zones or forex [currency exchange] that learners struggle. I know teacher in East London who uses certain websites and videos to explain these topics and his students are very successful with exams. I network with him; I sometimes call him. [...] It would be useful to follow his lecture, listen how he teaches and see what technological sources he uses (Teacher, EC township school).

Furthermore, teachers wanted to take stronger advantage of mobile technology for educational purposes. Even though school policies strictly regulate the use of mobile phones in the classroom, several interviewees argued that mobile learning can complement and enrich formal learning in several ways: accessing educational resources, connecting with others, and sharing content. Finally, some teachers emphasised the potential of free digital tools available for content creation, sharing and networking, such as Dropbox and Google Drive.

6. Discussion and conclusions

The main goal of this explorative study was to investigate the role of ICT in secondary tourism education from the viewpoint of teachers. Departing from technology domestication as a conceptual framework, the study revealed that all interviewed tourism teachers had some kind of physical access to instructional technology. From a domestication theory perspective, ‘technology commodification’ was fairly achievable in the majority of these cases. Indeed, teachers expressed positive attitudes toward ICT-enhanced instructional tools: ICT has the capacity to widen access and provide more authentic learning experiences for students, as many of them have never been exposed to any touristic activity. Furthermore, ICT promotes student interest, engagement, and motivation. Teachers also believe that ICT is critical to students’ future success, especially if they want to work in the tourism sector.

Notably, despite physical access and positive attitudes, some of the interviewed teachers did not use any form of ICT: their teaching was mainly textbook-based. Nearly half of the respondents (9 out of 19) could be positioned in the ‘technology appropriation’ phase of domestication. They quite actively use and integrate technology in their educational practice. This was either in the form of available in-room technology, taking learners to the computer lab, or bringing their personal ICT devices to work. Only four teachers could be located in a ‘conversion’ phase of domestication: they used technology regularly for curriculum delivery, for connecting with colleagues, and for sharing materials. These teachers also encouraged their students to use their mobile phones for learning. These findings are in accordance with previous studies on domestication of ICT in disadvantaged South African schools (e.g. Chigona et al., 2010; Bladergroen et al., 2012). In these studies, educators recognised and appreciated the benefits of ICT for instruction, but identified serious impediments to achieve technology conversion. These ranged from exogenous factors such as available infrastructure, to school culture, management approaches, and technology self-efficacy and anxiety.

Previous research (Bandura, 2002; Palak & Walls, 2009; Agbatogun, 2010) suggest that there is a strong positive correlation between teachers’ attitudes toward ICT and their self-efficacy. Despite positive attitudes exhibited toward ICT in this study, technology anxiety and the lack of confidence in using ICT were recognised as the foremost barriers preventing adoption.

The results of this study relate to Social Cognitive Theory (SCT) as various factors (personal, behavioural, and environmental) were identified contributing to teachers' confidence in using technology for instruction. On a personal level, many respondents highlighted that successful tourism teachers have to be self-starters and open to change in teaching methodologies. Regarding behavioural factors, it was acknowledged that those teachers who had more advanced skills and experiences with technology tended to integrate it more compared to those who lacked these skills and experiences. Technological know-how was due to some teachers' personal decision to learn how to adopt technology for teaching purposes in their free time. Considering environmental factors, interviewees identified various external barriers that hindered them from developing their skills with ICT and consequently integrating it in teaching practices. Such impediments included lack of time, daily work demands, lack of resources, and big classes (especially in township schools). The findings support the SCT construct of human agency, which operates in an interdependent, triadic, reciprocal and causal structure (Bandura, 1998, p.62). The causation involves various factors – personal, behavioural, and environmental – that influence each other and determine individual decisions.

Furthermore, Bandura (1977) identified four sources of efficacy: (i) Experience of mastery; (ii) Vicarious experience; (iii) Social persuasion; and (iv) Physiological arousal. Interviewees shared their suggestions, which would facilitate more confidence in using technology for instruction and some of these suggestions are aligned with Bandura's identified sources of self-efficacy. The main cause behind low levels of confidence in using ICT is a lack of skills and experience. This could be addressed through training and practicing with instructional technology and specific ICT tools and resources. In respect of vicarious experience, interviewees suggested the idea of intensifying collaboration with other teachers and observing how successful teachers employed technology in their tourism classes delivering certain topics. This can be beneficial in increasing technology self-efficacy as observing others performing intimidating practices without adverse consequences can generate confidence and belief in their abilities (Bandura, 1977). With regards to physiological arousal and in the situations where teachers fear that technology will break, it can be addressed with more training as well. According to Bandura (1977), stressful situations evoke emotional reactions that affect persons' beliefs about their competencies and abilities. Providing opportunities where teachers can learn and practice can decrease their fear towards instructional technology.

This study echoes similar challenges in tourism education reported in other developing or emerging countries, for example in Asia, as reported by Hsu (2015), who describes the main obstacles as limited educational resources, qualifications of faculty, and outdated educational materials. Similar results are reported by Harrison (2015) on tourism education in the South Pacific: he emphasised the lack of touristic exposure of learners, and the challenge of striking the right balance between vocational and academic aspects within tourism education. The findings of this research are also in accordance with those of Mayaka and Akama (2015) on tourism education in Kenya. The researchers concluded

that the full significance of ICT in tourism curriculum content and design is still far from being apprehended.

7. Significance for theory and policy implications

The findings of this study may be significant for broader theories and applications of technology adoption in education, especially in contexts beyond South Africa. As this research has shown, while digital technology is of significant utilitarian value for educators, it can have more emotive, symbolic and cognitive implications. Digital technology can facilitate the practical access to information and achievement of tasks, while broadening the cognitive horizons of learners by virtualising (or imagining) the tourism experience. Coupled with the use of mobile devices and digital services, tourism as a distant and improbable reality becomes a possible and lived experience. Research in the international context may look to this ‘augmented’ potential of technology in terms of tourism education.

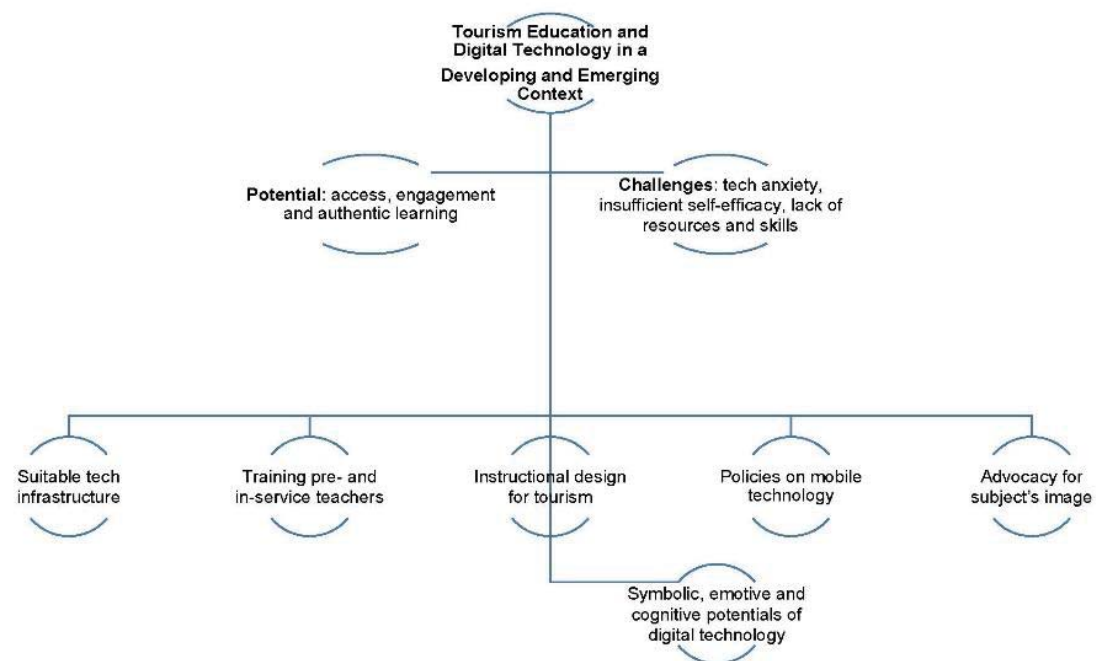
Besides providing much needed research on the opportunities and challenges of ICT for tourism teaching in the concerned schools and regions, this article might also be of practical interest, both locally and internationally. Policies should consider the point of view of teachers, so to ensure higher levels of technology appropriation and conversion. In particular, (i) suitable technological infrastructure is needed, to serve not only the Computer Application Technology classes, but to also support other subjects, including tourism. (ii) The mere provision of ICT is not sufficient: specific training activities – both pre- and in-service – are needed in order to enable teachers to use them without anxiety. (iii) Such training should go beyond the technology itself, tackling the instructional design of the very subject of tourism, how ICT can support its teaching and learning, to provide more authentic and broader tourism experiences, as well as to further improve attention, interest and motivation. (iv) Teachers should become better able to use ICT also for their professional development and in order to exchange materials and share experiences with other colleagues. (v) Additionally, regulations about the usage of personal mobile phones by students might be revised to allow them to access specific, value-added activities. (vi) At a higher level, the selection itself of competent tourism teachers should be viewed as a critical factor of success, and (vii) ad-hoc communication activities might be advisable to improve the overall image of the subject.

8. Limitations and future work

This research has a methodological limitation connected to the selected schools’ sample. There were no rural schools included in the sample due to accessibility constraints. Rural schools enrol a significant number of South African learners and face a series of challenges, which may be different compared to the reported schools in this article. Moreover, the country’s linguistic complexity limited the researcher to include schools with English as the main language of instruction. Schools where Afrikaans and isiXhosa are the main language of instruction were excluded due to the field researcher’s lack of knowledge of these languages.

Future work could specifically examine tourism curriculum content and attempt to understand the degree of localisation and the degree of ICT related usage.

Graphical abstract for publication “The Role of Digital Technology in Tourism Education: A Case Study of South African Secondary Schools”:



Publication 2: Raising Awareness and Promoting Informal Learning on World Heritage in Southern Africa. The Case of WHACY, a Gamified ICT-enhanced Tool

- Adukaite, A., Cantoni, L. (2016). Raising Awareness and Promoting Informal Learning on World Heritage in Southern Africa. The Case of WHACY, a Gamified ICT-enhanced Tool. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 12(2).

Raising Awareness and Promoting Informal Learning on World Heritage in Southern Africa. The Case of WHACY, a Gamified ICT-enhanced Tool

Abstract

Diffusion of digital games and the trend of gamification in various fields have increased scholars' attention on how digital games or their elements can be introduced into formal and informal learning practices. Majority of the research in this field has been conducted in economically developed regions and not so much in emerging economies. With this study the researchers focused on developing region of Southern African Development Community (SADC). *World Heritage Awareness Campaign for Youth (WHACY) in SADC* is a campaign dedicated to raise awareness and foster informal learning among Southern African youth about the heritage and sustainable tourism in the region. The campaign employed an online and offline gamified learning platform, which was supported by a dedicated website, Facebook page, wiki and offline materials. In one year of operation the campaign reached more than 100K audience. The purpose of this paper is to present the development, implementation, and evaluation of the campaign. The goals of the evaluation were dedicated to assess user experience in terms of engagement and conduciveness to learning as well as exploring the possibility of a gamified application to be integrated into the regular high school tourism curriculum. South African tourism students' and tourism teachers' perspectives were taken into consideration.

Keywords: *awareness campaign, SADC, South Africa, gamification, formal and informal learning, world heritage sites*

1. Introduction

Computers, internet and mobile technology have opened up the way to digital games, which have evolved into a significant global business and have become a common phenomenon in contemporary culture (ESA, 2015). However, beyond their use as entertainment, game mechanics and game thinking have also been applied in different industries for different purposes: this trend is called gamification (Deterding, 2012). Indeed, the idea of introducing game elements in non-entertainment environments is not novel; it has its roots in marketing activities such as reward systems, points collection, loyalty or frequent flyer programs (Seaborn & Fels, 2015; McGonigal, 2011). Game elements are also found in various simulations in the fields of education and training (Zichermann & Cunningham, 2011). The current re-emergence of gamification is influenced by factors such as cheaper and more accessible technologies, personal data tracking, and the popularity of games in individuals' everyday lives (Deterding, 2012).

Numerous positive claims have been put forward regarding the aspect of gamified learning in education, such as increased motivation and engagement, empowerment of students with low self-efficacy and even reinforcement of critical thinking (Turkay et al., 2014; da Rocha Seixas et al., 2016). While the research related to gamification and education in developed countries (North America and Europe) are pervasive in the literature (Boyle et al., 2016; Dicheva et al., 2015), only a few studies have been conducted in the developing countries environment (da Rocha Seixas et al., 2016; O'Donovan et al., 2013).

Within this paper a campaign called *World Heritage Awareness Campaign for Youth (WHACY) in SADC*, which is dedicated to raise awareness and foster informal learning among Southern African youth about the heritage and sustainable tourism in the region, is presented. The campaign employed an online and offline gamified learning tool, which was supported by a dedicated website, Facebook page, wiki and offline materials. In one year of operation the campaign reached more than 100K audience. The purpose of this paper is to present the development, implementation, and evaluation of the campaign. The goals of the evaluation were dedicated to assess user experience in terms of engagement and conduciveness to learning as well as exploring the possibility of a gamified applications to be integrated into the regular high school tourism curriculum focusing on one of the SADC countries: South Africa.

2. Literature review

2.1. Games and learning

Playing and learning is not a new phenomenon; the belief that children learn while playing is well recognized. While playing, children practice skills and develop social attitudes that are central to their social, motoric, emotional and intellectual development (Sutton-Smith, 2001). However, the recent arrival and growing acceptance of digital games has generated new interest on how to harness and take advantage of them for educational goals (Gee, 2008; Prensky, 2005). The relationship between games and learning has been approached from various theoretical perspectives: examining the informal learning that occurs during play (Sefton-Green, 2003) or the exploring the incorporation of games in formal learning activities (De Freitas & Oliver, 2006). Games, simulations, and gamification bridge the distinction between formal and informal learning. Introducing something that is considered an informal activity (gaming) into formal learning settings provides opportunities for better understanding on how formal and informal learning could reinforce each other in order to support cognitive development and promote learning (Sefton-Green, 2003; Koutromanos & Avraamidou, 2014).

In their systematic review of 143 papers of high quality evidence about outcomes of the games in education, Boyle et al. (2016, p. 182) reported that the most “occurring outcome was knowledge acquisition “2followed by perceptual and cognitive, affective and behaviour change, with fewer papers reporting physiological, skills and soft and social skills outcomes”. Furthermore, STEM subjects (science, technology, engineering and mathematics) as well as health were the most popular domains for educational digital games. Boyle et al. (2016) report that research on games in education has an international dimension: out of 143 evaluated studies, 62 were conducted in North America, Europe (n=45), Asia (n=26), South America (n=5) and Australasia (n=5). Interestingly, not even one study in the systematic review was conducted in Africa. This also corresponds to similar findings of Hew et al. (2016) who reported that gamification studies are mainly produced in the USA and Europe.

2.2. Theoretical background

Engagement and motivation are usually the ultimate goals of gamification practices. Thus, it is important to uncover what makes games and gamification engaging to its users and which theories support these practices specifically for learning. It is critical to understand intrinsic (driven from within the user, mainly for the enjoyment the activity provides) and extrinsic (driven from external factors, such as prize, higher grade, praise from the teacher etc.) motivations of the learner while engaged with gamified experiences (Kapp, 2012; Deci & Ryan, 2002). Majority of the theoretical frameworks of motivation include both types of motivations. Three theories are discussed below, which have informed the design and development of the presented case study.

Self-Determination Theory is often used to explain human motivations to perform an activity or task. According to Deci and Ryan (2002), three psychological innate needs motivate individuals to initiate behaviour: (i) *Competence*, the need of a human being to be challenged and to attain ‘mastery’ through acquiring new skills; (ii) *Autonomy*, the feeling that a person has control and determines the outcomes of her/his actions; and (iii) *Psychological relatedness*, the individual needs to interact and connect with others.

Furthermore, Malone (1981) introduced the *Theory of Intrinsically Motivating Instruction*. He investigated what makes games fun and intrinsically motivating and identified three principal elements: (i) *Challenge*, which depends on the uncertainty of the outcomes. If the user knows the exact outcome of using the application or knows that s/he will not be able to reach the goal, this will not facilitate challenging environment. In order to make the outcomes uncertain variables such as hidden information, various difficulty levels, or randomness could be introduced. (ii) *Fantasy*. It is an environment that evokes vivid mental images of things related to learning materials (using metaphors, for example), which has capacity to make instructional applications more engaging and provides emotional and cognitive advantages. (iii) *Curiosity*. The gaming environment should provide optimal informational complexity, which would evoke users’ cognitive and/or sensory curiosity throughout the process.

Finally, *Flow Theory* significantly informs gamification design. Flow is a mental state of full immersion with complete focus on the task (e.g., playing a video game) (Csikszentmihalyi, 1990). Flow concerns full mental involvement with an activity with continuous engagement during the process: the perfect state between anxiety and boredom. Flow also concerns the balanced state between players’ abilities and skills compared to the challenge level of the tasks. According to Csikszentmihalyi (1990), eight components enable a state of flow: (i) Achievable task; (ii) Concentration; (iii) Clear goals; (iv) Feedback; (v) Effortless involvement; (vi) Control over actions; (vii) Loss of self-consciousness; (viii) Loss of sense of time.

Based on the above mentioned theories, various authors (Kapp, 2012, Nah et al, 2014; Lee & Hammer, 2011) identified and listed the most common gamification elements used in the education:

- *Rewards*. This concept describes the feedback and/or incentive arrangement within the gamified application that encourages users to continue and can support a high level of motivation. Even negative rewards, which could be considered as punishment within the game, can facilitate learning. As argued by Kapp (2012), it is better to provide the user with smaller multiple rewards, distributed throughout the game instead of one big prize. Thus, *points and badges* are common gamification features, and serve as a form of rewards while progressing through the game and measuring gradual achievements and success.
- *Challenge* is the extent to which user skills match the challenges presented by the digital game (Kiili, 2005; Csikszentmihalyi, 1990). Appropriate challenges will keep the player engaged and motivated throughout the game and the playfulness of the experience will be higher (Woszczynski et al., 2002). Thus, if the application is too challenging the user may become frustrated quickly. On the contrary, if the application is not challenging enough the user may become disinterested. Elements of challenge within games are often supported by different difficulty *levels*.
- *Feedback* is a typical game feature, which is usually instant, clear and direct. Based on feedback, players can make certain decisions, that is, change or correct their playing behaviour. Educational gamification researchers argue that the immediacy and frequency of feedback contributes to greater learner engagement, effectiveness and attainment of the flow state (Kapp, 2012; Csikszentmihalyi, 1990).
- *Competition* among players is a common game element, where each participant strives to optimise their performance and to attain the best possible achievement against the other participants. The competition is often intensified with another gamification feature: *leader boards*. The leader board is a social component embedded into the digital game, consisting of a list of players with top scores. According to game designers, leader boards can be powerful motivators for players, pushing them to play repeatedly in order to get to the top of the list.

3. Context

3.1. The applied domain: UNESCO World Heritage Sites & tourism

In 1972, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) adopted a *Convention Concerning the Protection of the World Cultural and Natural Heritage*, aimed at the “identification, protection, conservation, presentation and transmission to future generations” (UNESCO, 1972: p. 3) of the world’s cultural and natural heritage of outstanding universal value. As of May 2016, the World Heritage Committee has included 1031 properties in the World Heritage List: 802 cultural, 197

natural, and 32 mixed sites in 163 countries. The World Heritage Convention clearly states that apart from conservation and protection of world heritage, its “presentation” (UNESCO, 1972: p. 3) is also among its primary aims. Presentation implies communication and creation of public awareness among the local community (ibid.) and international visitors (Pedersen, 2002). According to Weaver (2012), sincere public awareness and appreciation is required to generate sustainable conduct. Furthermore, the great potential of ICTs is recognized to facilitate sustainable tourism through awareness raising, valorisation, sensitization, and guidance for locals and tourists (Ali & Frew, 2013; Schieder et al, 2014). Indeed, the Convention states the need for “educational and information programmes to strengthen appreciation and respect” (UNESCO, 1972: p. 13) for cultural and natural heritage sites. One of the potential strategies to contribute to this reconciliation of tourism and preservation of heritage places is harnessing technologies for learning purposes (Cantoni et al, 2009) and possibly introducing gamification features for more profound engagement and interest creation.

The geographical context of the presented campaign is Southern African Development Community (SADC), a strategically important region in economic and geographic terms located in Southern Africa. It includes 15 countries: Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe. SADC region is considered still a developing geography, undergoing various sustainable development challenges. The SADC region is very rich in touristic resources in term of cultural and natural properties, which every year are attracting increasing numbers of tourists. According to the World Travel and Tourism Council (WTTC) and the Regional Organization of Tourism in Southern Africa (RETOSA), tourist international arrivals grew from 13 million to approximately 23 million during 2002-2012. These numbers are positively influencing the GDP, employment, and investment in the region. Therefore, tourism development in SADC is viewed as a substantial tool to contribute to the economic growth, hence, to alleviate poverty, advance security, and empower the promotion of local attractions (WTTC, 2013). The 15 countries of SADC region host 39 World Heritage Sites (WHs) – 17 cultural, 19 natural, 3 mixed – properties of outstanding universal value representing the cultural and natural richness of the region, which at the same time attract very high interest from the tourism perspective.

4. Project: WHACY

4.1. Case study: Awareness campaign about UNESCO World Heritage Sites in SADC

UNESCO Chair in ICT to develop and promote sustainable tourism in World Heritage Sites based at USI – Università della Svizzera italiana in Lugano (Switzerland) together with *Hospitality Youth Initiative (HYI)*, a South African NGO and the *Regional Tourism Organisation of Southern Africa (RETOSA)* have designed an awareness campaign about the 39 WHs in the SADC region.

The concept of the campaign was built on three main pillars:

- *Awareness.* Firstly, the gamified online/offline quiz tool, supported by online outlets as a dedicated website, wiki, and Facebook page, were designed to spread awareness among local students and young adults in Southern Africa around the unique and universally valuable heritage in their region.
- *Informal learning.* Participants become aware and gain knowledge about the outstanding value of the heritage in their region, and about the importance of sustainable tourism to ensure development at those sites.
- *Empowerment.* The promotion of a sense of ownership among youth of such heritage. The youth becomes aware of heritage as a relevant asset for their professional future, as well as for local development.

The project addressed the following audiences:

- Schools in the SADC region were invited to participate in the project, but the actual game was played by individual students with a foreseen age from 16 to 19.
- Any other individual participant interested in the topic.

4.2. Campaign's development: ICT tools

The principal tool for the campaign is an online/offline quiz platform. The platform is based on an algorithm that randomly retrieves questions from a previously populated database, and presents to the user a unique collection of multiple choice quizzes. An ad hoc database of 470 questions has been created, distributed among four categories:

- 390 questions on 39 World Heritage Sites (10 for each site divided into 5 difficult and 5 easy ones)
- 40 questions about sustainable tourism development
- 20 questions about UNESCO
- 20 questions about eTourism (information and communication technologies and tourism)

The goal for the user is to collect the highest score by correctly answering the questions. By reaching the end, the user obtains a personalized certificate with her/his final score in printable PDF format (Figure 1).

In order to adapt the contents to audience, who was either second, or third English language users, all the questions were revised by a panel of experts gathered by South African project partner. Moreover, during the design and development phase the quiz was hosted on a Swiss server. Before the launch, the application was migrated to a South African server in order to allow faster connection and data transmission for game participants. Additionally, an offline version on a CD-ROM was developed.



Figure 1: Awareness campaign interface example and final certificate

4.3. Gamification features of WHACY

Firstly, *rules* are provided in a dedicated section of the platform, specifying all the information needed about how to proceed with the game. The *reward structure* of WHACY consisted of a point system: the user collected points after answering questions. At the end of the quiz, a certificate was available to download, indicating participation and the score achieved. All these can be considered as extrinsic motivators for players to answer the questions correctly. *Feedback* is another gamification element present in the WHACY platform. Every time a player submits an answer, s/he receives an immediate feedback if the answer was correct, partially correct or incorrect. Moreover, a player receives complimentary information related to a question to facilitate learning about the topic. In addition, a progress bar is displayed to players to indicate the remaining questions to finish the game. As for *aesthetics*, the presence of different pictures in every question (corresponding to the WHSs described in the questions) and the presence of some videos enhance the user experience. Regarding the element of *time*, it is important to mention that during the first round of the quiz, the players were not restricted by time, and there was no time element present. Nevertheless, in the second round, a restriction of 30 seconds to answer a question make the game more intense by pressuring players to provide the answer within a limited period. The *replay* option is offered at the end of the game allowing the players to improve on their performance and increase their knowledge regarding the topics covered.

The game was organized along two main phases:

- *First Phase (May – Aug. 2014)*. The first round contained 28 questions: 16 questions on four selected WHSs out of 39, four questions about UNESCO, four about

sustainable tourism development, and four about eTourism. Questions were randomly selected from the pool of available questions, which meant that different playing instances were possible, without being exposed to the same questions. Participants could also play offline (CD-ROM).

- *Second Phase (Sep. – Nov. 2014)*. This round contained 42 questions about all 39 WHSs and other topics without a possibility to preselect WHSs as in the first round. Each question had timer with 30 seconds. The offline tool did not support the second round.

The initial plan of the campaign also envisioned the third phase: a residential workshop together with top performing students from each SADC country, however, due to various challenges it was cancelled.

Table 1 summarizes other ICT platforms used for the reinforcement of the campaign.

Platform	Description
Dedicated website: www.whacy.org	The website was created using Wordpress content management system with the main goal of presenting the project, its partners and goal to the wide public.
Dedicated wiki: http://wiki.africaheritage tourism.org	Wiki was created as content support repository about all WHSs and other topics: UNESCO, sustainable tourism development, eTourism. The wiki platform was chosen because it enables an easy management in terms of content creation and editing without any HTML or other coding perquisite.
Facebook page: www.facebook.com/africaheritage tourism	Facebook page has been created in order to support the project's promotion. It reached more than 4K likes (May 2016) mainly from Madagascar, Lesotho, Mozambique, Tanzania, Mauritius, Zambia, Malawi, Democratic Republic of Congo, South Africa and Botswana.

Table 1: Campaign's supporting ICT platforms

4.4. Campaign's outreach

Promotion of WHACY has been done both offline and online. Activities have been aimed at recruiting participants, as well as informing relevant stakeholders. Online promotion was mainly supported by dedicated Facebook page (see above) through regular posting about WHSs in SADC, photo competition, as well as several paid campaigns. Moreover, digital promotional materials were spread through channels such as YouTube. Furthermore, an email campaign was carried out approaching 6'900 potentially interested schools in SADC, however, only 18% had working email addresses. To overcome Internet connection problems, the offline version (CD-ROM) of WHACY has been produced and shipped to almost 2'500 schools in SADC region.

Moreover, 68 schools have been visited in person presenting the campaign to the head of the school and the relevant teacher (Tourism, Geography and/or IT).

Mainly due to a lack of internet connectivity the participating schools preferred to use offline version in CD-ROM format. More than 104'000 students have been exposed to online and offline WHACY as of March 2015. The offline exposure was estimated by HYI, based on telephone interviews with a sample of 128 schools, who received offline material. Participants from 13 SADC countries have been exposed to the campaign, but no participation from Swaziland and Angola has been reported.

5. Campaign's evaluation methodology

For the evaluation part of the campaign, one country from SADC region was selected i.e. South Africa, which is a developing/emerging country with a growing tourism industry. Tourism in South Africa is recognised as a key economic sector with potential for continuous growth, which demands a skilled and professional workforce. This implies that the local workforce should be aware of the nature and role of tourism, and should be able to critically evaluate its potential. Since 2000 tourism as a subject has been widely introduced at secondary school level (10-12 grades) throughout South Africa. Tourism subject has seen significant growth in terms of the number of schools where it is taught: from 120 schools in 2000 to almost 3'000 schools in 2014 (Umalusi, 2014). To this date, tourism is one of the most popular electives in high schools: up to 20% of all high school students select the subject (Allais, 2014).

Tourism education in South Africa is constrained by a lack of trained teachers, students' limited exposure to tourism industry, and students' lack of interest and motivation to study the subject (Adukaite et al., 2016; Umalusi, 2014; Chili, 2013). Tourism subject in South African high schools has a reputation of being an "*easy*" subject, which in some ways becomes a "*dumping ground*" for academically weak students or those who try but eventually cannot cope with other subjects (ibid.). The introduction and adoption of ICT has been identified as a potential enabler of tourism education (Adukaite et al., 2016). To address the challenge of students' apathy regarding the subject, one potential strategy would be the use of digitally gamified learning.

Due to the fact that topics of World Heritage Sites and sustainable tourism are covered in the South African tourism curriculum, audience of tourism teachers and students have been chosen for the evaluation of the campaign.

The evaluation of the campaign was carried out employing mixed methods throughout two phases (Table 2). The goals of the evaluation were mainly dedicated to assess students' user experience in terms of engagement and conduciveness to learning as well as exploring the possibility of a gamified application to be integrated into the regular high school tourism curriculum.

Phase	Evaluation Method	Location	Number of subjects
Phase 1	Focus groups	South Africa	9 focus groups with high school students from 11-12 grades taking tourism subject
	Semi structured interviews	South Africa	19 high school tourism teachers
Phase 2	Questionnaire	South Africa	209 high school tourism teachers

Table 2. Overview of the campaign's evaluation

Phase 1: Fieldwork in South Africa

During three months (April-June 2015) the main researcher has visited 16 schools in two provinces of South Africa: Western Cape Metro North District (ten schools) and Eastern Cape Western District (six schools). Firstly, the lists with the high schools offering tourism subject were obtained from the Department of Basic Education and the sample for the study was drawn including different types of schools in regards to their socio-economic characteristics because tourism is taught in all schools – from well-resourced private to poorly resourced disadvantaged community schools.

A typical visit to the school consisted of a group of tourism students (grades 11-12) playing WHACY for 30-45 minutes in the school's computer lab. Afterwards available and interested students were invited for a focus-group discussion, 20-45 minutes. For focus groups' discussion, semi-structured questioning approach was used to ensure consistency among groups, however, allowing quite large degree of flexibility. Finally, semi-structured interviews were conducted with tourism teachers lasting 30-75 minutes. The focus group and interview protocols covered different questions related to ICT integration for tourism teaching, however, in this paper only findings related to the campaign are reported. Table 3 provides an overview of the fieldwork, number of students and teachers involved.

Type of school	Western Cape (WC)	Eastern Cape (EC)
Public school (township). Previously, before 1994, only black or coloured schools, often inadequately resourced.	5 schools 60 students played 3 focus gr. (25 students) 6 teachers	4 schools 73 students played 2 focus gr. (19 students) 5 teachers
Public school (ex-model C). Previously, before 1994, only white schools, well resourced, now integrated.	3 schools 38 students played 2 focus gr. (16 students) 4 teachers	2 schools 15 students played 1 focus gr. (8 students) 2 teachers
Private schools. Independent, well resourced.	2 schools 27 students played 1 focus gr. (7 students) 2 teachers	0
	Total: 16 schools 213 students played WHACY 9 focus groups (75 students participated) 19 teachers interviewed	

Table 3: Outline of the field work

Summing up, 16 schools were visited, 213 students played WHACY and were observed, 9 focus group discussions with 75 students were held, ranging from 5 to 10 students per focus group, and 19 interviews with tourism teachers who also played WHACY and observed students playing it were conducted. All the focus group discussions and interviews were conducted in English, audio recorded and later transcribed. The transcripts were analysed by coding them using inductive thematic coding (Corbin & Strauss, 2008) through analysis software NVivo 10.

Phase 2: Tourism teachers' survey

The second evaluation phase was a survey with tourism teachers to obtain quantitative insights about their perceptions towards gamified application. The sample of the study was in-service tourism teachers in South Africa and the study adopted convenience sampling technique. The focus was on three provinces: Western Cape, Gauteng, Eastern Cape. Survey participants were asked to play WHACY game and to fill in the questionnaire reporting their perceptions about gamified application (Likert scale from 1 to 5, from strongly agree to strongly disagree).

The lists of the schools offering tourism subject in the respective provinces were obtained from the National Department of Education and the mailing lists were compiled (n=529 valid email addresses in 3 provinces). The survey was distributed via email addressing the school principal and asking to pass the survey information to school's tourism teachers. After two weeks the reminder followed, and after another week the telephone calls (n=80) were conducted to further invite tourism teachers to participate in the survey. Finally, the invitation to survey was distributed through tourism subject coordinators and advisers and

their mailing lists. In total 218 teachers filled out the survey and 209 were retained after data cleaning (see Table 4 for sample demographics).

Gender	F (83%); M (17%)
Age	20-34 (13%); 35-49 (61%); 50-65 and more (26%)
Province	Western Cape (34%); Eastern Cape (31%); Gauteng (30%); Mpumalanga (2%); KwaZulu-Natal (1%); Northern Cape (1%); Limpopo (1%)
Language (mother tongue)	Afrikaans (37%); English (24%); isiXhosa (26%); isiZulu (3%); Setswana (3%); Sesotho (2%); Sesotho sa Leboa (1%); Other (4%)

Table 4: Demographics of the survey sample

The respondents were asked to self-declare their level of technology training: 7% reported having extensive, 17% moderated, 39% occasional and only 37% with no technology training. This implies that the respondents of this survey were exposed to technology and even 66% of the sample reported that they used technology for teaching purposes. Thus, the sample can be considered as technologically experienced, and the results of the study cannot be generalizable for the rural schools where internet connection and technological training and exposure is scarce. Only 9% of the respondents had previously used digital games/quizzes for teaching purposes.

Ethical considerations

Firstly, research approvals and permissions were obtained from the respective regional Education Departments. Secondly, principals of the selected sample schools were contacted to obtain their permission to visit the school and conduct foreseen research. Thirdly, all respondents gave their written consent to be interviewed or surveyed. They were informed that their participation was voluntary, anonymous and confidential. The main researcher commenced with fieldwork after becoming familiar with the context and environment (Sherry, 2008).

6. Results

Engagement and learning opportunities: students' perspective

Overall observations proved that the quiz was easy to use and intuitive, none of the students experienced technological issues, even though 39% of participants reported that they have never used computers before. Two main themes emerged from the group discussions with students. First theme relates to gamification features of the application, which engaged students and made their experience enjoyable. Second, potential learning opportunities offered by gamified application.

Majority of the participants expressed excitement over the activity: *“It’s not boring as studying from textbook, it’s very interactive and exciting. It’s a new thing for us, we usually don’t do these things”* (Student, WC Township school).

The most engaging and triggering excitement features among the students while playing WHACY were:

- Aspect of **competition and score system**: *“You actually want to get it right because you are competing for points.”* (Student, WC township school). Competition made students try harder and invest efforts: *“When playing something like this, we get competitive, I don’t want to have lower mark <...>”* (Student, EC Township school)
- **Immediacy of the feedback**: *“I liked how instantly the answer was given, usually when it is given at the very end it is not registered in your head. Its better to get it instantly”* (Student, EC township school). However, some students revealed that striving for higher score was distracting them from reading the feedback in textual format after each question. Students were mainly reading feedback in the instances when their answer was wrong. One student revealed that, according to her, the feedback was too long and she did not read it.
- **Visual aesthetics**: *“I liked pictures behind the questions. It was enjoyable <...> I also liked the background pictures because they were hidden hints”* (Student, EC ex-model C school). Students reported that pictures and videos were engaging, however, in more than a half of visited schools videos were not supported because of a lack or slow speed internet connection.
- **Challenge**. In several focus groups the aspect of challenge emerged. Students agreed that it was challenging at the right level: *“It was challenging in a good way”* (Student, WC ex-model C school). Which was influenced by the fact that students were able to relate to quiz’s contents because of their tourism studies: *“I liked that I could connect to the content from tourism classes”* (Student, WC Township school). Only one student reported that the quiz was too easy for him. However, in several instances students were puzzled by the way the questions were structured, due to the fact that English was not their native language.

During the discussions students pointed out that WHACY has triggered their curiosity and willingness to learn even more about the related topics: *“<...> for the things I got wrong I will search the right answers and like this I learn the answers and maybe even more about it”* (Student, WC Township school).

Furthermore, students were suggesting that a playful quiz could become a complementary tool especially for content revision purposes: *“Would be nice to play something like this once a month. We learn things in class and instead of boring pen paper test we could do something like this”* (Student, WC Private school).

Regarding location where such application could be used, the mobility aspect emerged: *“I would like it on a phone, I could play it on a bus to school and learn. It could be syllabus related, you choose subject and it gives you a quiz, for revision would be cool”* (Student, EC ex-model C school).

Summing up, WHACY gamified learning experience was positively evaluated by students participating in the focus groups. However, engagement with ICT activities appeared to be a new practise for more than a half of participants, especially for the students from more disadvantaged schools. Going to computer lab for many of them was already an exciting experience in itself: *“It was nice to feel the technology in front of you”* (Student, WC Township school). In more disadvantaged schools students reported: *“We are not used to be taught with technology, we don’t use technology for learning”* (Student, EC Township school).

Engagement and learning opportunities: teachers’ perspective

During the interviews with tourism teachers, potential learning opportunities of gamified application emerged, especially addressing students’ low motivations and interest for the tourism subject. According to interviewed teachers, students rarely choose the subject because they are interested in it. After engaging with WHACY and observing their students playing, several teachers agreed that presenting contents in a more playful manner could increase their motivation to study tourism:

Would be very useful to introduce some chapters in a more playful way because they do enjoy it. They engage, I think it can even increase motivation in learning tourism (Teacher, WC Township school).

Furthermore, potential conduciveness to learning was observed by teachers:

They really enjoyed it, I saw when they had their score going up they were screaming “yes, yes!” and that gave them courage to carry on. I would use it definitely, it makes you think broad as well as trial and error contributes to learning (Teacher, EC Township school).

The teachers saw WHACY as a more engaging way to assess students’ knowledge:

It could be used to test their pre-knowledge of the topic right at the beginning to see what they actually know and then to reassess them at the end, when they are done with the chapter (Teacher, WC Private school).

The fact that application is self-driven was appreciated by teachers’ because it did not require efforts from their side: *“It could even work as a revision tool, they could do it at home or on their phone”* (Teacher, WC ex-model C school).

209 tourism teachers also filled in a survey where they were asked to evaluate the application's characteristics in terms of rewards, challenge, playfulness and potential learning opportunities. Almost all respondents (99%) agreed that points were a rewarding attribute, 89% of the respondents agreed that immediate feedback was contributing to rewarding playing experience. 67% of the teachers agreed that the application offers flow experience and boosts confidence of the player when progressing through the quiz. Moreover, 72% agreed that the tool stimulated players' curiosity. 93% of the teachers agreed that WHACY quiz offers suitable level of challenge to the students: 81% reported that challenge closely matches to their computer skill level and 74% stated that challenge closely matches to their knowledge level.

Almost all respondents (97%) perceived the gamified application as a potential teaching aid for tourism subject, mainly (83%) as an assessment tool. Moreover, majority of the respondents (97%) perceived WHACY as bridging formal and informal learning settings, as the tool which might be used both in the classroom and outside of it (Table 5).

	Strongly agree Agree	Neither agree nor disagree	Disagree Strongly disagree
As a teaching aid	97%	2%	1%
For assessment	83%	3%	4%
As a reward	45%	34%	21%
It might be a tool used both in the classroom and outside of it	97%	2%	1%

Table 5: Gamified application and tourism curriculum

Table 6 summarizes the learning opportunities the platform offers as perceived by surveyed teachers. The results proved that teachers to a great extent perceived the platform as having potential to foster awareness about world heritage (99%) and enhance knowledge (94%). Moreover, 86% of the respondents agreed that the tool can increase interest in tourism subject and 83% agreed to the fact that the platform can motivate students to learn more about the heritage.

Foster awareness about World Heritage Sites	99%
Enhance knowledge of World Heritage Sites	94%
Better visualize heritage places	94%
Increase interest in tourism subject	86%
Motivate students to learn more about heritage	83%
Better understand South African touristic potential	55%
Increase sense of pride of own heritage	46%
Increase sense of responsibility for heritage protection	17%

Table 6: Teachers perception of WHACY learning opportunities (strongly agree and agree values added)

Barriers to using a gamified application

Moreover, tourism teachers were asked to identify the main barriers (Table 7) to introduce gamified application into formal tourism teaching practices. Survey (n=209) results revealed that the main barrier was lack of time: 78%. In the comment section the respondents explained that the tourism program is already full and there is a strong pressure of preparing students for the final examinations, thus introducing new methodologies or tools for learning is not a priority. Slightly less than a half of respondents (47%) put forward the barrier of lack of technological access in the school. In the third position (38%), the teachers positioned the barrier of their own lack of professional training on how to integrate technology into teaching practices and in the comments the wish to receive the training on how to incorporate gamified learning applications was expressed. In the comment section a frequent mentioned barrier was language, even though in the majority of South African schools tourism is taught in English, which is often second or third language to the students, thus having contents translated in local languages, according to the teachers, would enhance learning experience.

Lack of time during the class period	78%
Lack of access to technology in my school	47%
Low quality or lack of internet connection in my school	38%
Lack professional training on how to integrate technology into teaching	38%
Lack of technological assistance in my school	19%
Inflexibility of the current curriculum	11%
Technologically unprepared students	6%
My lack of power in deciding which strategies to use for teaching	3%

Table 7: Barriers for using gamified application in tourism classes

Interviews with teachers (n=19) echoed similar barriers as the survey: lack of resources (computer and internet connection), which causes logistical challenges to use computer labs due to low computer/student ratio as well as lack of ICT training. Furthermore, technology anxiety emerged as a strong impediment for ICT integration in general into tourism teaching. Some respondents revealed that they were uncomfortable and intimidated to use ICT because of age or lack of skills and experience.

I teach in the traditional method and it proved to be quite difficult when somebody suggests you can do this x, y and z with technology and I said 'oops', I don't know how to use this kind of media and I am just going to be in my little comfort zone (Teacher, WC private school).

Furthermore, high penetration of mobile technology among students was identified as potential platform to engage with application, however, data cost challenge emerged:

Majority of kids have phones with internet, it could work as a homework, but the problem can be data and how much of data they have available. I think if student needs to decide if to use his data for this application or Facebook, Facebook might win (Teacher, EC Township school).

7. Discussion and conclusion

Students' engagement has been identified as a significant indicator of their academic success in South Africa (Council for Higher Education, 2010). Lack of engagement is considered as one of the factors contributing to poor graduation rates at the secondary and tertiary institutions in South Africa (Strydom *et al.*, 2010; Titus & Ng'ambi, 2014). It is argued that increased engagement is likely to decrease apathy for the specific subject and even improve academic performance (Fitzgerald, 2012). A popular strategy to address lack of student engagement is introducing game elements into the learning process: the so-called gamification of learning (Kapp, 2012). However, as argued by Titus & Ng'ambi (2014:743): "To date, there is paucity of evidence within South African education system with regards to games and its impact on student engagement". Thus, this study attempted to illustrate that gamification elements can foster student engagement and facilitate conduciveness to learning specifically in tourism education within South African secondary education, which suffers from students' lack of interest and motivation (Adukaite *et al.*, 2016).

The main goal of this paper was to present the *World Heritage Awareness Campaign for Youth (WHACY) in SADC*, a campaign dedicated to raise awareness and foster informal learning among Southern African youth about the heritage in their region as well as the sustainable tourism. For the evaluation of the campaign a mixed methods approach was used. The qualitative insights from the focus groups with South African tourism students revealed that the most engaging features of the application were competition (through the scoring system), immediacy of feedback, visual aesthetics and challenge. Moreover, the gamified application triggered curiosity and willingness to learn more about the related topics among the students. The findings are in line with presented conceptual framework and previous research (Csikszentmihalyi, 1990; Kapp, 2012; da Rocha Seixas *et al.*, 2016), underlying that elements of competition, challenge, feedback and visuals have potential to intrinsically motivate students and provide playful learning experience, which leads to greater engagement within the learning process. Although the study does not provide evidence that learning had occurred, it provides insights into potential of gamification and its nature to facilitate engagement and knowledge enhancement. However, for the majority of the participants' gamified learning was the first time experience, and in the disadvantaged schools going to computer lab was already an exciting experience in itself and this limits generalizability of the results.

Interviews and survey with South African tourism teachers revealed a great interest in gamified application's integration into the formal tourism curriculum. Gamified application was viewed as a more engaging assessment tool due to the multiple choice format. Teachers expressed positive attitudes towards gamified application recognizing its capacity to provide more motivating tourism learning experiences for students. Still, potential barriers to integrate application were identified such as lack of technical resources, limited availability of labs space and time. Moreover, despite positive attitudes towards ICT-enhanced tool within this study, technology anxiety and teachers' lack of confidence in using ICT was recognized as a significant barrier preventing the integration. The main source for low levels of confidence in using ICT is lack of skills and experience. This finding echoes extensive research on ICT integration within education in emerging countries and strong influence of teachers' low technology self-efficacy and anxiety (Fanni et al, 2013; Chigona et al, 2010; Agbatogun, 2010).

Additionally, mobile technology was recognized as having potential for usage of educational gamified applications because it is a highly pervasive technology in the region. Even though all visited schools had cell phone policies disallowing students to use them in the classroom, multiple teachers occasionally were making exceptions for tourism subject. However, teachers in township areas reported students' resistance to use cell phones for educational purposes due to the cost of data, as well as to limited skills.

Summing up, the gamified application appeared to mediate the engagement and facilitate space for learning within tourism classroom. This campaign highlights that gamification has potential in developing context as a catalyst for ICT and (in)formal learning initiatives. It should be noted that the study findings are based on self-declared data and it is only on one particular gamified application. Further research, especially longitudinal, would be useful to determine if gamification enhances learning using a variety of pedagogical methods.

Publication 3: Teacher perceptions on the use of digital gamified learning in tourism education: The case of South African secondary schools.

- Adukaite A., Er Ş., Van Zyl I., Cantoni L. Teacher perceptions on the use of digital gamified learning in tourism education: The case of South African secondary schools. *Computers and Education*.

Status: Revised and re-submitted

Teacher perceptions on the use of digital gamified learning in tourism education: The case of South African secondary schools.

Abstract

With the global diffusion of digital gaming, there is an increasing call to establish to what extent games and their elements could be harnessed for learning and education. The majority of research in this field has been conducted in more economically advanced and developed regions, and there is a paucity of research in emerging country contexts. It is argued that gamification can be effectively utilised also in these contexts to address learner engagement and motivation. The study investigated the extent to which six determined predictors (perceptions about playfulness, curriculum relatedness, learning opportunities, challenge, self-efficacy and computer anxiety) influence the acceptance of a gamified application by South African tourism teachers. Tourism education was selected for empirical study because of its popularity in developing countries where the economy heavily depends on tourism. However, it is a highly under researched area. Data was obtained from 209 tourism teachers, and was tested against the research model using a structural equation modelling approach. Findings reveal that the constructs of playfulness, curriculum relatedness and self-efficacy have a positive, direct impact on the construct of behavioural intention. The exogenous constructs of challenge, computer anxiety and learning opportunities have an indirect effect on behavioural intention via playfulness or curriculum relatedness. The study may prove useful to educators and practitioners in understanding which determinants may influence gamification introduction into formal secondary education.

Keywords: Gamification, Technology Acceptance, South Africa, Secondary Education, Structural Equation Model

1. Introduction

The digital gaming industry is a powerful global business. Digital games have become a common and lucrative form of entertainment in contemporary culture (ESA, 2015; Curwood, 2014). Beyond purposes of pure entertainment, however, game mechanics and game thinking have been introduced and applied within a range of industries. This trend is generally referred to as ‘gamification’, defined by Deterding, Dixon, Khaled, and Nacke (2011:10) as “the use of game design elements in non-game contexts”. Gamification has seen some utility in the education field, and has been shown to increase learner engagement and motivation (Hew, Huang, Chu, & Chiu, 2016; Da Rocha Seixas, Gomes, & De Melo Filho, 2016; Hanus & Fox, 2015).

While research related to gamification and education in economically developed regions (North America and Europe) is pervasive in the literature (Boyle, Hainey, Connolly, Gray, Earp & Ott et al., 2016; Dicheva, Dichev, Agre, & Angelova, 2015), few studies have been conducted in developing or emerging regions (Da Rocha Seixas et al., 2016; O’Donovan, Gain, & Marais, 2013). In contrast, this research was conducted in South Africa, which is considered an emerging and developing economy (UNDP, 2015; IMF, 2015); one in which the digital game industry is growing annually (PricewaterhouseCoopers, 2015). However, the industry still lags behind mature markets such as those of Western Europe. This is mainly due to the low level of broadband access in South Africa as well as stark

socio-economic inequalities in the country. As argued by Walton and Pallitt (2012), studying games in South Africa requires a more context-sensitive approach because youth in the country demonstrate highly differentiated adoption of technologies for gaming. Moreover, studies in gamification in education are mainly conducted in higher education institutions, typically involving computer science students (Dicheva et al., 2015). This study is proposed at the secondary education level and within the subject of tourism, which is an under-researched area (Authors, 2016).

Student engagement is usually the primary motivation to introduce gamified learning within formal education. Lack of engagement is also considered a key factor in poor graduation rates at secondary and tertiary institutions in South Africa (Strydom, Mentz, & Kuh, 2010; Titus & Ng'ambi, 2014). It is argued that increased engagement is likely to decrease apathy for specific subjects and even improve academic performance (Fitzgerald, Bruns, Sonka, Furco, & Swanson, 2012). As argued by Titus and Ng'ambi (2014:743), "to date, there is paucity of evidence within the South African education system with regards to games and its impact on student engagement". Several studies investigate digital games acceptance in the formal learning environment (e.g., Bourgonjon, Grove, De Smet, Van Looy, Soetaert, & Valcke, 2013; Hamari & Nousiainen, 2015) and argue for the critical role of teachers in the adoption process. As argued by Teo, Milutinović and Zhou (2016), if educators do not believe that using specific technology will help fulfil their needs, it is reasonable to assume that they will avoid adopting that technology. For the purposes of this study, South African in-service tourism teachers were asked to evaluate a specific gamified application. Respondents were asked to reflect on their behavioural intention to accept the application for tourism teaching in the formal high school curriculum.

The literature points to various factors that affect the behavioural intention to adopt digital games or gamified applications for instructional purposes. This study specifically examined two types of factors. Firstly, individual differences such as self-efficacy and computer anxiety were examined, as they have been repeatedly emphasised in the literature as the main inhibitors of technology adoption for instructional purposes, which is especially the case in developing contexts (Agbatogun, 2010; Li & Huang, 2016). Secondly, perceptions related to gamified system characteristics were examined, such as perceived playfulness and the level of challenge it provides (Padilla-Meléndez, Del Aguila-Obra, & Garrido-Moreno, 2013; Hamari, Shernoff, Rowe, Coller, Asbell-Clarke, & Edwards, 2016), curriculum relatedness (De Grove, Bourgonjon, & Van Looy, 2012), and learning opportunities offered by the application (Li & Huang, 2016). Thus, this study examined the structural relationships between selected individual differences and perceptions about system related characteristics. This was done to enhance understanding of the effects that these relationships would have on the behavioural intention of teachers to use a gamified application for tourism education.

Drawing on the literature review, we propose to explain tourism teachers' behavioural intention to integrate a gamified application based on particular features or elements of digital play. The following research question guides our study:

To what extent do perceived playfulness, curriculum relatedness, learning opportunities, challenge, computer anxiety and self-efficacy influence the behavioural intention to adopt gamified learning applications for tourism education?

This study contributes to the theoretical domain of gamified learning acceptance in education (e.g., De Grove et al., 2012; Bourgonjon et al., 2013; Hamari & Nousiainen, 2015). Moreover, there is still a paucity of quantitative research on gamification acceptance by educators, and this study will contribute new knowledge in this area. In addition, the study aims to enhance practitioner understanding how relationships of the tested variables may eventually inform the design of digital gamified learning systems.

2. Literature review

2.1. Gamification and learning

The relationship between digital games and learning has been studied from various perspectives, examining informal learning that happens during play (Williams, 2006; Sefton-Green, 2003) and exploring the incorporation of digital games in formal learning activities (De Freitas & Oliver, 2006). Yet, games, simulations, and gamification often bridge the distinctions between formal and informal learning in order to support cognitive development (Davis & Singh, 2015; Koutromanos & Avraamidou, 2014). Some researchers primarily focus on the cognitive aspect (Shute, Ventura, Kim, & Wang, 2014; Mayer, 2014), underlining that games are capable of generating new information that is processed by the player. Others highlight socio-cultural characteristics (Bell, Bricker, Reeve, Zimmerman, & Tzou, 2013; De Freitas, Rebolledo-Mendez, Liarokapis, Magoulas, & Poulouvassilis, 2010) and the importance of rich contextual information that is essential for learning to occur.

Many positive claims have been put forward regarding the aspect of gamified learning in education, such as that it affords increased motivation and engagement (Denny, 2013; Da Rocha Seixas et al., 2016; Su & Cheng, 2014), that it empowers students with low self-efficacy, and that it allows for increased autonomy over the learning process (Kebritchi, Hirumi, & Bai, 2010). Moreover, games can reinforce critical thinking and probe students to examine problems from multiple perspectives (Hew et al. 2016, Paraskeva et al., 2010). In their systematic review of 143 papers of high quality evidence about the outcomes of games in education, Boyle et al. (2016:188) reported that the frequent most outcome was knowledge acquisition “followed by perceptual and cognitive, affective and behaviour change, with fewer papers reporting physiological, skills and soft and social skills outcomes”. Furthermore, STEM subjects (science, technology, engineering and mathematics) as well as health were the most popular domains for educational digital games. Boyle et al. (2016) report that research on games in education has a strong international focus: out of 143 evaluated studies, 62 were conducted in North America, 45 in Europe, 26 in Asia, 5 in South America and 5 in Australasia. Interestingly, not a single study reported in the systematic review was conducted in Africa. This also corresponds to

similar findings of Hew et al. (2016) who reported that gamification studies are mainly conducted in the USA and Europe.

It is important to clarify the terminology used in this research. The basic differentiation between a digital game and gamification is that the latter is not a completely developed as a fully-fledged game (Deterding et al., 2011). However, some gamification and learning researchers, for example Kapp (2012), use gamification as a term that encompasses complete games and practices of playful design (game elements) for learning. Another term used extensively in the literature is serious games (Arnab, Lim, Carvalho, Bellotti, De Freitas, & Louchart et al., 2015). This category tends to highlight the characteristics of specific game elements such as avatars and fully immersive virtual reality. Moreover, serious games are likely to emphasise learning content, while gamification is a technique for learner engagement and motivation (Hamari, Koivisto & Sarsa, 2014). Nevertheless, differentiating between gamification practice and fully-fledged games is complex. However, in this research we refer to gamification and the use of game elements for engagement and motivation. Serious games, simulation and fully immersive games are not our main focus. Compared to research dedicated to fully-fledged games in education, studies on the integration of gamification in the learning process are in their infancy (Hew et al., 2016; Hamari et al., 2014). Gamification as an academic topic of interest is still relatively novel and lacks established theoretical frameworks and unified discourses (Hamari et al., 2014; Dicheva et al., 2015).

Dicheva et al. (2015) conducted an empirical study on gamification in education, employing a systematic mapping approach. From the 34 studies analysed, the following game mechanics were found to be most commonly used in education: points, badges, leader boards, levels, virtual currency, progress bars, and avatars. Similarly, Hamari et al. (2014) identified the ten most common motivational affordances: points, leader boards, achievements/badges, levels, story/theme, clear goals, feedback, rewards, progress, and challenge. Game mechanics such as badges, leader boards and points can significantly affect students' behavioural engagement as can be observed, for example, in the number of messages posted (Denny, 2013; Coetzee, Fox, Hearst, & Hartmann, 2014), or tags produced (Mekler, Brühlmann, Opwis, & Tuch, 2013). However, contrasting evidence was found by Dominguez et al. (2013): the experimental (gamified) group performed better in practical application but had poorer results in the final written exam, which tested knowledge of concepts explained in the course. Hew et al. (2016) reported that the use of gamification mechanics produced greater contributions in student discussion forums. However, the authors did not identify any significant difference in terms of students' recall of factual information.

While gamification has become popular as educational tool (Kapp, 2012), an emerging body of research suggests that gamifying learning is not always beneficial and effective (e.g., De-Marcos et al., 2016; Domínguez et al., 2013; Hamari et al., 2014; Christy & Fox, 2014). Some studies report mixed results regarding gamification use for learning, such as marginal positive outcomes compared to the necessary investment to develop successful gamification systems (O'Donovan et al., 2013; Mekler et al., 2013). Hanus and Fox (2015)

conclude that the use of badges, leader boards, and competition mechanisms did not improve educational outcomes. The authors state that “gamification in the classroom may be a double-edged sword” (2015:160). That is, for students who are interested in the subject and motivated to learn, gamification can diminish intrinsic motivation. For uninterested and -motivated students, gamification incentives can increase intrinsic motivation.

2.2. Digital play in South Africa

As stated previously, while play and games are universal, studying them in South Africa requires a highly context-sensitive approach (Walton & Pallitt, 2012). According to the authors, while access to digital gaming infrastructure is very unequal, play is mediated in both less and more privileged contexts. Arcade-type mobile phone games are more prevalent in under-resourced areas, and console games with elaborate narratives are more diffused in suburban and more affluent environments. Moreover, daily playing practices in South Africa involve “multi-literacies”; that is, the use of various semiotic modes such as multilingual communication, gestures, and dance (ibid.).

Amory (2010) conducted a study with 12 teenage orphans from a disadvantaged area in South Africa, who participated in the study by playing a complex video game on health related concepts. The researcher found that the digital game mediated learning and that participants were able to gain new knowledge. Amory argues, consequently, that video games should be used as tools that mediate learning by collaboration, discussion and questioning in a setting of social constructivist learning. O’Donovan, Gain and Marais (2013) presented a case study on how a university course on Computer Science in a South African university was gamified to improve content understanding, engagement, lecture attendance as well as problem solving skills. Various techniques were introduced throughout the course: a reward structure with badges and points, progress bars and leader boards, and a storyline with visuals. All the evaluation measures (final marks, attendance, lecturer evaluation questionnaire) were reported as positive and successful. However, the authors cautioned on the costs involved to introduce successful gamification interventions for education.

Ultimately, there is a paucity of scientific literature on play, games and gamification in South Africa. Yet, various research approaches and empirical studies do exist, mainly focusing on children in disadvantaged and under-resourced areas of the country, primarily addressing concepts of literacy (Walton & Pallitt, 2012; Amory, 2010). Conversely, gamification is mainly addressed at the higher education level through gamifying course learning materials in order to engage and motivate students (O’Donovan et al., 2013; Titus & Ng’ambi, 2014).

2.3. Tourism education

Tourism is often introduced as a subject in formal education curricula because of the increasing and significant economic contribution of the tourism industry to the private and

public sectors (Authors, 2016). Recently, enrolments in tourism and hospitality programs at global higher education institutions have rapidly increased (Airey, Tribe, Benckendorff, & Xiao, 2014; Dredge, Benckendorff, Day, Gross, Walo, Weeks et. al., 2013). It is argued, however, that tourism as a subject suffers from relatively poor performance. This is because it largely attracts weaker students and consequently produces graduates who struggle to find suitable employment (ibid.). In some countries, a shift from more research oriented education toward more business and vocationally oriented curricula is observed. This has led to a debate among scholars as to what extent tourism education should take the instrumental standpoint in preparing students for employment compared to having a knowledgeable citizenry (Tribe, 2000; Cuffy et al., 2012; Caton, 2015; Airey, Tribe, Benckendorff, & Xiao, 2014). According to Cuffy et al. (2012), the majority of research on tourism education and training is conducted in the field of higher education. Not many researchers take the 'lifelong' perspective, which implies that learning occurs in all types of environments; that is, in structured educational institutions as well as in informal settings. Another crucial aspect evident in the literature is that effective tourism education at different levels should be relevant to its context. That is, the cultural, economic, political and social environment should be prudently and sensibly considered (Smith & Cooper, 2000; Lewis, 2005). This is especially relevant in emerging economies in Asia and Africa, where tourism education is becoming increasingly popular (Hsu, 2015; Mayaka & Akama, 2015; Cuffy et al., 2012). Hsu (2015) reported limited educational resources, qualifications of faculty, and outdated educational materials as the main obstacles for tourism education. Similar results were reported by Harrison (2015) about tourism education in the South Pacific: he emphasised the lack of touristic exposure of tourism learners, and the challenge of striking the right balance between vocational and academic aspects within tourism education.

A number of authors have suggested that technology enhanced learning may overcome some of the challenges faced by tourism education (Cantoni, Kalbaska, Inversini, 2009; Benckendorff, Lohmann, Pratt, Reynolds, Strickland, & Whitelaw, 2015; Authors, 2016; Mayaka & Akama, 2015). Gamification, serious games, and simulations have received increasing attention in a number of education fields as well as in tourism (Authors, 2016; Benckendorff, Lohmann, Pratt, Reynolds, Strickland, & Whitelaw, 2015). It is here argued that gamification and game elements can facilitate experiential learning environments with the potential to increase student engagement and motivation (ibid.)

2.4. Tourism education in South African high schools

The setting for this study is South Africa, a developing/emerging country with a growing tourism industry. Tourism in South Africa is recognised as a key economic sector with potential for continuous growth, which demands a skilled and professional workforce. This implies that the local workforce should be aware of the nature and role of tourism, and should be able to evaluate its potential in a critical manner (Authors, 2016). Various strategies could be introduced to raise tourism awareness (Van Niekerk & Saayman, 2013); one of them is the introduction of tourism as a school subject. At secondary level,

tourism has been introduced at schools throughout South Africa since 2000. Since then, the tourism subject has seen significant growth in terms of the number of schools where it is taught: from 120 schools in 2000 to almost 3'000 schools in 2014 (Umalusi, 2014). To date, tourism is one of the most popular electives in high schools: up to 20% of all high school students select the subject (Allais, 2014; Authors, 2016).

Tourism teachers are requested to have access to internet resources in order to keep up with dynamic industry developments. The National Department of Basic Education also recommends access to audio-visual resources and computers (Department of Basic Education, 2011). Generally, tourism teachers have autonomy in selecting teaching approaches. The topics and themes are stipulated by the national curriculum, but teachers have the freedom to decide which instructional methodologies to adopt. However, tourism education is generally constrained by a lack of qualified teachers, limited exposure to tourism, and the lack of interest and motivation to study the subject as both students and teachers perceive it as 'easy' (Authors, 2016; Chili, 2013). The introduction and adoption of information and communication technology (ICT) has been identified as a potential enabler of tourism education (Authors, 2016). To address the challenge of student apathy regarding the subject, one potential strategy would be the use of digitally gamified learning. A specific gamified application, described in the following section, was utilised within this study to assess tourism teachers' attitudes toward gamification and learning.

2.5 A digital quiz on world heritage and sustainable tourism

A gamified application called ANON (website) was used as an experimental tool for this research. The campaign raises awareness and fosters informal learning about the universal value of 39 World Heritage Sites located in the Southern African Development Community (SADC). The campaign further promotes sustainable tourism, primarily among 16 to 19-year-old students in SADC. The campaign employed an online and offline gamified learning platform, which is based on an algorithm that randomly retrieves questions from a previously populated database, and presents a unique collection of multiple choice quizzes to the user. The platform was supported by a dedicated website, a Facebook page, a wiki and other offline materials. In one year of operation (2014-2015), the campaign reached an audience of more than 100'000.

The purpose of this study is to explore the acceptance of the ANON application in formal learning settings by tourism teachers. Tourism teachers were selected because topics of World Heritage Sites and sustainable tourism are covered in the tourism curriculum; thus, teachers of the subject have background knowledge about the content used within the platform. For the purpose of this research, the content of the existing platform was aligned with the content of the national tourism curriculum. Finally, an exemplary quiz about heritage sites and sustainable tourism was created (website). The quiz contained gamification features such as a reward system with a scoring mechanism, immediate feedback, and a final certificate of completion. Each question was illustrated with related background pictures, and in certain instances, with videos.

3. Conceptual framework

The majority of conceptual frameworks in the area of technology adoption originated with the theory of reasoned action (TRA), which derives from social psychology and describes human social behaviour (Fishbein & Ajzen, 1975). The core assumption of TRA is that behavioural intention is informed by a person's attitudes and subjective norms, and that eventually, intentions lead to actual behaviour. Building on the foundations of TRA, Ajzen (1991) later introduced the theory of planned behaviour. This extended theory contains the notion of 'perceived behavioural control', which originated in self-efficacy studies (Bandura, 1977) and more specifically, in social cognitive theory. Perceived behavioural control refers to a person's belief in their ability to perform a particular behaviour successfully. In 1989, Fred Davis introduced the technology acceptance model (TAM), which became a well-recognised framework in the technology adoption field. TAM explains behavioural intention in terms of perceived usefulness ("the degree to which a person believes that using a particular system would enhance his or her job performance") and ease of use ("the degree to which a person believes that using a particular system would be free from effort") (Davis, 1989:230). The TAM model has received major criticism, especially regarding its incapability to address contextual, organisational, individual, technological, and task characteristics (Legris, Ingham, & Colletette, 2003). Furthermore, TAM primarily originated in the business environment. Therefore, scholars argue that TAM variables do not adequately reflect the motivations of educators in accepting technology for teaching (Teo, 2016 et al.; Tate, Evermann, & Gable, 2015).

The literature review on teachers' acceptance of technology, with specific focus on digital games and gamified applications, has demonstrated that various determinants affect the adoption process. These include (i) factors at the individual teacher level like attitudes, experience, and skills (technological know-how) (Li & Huang, 2016; Bourgonjon et al., 2013; Hamari & Nousiainen, 2015; De Grove et al., 2012; Agbatogun, 2010); (ii) system related matters like playfulness, appropriate challenge, relatedness to the curriculum, and offered learning opportunities (Jagger, Siala, & Sloan et al., 2015; Padilla-Melendez et al., 2013; Da Rocha Seixas et al., 2016; Ketelhut & Schifter, 2011; De Grove et al., 2012; Bourgonjon et al., 2013); and (iii) context related aspects like organisational culture, support, and student preparedness (Hamari & Nousiainen, 2015; De Grove et al., 2012; Pynoo et al., 2011; De Smet et al., 2012; Lai & Chen, 2011).

3.1 Hypothetical model

In light of the abovementioned conceptual framework, the researchers developed a hypothetical model (Figure 1). The goal of this model is not to validate TAM or its related approaches. Rather, in testing the model, researchers want to determine the extent to which six selected variables influence South African tourism teachers' behavioural intention to integrate a gamified learning application into tourism instruction. These variables have been selected based on broader theoretical developments and empirical literature in the field, as will be discussed in the sections that follow. The hypotheses stemming from conceptual and empirical research are presented below.

Dependant variable: behavioural intention

In this research, gamified learning acceptance is operationalised as tourism teachers' behavioural intention to use a specific gamified application within the tourism curriculum. The study selected behavioural intention as a consequential variable because intention contains the decision of actual behaviour, according to TAM (Davis, 1989), which originates from the theory of reasoned action. Fishbein and Ajzen (1975) claim that human behaviour is predicted by a person's intention. Our study focused on intention and not actual use, because only a few teachers have had experience with gamified learning in their professional practice. The model suggests that the dependant variable can be influenced through variables of perceived playfulness and curriculum relatedness.

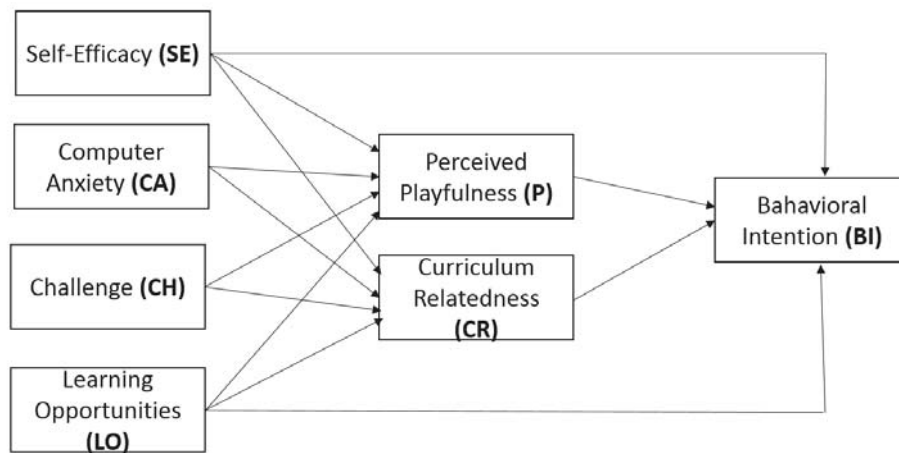


Figure 1: hypothetical model.

Perceived playfulness

Perceived playfulness is an intrinsic motivation related to the usage of a system (Wang & Wang, 2008; Venkatesh & Bala, 2008). It is influenced by personal experience with the setting (Moon & Kim, 2001) and encompasses physiological interest and stimulation (Csikszentmihalyi, 1990). Thus, when users are in a 'playful state', they feel that interaction with an application is intrinsically motivating, their attention is focused and they feel curious (Moon & Kim, 2001). Intrinsic motivation, which refers to satisfaction and enjoyment in performing certain behaviour, plays a significant role in behavioural intention to play digital games (Wang & Wang, 2008). Research has identified that playfulness is among the key drivers to use and adopt blended learning approaches (Padilla-Melendez et al., 2013). Huang, Jang, Machtmes and Deggs (2012) found that playfulness positively influences English learning on mobile devices. Wang, Wu, and Wang (2009) identified positive links between users' perceived playfulness and behavioural intention to use eLearning platforms and digital games for learning (Jagger et al., 2015). Playfulness is considered as one of the critical determinants that could impact learning engagement when introducing technology related instructional methods (Huang

et al., 2012). The playfulness of the digital quiz about heritage and tourism used within this study is facilitated through gamification features such as a reward system with a scoring mechanism, immediate feedback, a final certificate of completion, and aesthetics – these are common gamification features in the education field (Kapp, 2012). Thus, it is hypothesised that perceived playfulness when engaging with a gamified application will influence tourism teachers' behavioural intention to use it. The following hypothesis can thus be derived:

H1. Perceived playfulness (P) positively relates to behavioural intention (BI).

Curriculum relatedness

Secondary school teachers generally teach pre-planned content within a defined period. This can negatively influence the acceptance of new teaching practices in the formal educational environment (Becker, 2007; De Grove et al., 2012). However, if the new practice – for example, a gamified application – strongly relates to the curriculum and can facilitate the achievement of curriculum outcomes, it can positively influence adoption (Da Rocha Seixas et al., 2016; Ketelhut & Schifter, 2011; De Grove et al., 2012). De Grove et al. (2012) validated the construct of 'curriculum relatedness' and analysed teachers' intention to adopt digital games in the classroom. Their study revealed that curriculum relatedness and previous experience were the most important determinants in adopting digital games. Consequently, the digital application used in this study incorporates content from the official South African tourism curriculum, specifically related to World Heritage Sites and sustainable tourism. We thus hypothesise that:

H2. Curriculum relatedness (CR) positively relates to behavioural intention (BI).

The selected antecedents of the model fall under two categories: (i) perceptions of system characteristics such as challenge (CH) and learning opportunities (LO), as well as (ii) individual differences of the teachers, such as self-efficacy (SE) and computer anxiety (CA).

Learning opportunities

In the field of digital game acceptance in education, Bourgonjon, Valcke, Soetaert and Schellens (2010) introduced the construct of 'perceived learning opportunities'. This examines whether educators believe that games offer learning affordances. Simply stated, the construct of learning opportunities reflects the benefits and advantages of digital games (Prensky, 2005; Egenfeldt-Nielsen, 2007; Li & Huang, 2016). The researchers hypothesised that, if teachers perceive a gamified application to offer strong learning opportunities, they will consider its acceptance for teaching (Bourgonjon et al., 2013). Moreover, it can be expected that perceived learning opportunities are positively associated with curriculum relatedness. This is because the achievement of curriculum outcomes relates to knowledge transfer (De Grove et al., 2012). The digital quiz about heritage and tourism used within this study was designed mainly to foster awareness and

enhance knowledge about World Heritage Sites in Southern Africa. By employing gamified features in a formal setting, it is expected that students will be motivated to learn about their own heritage, which is explicitly highlighted as one of the goals of the National South African Tourism Curriculum (Department of Basic Education, 2011). Thus, it is hypothesised that the construct of learning opportunities might directly affect teachers' behavioural intentions. Moreover, it is assumed that today's students demonstrate greater preference towards learning methods that allow for interaction, control and experimentation (see Romero, Usart, & Ott, 2015). Therefore, learning opportunities created by a gamified application will positively impact playfulness.

H3. Learning opportunities (LO) positively relate to perceived playfulness (P).

H4. Learning opportunities (LO) positively relate to curriculum relatedness (CR).

H5. Learning opportunities (LO) positively relate to behavioural intention (BI).

Challenge

Research has identified various characteristics of gamified applications that can augment the learning process. This includes aspects such as immediate feedback and playful challenges (Kapp, 2012). Challenge is a common gaming feature, which is the extent to which a user's playing skills match the challenges presented by the digital game or gamified application (Hamari et al., 2016; De-Marcos et al., 2016). According to flow theory (Csikszentmihalyi, 1990), a person will find a challenge rewarding when it matches their skills. Therefore, appropriate challenges in a digital game will keep the player engaged and motivated throughout the game (Hamari et al., 2016). Thus, if an application is too challenging, users may become frustrated quickly. Similarly, if an application is not deemed challenging enough, users may become disinterested. Therefore, it is assumed that the perceived challenge of a gamified application will influence its perceived playfulness. Within this study, respondents were asked to evaluate if the gamified application provides a suitable level of challenge in terms of the computer skills and knowledge levels of their students. The contents of the gamified application were aligned to the national tourism curriculum. Thus, we hypothesised the relationship between challenge and curriculum relatedness.

H6. Challenge (CH) positively relates to perceived playfulness (P).

H7. Challenge (CH) positively relates to curriculum relatedness (CR).

Self-efficacy

There are various individual differences related to ICT usage, including individual personality traits, demographics as well as factors such as training and experience. The notion of self-efficacy originates from social cognitive theory (Bandura, 1977), and refers to a person's belief in their ability to perform a particular behaviour successfully. Self-efficacy is an important determinant of motivation and action (Bandura, 1986). Because of its significance in predicting human behaviour, self-efficacy has been studied extensively in the education field (Authors, 2013; Lai & Chen, 2011; Agbatogun, 2010).

There is strong evidence that having positive judgement about one's own ability influences the acceptance of technological tools in education (Compeau & Higgins, 1995; Teo, 2011). Teachers with high self-efficacy in using gamified applications should be able to assess their relevance for the broader curriculum in terms of content and existing instructional methodologies. ICT self-efficacy was found to influence the actual use of game-based learning technologies in a positive manner (Hamari & Nousiainen, 2015). Thus, we hypothesised that self-efficacy will directly influence teachers' behavioural intention. Moreover, prior studies suggest that self-efficacy is an important antecedent to playfulness (Wang & Wang, 2008; Chung & Tan, 2004). We derived the following hypotheses to this end:

H8. Self-efficacy (SE) positively relates to behavioural intention (BI).

H9. Self-efficacy (SE) positively relates to perceived playfulness (P).

H10. Self-efficacy (SE) positively relates to curriculum relatedness (CR).

Computer anxiety

Computer anxiety is the fear or apprehension of using computer related technologies (Leso & Peck, 1992). This is a common inhibitor of ICT integration into the educational setting (Azarfam & Jabbari, 2012), especially in developing country contexts (Agbatogun, 2010). Furthermore, scholars have found that technology experience and skills are inversely related to technology anxiety (Shah et al., 2012; Ekizoglu & Ozcinar, 2010). It is assumed that computer anxiety will negatively influence the behavioural intention to adopt a gamified application for tourism education. Technology anxiety or technostress have been found to be a significant influence on in-service teachers' intentions to use technology use as well as assessing application's relevance to curriculum (Joo, Lim & Kim, 2016). Many different obstacles inhibit teachers to use technology more actively, such as inadequate infrastructure, lack of training, and lack of support – collectively, these may induce tension or anxiety. This can result in physical or psychological stress, and tends to prevent technology use as well as assessing the application's relevance to the curriculum (Joo et al., 2016). Thus, the phenomenon defined as technology anxiety or technostress (Brod, 1984) continues to receive attention in the educational environment as various new technologies are introduced for teaching and learning purposes, such as digital books, mobile technology, digital games, cloud computing and others (Joo et al., 2016). Based on this, we deduced the following hypotheses:

H11. Computer anxiety (CA) negatively relates to perceived playfulness (P).

H12. Computer anxiety (CA) negatively relates to curriculum relatedness (CR).

4. Research Methodology

4.1 Instrument and Measures

An online questionnaire was utilised for collecting data and consisted of three parts: (i) demographic information (gender, age, ethnicity, home language, and province); (ii) teacher related variables (teaching experience, grades and subjects taught); and (iii) constructs of the hypothetical model. To ensure validity of the constructs, validated scales from previous research were applied and adapted to the context of the current study:

- *Behavioural intention* (Venkatesh, Morris, Davis, & Davis, 2003; Venkatesh & Bala, 2008).
- *Perceived playfulness* (Venkatesh & Bala, 2008; Wang & Wang, 2008; Padilla-Melendez et al., 2013).
- *Curriculum relatedness* (De Grove et al., 2012).
- *Challenge* (Chung & Tan, 2004; Wang & Wang, 2008).
- *Learning opportunities* (Bourgonjon et al., 2010, 2013; De Grove et al., 2012).
- *Self-efficacy* (Lai & Chen, 2011; Hamari & Nousiainen, 2015).
- *Computer anxiety* (Heinssen, Glass, & Knight, 1987; Wang & Wang, 2008).

The measures were reviewed by three experts in the area of information systems and educational technology and adjusted accordingly. The research model contained seven constructs with a total of 30 items which were measured using Likert scales (1–5), with anchors ranging from *strongly agree* to *strongly disagree*.

4.2 Sample and data collection

The sample of the study was a group of in-service tourism teachers in South Africa. The study adopted a convenience sampling (i.e. non-randomised) technique to collect data. The geographic focus of the study was three South African provinces: Western Cape, Gauteng, and Eastern Cape. Tourism is widely offered as a high school subject in these regions (Umalusi, 2014). Moreover, the three provinces are all popular tourist destinations in the country (South African Tourism, 2015).

Research permission was obtained from the respective regional Departments of Education. Lists of schools offering tourism in the respective provinces were obtained from the National Department of Education and a mailing list was subsequently compiled (n=529 valid email addresses in 3 provinces). Principals of the respective schools were contacted and invited to distribute the surveys to their tourism teaching staff. Telephone calls (n=80) were also conducted to invite tourism teachers to participate in the survey. Additionally, 16 schools were visited in person in the Western (n=10) and Eastern Cape Provinces (n=6) to distribute information about the study. Finally, an invitation to partake in the survey was distributed through tourism subject coordinators and their mailing lists. In total, 218 teachers completed the survey, of which 209 were retained after data cleaning.

83% (n=174) of the respondents were female and 17% (n=35) were male. The majority of respondents (80%) were between 35 and 54 years old. They were mainly Afrikaans (37%), English (24%) and isiXhosa (26%) native speakers, which correspond well to the main languages of the respective provinces: Western Cape (34%), Eastern Cape (32%), and

Gauteng (30%). 94% of respondents were from public schools and the remaining 6% from private schools.

5. Results: Descriptive statistics

The descriptive demographic data was analysed in SPSS 22. All of the respondents taught tourism as a subject. Only 11% of the sample taught one subject, i.e. tourism, while the majority (81%) of teachers taught two subjects, and the remaining 8% taught more than two subjects. Tourism was commonly taught by teachers also teaching geography (24%), life orientation (23%), commerce subjects (business studies, economics and management science, accounting – 17%), languages (13%), consumer studies and hospitality (12%), history (6%) and IT related subjects (4%). The remaining 1% taught other subjects such as music, physical sciences, and mathematics. On average, teachers had 16 years of teaching experience (M:16; SD:7.9).

Respondents were asked to self-declare their level of technology training: 13% reported having extensive, 35% moderate, 32% occasional, and 20% no technology training. This implies that most respondents were somehow exposed to digital technology. 66% of the sample stated that they used technology for teaching purposes. However, data revealed that respondents hardly had any experience with digital games/quizzes: only 9% previously used digital games/quizzes for teaching purposes, which echoes similar findings in other contexts in Europe and the United States (Bourgonjon et al., 2013; Kenny & McDaniel, 2011).

Moreover, the relationship between three items of the behavioural intention (BI) construct and level of self-reported technology training (extensive, moderate, occasional and no training) were tested (Table 1). According to the Chi-Square values, there is a strong association between training and agreement levels with all three behavioural intention items. According to Kendal's tau b correlation statistic between two ordinal variables, a positive correlation value was identified, indicating that higher training levels correspond to more agreement with BI items.

Item	Chi-Square (p-value)	Kendal's correlation (p-value)
BI1: Assuming I had access to the tool, I intend to use it for tourism teaching activities.	174.074 (0.000)	0.549 (0.047)
BI2: I would suggest to my school's headmaster to evaluate the possibility of using this tool for tourism teaching activities.	104.663 (0.000)	0.384 (0.055)
BI3: If I had to vote, I would vote in favour of using this type of tool in the classroom.	129.316 (0.000)	0.444 (0.054)

Table 1. Training level and behavioural intention items.

All respondents indicated that they tested the quiz before completing the survey: 84% of them finished the quiz, while the remaining 16% indicated that they played at least for two minutes before quitting. The main reasons for quitting were lack of time (12%), low quality internet connection (3%), perceived as not interesting (3%), and one person had difficulties understanding how it worked. Thus, all responses (n=209) were analysed, because two minutes was considered sufficient to understand basic quiz functions and characteristics.

Generally, almost all respondents (96%) perceived the gamified application as a potential teaching aid for the tourism subject, mainly for assessment purposes (93%) due to its multiple choice format. Interestingly, the gamified application was perceived as crossing formal and informal learning environments: 95% of respondents reported that the tool might be used both in the classroom and outside of it. Moreover, descriptive statistics demonstrated that the majority (91%) of respondents did not have any experience with using games or gamified systems in their teaching practices; this may have influenced their responses.

5.1 Instrument validity and reliability

Confirmatory factor analysis (CFA) was conducted with the Lavaan for R (Rosseel, 2011) open source package using the estimation method of weighted least squares (WLS) (asymptotically distribution free: ADF) to assess the internal consistency and factor structure stability. WLS was preferred since all the items were measured using ordinal variables via a 5-point Likert scale. Table 2 lists the set of items utilised to measure the constructs. There are several indicators to assess if the set of questions measuring an underlying construct are internally consistent. These are standardised factor loadings, average variance extracted (AVE), which demonstrate the average percentage of variation explained among the items of a construct, and composite reliability (CR), which is a measure of reliability and internal consistency of the measured variables representing a latent construct. The standardised factor loading estimates should be greater than 0.5 (ideally > 0.7), AVE should be greater than 0.5, and CR should be greater than 0.7 for good internal consistency (Fornell & Larcker, 1981).

The third column in Table 2 shows the factor loadings for each item measuring a particular construct where the full set of items were included in CFA. It is evident that some of the items have factor loading estimates lower than 0.5; AVE for the particular construct is less than 0.5 and CR less than 0.7 indicating that the internal consistency of the constructs is weak. As a result, the items with factor loadings lower than 0.5 were excluded and the CFA was re-estimated. After the refinement, the construct validity and reliability measures for behavioural intention (BI), perceived playfulness (P), curriculum relatedness (CR) and self-efficacy (SE) constructs are above the accepted thresholds of 0.5 and 0.7 respectively. However, the learning opportunities (LO) construct has an AVE just below 0.5 with factor loadings greater than 0.5 and CR greater than 0.7. As a result, the internal consistency of LO is considered to be weaker than other constructs. The challenge (CH) construct has an

AVE of 0.422, which is below 0.5 and a CR of 0.686 which is just below 0.7. However, since the factor loadings are greater than 0.5, it was again deemed acceptable to consider challenge (CH) as a weakly consistent construct.

The following model-fit indices (Byrne, 2001) were also calculated: the root mean square error of approximation (RMSEA), which should be below 0.05 while the 90% confidence interval must be narrow; the goodness-of-fit index (GFI), comparative fit index (CFI), and the adjusted goodness of fit index (AGFI) should be all above 0.9 for a good model fit. In the modified model (Table 2, 4th column) with two weakly consistent constructs, the RMSEA is 0.046 with a 90% confidence interval of 0.034-0.057. This is a satisfactory measure to accept that the modified CFA model is a good approximation for measuring the seven constructs involved in the analysis. Moreover, the goodness of fit statistics: GFI (=0.983), CFI (=0.994), AGFI (0.974) all exceed 0.95 indicating that the modified CFA model can be used in further estimations.

		Factor Loadings	Factor Loadings		Variances	Variances
Construct and items		Before	After		Before	After
BI: Behavioural Intentions	AVE	0.621	0.612	CR	0.829	0.823
BI1. Assuming I had access to the tool, I intend to use it for tourism teaching activities		0.684	0.645		0.532	0.584
BI2. I would suggest to my school's headmaster to evaluate the possibility of using this tool for tourism teaching activities		0.778	0.783		0.394	0.387
BI3. If I had to vote, I would vote in favour of using this type of tool in the classroom		0.888	0.899		0.212	0.191
P: Playfulness	AVE	0.388	0.556	CR	0.692	0.776
P1. Using the tool was enjoyable		0.853	0.933		0.273	0.130
P2. Using the tool stimulated my curiosity		0.445	0.443		0.802	0.804
<i>P3. When using the tool I did not realise how time passed</i>		0.333			0.889	
P4. I had fun using the tool		0.717	0.775		0.487	0.400
SE: Self-Efficacy	AVE	0.594	0.923	CR	0.838	0.973
SE1. I felt confident playing an online quiz even if there was no one around to show me how to play it		0.964	0.966		0.071	0.066
SE2. I felt confident playing an online quiz even if I have never played it before		0.960	0.961		0.078	0.077
SE3. I felt confident playing an online quiz even if I had only the online rules as a reference		0.951	0.955		0.095	0.089
<i>SE4. I would felt more confident playing an online quiz if someone showed me how to do it first</i>		-0.087			0.993	
<i>SE5. I would know how to handle the usage of this tool in tourism teaching classes</i>		0.456			0.792	
CR: Curriculum Relatedness	AVE	0.399	0.566	CR	0.652	0.722
CR1. The tool would fit the current tourism curriculum		0.652	0.745		0.575	0.446

CR2. <i>The tool could compliment the fulfilment of tourism curriculum requirements</i>		0.408			0.834	
CR3. The contents of the tool correspond well with the tourism curriculum part on World HS		0.778	0.759		0.394	0.423
LO: Learning Opportunities	AVE	0.339	0.467	CR	0.789	0.811
LO1. Foster awareness about World Heritage Sites		0.515	0.580		0.735	0.663
LO2. Enhance knowledge of World Heritage Sites		0.774	0.789		0.400	0.378
LO3. Motivate students to learn more about heritage		0.740	0.741		0.453	0.451
<i>LO4. Increase sense of pride of own heritage</i>		0.375			0.859	
<i>LO5. Increase sense of responsibility for heritage protection</i>		0.410			0.832	
<i>LO6. Better understand Southern African touristic potential</i>		0.298			0.911	
LO7. Better visualize heritage places		0.576	0.573		0.668	0.672
LO8. Increase interest in tourism subject		0.754	0.705		0.432	0.503
CH: Challenge	AVE	0.424	0.422	CR	0.688	0.686
CH1. When playing the online quiz, the students will experience suitable level of challenge		0.633	0.694		0.600	0.519
CH2. It would provide students with challenges that are closely matched to their technology skill level		0.643	0.612		0.587	0.625
CH3. It would provide students with challenges that are closely matched to their knowledge level		0.677	0.639		0.541	0.591
CA: Computer Anxiety	AVE	0.718	0.655	CR	0.909	0.884
CA1. Computers do not scare me at all		0.704	0.752		0.505	0.435
CA2. Working with computers makes me nervous		0.935	0.806		0.126	0.351
CA3. Computers make me feel uncomfortable		0.778	0.856		0.395	0.267
CA4. Computers are somewhat intimidating to me		0.946	0.821		0.104	0.326
	Chi	859.772 (384)	297.222 (207)			
	RMS EA	0.077 (0.070 0.084)	0.046 (0.034 0.057)			
	GFI	0.958	0.983			
	CFI	0.971	0.994			
	AGFI	0.942	0.974			

Table 2. Confirmatory factor analysis (items in *italics* were excluded for model re-estimation).

The construct scales indicated a high level of internal reliability, as Chronbach's alpha coefficients exceeded the threshold of 0.7 (Hair, Anderson, Tatham, & Black, 1998): behavioural intention ($\alpha = 0.934$), perceived playfulness ($\alpha = 0.810$), curriculum relatedness ($\alpha = 0.909$), challenge ($\alpha = 0.850$), learning opportunities ($\alpha = 0.853$), self-efficacy ($\alpha = 0.909$), and computer anxiety ($\alpha = 0.957$). This indicates that the instruments

can be considered reliable and valid. In the next step, structural equation modelling (Lavaan for R) was performed, which is an effective approach to test the interconnectedness between constructs (Kline, 2005).

5.2 Path analysis of research model

In examining tourism teachers' acceptance of a gamified application, seven constructs were considered: behavioural intention (BI), perceived playfulness (P), curriculum relatedness (CR), learning opportunities (LO), challenge (CH), self-efficacy (SE), and computer anxiety (CA). The goal was to find the interrelations between these constructs in line with the hypothetical model depicted in Figure 1. The constructs are measured as given in the CFA model discussed in the previous section.

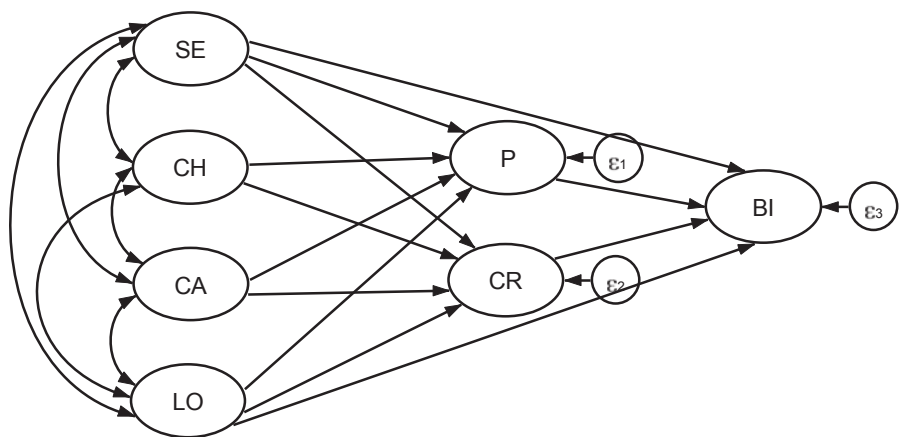


Figure 2. Path diagram of acceptance of gamified learning Model 1.

According to this model, the exogenous constructs SE and LO both have a direct and indirect effect on BI via P and CR. Conversely, CH and CA have only indirect effects. Since all the constructs are measured using 5-point Likert scale indicators, WLS (ADF) method is used to predict the parameters. The standardised and un-standardised parameter estimates, standard errors and p-values for each of the Model 1 relationships are given in the third column of Table 3. When examining the parameter estimates, it can be observed that some of the paths are not statistically significant with high p-values. As a result, the non-significant paths were eliminated from the model and the estimates were re-calculated resulting in Model 2 illustrated in Figure 3. New estimates, the model fit and the error measures are provided in Table 3.

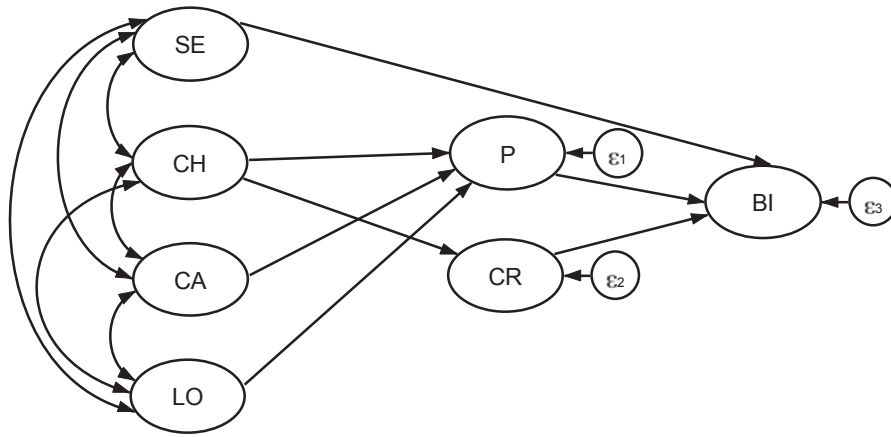


Figure 3. Path diagram of acceptance of gamified learning Model 2.

		Model 1		Model 2	
		Estimates [st.error] (p-value)	Standardised Estimates	Estimates [st.error] (p-value)	Standardised Estimates
P	SE	0.100 [0.102] (0.324)	0.105		
	CH	0.314 [0.159] (0.048)	0.238	0.402 [0.165] (0.014)	0.292
	CA	0.181 [0.108] (0.095)	0.147	0.236 [0.110] (0.032)	0.193
	LO	0.876 [0.203] (0.000)	0.552	0.883 [0.223] (0.000)	0.560
CR	SE	0.001 [0.109] (0.989)	0.002		
	CH	0.534 [0.187] (0.004)	0.513	0.785 [0.151] (0.000)	0.711
	CA	0.041 [0.118] (0.730)	0.042		
	LO	0.238 [0.176] (0.176)	0.191		
BI	SE	0.141 [0.064] (0.027)	0.212	0.140 [0.062] (0.023)	0.210
	P	0.147 [0.124] (0.238)	0.210	0.184 [0.074] (0.013)	0.262
	CR	0.215 [0.103] (0.038)	0.243	0.188 [0.099] (0.057)	0.215
	LO	0.033 [0.192] (0.864)	0.030		
Disturbance	Variances				
	BI	0.289 [0.061]	0.699	0.290 [0.061]	0.701
	P	0.270	0.318	0.236	0.280

		[0.092]		[0.092]	
	CR	0.308 [0.093]	0.584	0.267 [0.100]	0.495
Chisq/df		300.761/210=1.432		306.326/215=1.425	
RMSEA		0.046		0.045	
90% conf interval		(0.033 – 0.057)		(0.033 – 0.056)	
GFI		0.983		0.983	
CFI		0.994		0.994	
AGFI		0.974		0.974	

Table 3. Model 1 and Model 2 Parameter Estimates.

Considering the fit and error measures, Model 2 is at the acceptable level. The normed chi-square value is below 2, RMSEA is below the accepted norm 0.05 and the confidence interval is also at the acceptable level. Finally, all of the fit indices (GFI, CFI, AGFI) are above 0.95. All of these measures indicate a good fitted model.

The results of the paths between the constructs show the following key findings: the constructs of playfulness, curriculum relatedness and self-efficacy all have a positive, direct impact on the construct of behavioural intention. The exogenous constructs of challenge, computer anxiety and learning opportunities have an indirect effect on behavioural intentions. These effects happen via playfulness or curriculum relatedness. The indirect standardised effect of challenge via playfulness and curriculum relatedness is 0.229 ($=0.292 \times 0.262 + 0.711 \times 0.215$), computer anxiety via playfulness is 0.051 ($=0.193 \times 0.262$), and learning opportunities via playfulness is 0.147 ($=0.560 \times 0.262$). It is evident that the highest indirect impact is from the challenge construct. The estimated disturbance variances reflect the percentage of the variance for an endogenous variable that is not explained by its direct causes. The standardised disturbance variance estimate for the BI construct is 0.701 (Table 3 Disturbance Variances). As a result, we can conclude that the model is able to explain 29.9% (100%-70.1%) of the variance in tourism teachers' behavioural intention to use a gamified application for tourism education. Table 4 provides an overview of our confirmed and rejected hypotheses.

Hypotheses	Result
Perceived playfulness (P) positively relates to behavioural intention (BI)	Confirmed
Curriculum relatedness (CR) positively relates to behavioural intention (BI)	Confirmed
Learning opportunities (LO) positively relate to perceived playfulness (P)	Confirmed
Learning opportunities (LO) positively relate to curriculum relatedness (CR)	Rejected
Learning opportunities (LO) positively relate to behavioural intention (BI)	Rejected
Challenge (CH) positively relates to perceived playfulness (P)	Confirmed
Challenge (CH) positively relates to curriculum relatedness (CR)	Confirmed
Self-efficacy (SE) positively relates to behavioural intention (BI)	Confirmed
Self-efficacy (SE) positively relates to perceived playfulness (P)	Rejected
Self-efficacy (SE) positively relates to curriculum relatedness (CR)	Rejected
Computer anxiety (CA) negatively relates to perceived playfulness (P)	Confirmed
Computer anxiety (CA) negatively relates to curriculum relatedness (CR)	Rejected

Table 4. Hypotheses results.

6. Discussion and conclusions

Scholars argue that individuals play an essential role in the decision to adopt ICT; thus the teacher's role is critical in examining ICT use in education (Teo et al., 2016; Sumak, Hericko, & Pusnik, 2011). By determining significant predictors, this study investigated the extent to which perceived playfulness, curriculum relatedness, learning opportunities, challenge, self-efficacy and computer anxiety influence the acceptance of a gamified application by South African tourism teachers. Using structural equation modelling, the study found that among the six variables, the constructs of playfulness, curriculum relatedness and self-efficacy all have a positive, direct impact on the construct of behavioural intention. The exogenous constructs of challenge, computer anxiety and learning opportunities have an indirect effect on behavioural intention. These effects occur via playfulness or curriculum relatedness. The highest indirect impact was from the challenge construct.

It is argued that emotions play a role in the acceptance of a particular technology; scholars have proposed several variables such as perceived playfulness, perceived enjoyment, and flow to assess this (Venkatesh & Bala, 2008). This study assessed teachers' perceived playfulness of a specific gamified application and observed a positive direct effect on behavioural intention to use it. Because the application was perceived as enjoyable, fun and stimulating, teachers tend to consider its acceptance for tourism education. The findings support those of Wang and Wang (2008) and Moon and Kim (2001), where a significant direct relationship was found between playfulness and behavioural intention to use information technology and digital games. Similarly, in a study on secondary school teachers' adoption of teaching blogs (Lai & Chen, 2011), 'perceived enjoyment' was identified as a key determinant.

Previous studies (e.g. Wang & Wang, 2008) confirm that individuals enjoy greater playfulness when users' skills are matched to challenges, i.e. a proper challenge of a game increases the playfulness of the experience. Similarly, this research found that variables of challenge positively affected perceived playfulness. This implies that the application was perceived as offering the right amount of challenge to facilitate a playful user experience. Nevertheless, the challenge construct correlates positively with curriculum relatedness, meaning that the challenge offered by the application is appropriate for tourism students' computer and knowledge skills, and relates well to the formal tourism curriculum. The challenge reconciles learning content and the digital quiz's ability to facilitate an enjoyable and engaging experience.

Furthermore, a gamified application's congruency to the educational curriculum is essential in the adoption decision process (Da Rocha Seixas et al.; 2016; Ketelhut & Schifter, 2011; De Grove et al., 2012). This corresponds to the findings of this study, as curriculum relatedness of the tested application positively influences the behavioural intention to adopt it. Bourgonjon et al. (2013) illustrated that teachers do not perceive

commercial video games as having the capacity to improve their job performance; however, they did perceive that games provided opportunities for learning. Thus, it was also hypothesised that the construct of learning opportunities offered by the application will positively affect curriculum relatedness (De Grove et al., 2012). Interestingly, within the current study, learning opportunities do not have any significant relationship with curriculum relatedness but have a significant indirect relationship with behavioural intention via playfulness. This can be interpreted in the context that the use of digital games in South African education is still in its infancy. The majority of educators do not yet possess the beliefs and attitudes toward this medium of instruction, and struggle to relate it to formal curriculum requirements.

Considering constructs of individual differences, Wang and Wang (2008) found that computer self-efficacy and computer anxiety had no significant influence on the *playfulness* of digital games, but rather directly influenced the behavioural intention to play digital games. Similarly, in this study, self-efficacy has a direct effect on behavioural intention and no effects through playfulness and curriculum relatedness. This suggests that teachers who felt confident in their own abilities playing the quiz without prior demonstration or training tended to have higher behavioural intention to accept the application. Conversely, computer anxiety influenced behavioural intention indirectly through perceived playfulness. Teachers who were less anxious and who coped better with stress related to technology usage also perceived the application as more playful and eventually presented higher levels of acceptance.

However, the structural model did not explain the high degree of variance of the behavioural intention construct, indicating that the selected predictors were not the most relevant factors explaining the phenomenon in the selected context. Although the results are statistically significant, the effect of independent variables on the dependent variables are rather small. This may have to do with the various external factors related to the study context that come into play and affected acceptance intention. Thus, potential barriers for integrating the gamified application into education were also identified. The main barrier was acknowledged as the “lack of time”. 78% of respondents listed it as the primary obstacle. In the comment section of the survey, respondents explained that the tourism programme is already crammed, and that they were under pressure to prepare their students for final examinations. This prevents them from introducing new methodologies or tools. Slightly less than half of respondents (47%) put forward the barrier of “lack of technological access in the school”. Similarly, 38% of respondents underlined the low quality or lack of internet connection in their school for using digital applications. Frequent electricity cuts were also mentioned as a barrier to bring students to the computer lab. This relates to another expressed challenge of logistical coordination with computer labs. Rarely do tourism teachers have operational technology in the classroom. Students must thus be brought to a central computer lab. However, it is often challenging to coordinate the student timetable with IT related subjects, which are not prioritised (Authors, 2016). Moreover, in township areas, classes are big (up to 50 students), resulting in a high student-computer ratio. Another barrier identified was the lack of professional training in integrating technology for education (38%). In the comment section, teachers expressed

the need for training on incorporating the gamified application. Another barrier frequently mentioned in the comment section was “language”. Even though tourism is mainly taught in English, it is often not students’ first (or even second) language. According to the respondents, having content translated in other languages would enhance the learning experience. However, further research needs to be conducted to investigate the reasons for the degree of the model’s explained variance. For example, study subjects could be probed in more detail to examine whether teachers of a certain age and with specific teaching experience have more positive views.

7. Implications

The results of this research make a novel contribution to theory and practice. The present study aimed to identify significant factors in educators’ behavioural intention to use a gamified application. The study contributes to the literature in various ways. Firstly, the majority of research in the field of gamification and learning has been conducted in more economically advanced and developed regions, and not in emerging economies (Boyle et al., 2016; Hew et al., 2016; Dicheva et al., 2015). In developing economies, gamified learning could serve as a previously unharnessed strategy to address lack of student engagement within formal education (Da Rocha Seixas et al., 2016). This is especially the case in secondary education, where research on the improvement of tourism instruction is sparse (see Cuffy et al., 2012), specifically pertaining to the benefits of digital technologies (Authors, 2016). Furthermore, this study should stimulate debate around digital gaming in formal educational environments with limited technological infrastructure, but with great interest in digital play (Titus & Ng’ambi, 2014).

Moreover, some practical implications were identified. The results are specific to tourism teachers from three provinces in South Africa (n=209). However, it may prove useful to other educators in developing countries, especially in dealing with the lack of student engagement with tourism education (Boyle et al., 2016). To harness the positive impact of gamification for learning, educators should be provided with opportunities for interaction with gamified applications. These interactions should help educators acknowledge the role and value of ‘playfulness’ and the potential learning opportunities it can provide. Curriculum relatedness and playfulness with a proper level of challenge were found to be key drivers for adoption. Thus, gamified applications should provide adequate and curriculum-related content, presented in a playful and challenging manner. These have potential for subject knowledge advancement and can address student apathy and lack of motivation. Moreover, translation of application content should be considered as an important indicator for successful acceptance. Self-efficacy and computer anxiety also influence behavioural intention due to an identified lack of preparation, where specialised training becomes an important consideration (Joo et al., 2016). Thus, it could be reasoned that training, demonstrations, and hands-on experiences could play an important role, especially for pre-service teachers (Teo et al., 2016).

8. Limitations and future research

This research, as with any other empirical study, has limitations. Firstly, the sample was drawn from only three South African provinces, and the questionnaire was completed online. Thus, results cannot be generalised nationally. Studies with larger samples covering other provinces and including rural schools would be required. Furthermore, other variables could increase the explanatory power of the gamified learning adoption model, such as personal innovativeness of the teachers or variables at the school level, such as available technical support or influence of social norms. The descriptive statistics demonstrated that very few teachers have experience with using gamified systems for teaching purposes. Generally, the use of digital games in South African education is still in its early stages; the majority of educators do not yet possess the information and expertise around this medium of instruction. This study requested respondents to test a specific application before completing the survey. The majority of respondents tested the entire application, which took approximately 15-20 minutes. However, it is debatable if the allotted time was enough to inform beliefs about gamified applications and their potential for tourism education. Thus, a more longitudinal approach and a combination of qualitative and quantitative insights would be beneficial in establishing the potential of gamified systems for teaching. The use of experimental design could prove to be a more appropriate strategy to achieve the objectives of the research more comprehensively.

Overall conclusions and implications

The present research (composed of four publications) aims to make contribution in the under-researched area of tourism education in South Africa as well as revealing the potential of ICT and gamified learning within formal tourism education in South African high schools.

Four research objectives were guiding the study and below each of them is addressed individually.

Objective 1: To determine the extent ICT supports tourism education in South African high schools.

In order to address this objective a qualitative research design employing in-depth semi-structured interviews (n=24) with tourism teachers and government officials was applied. Departing from technology domestication as a conceptual framework, the study revealed that all interviewed tourism teachers had some kind of physical access to instructional technology. From a domestication theory perspective, 'technology commodification' was fairly achievable in the majority of these cases. Indeed, teachers expressed positive attitudes toward ICT-enhanced instructional tools: ICT has the capacity to widen access and provide more authentic learning experiences for students, as many of them have never been exposed to any touristic activity. Furthermore, ICT promotes student interest, engagement, and motivation. Teachers also believe that ICT is critical to students' future success, especially if they want to work in the tourism sector.

Notably, despite physical access and positive attitudes, some of the interviewed teachers did not use any form of ICT: their teaching was mainly textbook-based. Nearly half of the respondents (9 out of 19) could be positioned in the 'technology appropriation' phase of domestication. They quite actively use and integrate technology in their educational practice. This was either in the form of available in-room technology, taking learners to the computer lab, or bringing their personal ICT devices to work. Only four teachers could be located in a 'conversion' phase of domestication: they used technology regularly for curriculum delivery, for connecting with colleagues, and for sharing materials. These teachers also encouraged their students to use their mobile phones for learning. These findings are in accordance with previous studies on domestication of ICT in disadvantaged South African schools (e.g. Chigona et al., 2010; Bladergroen et al., 2012). In these studies, educators recognised and appreciated the benefits of ICT for instruction, but identified serious impediments to achieve technology conversion. These ranged from exogenous factors such as available infrastructure, to school culture, management approaches, and technology self-efficacy and anxiety.

Objective 2: To identify the barriers for ICT integration in tourism education.

Research design addressing the first objective was utilized also to answer the second objective. Despite positive attitudes exhibited toward ICT by interviewed South African tourism teachers, technology anxiety and the lack of confidence in using ICT were recognised as the foremost barriers preventing adoption.

Research findings related to the barriers for ICT integrations were reported through the lens of Social Cognitive Theory (SCT) as various factors (personal, behavioural, and environmental) were identified contributing to teachers' confidence in using technology for instruction. On a personal level, many respondents highlighted that successful tourism teachers have to be self-starters and open to change in teaching methodologies. Regarding behavioural factors, it was acknowledged that those teachers who had more advanced skills and experiences with technology tended to integrate it more compared to those who lacked these skills and experiences. Technological know-how was due to some teachers' personal decision to learn how to adopt technology for teaching purposes in their free time. Considering environmental factors, interviewees identified various external barriers that hindered them from developing their skills with ICT and consequently integrating it in teaching practices. Such impediments included lack of time, daily work demands, lack of resources, and big classes (especially in township schools). The findings support the SCT construct of human agency, which operates in an interdependent, triadic, reciprocal and causal structure (Bandura, 1998, p.62). The causation involves various factors – personal, behavioural, and environmental – that influence each other and determine individual decisions.

Objective 3: To assess students' user experience in terms of engagement with gamified application.

In order to address this research objective qualitative insights from focus groups (n=9) with South African tourism students were utilized. Before the focus group discussion participants engaged with gamified application WHACY (see section 3.5) for 30-45 minutes in the school's computer lab. The finding revealed that for South African tourism students the most engaging features of the application were competition (through the scoring system), immediacy of feedback, visual aesthetics and challenge. Moreover, the gamified application triggered curiosity and willingness to learn more about the related topics among the students.

The findings are in line with gamification conceptual frameworks (Csikszentmihalyi, 1990; Kapp, 2012; da Rocha Seixas et al., 2016), underlying that elements of competition, challenge, feedback and visuals have potential to intrinsically motivate students and provide playful learning experience, which leads to greater engagement within the

learning process. Although the study does not provide evidence that learning had occurred, it provides insights into potential of gamification and its nature to facilitate engagement and knowledge enhancement. However, for the majority of the participants' gamified learning was the first time experience, and in the disadvantaged schools going to computer lab was already an exciting experience in itself and this limits generalizability of the results.

Objective 4: To identify factors that influence tourism teachers' behavioural intention to accept gamified learning application.

Quantitative data obtained from 209 tourism teachers in South Africa was used to address the fourth research objective. Study respondents were asked to test a gamified application WHACY (see section 3.5), which took approximately 15-20 minutes before completing the survey. It was investigated to which extent six determined predictors (perceptions about playfulness, curriculum relatedness, learning opportunities, challenge, self-efficacy and computer anxiety) influence the acceptance of a gamified application by South African tourism teachers. Using structural equation modelling, the study found that among the six variables, the constructs of playfulness, curriculum relatedness and self-efficacy all had a positive, direct impact on the construct of behavioural intention. The exogenous constructs of challenge, computer anxiety and learning opportunities have an indirect effect on behavioural intention. These effects occur via playfulness or curriculum relatedness. The highest indirect impact was from the challenge construct.

To harness the positive impact of gamification for learning, educators should be provided with opportunities for interaction with gamified applications. These interactions should help educators acknowledge the role and value of 'playfulness' and the potential learning opportunities it can provide. Curriculum relatedness and playfulness with a proper level of challenge were found to be key drivers for adoption. Thus, gamified applications should provide adequate and curriculum-related content, presented in a playful and challenging manner. These have potential for subject knowledge advancement and can address student apathy and lack of motivation. Self-efficacy and computer anxiety also influence behavioural intention due to an identified lack of preparation, where specialised training becomes an important consideration (Joo et al., 2016). Thus, it could be reasoned that training, demonstrations, and hands-on experiences could play an important role, especially for pre-service teachers (Teo et al., 2016).

Implications

The study contributes to the literature in various ways. Firstly, the majority of research in the field of gamification and learning has been conducted in more economically advanced and developed regions, and not in emerging economies (Boyle et al., 2016; Hew et al., 2016; Dicheva et al., 2015). In developing economies, gamified learning could serve as a previously unharnessed strategy to address lack of student engagement within formal education (Da Rocha Seixas et al., 2016). This is especially the case in secondary education, where research on the improvement of tourism instruction is sparse (see Cuffy

et al., 2012), specifically pertaining to the benefits of digital technologies (Adukaite, Van Zyl, Cantoni, 2016). Furthermore, this study should stimulate debate around digital gaming in formal educational environments with limited technological infrastructure, but with great interest in digital play (Titus & Ng'ambi, 2014).

The findings of this study may be significant for broader theories and applications of technology adoption in education, especially in contexts beyond South Africa. As this research has shown, while digital technology is of significant utilitarian value for educators, it can have more emotive, symbolic and cognitive implications. Digital technology can facilitate the practical access to information and achievement of tasks, while broadening the cognitive horizons of learners by virtualising (or imagining) the tourism experience. Coupled with the use of mobile devices and digital services, tourism as a distant and improbable reality becomes a possible and lived experience. Research in the international context may look to this 'augmented' potential of technology in terms of tourism education.

Besides providing much needed research on the opportunities and challenges of ICT for tourism teaching in the concerned schools and regions, this research might also be of practical interest, both locally and internationally. Policies should consider the point of view of teachers, so to ensure higher levels of technology appropriation and conversion. In particular, (i) suitable technological infrastructure is needed, to serve not only the Computer Application Technology classes, but to also support other subjects, including tourism. (ii) The mere provision of ICT is not sufficient: specific training activities – both pre- and in-service – are needed in order to enable teachers to use them without anxiety. (iii) Such training should go beyond the technology itself, tackling the instructional design of the very subject of tourism, how ICT can support its teaching and learning, to provide more authentic and broader tourism experiences, as well as to further improve attention, interest and motivation. (iv) Teachers should become better able to use ICT also for their professional development and in order to exchange materials and share experiences with other colleagues. (v) Additionally, regulations about the usage of personal mobile phones by students might be revised to allow them to access specific, value-added activities. (vi) At a higher level, the selection itself of competent tourism teachers should be viewed as a critical factor of success, and (vii) ad-hoc communication activities might be advisable to improve the overall image of the subject.

Limitations

This research, as with any other empirical study, has limitations. Firstly, a methodological limitation connected to the selected schools' sample. There were no rural schools included in the sample due to accessibility constraints. Rural schools enroll a significant number of South African learners and face a series of challenges, which may be different compared to the reported schools in this research. Furthermore, for quantitative study the sample was drawn from only three South African provinces, and the questionnaire was completed online. Thus, results cannot be generalised nationally. Moreover, the country's linguistic

complexity limited the researcher to include schools with English as the main language of instruction. Schools where Afrikaans and isiXhosa are the main language of instruction were excluded due to the researcher's lack of knowledge of these languages.

It should also be noted that the study findings are based on self-declared data and it is only on one particular gamified application. The findings revealed that very few teachers have experience with using gamified systems for teaching purposes. Generally, the use of digital games in South African education is still in its early stages; the majority of educators do not yet possess the information and expertise around this medium of instruction. The majority of teachers participating in this study tested gamified application WHACY (see section 3.45), which took approximately 15-20 minutes. However, it is debatable if the allotted time was enough to inform beliefs about gamified applications and their potential for tourism education.

Future research

Further research, especially longitudinal and a combination of qualitative and quantitative insights would be beneficial to determine if gamification enhances learning using a variety of pedagogical methods in developing country context. The use of experimental design could prove to be a more appropriate strategy to achieve the objectives of the research more comprehensively. Furthermore, studies with larger samples covering other provinces and including rural schools would be required. Also other variables could increase the explanatory power of the gamified learning adoption model, such as personal innovativeness of the teachers or variables at the school level, such as available technical support or influence of social norms.

A future work could specifically look at the tourism curriculum content, attempting to understand the degree of localization, because often tourism curricula in developing/emerging contexts are replicated from Western contexts. Furthermore, it would be interesting to explore the perspective of lifelong learning within tourism education in South Africa, specifically looking at the role of ICT and informal learning.

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Appendix

a. Teachers' survey

INFORMED CONSENT

WHAT IS THE PURPOSE OF THIS STUDY?

To learn about teachers' attitudes towards technology enhanced learning about heritage and tourism.

WHY SHOULD I PARTICIPATE IN THE STUDY?

You will contribute to an international research on how technologies could assist Tourism teaching in South Africa.

WHO IS DOING THE STUDY?

It is a common study of UNESCO Chair in ICT (Information and Communication Technologies) to develop and promote sustainable tourism in World Heritage Sites based in Switzerland at the Università della Svizzera italiana (USI Lugano) and University of Cape Town, Department of Information Systems. Responsible person is Asta Adukaite, a doctoral candidate.

HOW WILL I PARTICIPATE IN THE STUDY?

Firstly, you test an online quiz (www.whacygame.org/test), a potential educational tool for students about World Heritage Sites in SADC and tourism. Secondly, you complete this online survey that takes approximately 10 minutes and consists of questions.

WHO WILL SEE THE INFORMATION THAT YOU GIVE?

Only the researcher in charge of the study will see your responses. Your responses will be combined with responses from others before being analysed. You will not be personally identified in any way, and your individual responses will be kept confidential.

WHAT IF YOU HAVE QUESTIONS, SUGGESTIONS, CONCERNS, OR COMPLAINTS?

You are invited to send questions, suggestions, concerns, or complaints about the study, to the researcher, Asta Adukaite (asta.adukaite@usi.ch) at any time before or after your participation.

Your participation in this study is completely voluntary.

If you agree to participate in this study click button "Next" to start the survey.

PART 1. BACKGROUND INFORMATION

[1] What is your gender?

- ☐ Female
- ☐ Male

[2] What is your age?

- ☐ 20-24
- ☐ 25-29
- ☐ 30-34
- ☐ 35-39
- ☐ 40-44
- ☐ 45-49
- ☐ 50-54

- ☐ 55-59
- ☐ 60-65

[3] Which category best describes your ethnic group?

- ☐ African
- ☐ Indian/Asian
- ☐ Coloured
- ☐ White
- ☐ Other (specify in the provided space) _____

[4]What is your home language?

- ☐ Afrikaans
- ☐ English
- ☐ isiNdebele
- ☐ isiXhosa
- ☐ isiZulu
- ☐ Sesotho sa Leboa
- ☐ Setswana
- ☐ Sesotho
- ☐ siSwati
- ☐ Tshivenda
- ☐ Xitsonga
- ☐ Other (specify in the provided space) _____

[5]In which province is your school located?

- ☐ The Eastern Cape
- ☐ The Free State
- ☐ Gauteng
- ☐ KwaZulu-Natal
- ☐ Limpopo
- ☐ Mpumalanga
- ☐ The Northern Cape
- ☐ North West
- ☐ The Western Cape

[6]Which grades do you currently teach?

Please choose all that apply:

- ☐ 8th grade
- ☐ 9th grade
- ☐ 10th grade
- ☐ 11th grade
- ☐ 12th grade
- ☐ Other: _____

[7]Which subject areas do you teach?

Please choose all that apply:

- ☐ Tourism

- ☐ Geography
- ☐ History
- ☐ Mathematics
- ☐ Foreign Language
- ☐ Home language
- ☐ Science
- ☐ Social Studies
- ☐ Physical Education
- ☐ Life orientation
- ☐ Other: _____

[8]How many years have you been teaching?

Please write your answer here: _____

[9]Which of the following statements best characterizes your professional development experience with technology?

Please choose only one of the following:

- ☐ I have had EXTENSIVE technology training
- ☐ I have had MODERATE technology training
- ☐ I have had OCCASIONAL technology training
- ☐ I have had NO technology training

[10]Which of the following devices do you use?

Please choose all that apply:

- ☐ Portable phone that can connect to the internet
- ☐ Portable phone that cannot connect to the internet
- ☐ Desktop computer
- ☐ Laptop computer
- ☐ Tablet device (e.g., e-Reader, iPad)
- ☐ Mp3 player (e.g., iPod, iPod touch)
- ☐ DVD player
- ☐ Game console
- ☐ Digital camera
- ☐ None of the above
- ☐ Other: _____

[11]Indicate your opinion about each of the statements below:

	YES	NO
I have previously used technology for teaching purposes	<input type="radio"/>	<input type="radio"/>
I have experience with the use of digital games/quizzes for teaching	<input type="radio"/>	<input type="radio"/>
I have experience with the use of games (not digital) in the classroom	<input type="radio"/>	<input type="radio"/>

[12]Indicate your opinion about each of the statements below:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
If I heard about a new information technology tool, I would look for ways to experiment with it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Among my colleagues, I am usually the first to try out new information technologies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In general, I am hesitant to try out new information technologies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I like to experiment with new information technologies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PART 2. EVALUATION OF THE TESTED TOOL

[13] I have tested the online quiz about heritage and tourism:

- ☐ At least for 2 minutes
- ☐ Until the end
- ☐ Other _____

[14]How, according to you, the tool you have just tested could be used for tourism teaching activities?

Please choose the appropriate response for each item:

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
As a reward	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
For assessment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a teaching aid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As one of the main instructional activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would advise to use it only as an extra curriculum activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It might be a tool used both in the classroom and outside of it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[15] Evaluate the statement below about different features of the tool:

Please choose the appropriate response for each item:

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
I felt rewarded when I got points for correct answers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I found that the feedback provided after each question was important to my learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It boosted my confidence to keep on playing when I progressed through the quiz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I felt rewarded when I
got a final certificate at
the end of the quiz

☐ ☐ ☐ ☐ ☐

When playing the
online quiz, I
experienced suitable
level of challenge

☐ ☐ ☐ ☐ ☐

The tool provided me
with challenges that are
closely matched to my
computer skill level

☐ ☐ ☐ ☐ ☐

The tool provided me
with challenges that are
closely matched to my
knowledge level

☐ ☐ ☐ ☐ ☐

[16] This type of tool offers opportunities to:

Please choose the appropriate response for each item:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Foster awareness about World Heritage Sites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhance knowledge of World Heritage Sites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motivate students to learn more about heritage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase sense of pride of own heritage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Increase sense of responsibility for heritage protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Better understand South African touristic potential	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Better visualize heritage places	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[17] How would you evaluate the tool you have just tested?

Please choose the appropriate response for each item:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
The tool would fit the current tourism curriculum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The tool could compliments the fulfillment of tourism curriculum requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The content of the tool correspond well with the tourism curriculum part on World Heritage Sites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It was easy to use the tool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students' interaction with this type of learning tool would be easy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It would be easy for me to use this type of tool in the tourism classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[18] Provide your opinion on the following statements related to the intervention you have tested.

Please choose the appropriate response for each item:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Computers do not scare me at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Working with computer makes me nervous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computers make me feel uncomfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computers are somewhat intimidating to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[19] Provide your opinion on the following statements related to the intervention you have tested.

Please choose the appropriate response for each item:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I felt confident playing an online quiz even if there was no one around to show me how to play it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt confident playing an online quiz even if I have never played it before	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt confident playing an online quiz even if I had only the online rules as a reference	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I would left more confident playing an online quiz if someone showed me how to do it first

☐ ☐ ☐ ☐ ☐

I would know how to handle the usage of this tool in tourism teaching classes

☐ ☐ ☐ ☐ ☐

[20] Provide your opinion on the following statements related to the tool you have tested.

Please choose the appropriate response for each item:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Using the tool was enjoyable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the tool stimulated my curiosity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When using the tool I did not realize how the time passed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had fun using the tool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[21] Which are the main barriers, according to you, in integrating this tool in current tourism teaching practices:

Please choose all that apply

Lack of access to technology in my school ☐

Lack of technological assistance in my school ☐

My lack of power in deciding which strategies to use for teaching ☐

I lack professional training on how to integrate technology into teaching ☐

Technologically unprepared students ☐

Lack of time during the class period ☐

Inflexibility of the current curriculum ☐

[22]Indicate your opinion on the following statements:

Please choose the appropriate response for each item:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Assuming I had access to the tool, I intend to use for tourism teaching activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would suggest to my school's headmaster to evaluate the possibility of using this tool (or similar) for tourism teaching activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had to vote, I would vote in favour of using this type of tool in the classroom	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would encourage students to use this tool in extra curricular activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[23]If you have any other comments or suggestions feel free to provide them here:

If you would be interested to further explore the possibility of using this tool in your classroom feel free to contact Asta Adukaite asta.adukaite@usi.ch. Participation is free of charge and the contents of the quiz can be simply adapted to your needs.

Thank you for completing this survey.

b. Guiding questions for Tourism Teachers interviews:

Tourism as a subject

1. When was tourism introduced in your schools? What were the main reasons to introduce it?
2. Is it successful elective? Why?
3. What are the main motivations for students to choose the subject?
4. Do you think some of them will pursue career in tourism sector? Are you aware of any previous students pursuing career in tourism?

Tourism teacher

5. Since when are you tourism teacher? How did you decide to become a tourism teacher?
6. How do upgrade your knowledge and skills on tourism teaching?
7. Do you network with other Tourism Teachers in district/province/national/international level? How?

Teaching tourism

1. Which topics of tourism curriculum engage students the most? What they like/dislike about this subject?
2. Which teaching methods do engage the most tourism students?
3. How autonomous are you when deciding on tourism teaching contents and teaching strategies?
4. Which are the main challenges for tourism education?

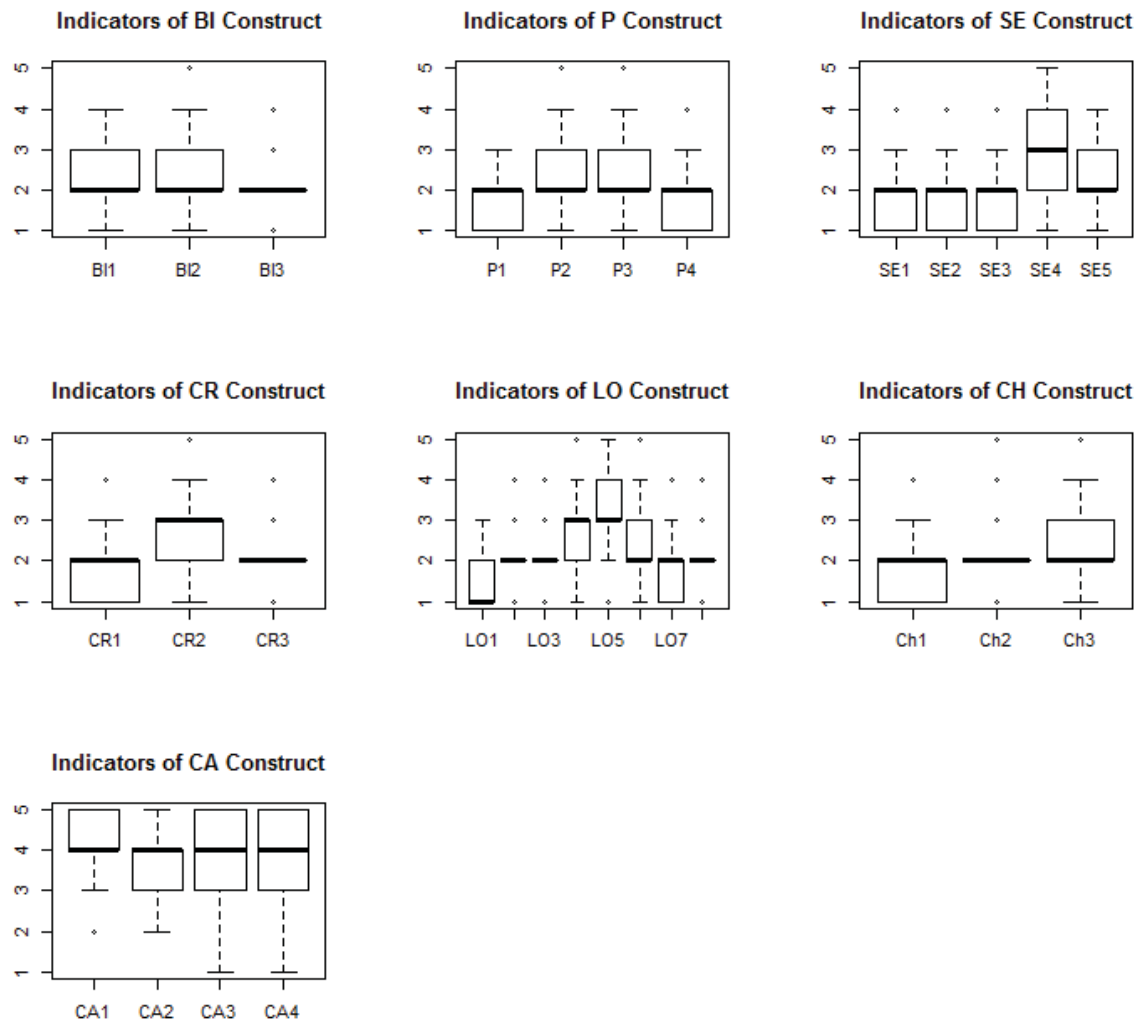
ICT and tourism teaching

5. Do you use information communication technologies (computers, internet, TV, mobile etc...) for tourism teaching? If yes, which ones and how?
6. How much are your students engaged with technologies?
7. How information communication technologies (internet, mobile) could be harnessed for tourism education?
8. What are the main challenges for introducing ICT to tourism education?
9. What is your opinion about using game/game elements for tourism teaching?

Closing

10. Do you think the current tourism education and training addresses the needs of the local industry and the wider society?
11. What should be the priorities of tourism education? For example: basic awareness, importance and value of heritage, ICT, sustainable development, employment awareness, sector specific skills etc?
12. Do you have any suggestion how to improve tourism education in SA?

Item statistics (Publication 3)



Item statistics (Publication 3)

Construct	Item	mean	median	Range	s.d.	CV
BI	BI1	2.35	2	1 - 4	0.94	39.9%
	BI2	2.22	2	1 - 5	1.00	45.3%
	BI3	2.16	2	1 - 4	0.98	45.6%
P	P1	1.62	2	1 - 3	0.52	31.9%
	P2	2.15	2	1 - 5	0.82	38.2%
	P3	2.40	2	1 - 5	0.94	39.0%
	P4	1.68	2	1 - 4	0.62	36.8%
SE	SE1	1.82	2	1 - 4	0.86	47.3%
	SE2	1.89	2	1 - 4	0.87	46.0%
	SE3	1.88	2	1 - 4	0.90	48.0%
	SE4	3.00	3	1 - 5	1.21	40.3%
	SE5	2.28	2	1 - 4	0.83	36.5%
CA	CA1	4.06	4	2 - 5	0.90	22.3%
	CA2	3.71	4	2 - 5	0.99	26.7%
	CA3	3.70	4	1 - 5	1.09	29.5%
	CA4	3.75	4	1 - 5	1.05	27.9%
CR	CR1	1.92	2	1 - 4	0.84	43.9%
	CR2	2.70	3	1 - 5	1.03	38.1%
	CR3	2.11	2	1 - 4	0.80	37.8%
LO	LO1	1.44	1	1 - 3	0.51	35.3%
	LO2	1.88	2	1 - 4	0.52	27.6%
	LO3	1.95	2	1 - 4	0.73	37.2%
	LO4	2.67	3	1 - 5	1.01	37.7%
	LO5	3.11	3	1 - 5	0.91	29.3%
	LO6	2.44	2	1 - 5	0.93	38.2%
	LO7	1.70	2	1 - 4	0.63	37.0%
	LO8	1.94	2	1 - 4	0.60	31.0%
Ch	Ch1	1.65	2	1 - 4	0.73	44.1%
	Ch2	2.07	2	1 - 5	0.81	39.3%
	Ch3	2.21	2	1 - 5	0.84	38.0%



GAUTENG PROVINCE

Department: Education

REPUBLIC OF SOUTH AFRICA

For administrative use:
Reference no: D2016 / 012

GDE RESEARCH APPROVAL LETTER

Date:	7 April 2015
Validity of Research Approval:	7 April 2015 to 2 October 2015
Name of Researcher:	Adukaite A.A.
Address of Researcher:	1103- Horizon Bay; 4 Blaauwberg Road; Table View; Cape Town; 7441
Telephone / Fax Number/s:	072 404 5503
Email address:	asta.adukaite@usi.ch
Research Topic:	Gamified learning acceptance by South African Tourism teachers
Number and type of schools:	FOUR HUNDRED and SEVENTY Secondary Schools
District/s/HO	All districts

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved. A separate copy of this letter must be presented to the Principal, SGB and the relevant District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted. However participation is VOLUNTARY.

The following conditions apply to GDE research. The researcher has agreed to and may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted:

CONDITIONS FOR CONDUCTING RESEARCH IN GDE

1. The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter;
2. A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB);

Handwritten signature and date:
2015/04/08

1

Making education a societal priority

Office of the Director: Knowledge Management and Research

9th Floor, 111 Commissioner Street, Johannesburg, 2001
P.O. Box 7710, Johannesburg, 2000 Tel: (011) 355 0506
Email: David.Makhado@gauteng.gov.za
Website: www.education.gpg.gov.za

3. A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned;
4. The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, SGBs, teachers and learners involved. Participation is voluntary and additional remuneration will not be paid;
5. Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal and/or Director must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage;
6. Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year. If incomplete, an amended Research Approval letter may be requested to conduct research in the following year;
7. Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.
8. It is the researcher's responsibility to obtain written parental consent and learner;
9. The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources;
10. The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations;
11. On completion of the study the researcher must supply the Director: Education Research and Knowledge Management with one Hard Cover, an electronic copy and a Research Summary of the completed Research Report;
12. The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned; and
13. Should the researcher have been involved with research at a school and/or a district/head office level, the Director and school concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards


.....

Dr David Makhado

Director: Education Research and Knowledge Management

DATE: 2015/04/08
.....



education
MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

Building No 5, Government Boulevard Riverside Park, Mpumalanga Province
Private Bag X11341, Mbombela, 1200.
Tel: 013 766 5552/5115, Toll Free Line 0800 203 116

Uinko le Tamfundvo Umnyango we Fundo

Departement van Onderwys

Ndzawulo ya Dyondzo

Universita Della Svizzera italiana
Facolla di Lugano
Faculty of Communication Sciences
Lugano
Switzerland

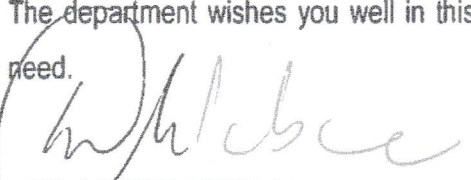
RE: APPLICATION TO CONDUCT RESEARCH: MRS ASTA ADUKAITE

Your application to conduct research was received. The title of your study reads: "tourism education and impact of information and communication technologies."

In terms of the attached draft research policy data or any research activity can only be conducted after school hours as per appointment. You are also requested to share your findings with the relevant sections of the department so that we may consider implementing your findings if that will be in the best interest of the department. To this effect, your final approved research report (both soft and hard copy) should be submitted to the department so that your recommendations could be implemented. You may be required to prepare a presentation and present at the departments annual research dialogue.

For more information kindly liaise with the department's research unit @ 013 766 5476 or a.baloyi@education.mpu.gov.za.

The department wishes you well in this important project and pledges to give you the necessary support you may need.


MRS MOC MHLABANE
HEAD OF DEPARTMENT

23, 4, 15
DATE





REFERENCE: 20150422-46591

ENQUIRIES: Dr A T Wyngaard

Mrs Asta Adukaite
1103 Horizon Bay
4 Blaauwberg Road
Table View
7441

Dear Mrs Asta Adukaite

RESEARCH PROPOSAL: GAMIFIED LEARNING ACCEPTANCE BY SOUTH AFRICAN TOURISM TEACHERS AND STUDENTS

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **02 May 2015 till 30 August 2015**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

**The Director: Research Services
Western Cape Education Department
Private Bag X9114
CAPE TOWN
8000**

We wish you success in your research.

Kind regards.

Signed: Dr Audrey T Wyngaard

Directorate: Research

DATE: 22 April 2015