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WORK-BASED LEARNING AND RESEARCH FOR MID-CAREER PROFESSIONALS: PROFESSIONAL STUDIES IN AUSTRALIA

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ABSTRACT

Aim/Purpose	Work-based learning has been identified in the literature, and is established in academia and in the global worlds of work; however, an examination of work-based research, particularly at the doctoral level, has been less well articulated. Moreover, a paucity of published literature on either work-based research or Professional Studies means little is known about the dynamics and drivers of these domains. This study aims to begin addressing the shortfall in literature on work-based research and Professional Studies programs, using the program at University of Southern Queensland as an example.
Background	This paper examines work-based research in the context of the Professional Studies program at University of Southern Queensland in Australia, with which the authors are affiliated.
Methodology	Analysis of work-based research includes discussion of 'messy' research environments and the changing nature of workplaces, along with the opportunities and challenges such environments pose for action researchers.
Contribution	In addition to addressing a shortfall in the published literature on work-based research, the paper also contributes insight into the mechanisms used to promote reflective practice and the generation of professional artefacts.
Findings	Often driven by altruism, work-based research as implemented in the Professional Studies program results in a so-called 'triple dividend', designed to benefit the individual researcher, work environment, and community of practice.

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Recommendations for Practitioners	To be successful contributors to work-based research, practitioners need to reflect carefully and deeply on experience, planning and outcomes, using what in this paper we call 'micro-reflective' (personal) and 'macro-reflective' (program) cycles of reflection.
Recommendation for Researchers	In addition to generating new knowledge and expanding the frontiers of workplaces, work-based research is often motivated by complicated and wide-reaching imperatives; work-based researchers therefore need to consider the goals, objectives, priorities and vision of their work environments, as well as understand issues related to bias, ethical practice and the nature of insider research.
Impact on Society	Work-based learning and research address the complexities, challenges and future demands of Australian workplaces along with the work, mobility and personal development needs of mid- to senior-career professionals.
Future Research	In addition to the multitude of action research programs possible in work-places in Australia, more research is needed to understand higher education work-based learning and its relation to, and impact on, work-based research, particularly when applying mixed methods research to work environments.
Keywords	work-based learning, work-based research, professional studies, reflective practice, mixed methods research, action research

INTRODUCTION

Modes of learning and teaching in many countries have undergone dramatic change over the last 25 years. Abandoned are the days of wise teachers serving as 'agents of learning' and 'transmitters of knowledge' and students as 'passive and empty receptacles' waiting patiently to absorb dispensed wisdom. Teachers are now 'facilitators' of individualised learning programs and, for well-established reasons, students increasingly self-direct their own study, a lot of which is often experience-based (Reece & Walker, 2016).

This shift in learning and teaching has led to initiatives like "work-integrated learning" (Kaider & Hains-Wesson, 2016), "community-based learning" (Hart & Akhurst, 2017), and "blended learning" (De Vriendt, 2015), and calls for greater integration of workplace learning into higher education and of higher education into the workplace (e.g., Yankelovich, 2006) and the rise of alternate forms of learning in the workplace (e.g., Bingham & Connor, 2015; Cross, 2012; Jennings, 2012; Vaughan, O'Neil, & Cameron, 2011). Against this general social landscape and educational backdrop, a significant corpus of published literature also suggests an international trend away from a focus on enrolment in formal, discipline-based, tertiary education programs toward more broadly applied definitions and applications of knowledge and curricula to include work-based learning. Some educational theorists have suggested that this phenomenon is due to a growing disconnect between "the knowledge needed at work and the knowledge and skills produced through formal education" (Tynjälä, 2008, p. 131). (In this paper, we make the distinction between '*workplace* learning and research', which may occur in one's 'workplace', and the preferable and more contemporary concept of '*work-based* learning and research', which may occur in one's workplace but may also occur in one's wider work environment, and is often therefore not associated with a 'place' of work *per se* but a 'domain of practice'—a professional sphere in which one works—irrespective of the specific location in which one's work is carried out.)

During this same period, the global world of work has confronted similar seismic shifts as those documented in learning and teaching. Theorists earlier in the century maintained that such fundamental transformations have the potential to "change the face of work and industry, and establish new economic and political powers on the global scene" (Silberglitt, Anton, Howell, & Wong, 2006, p. 1). As a result, according to Cross (2012, p. 3), the workplace has "changed

inexorably [in the last 20 years]. Business has become unpredictable. Results are asymmetric. Everyone's connected. Value has migrated to intangibles. Organisations are becoming organic. Talent choses where to work. Power is shifting from suppliers to customers. Learning and work are converging. Time has sped up."

Many of the knowledges and skills needed to successfully navigate and thrive in such rapidly changing technological work and knowledge environments can't be picked up in books or learned in classrooms because workers acquire most of what they know "through doing rather than through knowing. Added to this there is an emerging appreciation of the important role that context plays in any learning" (Jennings, 2012, p. 1). Thus, work-based learning has arisen to address some of these concerns by integrating 'work experience' with practice, scholarship and research, and by "exploiting the limited time and [training] budgets available to organisations so they can realise increased performance improvement, greater employee development opportunities and improved flexibility in the provision of learning opportunities to the workforce" (Jennings, 2012, p. 1).

Lester and Costley (2010, p. 562) point out that work-based learning is not only "situated in the workplace [but] arises directly out of workplace concerns". In fact, Tynjälä (2008) has argued that the aforementioned changes in education are a direct consequence of the technological upheavals occurring in society and the world of work as a whole when she points out that:

> [T]he rapid development of information and communications technology, the growing production of knowledge in the economy, increasing internationalization and globalization as well as changes in occupational structures and in the contents and organisation of work have challenged not only educational institutions but also work organisations to develop new ways of ensuring that the level of competence of the workforce meets these challenges. Thus, continuous learning has become important both for individuals operating in the learning society and for organizations competing in international markets (p. 131).

Work-based learning is distinguished by what it is not: it is not training; it is not formal; it is not focused narrowly on skills; it is not about individuals; it is not disconnected from the needs and interests of society; and it is not a mere relocation of learning from the classroom to the workplace—it represents a complete rethinking of "shared meanings, ideas, behaviours and attitudes" (Manuti, Pastore, Scardigno, Giancaspro, & Morciano, 2015, p. 2). The three basic axioms of work-based learning can, according to Manuti et al. (2015, p. 3), therefore be defined as: (1) workplaces are legitimate and worthy sites at which learning can occur; (2) workplaces should be seen as learning environments; and (3) learning and working are inextricably linked. This recognition differs from the traditional and standard paradigm of learning, which: (a) emphasises individual mind as the primary vehicle through which cognitive power and meanings are acquired and accumulated; (b) elevates the 'interiority' of the mind as separate and superior to the outside world; and (c) accentuates the uniformity of formal, codified aims and measurable outcomes (Tynjälä, 2008, p. 131).

Work-based learning, particularly as it is encouraged in higher education when professionals enter the academic world, complements these elements with not only a paradigm of 'learning through action' (as discussed below in more detail) but also configures learning as a contextual, informal, and social phenomenon that generates new forms of tacit, yet integrated, knowledge. In this sense, work-based learning, Tynjälä (2008, p. 132) argues, can be "characterised as creating new modes of action, new practices, new procedures and new products", and thereafter she makes a persuasive case for the learning of groups, the learning of communities, the learning of organisations, and the inter-organisational learning of networks and regions.

The purpose of this study is to specifically examine work-based learning in relation to work-based research, and to identify evidence of both in the Professional Studies Program as conceived and implemented at the University of Southern Queensland (USQ) in Australia (a second, companion

paper will separately consider two research case studies currently being conducted in the Australian work-based learning and research context (Fergusson, L., Allred, T., Dux, T., & Muianga, 2018)).

The paper is, therefore, organised into two main sections: an explanation of work-based research; and a description of the Professional Studies Program at USQ and its relation to work-based learning and research.

WORK-BASED RESEARCH

Work-based research is similar to other approaches to gaining knowledge when applying the scientific method; it, too, represents the systematic study of materials and phenomena in order to answer questions, establish facts, and reach new conclusions. However, several distinctly unique features identify the work-based approach.

For example, unlike research environments in which variables can be controlled and tested in order to make reliable and definitive statements, work-based research is usually conducted in complex (what some practitioners call "messy" [e.g., O'Leary & Hunt, 2016, p. 10]) work and organisational environments, and these may be constantly changing; oftentimes this complexity and change suggest new challenges and opportunities, but may also pose new, unforeseen risks. Moreover, such research settings are generally occupied by multiple stakeholders, including managers, board members, peers, suppliers, and consultants, each of whom may affect context and outcomes. Together, these factors make work-based research dynamic, innovative and above all 'applied', in the sense that it is 'change-oriented research'.

Thus, work-based research is usually classified as 'action research', which is most generally defined as research carried out in the course of an activity or work aimed at improving the methods and approaches of those involved in the activity or occupation, often in the context of providing data to form the basis of rational, informed, evidence-based decision making. More recent interpretations expand this definition to suggest that "unlike conventional social science, [the purpose of action research] is not primarily or solely to understand social arrangements, but also to effect desired change as a path to generating knowledge and empowering stakeholders" (Huang, 2010, p. 93). In this section, we summarise the basic elements and unique features of work-based research, drawing from O'Leary and Hunt (2016) and others (e.g., Treadwell, 2010).

REASONS FOR CONDUCTING RESEARCH

The traditional purpose of conducting research is to generate new knowledge and thereby expand the frontiers of a discipline. In work-based research, the underlying motivation for conducting research is more complicated and wide-reaching. Teddlie and Tashakkori (2009) point to the example of transformative researchers whose purpose is to help oppressed and marginalised groups gain greater social justice rather than merely generate knowledge (they may generate new knowledge, but it is not their primary mission).

The authors therefore advance a number of theories that explain and motivate work-based research, including personal reasons such as career development and satisfying curiosity about complex phenomena, and societal reasons such as improving society and its institutions and empowering disadvantaged groups or constituencies (Teddlie & Tashakkori, 2009, pp. 113-115). To this list we can add organisational reasons, including a desire to improve performance or other outcomes of a company, peer group or government agency, and a desire to test innovations and develop causal explanations for, and correlational examples of, workplace phenomena.

COMPREHENDING THE WORKPLACE AND WORK SPACE

An understanding of the workplace and the practice domain of one's work are essential for work-based research. This includes a fluency with both the organisational structure and culture of one's

workplace. Being familiar with not only one's own job responsibilities and place in the organisation but with those around us (such as one's manager), as well as how the organisation is structured (e.g., functionally or divisionally), are considered essential. However, an understanding of organisational culture is equally important. For example, what are the core values held by the organisation, what assumptions underlie those values, and what behaviours and attitudes characterise and define the workplace? These might find expression in the way language between management and staff is applied (i.e., formal or informal usage), the way decisions are made (i.e., consensually or by edict), how the value of 'learning' and 'knowledge acquisition' is viewed, and how human resource issues, such as responsibility and accountability, are conceived and enacted. Similarly, for the work-based researcher, knowing where the 'power' in the organisation lies and what the organisation's frustrations, goals, objectives, priorities and vision for the future are (particularly when it comes to developing an agenda and plan for research in the workplace), are considered crucial. Understanding the goals, objectives, priorities and vision in particular provides considerable research potential.

Workplace and Practice Domain Issues

O'Leary and Hunt (2016) highlight the need to identify organisational 'issues' before asking questions. Their focus is on understanding the types and extent of issues an organisation faces and where research might contribute to addressing and resolving these issues. However, issues extend beyond the organisation and include problems, needs, challenges and opportunities in the wider practice domain or profession (i.e., the work 'space'), which may also motivate a researcher to embed a program within a specific organisation while addressing higher order or discipline-wide issues. In both cases, it is important for the researcher to distinguish between the urgency, importance and scale of issues. Distinctions need to be made between issues which are merely urgent (but not necessarily important or substantial) and those that are strategically fundamental, mission-critical, or of an order of magnitude that threaten the sustainability or survival of the organisation.

These latter types of issues may be more amenable to research, although pressing issues may receive more attention in the short-term. Moreover, particularly in small-scale workplace research, it is imperative to look critically at the organisation and to examine the practice domain outside the organisation, not simply hear the 'dominant voice' in which the researcher unquestioningly aligns personal thoughts to those of the organisation without due reflection and critical thought. In short, developing an understanding of the legitimate frustrations and priorities of an organisation, and then asking: 'what can I contribute?' potentially lead to valuable research questions being advanced.

Developing Research Questions and Applied Research Plans

Having identified a relevant workplace issue (which is either specific to one's own organisation or applicable to the wider practice domain) and thereby setting a possible direction for work-based research, certain foundational questions may be asked. In this sense, research questions define the investigation, set the boundaries of investigation, provide a direction for investigation, and act as a frame of reference for evaluating the research program (O'Leary & Hunt, 2016, p. 46). Research questions are different to hypotheses or null-hypotheses in that they generally do not propose on the basis of logical conjecture and under strictly controlled conditions to test the existence (or absence) of a relationship between two or more variables. Like hypotheses, research questions are often advanced on the basis of a hunch or educated guess, and are equally specific, testable and realistic.

However, research questions differ from hypotheses because of their penchant for generating broad (although not always generalizable) understandings and conclusions, their sometimes lack of clearly defined variables, their emphasis on an 'experience' rather than an 'observation' of social and organisational phenomena, their proclivity for developing 'rich' data, and their oft-declared aim of engaging in collaborative change (O'Leary & Hunt, 2016, p. 47).

Having developed one or more research questions, a plan is developed on the basis of several factors. The first of these, as is the case with many forms of research, a review of the literature and development of a research model. Such a review would typically address such topics as: what do I know about this topic and how can I find out more; how do I develop a convincing rationale for the study; what frameworks, models, and/or theory will help the study; and what research has already been conducted in this area?

In addition to analysing the published academic literature on the discipline, reviews of this type might also envelop government white papers and policy documents, company annual reports, competency models, trade journals, and so-called "grey literature" (i.e., literature that exists outside standard academic and commercial domains, such as less public or unpublished organisational data), and may extend to root cause analysis or public policy analysis (e.g., Dunn, 2015).

As is also the case with hypotheses in experimental, quasi-experimental, time-series, correlational and other forms of empirical research, research questions (what I want to know), which logically follow from the problem being investigated, also logically necessitate a method (how I am going to know it), and therefore developing a research plan is somewhat straightforward, because the population type, size and conditions, along with any instruments and designs (e.g., longitudinal or cross-sectional), logically follow from the question. O'Leary and Hunt (2016, pp. 81-82) call the next phase of research going from "questions to methods" because "decision-making relating to methods [in work-based research] is question-driven".

Moreover, due to the nature of work-based research, the development of an appropriate method and research design can be more challenging. For example, while the question may be narrowly defined, its goals can be open-ended and the context, as stated above, can sometimes be messy. O'Leary and Hunt (2016) therefore point out that work-based research generally aims to fulfil one or more of the following: (1) understand a problem; (2) find a workable solution to the problem; and/or (3) evaluate the success or failure of an 'intervention'. Thus, a work-based research plan may be evaluative in nature and will usually include: significance and scope of the problem; purpose and merits of the research (including purpose, aims, and objectives) and possible benefits to the organisation or practice domain; merits of the research question; merits and trustworthiness of the researcher (including qualifications, gender, age, position, ethnicity, and so forth); merits and description of the proposed research method; timelines, budgets and funding (if applicable); and ethical considerations (including consideration of insider-research controls, consents and privacy).

Action Research and Mixed Methods

Work-based research favours a variety of different forms of mixed methods, because they have the scope and flexibility to investigate complex phenomena in a wide variety of practice domains, such as those observed in work environments, although all methods are embraced on a 'best-fit' basis by workplace researchers depending on the problem and research question under investigation.

Mixed methods are discussed in detail by Creswell (2003), Creswell and Plano Clark (2011) and Teddlie and Tashakkori (2009), but have their origins in "multiple methods" of the late 1980s, as described, for example, by Mark and Shotland (1987), and constitute what Teddlie and Tashakkori (2009, p. 3) call the "third research community" after quantitative (positivist and post-positivist paradigms) and qualitative (constructivist paradigm) methods. Table 1 summarises the relation of each research community. (We have not attempted to provide an in-depth analytical comparison of each of the three research communities, but present this Table 1 to show their relation and the relevance of mixed methods to action work-based research and subsequently to Professional Studies.)

Table 1. Dimensions of qualitative, mixed methods and quantitative research designs (adapted from Teddlie & Tashakkori, 2009, p. 22 and p. 162)

Dimension	Qualitative (QUAL)	Mixed Methods	Quantitative (QUAN)
Paradigm	Constructivist (and variants)	Pragmatist; transformative perspective	Positivist; post-positivist
Research Questions	QUAL research questions	Mixed method research questions (QUAN and QUAL)	QUAN research questions; null hypothesis; hypothesis
Form of Data	Most typically, although not exclusively, narrative and descriptive	Narrative, descriptive and numeric	Most typically, although not exclusively, numeric
Purpose of Research	(Often) exploratory plus confirmatory	Confirmatory (i.e., explanatory) plus exploratory	(Often) confirmatory plus exploratory
Role of Theory and Logic	Grounded theory; inductive logic	Both inductive and deductive logic; inductive-deductive research cycle	Rooted in conceptual framework or theory; hypothetico-deductive model
Typical Studies or Designs	Ethnographic research designs and others (e.g., case studies); mono-method multi-strand designs (i.e., parallel mono-method = QUAL + QUAL; sequential mono-method = QUAL > QUAL)	Mixed method exploratory (QUAL > QUAN), explanatory (QUAN > QUAL), converged or triangulated (QUAL + QUAN), and embedded (QUAN[qual] or QUAL[quan]); quasi-mixed mono-strand designs (i.e., sequential, parallel, multi-level)	Experimental, quasi-experimental, correlational, time-series, survey, etc.; mono-method multi-strand designs (i.e., parallel mono-method = QUAN + QUAN; sequential mono-method = QUAN > QUAN)
Sampling	Mostly purposive	Probability, purposive, and mixed methods sampling (such as parallel mixed methods sampling, sequential mixed methods sampling, and multilevel mixed method sampling)	Mostly probability
Data Analysis	Thematic strategies; categorical and contextualising	Integration of thematic and statistical; data conversion	Statistical analyses; descriptive and inferential
Validity and Trustworthiness	Trustworthy; credible; transferable	Inferential quality; inferentially transferable	Internally valid; externally valid

Thus, Creswell and Plano Clark (2011, p. 4) suggest mixed methods can be viewed "more as a methodology that span[s] viewpoints" rather than a strict research method; in short, they maintain that mixed methods are both a method and a philosophical orientation when they say:

> Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems that either approach alone (Creswell & Plano Clark, 2011, p. 5).

Creswell and Plano Clark (2011, pp. 8-11) go on to explain that mixed methods are most applicable in research when one data source is insufficient to represent and explain a phenomenon, when initial quantitative results need to be explained, when exploratory qualitative findings need to be generalised, when one study needs to be enhanced by a second method, when a theory needs to be embedded in multiple data strands, and when a research objective needs to be understood in the context of multiple research phases. Given the often exploratory and abductive nature of workplace research, each of these needs and research scenarios frequently arise.

Managing Data

A variety of data types are common in workplace research, including historical and existing private- and public-sector data. For example, private sector data may include databases, reports, catalogues, safety records, sales figures, human resource records, and client records. However, public sector data might also include data held by international organisations, like the World Health Organisation (WHO) or the Organisation for Economic Cooperation and Development (OECD), national data held by governments, non-governmental organisation data, archival data, and policy documents. Workplace research may also include online data, which raises a number of other data management challenges.

Each of these data types is commonly dealt with in workplace research (O'Leary & Hunt, 2016). Similarly, primary data are generated in workplace research, and because of the mixed method commonly employed, the volume of data can be exhaustive. Primary data are collected by the investigator specifically in response to asking the research question, and can include data generated from interviews, surveys, observations and focus groups. How data is gathered, interrogated and used in workplace research is relevant to the veracity and usefulness of the research outcome; however, how data are managed in workplace research does not vary significantly from other forms of research.

Generating a Deliverable

Depending on the audience, a work-based research deliverable may take the form of a report, policy document, presentation or essay for professionals or specialist practitioners (what below in the context of the Professional Studies Program we term an 'artefact') when referring to the practice domain. In the case of scholarship, a deliverable can take the form of a thesis, dissertation or journal article written primarily for an academic or specialist audience. In both cases, the deliverable is designed to address the problem under investigation, although an emphasis on recommendations and action steps may feature more predominantly in the former rather than the latter artefact. As shown in Table 2, O'Leary and Hunt (2016) distinguish deliverables of work-based research according to the following summary. In each case, O'Leary & Hunt (2016, p. 224) argue that work-based research should, irrespective of its audience, be problem focused, analysis driven, and evidence based, and should always offer viable recommendations.

Table 2. Work-based research deliverables matrix (adapted from O'Leary & Hunt, 2016, p. 224)

Dimension	Professional	Academic
Main Point	Recommendations; action plan; report; white paper; manual; training program	Thesis; dissertation; argument; knowledge development
Purpose	Persuade; influence organisational decision-making and direction	Inform; contribute to bodies of knowledge
Content	Problem-solving; action-oriented; organisational data	Theory generation; meaning construction; theory testing
Audience	Generalists; practice-domain specialists; 'pracademics'	Experts; scholars; academics
Dissemination	Circulation; in-house; industry-specific	Publishing; peer-review
Readership	Large (including the general public)	Limited, specialised

As discussed in the following section, there are two deliverables required for the award of doctorate in Professional Studies program at University of Southern Queensland: as a result of the professional journey and a work-based project, participants generate an artefact; and as a result of the academic journey participants generate a dissertation. Both of these conform to the O'Leary and Hunt deliverables matrix in Table 2.

PROFESSIONAL STUDIES PROGRAM

A fundamental conclusion about the value of work-based learning and research is the recognition by governments and industry, and by society more generally, that there is a definite and measurable shortage of 'advanced practice professionals' in Australian workplaces. To this end, upskilling and training of the workforce are national priorities (e.g., Minerals Council of Australia, 2014). Indeed, as early as 2000, successive Australian governments have tried to address this shortage (e.g., Connell & Burgess, 2001), and practice domains such as medicine and nursing have been specifically targeted (McGrath, 2004). As a result, it has long been recognised that in order to enjoy a "sustainable workforce", Australia must develop "skills ecosystems" (Hall & Lansbury, 2006) as well as more generally enhanced work-based learning and research. Thus, advanced practice professionals are those contributors who significantly extend knowledge and skills within a practical environment (such as a workplace), and thereby make a valuable difference to productivity and organisational output, and to society as a whole.

Advanced practice professionals (in oncological primary care nursing, for example, they are referred to as Advanced Practice Nurses [Sayers, DiGiacomo, & Davidson, 2011], but may have other names in different professions) have what some call 'super-skills'. Super-skills often refer to highly specialised skills, such as those required in medical, construction, information technology and financial services professions, but can also relate to advanced practice in general, whereby professionals need not only specialist training in a discipline, but also need to develop problem-solving, field-independent and other cognitive and affective capabilities necessary to function effectively and efficiently in a rapidly changing, global world of work.

Professional Studies Programs (PSP), like the one at University of Southern Queensland (which we abbreviate to USQPSP), have been conceived and implemented precisely to address the need for more advanced practice professionals in the Australian workplace, specifically for mid-career professionals (MCP) with a particular focus on equity and access (van der Laan & Neary, 2016). We define a MCP as a middle or senior manager or practitioner with more than ten years' professional

experience in their practice domain (a generally accepted definition, such as that held by the U.S. Office of Personal Management). MCPs may want diversity and challenge in their workplace and the people with whom they work. It is said that after proving themselves earlier in their careers, MCPs often also want to focus on the cultural values of their organization, and may want to add value to their workplace. In the USQPSP, MCPs are generally passionate about learning and are almost always motivated by altruism.

Like work-based learning, 'Professional Studies' is a term used to describe academic programs that emphasise applied and non-traditional modes of knowledge and skills acquisition in higher education, and therefore these types of programs embrace formal, non-formal and informal pathways of learning. Lester and Costley (2010, p. 562) suggest it is a "transdisciplinary field that sits outside of subject frameworks and has its own set of norms and practices". The first of these features is predicated largely on the so-called 'learning-by-doing' principle (Reece, 2011) and, as cited above, encourages action research (the principle is also referred to as "knowledge-by-action" and "knowing-by-practice" [e.g., Thistlethwaite, 2013]).

As Reece (2011, p. 1) points out, the principle of learning-by-doing means "learning from experiences resulting directly from one's own actions, as contrasted with learning from watching others perform, reading others' instructions or descriptions, or listening to others' instructions or lectures", an approach embedded in history (he specifically cites approaches like "discovery-versus-investigation", the "practice-theory-practice" cycle, and "proof-upon-practice", emphasising the relevance of the word "practice" to mean both repetition and praxis [p. 1] which is intrinsic to PSPs). To this end, PSPs also recognise and embrace concepts of 'self-directed learning' and 'life-long learning', principles embedded in theories and frameworks of competency and capability (a topic discussed, for example, by psychologists [e.g., Wise et al., 2010]). In these ways, PSPs are highly individualised and designed to meet the specific personal and professional needs of each student and the workplaces to which they contribute.

However, to qualify at the highest level of education, these approaches must also be structurally sound and academically rigorous. For this reason, students in PSPs must also maintain the highest standards of research literacy and scholarship (for example, degrees in the USQPSP meet the Australian Qualifications Framework [AQF] standards for Level 9 [Masters] and Level 10 [PhD/Doctorate], as do other post-graduate programs in Australia, which state for Level 10: "graduates at this level will have systematic and critical understanding of a complex field of learning and specialised research skills for the advancement of learning and/or for professional practice" [Australian Qualifications Framework Council, 2013, p. 13]). Thus, PSPs offer the same qualification recognition and standard as traditional programs, but would argue they possibly provide more relevant outcomes with a focus on real-time, real-world challenges and opportunities.

Learning and Reflection

At the core of PSPs is 'reflective practice', a process well documented and encouraged in nursing and education (e.g., Sherwood & Horton-Deutsch, 2011) but also applied in the workplace to enhance organisational learning (e.g., Hilden & Tikkamäki, 2013). As shown in Figure 1(A) from Kolb's (1984) model, professional reflection involves four main iterative steps: (1) having a concrete, real-world experience (be it educational or work-related) > (2) reflecting on the experience by reviewing it critically and thereby possibly (and hopefully) learning from it > (3) planning and trying out something new at work on the basis of what one has learned (what some call 'active experimentation') > (4) having a concrete experience, and so on.

We call this a 'micro-reflective cycle', because it happens on the personal level within individuals and is therefore intimate to personal learning. Others, such as O'Connor and Diggins (2002), advocate different approaches but with the same essential structure leading to the same intended learning outcome. Kolb and others also recommend cycling through these steps more than once to increase

learning in a process called 'double-loop learning' (e.g., Hilden & Tikkamäki, 2013, p. 79). While some theorists worry about what they call a "dearth of evidence-based publications [in reflective practice]", they also acknowledge that in education, for example, reflection is "recognised as a practice for enhancing and potentially deepening learning across the academy, nationally and internationally" (Harvey, 2016, p. 1), a view held by many others in related fields (e.g., Ryan, 2011).

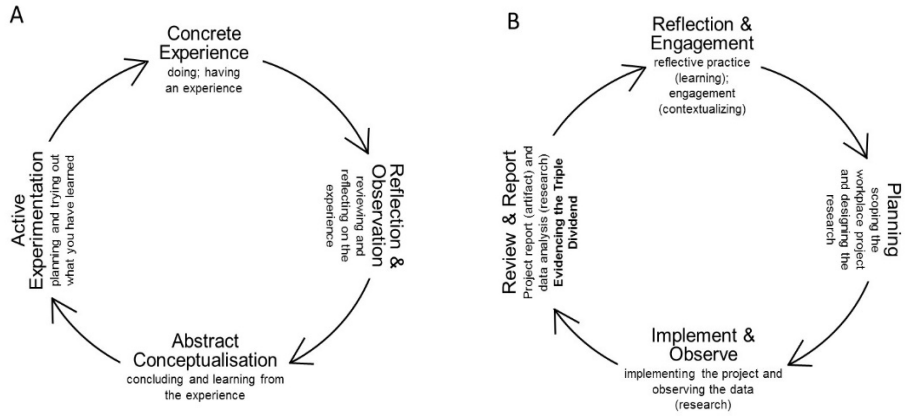

Figure 1. Kolb's (micro) reflective cycle, as it is practiced by the MCP (A), and the workplace project and research (macro) reflective cycle (B), as they apply to the USQPSP

As shown in Figure 1(B), reflective learning can also occur at larger time and distance scales, in this case at the program level, thus the reference to a 'macro-reflective cycle'. In this process, the entire learning and research journey in the USQPSP can be mapped onto and integrated with Kolb's cycle. As a result of the 'micro-reflective cycle' (A), each MCP in (B): (1) reflects, learns and engages in the program, thereby dovetailing the 'micro-reflective cycle' with Reflection & Engagement > and, as a result, (2) is in a better position to scope and plan a work-based or workplace project, along with developing a research component (to be discussed in more detail below) > resulting in (3) a report (what we refer to below as an 'artefact' in the context of the USQPSP), thereby evidencing the triple dividend (also described below) > which in turn leads to (4) further reflection and engagement, and thereby more learning and understanding about oneself, one's workplace, and one's professional practice domain.

However, it is also important to acknowledge that these two reflective cycles, as practiced in the USQPSP, have been carefully designed to avoid the ethical pitfalls identified by Hobbs (2007), particularly those related to assessment and privacy. In the USQPSP, innovative tools and procedures have been specifically developed to aid the macro-reflective cycle (including the so-called 'CV Tool', the subject of a separate forthcoming research paper). More work around integrating these tools and procedures with macro-reflective cycles are under development, but include integrating learning objectives with research questions, for example, and evidence of reflective practice for MCP has been provided in the aforementioned accompanying paper.

Professional Practice and Work-based Research

Building upon these two cycles, the USQPSP doctoral program has designed two integral and parallel strands to the MCP doctoral journey—a professional pathway of learning and project planning and implementation that is unique to the program, and a research pathway that includes the recognisable components of a standard applied research program, including use of the scientific method as it applies to action research—as shown in Figure 2.

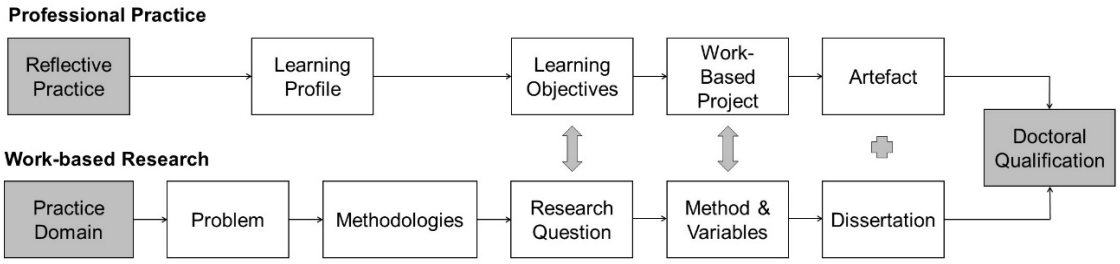

Figure 2. Steps in the professional journey and in the research journey of the MCP in the USQPSP doctoral program, showing their relationship and ultimate convergence in the doctoral qualification

The first is the professional practice journey shown at the top of Figure 2, which begins with the MCPs micro-reflective cycle, including consideration of what s/he has done so far as a professional and what s/he has learned as a result of doing it. This process, after several iterative reflective cycles, results in the development of a learning profile, organised into taxonomic learning classes, such as analytical skills, problem solving, critical judgement, and emotional intelligence. After prioritisation and ranking, these learning classes are then used to form a 'learning profile' of professional capability, which helps the MCP identify key learning areas to bridge the gap between what has been learned and future learning aspirations. Based on this profile, the MCP then identifies key learning objectives that will enhance professional (and research) development.

These learning objectives, often developed in consultation with peers or seniors in the workplace, also begin to narrow the needs and opportunities suited to both the learner and the workplace. Hence, the MCP, having developed an understanding of their own personal and professional competencies and capabilities as well as a deeper understanding of their world of work in conjunction and consultation with their workplace, peers, supervisors and broader practice domain, is in a formidable position to plan and implement a 'work-based project', the result of which is an artefact, such as a framework, training manual, report, white paper, or other documentation of the project.

An example of this process might be as follows. Micro-reflective practice by the MCP revealed that, as a result of project managing a regional network of non-government organisations (NGOs), 'I learnt how to manage a small team of staff and how to provide workload allocations and professional development support to members of the team' and 'I learnt how to utilise Queensland State Government protocols to influence government decisions and budget allocations', which can be identified with the learning classes of 'communication-related capabilities' and 'personal and social capabilities'. Along with a series of other professional traits and capabilities identified through reflective practice, these learning classes suggest that, while I am a good communicator and organiser, my ability to resolve conflict in the workplace and my knowledge of data gathering and analysis are limited (i.e., 'I have developed a learning profile'). Therefore, 'I need to enhance my problem-solving ability and social flexibility in pursing possible workplace solutions, along with a need to improve the quality of critical analysis and effectiveness of research strategies I employ'. The work-based project derived from such analysis could assess, for example, a new NGO management development program in organisational leadership and communications to be implemented in three regional Queensland NGOs with the participation of ten senior managers. The artefact for a work-based project of this type might be a management training manual.

Running in parallel to professional practice is the work-based research journey, which begins in the Queensland NGO practice domain. As a result of both reflection and a review of the literature, the MCP identifies a 'problem' for the domain, which may include a gap in the literature, a need or opportunity for improvement, or a recommendation from prior research. The problem may be a documented lack of effective NGO management training in the areas of communication and

planning. In conjunction with this preliminary analysis, the MCP also begins a study, through coursework and online activities and reading, of methodologies and paradigms, and those principles and concepts that underpin and ground theory for the practice domain; developing skills in research methods, logic, and critical thinking, critical reading and critical writing, form a part of the research journey.

As a result of this process, the MCP develops a research question to address the problem statement. An example of a research question in the present context might be: What is the impact of training X over a 12-month period on the communication performance and problem-solving abilities of senior NGO managers in Queensland? At this time, an iterative correlation and synchronicity begins to form between the learning objectives developed in the professional journey and the research question, with research questions leading the MCP to identify and isolate relevant variables and workplace research methods, as described in the previous section of this paper, which are suitable to test and evaluate her/his work-based project. The final outcome of the research journey, as is the case with other PhD and doctoral programs, is a dissertation of research, which, when converged with the artefact, results in the qualification of Doctor of Professional Studies (DPRS). In summary then, in the context of a work environment, the reflective cycle and research in the USQPSP includes selecting a problem focus, clarifying theories, identifying research questions, collecting data, analysing data, reporting results in an artefact and dissertation, and ultimately taking an informed, evidence-based action to address or solve a specific workplace problem.

The overall outcome from the USQPSP learning contract, which combines a work-based project with a research component for each MCP, is what is called the 'triple dividend', meaning benefit for: (1) the individual; (2) the organisation; and (3) the profession (not to be confused with the "triple bottom line" of profit, people and planet). The individual dividend is in self-development; the work-based project, and the research study that evaluates it, contributes to the MCP's self-development, both professionally and personally, by achieving her/his pre-agreed overall learning goals. The goals usually include improving communication skills, critical thinking skills, and research skills, coupled with gaining new knowledge, but may be as basic as improving the chances of job promotion or career advancement.

The organisational dividend is benefit to the workplace or practice domain. The work-based project and the research study that evaluates it, provide measurable and significant contributions to workplace or organisational improvement through innovation, problem solving, new data and analysis, product development and/or strategic insight. Other dividends may include aiding the development of practice, programs, policy and corporate culture. The professional dividend is to academia and practice: the work-based project and the research study that evaluates it contribute to professional practice as supported by academically sound evidence and observations in terms of a rigorous research design.

Tensions and conflict can exist between demands in the workplace and the need to develop capable and relevant practice while supporting personal development and maintaining academic rigour and validity in research (e.g., Amah, 2014; Lepine, Podsakoff, & Lepine, 2005). These may even manifest in MCP ill-health, sleep disturbance and reduced productivity (e.g., Lizano & Mor Barak, 2012). However, universities are beginning to engage with these issues at a deeper level than suggested by simple notions of employer engagement and skills development, and evidence indicates that well-designed work-based programs are both effective and robust when addressing these concerns and challenges (Lester & Costley, 2010).

CONCLUSION

In this paper, we have considered work-based learning in relation to work-based research, and have sought to identify evidence of both in the Professional Studies Program as conceived and implemented at the University of Southern Queensland in Australia. One of the basic conclusions

of this paper is that research and scholarship are both important to and integral in work-based learning, and we have shown how, through the Professional Studies Program, these two elements of work-based learning have been incorporated into the doctoral program for mid-career professionals.

Specifically, we have identified the MCP's ongoing professional work-based practice that develops in the Program to a work-based project, such as an organisational improvement or management development program for administrators of NGOs as one leg of the professional research journey. Such practice results in a deliverable, what we have called an 'artefact', such as a report, model, framework, or other tangible output of the work-based project.

The other element of the Program is the work-based research developed around the project to measure, test, assess or evaluate its impact on the workplace or practice domain. In the context of the USQ doctoral Professional Studies Program, students develop quantitative, qualitative or mixed method research designs which after implementation result in the generation of a dissertation. Taken together, the artefact and dissertation form the basis upon which MCPs in the Program are assessed for competence and capability to operate as 'scholarly professionals'.

We suggest that work-based learning and work-based research address the complexities, challenges and future demands of Australian workplaces along with the work, mobility and personal development needs of mid-career professionals. By examining two case studies in the Australian work-place learning and research context, in an accompanying paper (Fergusson et al., 2018) we provide further evidence of how 'advanced practice professionals' conceive and execute mixed method work-based research in the USQPSP doctoral program; one in the field of authenitic safety leadership and its role in workplace health, safety and wellness, and a second that investigates the professional identity of investigators in the Australian Public Service.

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WORK-BASED LEARNING AND RESEARCH FOR MID-CAREER PROFESSIONALS: TWO PROJECT EXAMPLES FROM AUSTRALIA

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ABSTRACT

Aim/Purpose	Most research on work-based learning and research relates to theory, including perspectives, principles and curricula, but few studies provide contemporary examples of work-based projects, particularly in the Australian context; this paper aims to address that limitation.
Background	The Professional Studies Program at University of Southern Queensland is dedicated to offering advanced practice professionals the opportunity to self-direct organizational and work-based research projects to solve real-world workplace problems; two such examples in the Australian context are provided by this paper.
Methodology	The paper employs a descriptive approach to analyzing these two work-based research projects and describes the mixed methods used by each researcher.
Contribution	The paper provides examples of work-based research in (a) health, safety, and wellness leadership and its relation to corporate performance; and (b) investigator identity in the Australian Public Service; neither topic has been examined before in Australia and little, if anything, is empirically known about these topics internationally.

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Findings	The paper presents the expected outcomes for each project, including discussion of the 'triple dividend' of personal, organizational, and practice domain benefits; as importantly, the paper presents statements of workplace problems, needs and opportunities, status of the practice domain, background and prior learning of the researchers, learning objectives, work-based research in the practice domain, and lessons learned from research which can be integrated into a structured framework of advanced practice.
Recommendations for Practitioners	This is a preliminary study of two work-based research projects in Australia; as these and other real-world projects are completed, further systematic and rigorous reports to the international educational community will reveal the granulated value of conducting projects designed to change organisations and concordant practice domains.
Recommendation for Researchers	While introducing the basic elements of research methods and expected outcomes of work-based projects, examples in this paper give only a glimpse into the possible longer-term contributions such research can make to workplaces in Australia. Researchers, as a consequence, need to better understand the relationship between practice domains, research as a valuable investigative tool in workplaces, and organizational and social outcomes.
Impact on Society	Work-based learning and research have been developed to not only meet the complex and changing demands of the global workforce but have been implemented to address real-world organizational problems for the benefit of society; this paper provides two examples where such benefit may occur.
Future Research	Future research should focus on the investigation of triple-dividend outcomes and whether they are sustainable over the longer term.
Keywords	advanced practice professional, work-based learning, work-based research, leadership, safety, investigation, identity

INTRODUCTION

In this paper we introduce two work-based research projects currently being conducted by mid-career professionals in the contexts of advanced practice professionalism, in order to provide concrete examples of work-based learning (WBL) in Australia, with a focus on research methods, outcomes, and deliverables as practiced in the University of Southern Queensland's Professional Studies Program (USQPSP).

Project One considers safety leadership and its impact on the performance of Australian companies, including the status of authentic leadership and health, safety, and well-being in the workplace and their combined relation to corporate culture. Therefore, a practice-based project is being undertaken to provide an understanding of the effectiveness of safety leadership within an organisation, as well as develop a framework for leaders to promote a culture of health, safety, and well-being to improve company performance as determined by a variety of quantitative and qualitative metrics. Project Two summarises the professional identity of investigators within the Australian Public Service, with an emphasis on definitions of investigation and competency, and how these relate to professional identity. The project is evaluating current competency and training paradigms for investigators, resulting in a competency-based framework designed to help articulate the professional identification of investigators. Descriptions for both projects include background and prior learning of the researchers and lessons learned from work-based research.

We have separately considered the relation between WBL and work-based research (Fergusson, Allred, & Dux, 2018) and explained how each is fostered in the USQPSP for mid-career profession-

als (MCPs). We define MCPs as middle or senior managers or practitioners with more than ten years' professional experience in their practice domain. We have also introduced data that indicate a shortage of advanced practice professionals (APPs) in the Australian workforce, and that up-skilling and training are national priorities (e.g., Minerals Council of Australia, 2014). For example, employment data indicate that by 2030 Australia will have a shortage of 120,000 qualified nurses, many of them APPs (Australian College of Nursing, 2016, p. 7) and in 2016-17 only 73% of "skilled" professional and 59% of technical trade job vacancies were filled, with an average of just 13.5 applicants per vacancy but only two applicants being suitably qualified to fill them (Department of Employment, 2017, p. 5). Indeed, as early as 2000, successive Australian governments have recognised these and other shortages (e.g., Connell & Burgess, 2001) and have, as a consequence, specifically targeted professions such as medicine and nursing to address them (McGrath, 2004).

Moreover, as Noe, Clarke, and Klein (2014) have pointed out, many organisations "are having difficulties finding employees with suitable skill sets for open positions and are uncertain about how to best manage and capitalize on the talents of a workforce that is increasingly diverse in terms of age, race, and national origin" (p. 246). The authors' focus on human capital resource, and its relation to learning, suggests that companies may lose competitive advantage when their implicit and explicit knowledge of this resource is faulty or underdeveloped. These combined challenges have been identified by some higher education institutions in Australia, including RMIT University which in 2009 introduced a Bachelor of Business Entrepreneurship (BBE) to provide a series of WBL courses as part of its strategic aim of enhancing graduate employability and its organisational capacity to deal with the complexities in new and emerging economies (Huq & Gilbert, 2013). Middlesex University in the UK also provides a useful international example of current practice, and Bravenboer and Lester's (2016) exploration of the WBL landscape provides a grounding for aligned approaches when developing university qualifications that enable integration of higher education learning outcomes with professional competence and advanced practice through WBL; their research suggests a benefit when viewing WBL as both a unique field of study and a mode of learning where transferable and higher order skills are necessary for employment.

As a result of these combined economic and educational forces, it has been recognised that in order to enjoy a sustainable workforce, Australia must develop "skills ecosystems" (Hall & Lansbury, 2006) in which APPs have an opportunity to learn, study, and thrive in advanced practice, as well as more broadly enhance work-based learning and research, because APPs are considered workforce contributors who significantly extend knowledge and skills within a practice environment (such as a workplace), and thereby make a valuable contribution to productivity and organisational output and to society as a whole.

In this paper we analyse two work-based research projects from the USQPSP and analyse how each is contributing to filling the shortage of APPs in Australia while simultaneously advancing practice-based disciplines and improving workplaces. Advanced practice professionals possess and display what some call "super-skills" (e.g., Kivunja, 2015). The term super-skills often refers to highly specialised skills and proficiencies, such as those required in professions related to medicine and allied healthcare, construction, information technology, and financial services, but can also relate to advanced practice in general, which requires not only specialist training but the development of problem-solving, field-independent, and other cognitive and affective traits and capabilities necessary to function effectively in, and thereby inform and transform, rapidly changing global worlds of work.

Background

For the purposes of illustration and as the most mature models in Australia, we discuss nursing and pharmacy to explain the APP construct (in oncological primary care nursing, APPs are referred to as Advanced Practice Nurses (Sayers, DiGiacomo, & Davidson, 2011) and in pharmacy as Advanced Focused Pharmacists (APPFSC Secretariat, 2012) but may have other names in different practice domains). Specifically, the Advanced Pharmacy Practice Framework Steering Committee (APPFSC)

has articulated the characteristics of APPs for pharmacy (APPFSC Secretariat, 2012). It defines advanced pharmacy practice as "practice that is so significantly different from that achieved at initial registration that it warrants recognition by professional peers and the public of the expertise of the practitioner and the education, training and experience from which that capability was derived" (APPFSC Secretariat, 2012, p. 4). The APPFSC identifies professional traits such as autonomy (i.e., "having a sense of one's own identity and an ability to act independently and to exert control over one's environment, including a sense of task mastery, internal locus of control, and self-efficacy" (APPFSC Secretariat, 2012, p. 4)), peer recognition, and an ability to influence the professional practice of others and the discipline as a whole, as key benchmarks of APPs in pharmacy. However, it is also relevant to point out that "there remains the lack of an agreed definition of advanced practice and its core competencies. This has occurred perhaps as a result of the rapid development of roles captured under the umbrella term 'advanced' that has occurred more rapidly than focussed efforts to clarify and define the term" (Department of Health, 2017, p. 7), although Gardiner et al.'s (2013) use of the so-called "strong model of advanced practice" is informative.

Figure 1(a) shows that a *generalist pharmacist*, who has base qualifications, is able to apply primary skills and knowledge to a wide variety of consumers across a broad range of medical conditions, whereas a *focused pharmacist* can apply those skills and knowledge to either a broad range of medical conditions in a specific consumer group or to a limited range of medical conditions across a wide variety of consumers, and an *advanced generalist pharmacist* can apply her/his skills and knowledge to a wide variety of consumers with more complex health care needs across a broad range of medical conditions. An APP or *advanced focused pharmacist*, on the other hand, can practice effectively across a wide variety of complex health care issues arising from a broad range of medical conditions in a specific consumer group or a limited range of medical conditions across a wide variety of consumers. It is the development and promotion of this type of APP that the profession seeks to foster in Australia.

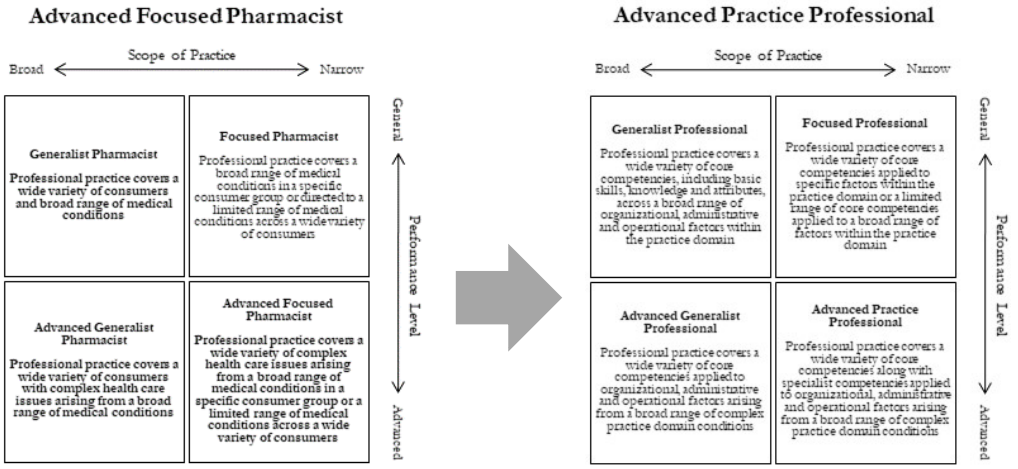
The skills and knowledge of both an advanced and focused pharmacist could be mistaken for mere specialisation. However, the APPFSC is quick to point out that

> where pharmacists choose to limit their scope of practice by focusing on particular areas of practice (e.g., compounding or medication management) they afford themselves the opportunity to increase their expertise and improve their performance. This is probably the reason that 'specialisation' in practice is often seen as being synonymous with 'advanced' practice. However, 'specialisation' refers only to scope of practice and does not, of itself, confer the additional expertise that underpins advanced pharmacy practice. It therefore follows that 'specialisation' can occur without any associated enhancement of performance. (APPFSC Secretariat, 2012, p. 7)

Thus, there is potential for the concept of specialization to be misunderstood as advanced practice, which importantly includes other, often cognitive, affective, and attitudinal, traits associated with advanced performance and deliverables, such as the ability to (a) manage the effectiveness of work group activities; (b) contribute to the formation of organisational policy; (c) balance contributions to the organisation with contributions to the community; (d) adopt a questioning and critical approach in all aspects of practice; (e) identify domain problems and opportunities, and select and apply appropriate research methods to investigate them; and (f) practice in a manner that encompasses the needs, preferences, and perspectives of others. For this reason, performance level in the APPFSC model,

> may be defined as a level of accomplishment that reflects the *expertise* [emphasis added] of the individual based on their training and experience. It is [therefore] important to recognise that it [i.e., performance] does not relate to any particular service or range of services and is not a measure of the quality of services provided. Professional practice may be viewed as a continuum based on the post-registration learning that has occurred through all means available to the individual. At some point along the continuum there is a 'threshold' performance

level above which performance could be considered 'advanced' while below that threshold performance would be considered to be at the 'general' level. Excellence in practice relates to the quality of professional practice and is achievable by all [professionals] regardless of the performance level at which they operate. (APPFSC Secretariat, 2012, p. 8)



Figures 1(a) and 1(b): Scope of practice and levels of performance for advanced focused pharmacists (APPFSC Secretariat, 2012, p. 7) and for advanced practice professionals

To this end, the APPFSC advocates a continuum model of practice which begins with general qualifications in pharmacy, and then seamlessly continues through a transition phase of advanced practice and a consolidation phase of advanced practice, ultimately reaching the status of *advanced practitioner* or *advanced focused pharmacist* (APPFSC Secretariat, 2012, p. 10); in the language of this paper, such a practitioner has achieved the status of APP.

Figure 1(b) also shows the same four generic types of practice professional, irrespective of the domain, according to scope of practice and level of performance, including the *generalist professional* > *focused professional* or > *generalist professional* > *advanced generalist professional*, and shows how both may lead to traits and performance associated with being an APP. However, other terms and constructs, such as *extended practice* and *expanded practice* in addition to *advanced practice*, have been used "to describe specific titles, roles and functions that involve variations to what is generally accepted as a traditional core scope of practice" (Department of Health, 2017, p. 7).

In our definition, an APP's practice may cover a wide variety of core competencies along with specialist competencies applied to organizational, administrative, and operational factors arising from a broad range of complex practice domain conditions. Among the recognised competency hallmarks of APPs is a desire to impact their workplace (and society more generally), their ability to think and read critically, to question and engage with practice domain problems, to solve workplace or work-based real-world problems and to innovate, and, in the context of the present study, their ability to understand and conduct work-based research. As importantly, APPs are often driven by altruism.

In our accompanying paper (Fergusson et al., 2018), we introduced both the unique features of work-based research and its application in the USQPSP (which was specifically designed to meet the needs of MCPs who are APPs by training scholarly professionals rather than professional scholars) as they relate to work-based learning. Professional Studies in this context is a term used to describe academic programs that emphasise *applied* and *non-traditional* modes of knowledge and skills acquisition in higher education, embracing formal, non-formal, and informal pathways of learning coupled with a transformational ethos. A cornerstone of the USQPSP is its focus on work-based research; in particular, its engagement with *action research* using mixed method research designs (e.g., Cresswell & Plano Clark, 2011; Teddlie & Tashakkori, 2009) is to be highlighted.

The purpose of this paper is to expand the discussion of work-based learning and research for MCPs by introducing two projects currently being conducted in Australia as part of the USQPSP doctoral program to identify some of the primary factors associated with contemporary work-based research. Each project, based on the features of work-based learning and research, is divided into six sections: 1) overview of the problem; 2) status of the practice domain; 3) background and prior learning of the researcher; 4) work-based research in the practice domain; 5) expected outcomes of work-based research; and 6) lessons learned from conducting work-based research.

The first of these projects considers the relationship between authentic leadership, health, safety and well-being, and performance as they relate to the corporate culture of Australia. The nexus between safety leadership behaviours and organizational culture and outcomes has been presented elsewhere (e.g., University of Queensland, 2016), but its relation to corporate performance in Australia has yet to be investigated. The second project summarises the development of professional identity of investigators in the Australian Public Service, a topic under-represented in the literature on investigative services and investigation as a profession (although preliminary work on identity has been conducted in policing more generally, e.g., Bayerl et al., 2014).

In this way, the present paper provides concrete examples of work-based learning and insider-research currently being conducted in Australia by APPs, thereby extending our understanding of what is possible in this field of endeavour; such an endeavour extends the work of Costley and Abukari (2015), which sought to assess the impact of work-based research projects at the postgraduate level in the United Kingdom.

PROJECT #ONE: SAFETY LEADERSHIP AND COMPANY PERFORMANCE

OVERVIEW OF THE PROBLEM

Workplace health, safety, and well-being (sometimes called occupational health and safety or OH&S) addresses a combination of individual, organisational and societal issues. Poor workplace health, safety, and well-being practices inevitably impact people, and may include injury and illness (or loss of life in the most extreme cases); workplace injuries and illnesses lead to loss of enjoyment of life (e.g., reduced participation in recreational activities), relationship difficulties and breakdowns, and psychological ill-health (Quinlan, Bohle, & Lamm, 2010), in short, reduced human well-being.

Similarly, at the organisational level, poor workplace health, safety, and well-being results in reduced productivity (or prosecution in the most extreme cases), while from a broader societal view it can adversely impact the economy, insurance schemes, and healthcare costs. For example, according to Gahan, Sievewright, and Evans (2014), direct (i.e., compensation claims and insurance premiums) and indirect (i.e., absenteeism, presenteeism, and turnover) costs associated with injuries and illnesses sustained in the Australian workplace amount to approximately $60 billion each year (which equals almost 5% of Gross Domestic Product).

Despite technological advances, workplace injuries, illnesses, and fatalities are not uncommon, with Safe Work Australia (SWA, 2017) reporting that 178 workers were killed in Australian workplaces in 2016. While this number was a 22.6% reduction from 2015 and a 42.6% reduction from 2007, these data translate to a worker fatality rate of 1.5 fatalities for every 100,000 workers, which was, by way of comparison, approximately the same mortality rate as asthma in 2014 (Australian Institute of Health and Welfare, 2017).

Unplanned events can also adversely affect an organisation's performance, negatively affecting costs, delivery schedules, and customers. Love, Teo, Morrison, and Grove (2016), for example, have explored these impacts on construction projects and the rework required to resolve quality and safety-related issues, showing productivity delays and production downtimes, repairs to damaged plant and

equipment, and poor service delivery to customers can lead to reputational damage and the loss of business.

Status of the Practice Domain

The project focuses on safety leadership and its impact on corporate performance. As part of the USQPSP, a practice-based project is being undertaken in conjunction with the MCP's employer that aims to provide an understanding of the effectiveness of safety leadership within an organisation, as well as develop a framework for leaders to promote a culture of health, safety, and well-being to improve overall company performance as determined by a variety of objective metrics.

The study aims to explore the role safety leadership plays in fostering a positive and adaptive workplace culture. Gahan (2015) asserts that when an organisation gets its health, safety, and well-being policy position and behaviour right, its culture is stronger and more adaptive, leading to greater resilience, continuous improvement, and better organisational performance; improved safety performance, therefore, can be viewed as having a symbiotic relationship with work quality because of the adverse impact unplanned events (e.g., events that cause injury, illness, damage, or loss) has on costs, delivery schedule, and customer disruption (Love et al., 2016).

It has been established that leadership plays a significant role in organizational success. For example, Wu (2005) pointed out that high-quality leadership is important when responding to volatile, uncertain, complex, and ambiguous (VUCA) environments, and without leadership, organisations are unable to effectively adapt and respond to these challenges. Thus, the Centre for Workplace Leadership (cited in Yukl, 1989, p. 253) stated leadership is "influencing task objectives and strategies, influencing commitment and compliance in task behaviour to achieve these objectives, influencing group maintenance and identification, and influencing the culture of an organization."

Extrapolating from Yukl's (1989) definition of leadership, safety leadership revolves around leading and influencing to achieve defined health, safety and well-being goals and objectives. Wu (2005) defined safety leadership as "the process of interaction between leaders and followers, through which leaders could exert their influence on followers to achieve organizational safety goals under the circumstances of organizational and individual factors" (p. 28). Safety leadership has therefore been identified as one parameter with which to improve employees' safety behaviour and thereby have a positive impact on a company's health, safety, and well-being performance. To this end, the UK's Health and Safety Executive (HSE) commissioned a review of the literature on effective safety leadership behaviours (Lekka & Healey, 2012). The HSE review found that transformational and authentic theories of leadership have a positive influence on the effective management of safety, and Conchie, Moon, and Duncan (2013) similarly contend that safety leadership initiatives, directed at the supervisory level, may be more effective at improving corporate safety than initiatives directed at the wider employee base.

One way supervisors can better influence employees is through trust. For example, Conchie and Donald (2009) have defined trust as "an individual's willingness to rely on another [person] based on positive expectations that he or she will act safely or intend to act safely" (p. 137). Trust, therefore, has a positive influence on employees' safety behaviour "because it increases their willingness to engage in behaviors that improve safety, particularly those behaviors that carry a risk of being reframed as reflecting poor safety performance" (Conchie & Donald, 2009, p. 137). It can therefore be supposed that safety-specific trust in supervisors can be improved through safety-specific transformational leadership, which in turn generates reciprocated trust.

Moreover, authentic leaders "build enduring relationships, work hard, and lead with purpose, meaning and values" (Avolio & Gardner, 2005, p. 329), openly share information needed to make decisions with their followers, and accept followers' inputs into decision-making (Avolio, Walumbwa, & Weber, 2009). O'Neill, Wolfe, and Holley (2015) found that advocating healthy and safe workplaces requires leaders to build trust with their followers, and that "authentic leaders unambiguously

demonstrate an active commitment to [safety]" (p. 23) by building systems and structures that incorporate practical safety in day-to-day operations, and Cavazotte, Duarte, and Gobbo (2013) found an association between authentic leadership and improved influence on safety performance. Agote, Aramburu, and Lines (2016) have also revealed that authentic leadership behaviour is associated with a follower's trust in their leader; they concluded that "trust is fundamental for the effectiveness of leadership…and [authentic leadership] builds trust" (p. 50). Similarly, in the context of health and safety futures, Ernst and Young (2016) recently identified trust as a foundational requirement for leaders who wish to progress health, safety, and well-being initiatives in the workplace.

An anchor point has been selected in the MCP's focus on safety leadership due to the association of authentic leadership with positive outcomes for followers, including reduced burnout, follower commitment, engagement and empowerment, improved job satisfaction, and trust-building capabilities (Orazi et al., 2014). The MCP is therefore exploring what impact the authentic approach to safety leadership has on safe workplaces, and whether or not this develops a stronger and more adaptive workplace culture, which in turn might lead to greater continuous improvement and better outcomes for Australian organisations (Gahan, 2015), by asking, "Does safety leadership impact organisational performance?", centered on a Pragmatic, problem-centric approach using a longitudinal QUAN>qual>QUAN embedded mixed method design. Pre- and post-intervention of training, quantitative data will be collected via an online survey to approximately 150 managers and staff to measure organisational performance metrics, including revenue, customer net promoter data, lost time injury frequency rate, and total recordable frequency rate; qualitative data will be collected throughout the intervention phase and will include interviews and reflections of participants to measure the response and effectiveness of the health, safety and wellness training implementation.

Background and Prior Learning of the Researcher

The MCP (the second author), a Melbourne-based Certified Chartered Generalist Occupational Health and Safety professional with ten years' experience, is employed as a Health Safety Environment and Quality Manager for an ASX-listed facility management company. The MCP views the continuous increase of knowledge and learning as a personal investment in himself and his career, which Law (2001, p. 4) described as an "investment of energy" and believes that completing the USQPSP will provide a framework for future career opportunities through its interdisciplinary approach as well as its focus on practice-based workplace research.

The MCP's own professional development has included formal, informal, and non-formal learning; formal learning and development have included post-graduate studies in both Occupational Health and Safety as well as business, with a significant proportion of learning and development occurring more informally and non-formally from employment and other community-related work. The MCP was drawn to the USQPSP because of its systematised focus on work-based research—applying doctoral-level inquiry and rigour to workplace issues and projects. The benefits of workplace and work-based journaling, a key element of the USQPSP, are widely accepted (e.g., Nguyen, 2015), however the emphasis on structured workplace and lifelong learning is also considered a key to developing professional capabilities.

Work-based Research in the Practice Domain

Because learning is obviously more than just the storage, retrieval, and application of information, it can no longer be confined to the student-classroom context; learning involves complicated patterns of rational and emotional elements, along with a range of psychological phenomena (Illeris, 2004). Moreover, learning occurs through the social interactions of individuals and their environment, be it through formal or non-formal learning contexts, such as workplaces.

If viewed through the lens of contribution to professional development and employability, as proposed by Bezanson (2003), lifelong learning can be defined as: "All purposeful learning activity un-

dertaken in an ongoing way with the aim of improving knowledge, skills and competence" (Community Outreach and Engagement Core, 2000, p. 3). Furthermore, the concept of work is rapidly changing. Just as the work health, safety, and well-being profession has shifted through five stages (Borys, Else, & Leggett, 2009), so too has the concept of 'work' evolved; we are moving, it is said, from an age of knowledge workers to an age of conceptual workers (Cross, 2012). This new age and world of work sees the convergence of continuous learning as a fundamental requirement for workers to keep up with the rapid, volatile and discontinuous change increasingly seen in the 21st-century workplace. The MCP's doctoral journey can therefore be seen as part of a refocus on continuous learning in this adaptive age.

The notion of applying scientific enquiry to solving complex problems in the workplace highlighted earlier by Gregory (1994) resonates with the researcher and has drawn him to a practice-based learning pedagogy. Practice-based learning has its conceptual underpinnings in the enhancement and recognition of work-based learning and other experiences (Lester & Costley, 2010) through reflective practice (Schön, 1987). It is in these experiences, or experiments of proven and disproven hypotheses (Fox, 2014), where learning occurs through reflection.

Spalding and Wilson (2002) have defined such reflection as "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (p. 1394). The epistemological basis of practice-based learning is grounded in pragmatic Constructivism, where knowing and doing are interdependent; it is this notion of Constructivism, where practice is informed by knowledge which in turn generates further knowledge, that leads to change in practice (as identified 30 years ago by Schön, 1987).

The USQPSP harnesses practice-based pedagogy by applying doctoral-level inquiry and rigour to workplace issues and projects, thereby building a student's professional capabilities, self-awareness, and reflective abilities. The USQPSP therefore suits the enhancement of professional practice, as it applies a robust, pedagogical framework to each student's domain of practice, while developing the MCP's capabilities, building capacity in their practice environments, and contributing to their self-awareness and intellectual independence (University of Southern Queensland, 2017).

To this end, the USQPSP encourages candidates to develop practice-based projects which incorporate action research (Doncaster & Thorne, 2000) by 1) identifying a need for change; 2) designing and implementing interventions to bring about change; 3) evaluating the effectiveness of interventions; 4) identifying further needs for change; and 5) repeating as required. Throughout these research cycles, reflection on the actions taken in the workplace provides the researcher with an opportunity to learn through further reflection and modified action, thereby solving problems in, and expanding one's knowledge of, the practice domain.

Expected Outcomes of Work-based Research

The USQPSP seeks to deliver a triple dividend. Benefits at the individual level centre on self-development; the MCP expects that completing this program will "impart a set of high-level skills and capabilities", as suggested by Doncaster and Thorne (2000), including: "habitual reflection and self-directed learning; an ability to tackle unpredictable problems in novel ways; an ability to synthesise ideas and redefine existing knowledge; and an ability to work at the current theoretical limits" of his field of practice.

According to the MCP, the anticipated organisational benefits include "a better understanding of the effectiveness of safety leadership within an organisation, as well as a tangible framework for leaders to work within in order to have a salutary impact on unplanned events. The overall benefit anticipated for the organisation is a reduction in unplanned events and improved organisational performance".

An anticipated outcome is a "significant and original contribution to knowledge [specifically] in the context of professional practice" (Australian Qualifications Framework Council, 2013, p. 63). The OHS Body of Knowledge for the profession in Australia has been in development since 2009, with its first iteration published by the Health and Safety Professionals Alliance (HaSPA, 2012). The OHS Body of Knowledge will continue to be updated and revised as the "evidence base expands" (HaSPA, 2012, p. i), but it is anticipated that the outcomes and learnings of this USQPSP research project will contribute to the expanding body of evidence in health, safety and well-being, the third leg of the dividend tripod.

Lessons Learned from Conducting Work-based Research

On entering the USQPSP, the MCP was expecting a linear learning process—a step-by-step process of building knowledge and skills.

While, the program design provides a scaffold of learning outcomes, the MCP has found "learning to be nonlinear and non-sequential, as a result of the self-paced, learner-centred pedagogy." Coaching and guidance is provided by USQPSP facilitators and the MCP's supervisory team, however the responsibility for learning and driving progress is that of the MCP. Thus, the MCP has progressed through four key learning milestones in the USQPSP; these learnings are presented in Table 1.

Table 1: MCP learning milestones in the USQPSP.

Milestone	MCP Learning
Developing a Learning Program	Prior to commencing the practice-based research project, USQPSP candidates are encouraged to reflect on and review their previous learning in order to develop and plan learning objectives (LOs). MCP's develop a Statement of Prior Learning with LOs formulated at the taxonomic level of synthesis and evaluation. This process helped the MCP understand that learning opportunities can be found everywhere, not just in formal classroom settings. The MCP initially found this process to be confronting, accompanied by an overwhelming self-doubt and sense of "intellectual phoniness" (Clance & Imes, 1978, p. 241).
Developing a Research Proposal	Developing a practice-based research proposal was the culmination of coursework in preparation for the MCP's transition to doctoral candidature. The MCP valued the critical review, coaching, and advice provided by his supervisory team, which helped guide the structure and approach of the research proposal and increased the MCP's confidence in preparation for the confirmation seminar. It was during this stage the MCP understood he, not his supervisors, was in control of his doctoral program.
Confirmation of Candidature	In preparing for confirmation, the MCP had to reimagine how to speak to the research proposal. Valuable feedback was received both during the seminar and in the confirmation report, which recommended the MCP include more of himself in the proposal, despite his knowledge, passion for the topic and breadth of experience conveyed in the confirmation presentation. The feedback to locate and include himself in his work strongly resonated with the MCP and changed his thinking around expectations for academic workplace writing and research.

Milestone	MCP Learning
Ethics Approval	The MCP was then required to secure ethics approval for his workplace research project. As part of this process, the MCP had to critically evaluate his research proposal and methodology to assess their potential impact on participants. The USQPSP human research ethics process provided a robust and structured approach to assessing each stage of interaction with participants and prompted reflection on previously unconsidered aspects of those potential impacts. Reflecting on the human research ethics process, the MCP appreciated the thoroughness of the process, which ensured high levels of protection to all participants in work-based research project.

While the research and doctoral program is still in progress, there have been opportunities for the MCP to learn through action and practitioner inquiry (Dana & Yendol-Hoppey, 2014). As explained in the companion paper (Fergusson et al., 2018), it has been in micro-reflective cycles where the MCP has turned concrete experience into workable conclusions and learnings.

The doctoral journey has been one of continual learning; everything which has preceded it has helped prepare the MCP for the journey—each life-stage has presented its own learnings, and each has supported subsequent growth and opportunity. The MCP therefore likens the doctoral journey to that of a black belt in karate: each rank prepares the participant for the next grade, but the black belt is not the end of knowledge; it is rather the beginning of new knowledge. The MCP's aspiration is thus to harness the concept of *Shoshin*, in which "there are many possibilities [in the beginner's mind], but in the expert's [mind] there are few" (Suzuki, 2011, p. 21).

PROJECT #TWO: PROFESSIONAL IDENTITY AND TRAINING OF INVESTIGATORS

OVERVIEW OF THE PROBLEM

Precise definitions of investigator identity and its recognition as an independent profession have not been forthcoming. This workplace research project will examine the professional identity of investigators within the Australian Public Service and consider its fit-for-future competencies and training.

Inputs from regulatory officers impact our lives; from receiving a parking infringement notice to justifying one's qualification to serve as a company director, regulatory interactions occur on an almost daily basis. These types of interactions, although related, are distinct from interactions with investigators of policing agencies, because these are mostly associated with crime. It is in the context of policing agencies that the present study of investigation has been conceived, a term which can be defined as a "process of seeking information relevant to an alleged, apparent or potential breach of the law, involving possible judicial proceedings. The primary purpose of an investigation is to gather admissible evidence for any subsequent action, whether under criminal, civil penalty, civil, disciplinary or administrative sanctions. Investigations can also result in prevention and/or disruption action" (Australian Government, 2011a, p. 1).

Investigators within Australian Federal Government agencies typically possess a minimum vocational qualification (e.g., Certificate IV in Government [Investigation]). However, not only are investigators directly involved in gathering facts and evidence to determine breaches of relevant legislation and to correctly apply the law and rules of evidence, it is also necessary that they interact successfully with witnesses and offenders. Despite this apparent uniformity of underlying roles and functions, investigators are not always trained consistently or adequately to perform these tasks. Certainly, many inves-

tigators may have been drawn from the ranks of State and Federal police forces and are therefore experienced in the demanding field of criminal justice, but more recently, investigator recruits have also included agency-trained public servants, and the training these investigators have received to qualify for the job can be inconsistent. Inadequacy in both the quality and sustainability of investigator training in some Public Service sectors has been observed over the last 20 years (e.g., Roberts, 2000).

Moreover, regulatory training in Australia has typically been outsourced to private firms, who base the content of their programs on national qualifications frameworks and the legislative requirements of Australian Government Investigation standards (e.g., Australian Government, 2011a). But the selection of an appropriate training provider by Federal Government agencies is often not based on the record of the provider or their ability to deliver satisfactory or sustainable results, but on their ability to negotiate the tendering process, thus potentially affecting the quality of investigator training outcomes.

Status of the Practice Domain

The concept of investigation has been applied colloquially in different Federal Government contexts. Investigation is primarily regarded as a set of skills that can be utilised by anyone with a desire to extract information or facts from circumstances rather than a distinct, well-articulated profession. It is this emphasis on application of tasks that dilutes and obfuscates the classification of investigation as a profession. Furthermore, from this superficiality follows what could be regarded as a haphazard and opportunistic approach to its training delivery, where vocational institutions engage in ad-hoc methods to impart knowledge and skills; investigation may find application in real-world working environments, but its true professional identity has remained elusive.

The regulatory environment of Australia employs investigation in a variety of ways: from determining breaches of workplace legislation and enforcing worker/employer rights to prosecuting tax fraud. The Federal Government originally mandated alignment of its investigation practitioners with the Commonwealth Fraud Control Guidelines (Australian Government, 2011b), which stipulate the minimum qualification standards required for personnel in each agency that undertakes investigation as a core function. This requirement has since been modified, with qualification derivation now under the provisions of the Australian Government Investigations Standards (Australian Government, 2011a), specifically Section 1.5 of the Standards. This Section references the applicable Public Service Training package (i.e., PSP04) for the purposes of training course equivalence in an attempt to standardise delivery.

Any work that is performed for a living can be deemed 'professional' work, but as Lawrence (1999) has previously observed the definition of what constitutes a profession can be debated. According to Mulcare (2014, p. 32), "a profession is a disciplined group of individuals who adhere to ethical standards and who hold themselves out as, and are accepted by the public as, possessing special knowledge and skills in a widely recognised body of learning derived from research, education and training at a high level." It can thereby be argued that a profession is a cooperative undertaking and not an individual quest; such a view suggests that professional practice occurs where occupationally organised groups function according to moral guidelines above and beyond what society demands as a norm (e.g., Davis, 2002).

Early interpretations of professions thus suggested that those professing must embrace a moral calling and a desire to honourably serve society, thus extending work into professional independence and an ability to choose where and when one works (Coffee, 2006). Therefore, moralities translation into a professional code of practice was viewed as intrinsic to professional identity, without which we would merely be left with honest occupations and trade associations (Davis, 2002). This extra-materialistic view of what it means to engage in a profession is accepted in the modern sociological sense and inextricably links a profession to society; a profession, then, is a moral community of like-

minded members whose influence extends into society via interactions between the profession and society in which the interactions take place (e.g., Frankel, 1989). Drawn from this preliminary examination of professional identity, such a definition of investigation as a profession will underpin the research process undertaken by the MCP. What it means to be a professional investigator and how that is interpreted by the relevant Federal Government agency will have a bearing on understanding effective and meaningful ways of integrating competence and competency-based investigator training into investigation.

In Australia, competence has found application in competency-based training where programs are designed around pre-determined training and assessment outcomes, often designed to meet industry requirements (James, 2001). If done well by a Federal Government agency, training not only enhances individual employee performance and productivity, which feed into broader organizational goals, but can also positively influence employee alignment, engagement and overall performance (Ice, 2009). Moreover, evaluation of training is key to establishing its relevance and effectiveness, and thus needs to be built into training packages during the design phase; evaluation must verify that a change occurred, that change was a result of training, and that change can be repeated with other employees.

Minimal research has been directed toward public service subset functions in Australia, including investigation; this has been compounded in the Australian Public Service, which contains a multitude of regulatory environments in different agencies with related, but very distinct, investigative methodologies and needs. Consequently, the competence base and ongoing level of training applicable to practitioners is often deficient, and whether training contributes to professionalization is a question which may bear on proposed or perceived improvements. On that basis, a pedagogical analysis of investigative training in the Public Service sector will be one of the primary subjects of this research. The project will analyse and evaluate current competency and training paradigms for investigators within the regulatory environment of the Australian Public Service resulting in a competency-based framework designed to help articulate the professional identification of investigators by asking: "What are the key competencies and training needs that define, describe and develop a fit-for-future investigation profession in the Australian Federal Public Service?" using an Pragmatic exploratory QUAL>QUAN mixed method sequential design, which will firstly identify and interview key informants within the profession to obtain qualitative data and will then be thematically analysed to serve the basis of a larger scale quantitative survey.

Background and Prior Learning of the Researcher

The MCP (the third author) has worked as an investigative practitioner for 27 years, undertaking investigative functions within the Australian Federal Police and Queensland Police Service (both in uniform and plain clothes) and has worked as a private factual and surveillance investigator, more recently in the Federal public service as an investigator and an investigation manager. The MCP currently manages a team of investigators charged with regulating the Tax Practitioner profession. Throughout his career, the MCP has utilised a range of common and statute laws as a regulator, and although the landscape of regulation is heavily influenced by (or indeed dependent on) the law to drive process, the investigative function comprises a set of core skills or competences allowing practitioners to apply the law in accordance with established procedures and precedent.

Investigative training throughout this period led the MCP to in-service (in the case of policing) and privately sourced vocational courses and qualifications. Delving into tertiary education as a means of career development, on peer advice, the MCP completed a Master's degree in fraud and financial investigation, which touched upon the topic of investigation as a profession. The concept focussed the MCP's thinking about current levels of Federal investigative training. The MCP was aware of the requirements of the Commonwealth Fraud Control Guidelines (Australian Government, 2011b), which mandate the minimal level of vocational training required to undertake work as an investigator, but a lack of cohesion between the requirement to undertake training and the application of training was observed, along with the lack of locally trained investigators in the Australian Public

Service who were mostly supplemented by law enforcement staff with pre-existing training and experience.

As a manager of staff who were undertaking the requisite training program, the MCP saw firsthand evidence of a lack of cohesiveness and alignment between coursework and its application. This problem is compounded by the differing requirements of public-sector agencies compared to more conventional law enforcement approaches, and in that the actual practice of newly acquired skills was not regularly available in the public service workplace. Thus, the opportunity to solve a real-world problem in a situational context fit with the intended learning outcomes of the USQPSP, and it became obvious that the application of workplace research in this area might serve to argue the case for change in investigator training and competency.

Work-based Research in the Practice Domain

Professional Studies, as a distinct university-level program, has gained traction because it is a relevant and attractive option for MCPs seeking to enhance learning and development in a context that has both current and practical application. Action learning theory (e.g., Gregory, 1994) proposes that professionals learn most effectively when learning is achieved by addressing real-world problems in the context of their working environment; such a view has its foundations in tangible, real-world problems which can serve as catalyst for social regeneration (Boshyk, 2014). Gregory (1994) draws a distinction between action learning and action research, founding the latter on the former by emphasising that action learning (i.e., learning in the workplace when bound by real-world problems and solutions) becomes action research when inquiry is applied to specific problems which can be addressed by defined research questions and strategies aimed at solutions and improvement. Action learning is therefore similar to action research, in that it includes an action-oriented query which can be considered collaboratively, with the goal being experiential learning and improvement (Rigg, 2014).

Learning in the workplace offers as many opportunities as does learning in the classroom, but to be competitive in the 21st-century marketplace, work-based learning must be focused by reflection on practice (Raelin, 2008). In his self-directed leadership development model, Nesbit (2012) considers 'reflection' a meta-skill, which is one of the three skills he considers crucial for self-development. In this model, deep and considered reflection is crucial to a learner's understanding of her/his personal and institutional shortcomings. Such an approach is central to the USQPSP. However, notwithstanding the benefits of structured micro- and macro-reflective practice as discussed in our accompanying paper (Fergusson et al., 2018), the motivational demands of this individually driven and isolated process can be problematic. For example, Galea (2012) noted the dangers of inadequate reflection by referring to Dewey's view that some thinking through reflection can be devoid of inquiry, can be hasty and inconclusive, and that a careful and considered approach, lacking as much as possible from the interference of individual bias, is most productive. Nonetheless, the reflective professional can be pivotal in work-based learning upon which effective work-based research can be well founded and productive.

Expected Outcomes of Work-based Research

There is a growing demand for higher education to become more involved in work-based learning, work-based research, and professional development. For example, Lester and Costley (2010) maintain there is a growing body of evidence which suggests adult participation in higher education is increasing directly as a result of linkages and alignment between work-based learning and higher education. The resultant alliances and projects thereby add value to the workplace and practice domain.

Criticisms of such programs stem from concern about their integrity in an academic sense, including their structure, assessment criteria, and the roles that teachers play. Participants in a work-based program at Coventry University were therefore surveyed during 1999–2000 to determine benefits and

concerns of students and employers (Johnson, 2001). Benefits identified by students included flexibility of training and attendance, up-to-date course material, and gaining marketable skills, while employers saw benefits in the flexible approach to learning with a relatively low cost of training, and improvements arising from work-based projects; the University counted an increase in staff knowledge, along with training and collaboration with corporate partners and associated funding benefits, as an advantage.

However, students saw the apparently loose structure of the course and requirements for self-motivation as limitations; course credibility was also cited as a concern for both students and employers, and employers considered the security of their intellectual property rights a concern, and the provision of mentors in the workplace as a limitation and challenge. Similarly, the University considered an overarching concern emanating from the perception of work-based courses being substandard in comparison to their more traditional research-based programs, and that academic snobbery and the resultant logistical issues of staff training and allocation needed to be overcome. It can nevertheless be seen that different types of Professional Studies programs are gaining traction throughout the world, as higher degrees with integrity and purpose increasingly offer tangible benefit to working communities, particularly as a result of increased research and when new data come to light and are tested.

While arguments for and against these types of programs were considered by the MCP prior to enrolment in the USQSP, his employer and related employee groups involved in the present study were in support of it, and the benefits to both stakeholders (such as higher engagement and relevance along with lower costs) outweighed concerns about intellectual property rights.

Lessons Learned from Conducting Work-based Research

Capability is a conceptually higher order practitioner ability than competence (Lester, 2014); capable advanced practitioners not only know what, but how, to learn (Woods, 2013), and such capabilities allow practitioner-led learning and reflection, driven by holistic considerations and a self-motivated desire to improve (Lozano, Boni, Peris, & Hueso, 2012).

The distinction between capability and competence is important when considering the self-assessment process undertaken in the USQPSP. Earlier we referred to the micro-reflective cycle (Fergusson et al., 2018), a process utilised in the USQPSP to first understand and then develop a learning profile of the MCP's professional capabilities and a set of learning objectives (or LOs, elsewhere referred to as intended learning outcomes or ILOs, e.g., Belland, French, & Ertmer, 2009) to frame a way of maximising and extending the learning process (a USQPSP instrument called the *CV Tool* is used for this purpose). These LOs then serve as the foundation to a research program, which, according to the MCP, "would not only actualise the LOs but, through them, achieve the broader goals of the USQPSP", including the development of APP skills and knowledge. An example for this MCP, showing the relation of LOs, learning profile and their relation to APP, can be seen in Figure 2.

Moreover, the CV Tool utilizes a taxonomy of four capability learning areas (i.e., communication, intellectual, methodological, and personal/social) against which the MCP can align previous work experience, thereby allowing a seamless linkage between items in the learning profile and the different classes of LOs in order to generate a complete and holistic self-assessment of past work experience and learnings along with future learning and research needs.

By documenting the MCP's life-skills and historical work experience through the CV Tool, the self-administered assessment of prior learning "revealed a breadth of historical experience, much of its related to investigating, as well as the application of management skills." After developing the learning profile, the highest rated areas in the MCP's skillset were spread across all four of the capability areas. Some areas of deficiency, when compared with associated skills in each capability area, attracted attention because they related closely to what the MCP perceived as learning development opportunities. Strengths and current learnings were identified in the areas of intellectual capabilities, com-

munication-related capabilities, and personal/social capabilities, and were self-assessed as being substantially related to managerial experience. A deficiency was observed by the MCP "in methodological capability, specifically in technology adoption and tolerance for ambiguity," and thus, as a result of identifying this deficiency, a constructive outcome of the exercise was to focus future learning on developing the MCP's methodological capability during the USQPSP.

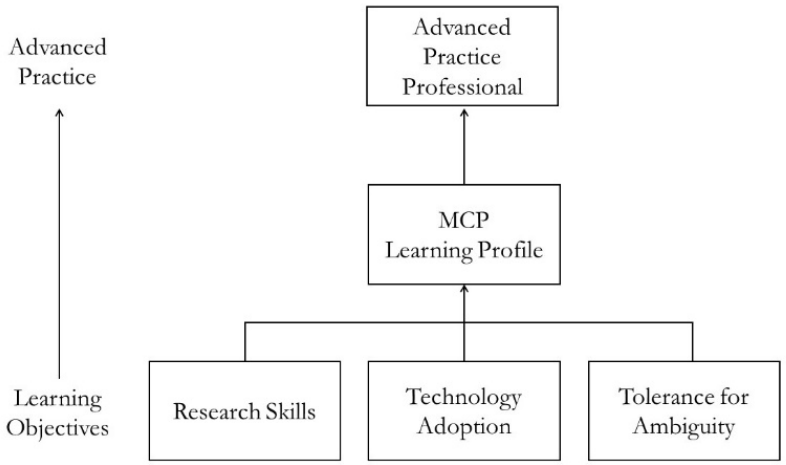


Figure 2: CV Tool output for MCP learning profile.

A cursory reflection on these learning needs may indicate a conservatism induced by the Public Service environment and might be attributed to a general apathy about technology and its application in a modern workplace. However, technology was not absent from the MCP's workplace experience and therefore the identified learning needs may indicate more of a reluctance to embrace communication and social networking tools (and to thereby enjoy their benefits), and hence the micro-reflective cycle may have been a factor in arriving at an understanding why these capabilities were underdeveloped. Similarly, tolerance for ambiguity, specifically rigidity of a prescriptive workplace, may underpin such reluctance to change coupled with a lack of opportunity to exercise change. As documented in Figure 2, these capabilities have therefore been targeted for attention in the formation of the MCP's self-designed LOs as indicated by the following:

a) *Enhance critical thinking, objective judgment and tolerance for ambiguity by critically evaluating existing methodologies utilised in the delivery of regulatory training and by designing a best-practice model capable of being uniformly adopted.* The process of researching methodologies, which is a core element of addressing the problem of competence deficiency, will exercise and develop research skills founded on the elements of critical thinking, objective judgment and tolerance for ambiguity necessary for an objective and balanced assessment of the data acquired.

b) *Subject to best-practice model identification, enhance adoption of technology by collating, assessing and proposing suitable technologies for the delivery of regulatory training.* This objective contributes to suitable technology identification and adoption as a delivery mechanism aligned with proposed competencies.

c) *Enhance tolerance for ambiguity and objective judgment by remaining cognizant and recording reflections related to potential ambiguities presented by methodological analyses and testing, and by validating results using qualitative and quantitative means.* This last objective relates directly to the research process and the need for objectivity when maintaining rigor and formulating persuasive arguments. Reflection on conflicting results of analysis and acknowledging potential biases is the bedrock of maintaining objectivity and essential to a sufficient and acceptable research product, what in the USQPSP is called a project 'artefact'.

Each of these LOs will measure self-development as part of the doctoral learning journey facilitated by the work-based research project. They are drawn from self-identified deficiencies in MCP capabil-

ity and "will hopefully be satisfied by the workplace research process and work-based project." As an integral part of the USQPSP, these contributions form part of the proposed triple dividend of outcomes.

CONCLUSION

We have identified the important role that learning and research play in the working lives of MCPs who are APPs. To this end, the Professional Studies Program at University of Southern Queensland teaches and mentors the development of higher-order research and scholarship as a way of promoting work-based learning and professional achievement; its goal is to thereby create *scholarly professionals*. A second dimension of the Program is its contribution to workplace and practice domain problems, including limitations of research and gaps in knowledge associated with emerging professional roles and changing workplaces. Finally, the Program seeks to have an impact on society more generally through a combination of the personal development of APPs and the value they bring to workplaces, practice domains, and society. In this paper, we call these collective benefits a triple dividend.

The two project examples presented in this paper begin to document the types of professional engagement and applied projects possible in work-based research by APPs and highlight the multifarious dimensions of learning MCPs can engage in as they advance in professional practice.

While statements of workplace problems, needs, and opportunities, along with the status of the practice domain, are common in this type of doctoral action research, these project examples also show how the background and prior learning of the MCP, learning objectives, work-based research in the practice domain, and lessons learned from conducting research can be integrated into a structured framework of advanced practice. While also introducing the basic elements of applied research methods and expected outcomes of work-based research projects, the examples in this paper give a glimpse into the possible longer-term contributions such research can make to workplaces in Australia.

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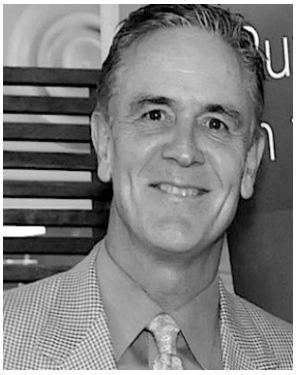
BIOGRAPHIES



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AN EXAMINATION OF GEN Z LEARNERS ATTENDING A MINORITY UNIVERSITY

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ABSTRACT

Aim/Purpose: This paper presents the preliminary findings of a pilot survey that sought to examine the technology uses, backgrounds, needs, interests, career goals, and professional expectations of Generation Z students enrolled at a minority serving institution in the United States Mid-Atlantic region.

Background: Students entering college today are part of Generation Z born in the late 90's through 2016. Known for their short attention spans and heightened ability to multi-task, they already outnumber millennials and are the first true digital natives born during the age of smart phone.

Methodology: In the fall of 2017, an online student perception survey was piloted with students enrolled at a mid-Atlantic minority serving institution. The survey included a combination of dichotomous, Likert-scaled, and ranking questions. The survey was administered electronically using the Survey Monkey system to students following completion of core computer concepts courses and explored their technology backgrounds, skills, perceived computing self-efficacy, and the role they predict technology will play in their future career. The data was subsequently exported to Microsoft Excel and SPSS where descriptive statistical analyses were conducted.

Contribution: As Generation Z descends on college campuses, with their technology dominated backgrounds and different communications, learning, and social preferences, it is important to better understand this generation whose needs and expectations will help shape the future of higher education. Additionally, this study also provides research on a population (first-generation minority college students) that is expanding in numbers in higher education and that the literature, reports is impacted negatively by the digital divide and educational inequalities. This paper is timely and relevant and helps to extend our understanding of Generation Z.

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Findings	The findings show that Generation Z learners enrolled in a minority-serving institution enjoy computer classes, feel that using computers comes easy to them; and perceive themselves as experts in the use of social media, mobile operating systems, using a smart phone, searching the Web, and email. Participants also reported that they want to be more technologically literate, want to be more skilled in computer software applications, and are interested in learning about cyber security. In terms of the future, most respondents also believe that their career will require them to analyze information to inform decision making. Additionally, most stated that information security will be important to their future career. Finally, the results affirmed that college computing courses remain important and that college students recognize that technology will play a crucial role in their career with employers wanting to see job applicants with strong technology skills.
Recommendations for Practitioners	Generation Z learners enrolled in higher education need, and want, a wide range of technology courses available to them in order to help them meet the rapidly evolving demands of tomorrow's workplace. Students in this study overwhelmingly see the value in enhancing their technology skills especially in such areas as computer software applications, information management, and cyber security.
Recommendation for Researchers	Institutions of higher education should invest in thorough and ongoing examinations of the information and technology literacy skills, needs, and perceptions of students.
Impact on Society	Understanding the interests and needs of Generation Z learners is imperative to the future of higher education.
Future Research	This survey is a work in progress that is part of a pilot study that is being used to help guide a much more sizable examination of Generation Z learners.
Keywords	technology skills, career readiness, technological literacy, Generation Z, computer concepts course, computer education, computer skills assessment, UMES, minority learners, career and technology readiness, technology assessment, digital literacy, computer self-efficacy

INTRODUCTION

For years, we have discussed millennials who were born between 1980 and 1996ish, but things are changing. Students entering college today are part of Generation Z, born in the late 90's through 2016, making the oldest among them 20 or so years old. They are the first generation that used a tablet before they could ride a bike, the first to have childhood friends that they played with electronically, and the first to have their births and baby photos and elementary school recitals shared on social media. Their minds, relationships, learning preferences, emotional health, sense of self, have all been inexplicably shaped by constant exposure to screens (Gibson, 2016).

In the fall of 2017, a survey was administered to 160 students who had completed an entry-level computer concepts and applications course at the University of Maryland Eastern Shore (UMES), a Historically Black, 1890 land-grant institution and member of the University system of the State of Maryland. The institution primarily serves first generation, low income, and minority learners with an enrollment of approximately 3400 as of the Fall of 2016. The survey sought to explore participants' technology backgrounds, device usage, perceived computing self-efficacy, and the role they predict technology will play in their future career. This survey is a work in progress that is part of a pilot study that is being used to help guide a much more sizable examination of Generation Z learners.

LITERATURE REVIEW

Over 74 million strong, Gen Z makes up almost one-quarter of the U.S. population. They already outnumber any current living generation and are the first true generation of digital natives (Williams, 2015). According to Shatto and Erwin (2016), Generation Z is incredibly savvy when it comes to mobile technologies and self-directed learning; however, they lack critical thinking skills as well as the ability to fully evaluate the validity of information. As a result, they are particularly susceptible to fake news and pseudo information, which is intensified by their exceedingly short attention spans. In addition, this generation is noted for its unprecedented awareness and acceptance for cultural, racial, and sexual diversity.

The concept of digital natives and digital immigrants was first introduced by Marc Prensky (2001) who said:

> Our students today are all native speakers of the digital language of computers, video games and the Internet. So what does that make the rest of us? Those of us who were not born into the digital world but have, at some later point in our lives, become fascinated by and adopted many or most aspects of the new technology are, and always will be compared to them, Digital Immigrants. (p.1)

At the time, Prensky was referring to computers and video game systems as the hallmark technology to digital natives; however, mobile devices and omnipresent social media have grown tremendously since he first introduced his digital native/digital immigrant concept. Technology is now far more engrained in people's lives. Sherry Turkle (2011) presented this technological embeddedness as the concept of tethering, which she explained as "intense one on one relationships with machines" that has led to the development of a "networked culture" where people use technology as the "architect" of intimacies whereas social media is shaping the way people view themselves and their relationships. The literature finds that Generation Z has been raised tethered with mobile technologies, social media, and instant access to Web-based information omnipresent in their lives (Claveria, 2017; Lenhart, 2015; Shatto & Erwin, 2016; Törőcsik, Szűcs, & Kehl, 2014; Williams, 2015). Finally, Törőcsik et al. (2014) explain that Generation Z is the first true "global generation" in the world having been enculturated from birth to developing a multi-cultural and multi-national mindset.

A Pew Research Center study (Lenhart, 2015) found that Generation Z youth are accustomed to the ease and access of ever present smart phones and other mobile devices with virtually all going online daily and many connected nearly constantly. Use of social media such as Facebook, Instagram, and Snapchat were found to be fairly prevalent as was texting with an average of 30 cell phone texts being sent and received daily. Gaps in access to technology were found along socio-economic, racial, and ethnic lines, especially when access to desktop and laptop computers was considered.

Gibson (2016) explains that Generation Z is going to transform society with their different way of thinking and learning. He asserts that their minds, relationships, learning preferences, emotional health, and sense of self have all been shaped by constant screen exposure from an early age, which has altered their neural circuitry leading to shorter attention spans, stunted social skills, and a heightened ability to multitask (Gibson, 2016).

Törőcsik et al. (2014) conducted a study of Generation Z teenagers in Hungary. They found that this generation's outlook has been totally framed by networked digital technologies so that they prefer short bites of real time information with pictures, have short attention spans, prefer simplification, and spend copious amounts of their free time using mobile devices and social media.

A comparison was done by Claveria (2017) of millennials verses Generation Z and claimed that where millennials have never seen a floppy disc most of Generation Z is unfamiliar with a flip phone, and that Generation Z has a 30% shorter attention span than millennials, spends less time watching television, and makes more online purchases. Further, where choice overload has been

found to be a leading stressor of millennials, phone separation anxiety is found to be the biggest stressor of Generation Z.

A lack of technological competency has been shown to be associated with a lower quality of life with higher risks of unemployment (Sparks, Katz, & Beile, 2016). Further, employers are concerned about the technological proficiency of individuals entering the workforce (Hart Research Associates, 2013) with studies finding that, while recent graduates are savvy when it comes to social media and the internet, they are frequently lacking in the use of core productivity tools and applications (Head, 2012).

A large-scale study reported by Library Journal (Dixon, 2017) found that first-year college and university students entered higher education with widely varying levels of information literacy that is partially caused by a national funding crisis that has left countless K–12 public schools without functioning school libraries and trained school librarians/media specialists. According to the report, less than one-third (28%) of first generation college students entered with proper information literacy skills so as to be able to locate and critically evaluate information. The study explains that these deficiencies are exacerbated by students' overconfidence, apathy, and weak attention spans.

Socio-economic factors and issues of the digital divide prevail in importance. Subramony (2014) explains that the digital divide remains one of the biggest challenges in modern times despite the ubiquitous nature of digital technologies. Similarly, a study by Ritzhaupt, Liu, Dawson, and Barron (2013), who examined 5,990 students from 13 school districts across the state of Florida, found that the digital divide remains prevalent in the United States. Further, work by Buzzetto-Hollywood, Elobeid, and Elobaid (2017) found that first-generation students attending a mid-Atlantic historically Black university arrived on campus with digital literacy issues, most notably with severe deficiencies when it came to the use of core computer applications.

In the United States, it is widely recognized that many young adults are not equipped with the skills to succeed as a contributing member of the 21st Century Workforce. The Partnership for 21st Century Skills, which includes such companies as Microsoft, Apple, Cisco, and Pearson, has criticized the American educational system, referring to it as obsolete and outmoded, and has challenged educators to build such crucial skills as critical thinking, problem solving, creativity, oral and writing communications, and technological readiness into the learning process (Eisen, Jasinowski, & Kleinert, 2005).

Swartz (2017) explains that data from the U.S. Bureau of Labor Statistics and graduation rates predicted by the National Science Foundation indicate that there will be an estimated 1 million more computing jobs than applicants who can fill them by 2020. Compounding the problem, the author explained, is that only 11% of employers believe higher education is "very effective" in readying graduates to meet skills needed in their organizations with more than 62% of students responding in surveys that they were unprepared when it comes to the skills needed for workplace success.

A 2016 national survey released by the Society for Human Resource Management (2016) and sponsored by the American Statistical Association, found that over the past five years, nearly two-thirds of organizations (65%) studied had increased the number of positions requiring data analysis skills, and more than half (59%) expected to increase the number of positions at their organizations over the next five years. Further, employers who filled a data analysis position within the last 12 months noted challenges with 78% reporting they had difficulty recruiting qualified candidates. Departments found to be most in need of individuals capable of conducting data analyses were accounting and finance (71%), human resources (54%), and business and administration (50%).

METHODOLOGY

In the fall of 2017, an online student perception pilot survey was prepared and administered to students enrolled at a mid-Atlantic minority serving institution. A survey method was selected because it enables scholars to explore social psychological phenomena with representative populations with valid and measurable queries (Visser, Krosnick, & Lavarakas, 2000). The survey was prepared within,

and delivered using, the Survey Monkey system. The instrument included a combination of dichotomous, Likert-scaled, and ranking questions. The survey was administered to students following completion of core computer concepts courses with students provided time to anonymously complete the survey at the end of an appointed course session. The questions explored participants technology backgrounds, perceived computing self-efficacy, and the role they predict technology will play in their future career. The data was subsequently exported to Microsoft Excel where descriptive statistical analyses were conducted. During the analyses the following hypotheses were explored

H_1- Generation Z learners enrolled in a minority serving institution enjoy computer classes.

This hypothesis was measured with responses to a five-point Likert scaled statement "*I enjoy computer classes*" whereas it was decided that if a mean of >3.0 was achieved, then the threshold for affirming the hypothesis had been met.

H_2- Generation Z learners enrolled in a minority serving institution believe they are technologically skilled in common technology tools and communication services.

This hypothesis was measured with responses to a series of five-point Likert scaled statements including:

- *"Working with computers comes easy to me*" which was measured on a scale from strongly disagree to strongly agree
- "*How skilled are you with the following*" (computer applications, operating systems, and mobile operating systems) which was measured on a scale from very unskilled to very skilled
- "*How familiar are you with the following*" (social media, email, smart phones, and web searches) which was measured on a scale from totally unfamiliar to very familiar

It was decided that if an overall mean of >3.0 was achieved, then the threshold for affirming the hypothesis had been met.

H_3- Generation Z learners enrolled in a minority serving institution want to improve their technology skills.

This hypothesis was measured with responses to a series of five-point Likert scaled statements including:

- "*I would like to be more technologically literate"*
- *"I would like to be more skilled in the use of computer software applications"*
- *"I would like to know more about computer fundamentals* (basic hardware components; networking fundamentals; cloud computer; use, and management of operating systems; and storage options)"
- "*I would like to know more about cybersecurity*"

It was decided that if an overall mean of >3.0 was achieved, then the threshold for affirming the hypothesis had been met.

H_4- Generation Z learners enrolled in a minority serving institution believe that technology will impact their future career.

This hypothesis was measured with responses to a series of five-point Likert scaled statements including: *"Technology will play a major role in my future career", "My future career will require me to use technology to analyze information to inform decision making"*, and "*Employers want to see job applications with good technology skills"* where it was decided that if a mean of >3.0 was achieved, then the threshold for affirming the hypothesis had been met.

FINDINGS

There were 160 students who completed the survey representing a response rate of >75% with most of the respondents noting that it is important for college students to take computer courses $\mu = 4.12$. In this section each of the hypotheses are tested and related back to the literature

H_1- Generation Z learners enrolled in a minorit`y serving institution enjoy computer classes.

This hypothesis was considered by examining responses to a five-point Likert scaled statement *"I enjoy computer classes*" and is represented in Table 1 where a mean of 3.74, a standard deviation of 1.84, and a confidence interval at 95% of .168. With a mean of >3.0 this hypothesis is determined as having been met with findings consistent to what has been reported by Buzzetto-Hollywood (2017).

Table 1: Generation Z Learners Enjoy Computer Classes

N=160	Strongly Disagree (1)–	Disagree (2)–	Neutral (3)–	Agree (4)–	Strongly Agree (5)–	**MEAN**	**STDV**	**CONF**
I enjoy computer classes	6.88% 11	3.75% 6	22.50% 36	42.50% 68	24.38% 39	3.74	1.84	.168

H_2- Generation Z learners enrolled in a minority serving institution believe they are technologically skilled in common technology tools and communication services.

This hypothesis was measured with responses to a series of five-point Likert scaled statements. Table 2 considers responses to the statement "*Working with computers comes easy to me*" which was measured on a scale from strongly disagree to strongly agree with a mean of 3.86, a standard deviation of 1.025, and a confidence interval at 95% of .159 found.

Table 2: Responses To The Statement Working With Computers Comes Easy To Me

N=160	Strongly Disagree (1)–	Disagree (2)–	Neutral (3)–	Agree (4)–	Strongly Agree (5)–	**MEAN**	**STDV**	**CONF**
Working with computers comes easy to me	4.38% 7	4.38% 7	20.63% 33	41.88% 67	28.75% 46	3.86	1.025	.159

Table 3 considered responses to the query "*How skilled are you with the following*" (computer applications, operating systems, mobile operating systems, and information processing) which was measured on a scale from very unskilled to very skilled with a mean of 3.91, a standard deviation of .809 and a confidence interval of .125 found for computer applications; a mean of 4.18, a standard deviation of .846 and a confidence interval of .135 for desktop/laptop operating systems; and a mean of 4.33, a standard deviation of .838 and a confidence interval of .130 for mobile operating systems.

Table 3: Respondents Skills

N=160	Strongly Disagree (1)–	Disagree (2)–	Neutral (3)–	Agree (4)–	Strongly Agree (5)–	**MEAN**	**STDV**	**CONF**
Overall use of computer applications	2.63% 4	3.95% 6	9.87% 15	67.11% 102	16.4% 25	3.91	.809	.125

Table 3: Respondents Skills

N=160	Strongly Disagree (1)–	Disagree (2)–	Neutral (3)–	Agree (4)–	Strongly Agree (5)–	**MEAN**	**STDV**	**CONF**
Use of Operating Systems (Windows, Mac OS, or Chrome)	1.31% 2	3.27% 5	10.46% 16	45.75% 70	39.22% 60	4.18	.846	.135
Use of Mobile Operating Systems (e.g. Apple iOS or Google Android)	1.29% 2	2.58% 4	8.39% 13	37.42% 58	50.32% 78	4.33	.838	.130

Table 4 considered familiarity with a range of common activities including social media, email, smartphones, and Web searches. Respondents indicated strong familiarity with each including social media (μ = 4.47, σX=..969, and CI=.150), email (μ = 4.68, σX=.764, and CI=.118), smartphones (μ = 4.78, σX=.647, and CI=.1), and Web searches (μ = 4.76, σX=.733, and CI=.111).

Table 4: Familiarity

N=160	Strongly Disagree (1)–	Disagree (2)–	Neutral (3)–	Agree (4)–	Strongly Agree (5)–	**MEAN**	**STDV**	**CONF**
Social Media (e.g. Face-book, Twit-ter, Insta-gram, or SnapChat)	3.25% 5	3.90% 6	3.25% 5	11.69% 18	77.92% 120	4.57	.969	.150
Email	1.95% 3	0.65% 1	4.55% 7	12.99% 20	79.87% 123	4.68	.764	0.118
Using A Smartphone	0.65% 1	1.29% 2	4.52% 7	6.45% 10	87.10% 135	4.78	.647	.1
Searching the Web	1.95% 3	0.65% 1	3.90% 6	6.49% 10	87.01% 134	4.76	.733	.111

Without exception, and with respect to all statements and questions, all means were >3.0 thus affirming the hypothesis that students are confident in their technological abilities including use of basic computer applications, social media, email, smart phones, and searching the Web. These findings are consistent with what has been reported by Buzzetto-Hollywood et al. (2017), Lenhart (2015), Hanson, Kilcoyne, Perez-Mira, Hanson, and Champion (2011), Marakas, Johnson, and Clay (2007), and Smith, Given, Julien, Ouellette, and DeLong (2013).

Several studies have concluded that students entering college today have mastered the small portion of familiar technologies that they use on a daily basis (Buzzetto-Hollywood et al., 2017; Hargatti, 2005; Mishra, Cellante, & Kavanaugh, 2015;) such as social media, email, and cell phone and Web usage but lack the skills to use technology to more critically evaluate information (Buzzetto-Hollywood, 2017; Head, 2012; Mishra et al., 2015). This was affirmed in this study when two agreement questions were considered that looked at students familiarity with modeling software, statistical software, and software used for data analytics where the respondents noted a lack of familiarity with all means <3.0.

H_3- Generation Z learners enrolled in a minority serving institution want to improve their technology skills.

This hypothesis was measured by considering responses to a series of five-point Likert scaled statements, all of which are represented in Table 5, which considers students interests in improving their technology skills. As demonstrated in Table 5, respondents indicated interest in becoming more technologically literate ($\mu = 4.08$, $\sigma X=1.043$, and CI=.162), improving their ability to use software applications ($\mu = 3.91$, $\sigma X=1.012$, and CI=.157), extending their knowledge of computing fundamentals ($\mu = 3{,}72$, $\sigma X=1.010$, and CI=.157), and becoming more familiar with cybersecurity ($\mu = 3.78$, $\sigma X=1.114$, and CI=.173). With all of the means >3.0, this hypothesis is viewed as being affirmed and is consistent with what has been reported in the literature by Buzzetto-Hollywood (2017), Dahlstrom, Walker, and Dziuban (2014), and Nataraj (2014).

Table 5: Interest In Improving Their Technology Skills

N=160	Strongly Disagree (1)–	Disagree (2)–	Neutral (3)–	Agree (4)–	Strongly Agree (5)–	**MEAN**	**STDV**	**CONF**
I would like to improve my overall technological literacy	5.00% 8	1.25% 2	16.88% 27	35.00% 56	41.88% 67	4.08	1.043	.162
I would like to be more skilled in the use of computer software applications	5.00% 8	2.50% 4	18.13% 29	45.00% 72	29.38% 47	3.91	1.012	.157

Table 5: Interest In Improving Their Technology Skills								
N=160	Strongly Disagree (1)–	Disagree (2)–	Neutral (3)–	Agree (4)–	Strongly Agree (5)–	**MEAN**	**STDV**	**CONF**
I would like to know more about computer funda-mentals (hardware; network-ing; cloud compu-ting; OS; and stor-age)	3.75% 6	6.88% 11	25.62% 41	41.25% 66	22.50% 36	3.72	1.010	.157
I would like to know more about cybersecu-rity	4.38% 7	8.13% 13	24.38% 39	31.25% 50	31.87% 51	3.78	1.114	.173

H_4. Generation Z learners enrolled in a minority serving institution believe that technology will impact their future career.

This hypothesis was measured by considering responses to three five-point Likert scaled statements, all of which are represented in Table 6,where students agreed that technology will play an important role in their future career ($\mu = 4.14$, $\sigma X=.961$, and CI=.149); their future will require them to use technology to analyze information to inform decision making ($\mu = 3.95$, $\sigma X=1.043$, and CI=.162); and that employers want to see job applicants with good technology skills ($\mu = 4.11$, $\sigma X=.951$, and CI=.147). With all means >3.0, this hypothesis is viewed as being affirmed and is consistent with what has been reported in the literature (Hart Research Associates, 2013; Society for Human Resource Management, 2016; Swartz, 2017).

Table 6: Respondents Perceptions Of The Impact Of Technology On Their Future								
N=160	Strongly Disagree (1)–	Disagree (2)–	Neutral (3)–	Agree (4)–	Strongly Agree (5)–	**MEAN**	**STDV**	**CONF**
Technol-ogy will play a major role in my future career	2.58% 4	1.94% 3	18.71% 29	32.90% 51	43.87% 68	4.14	.961	.149
My future career will require me to use	3.23% 5	6.45% 10	18.06% 28	36.77% 57	35.48% 55	3.95	1.043	.162

Table 6: Respondents Perceptions Of The Impact Of Technology On Their Future								
N=160	Strongly Disagree (1)–	Disagree (2)–	Neutral (3)–	Agree (4)–	Strongly Agree (5)–	**MEAN**	**STDV**	**CONF**
technology to analyze information to inform decision making								
Employers want to see job applications with good technology skills	2.58% 4	3.23% 5	14.84% 23	39.35% 61	40.00% 62	4.11	.951	.147

DISCUSSION

Generation Z are digital natives (Williams, 2015) who have been found in the literature to be tethered to, dependent on, and comfortable with, mobile devices, the internet, and social media (Claveria, 2017; Lenhart, 2015; Shatto & Erwin, 2016; Törőcsik, Szűcs, & Kehl, 2014; Williams, 2015) and this pilot study has provided detailed confirmation of the literature especially as it applies to minority learners. Additionally, Generation Z is confident, perhaps overly so, in both the literature and this study, in their technological abilities in the use of basic computer applications, social media, email, smart phones, and searching the Web (Buzzetto-Hollywood et al., 2017; Lenhart, 2015; Smith et al., 2013). And where staffing studies and reports continue to show the ever-increasing value of technology skills for new hires and recent college graduates (Hart Research Associates, 2013; Society for Human Resource Management, 2016; Swartz, 2017), the students in this study also report that technology will play a major role in their future career and exhibit an interest in enhancing their technological skills and overall readiness similarly to what has been reported by such studies as Dahlstrom et al. (2014.)

Generation Z learners enrolled in higher education want a wide range of technology learning opportunities available to them in order to help them meet the rapidly evolving demands of tomorrow's workplace. Students overwhelmingly see the value in enhancing their technology skills, especially in such areas as computer software applications, information management, and cyber security. Further, the findings indicate that institutions of higher education should invest in a thorough examination of technology skills, needs, and perceptions of students entering the institution. This investigation should be ongoing in order to reflect the evolving technology skill expectations desired in higher education and the workplace.

LIMITATIONS

The greatest limitation of this study is that is focused exclusively on students attending a single institution. However, at the same time, this study provides research on a population that is expanding in numbers in higher education and that many educators, and much research, reports as being underprepared for academic success (Allen, 1987; Buzzetto-More & Sweat-Guy, 2007).

Additionally, this survey was administered after students had completed a core computer concepts class, as such that may have increased their positive perceptions of their skills. This possible flaw is being remedied in the next phase of this study, which will be administered to students enrolled in freshmen experience courses. This study has also been expanded to include multiple institutions and more demographic and lifestyle questions in its next iteration.

Finally, there is a paucity of available literature on Generation Z learners in higher education. This shortage makes making comparisons to the literature challenging. At the same time, it highlights the need for, and value of, studies such as this study.

CONCLUSIONS

As Generation Z descends on college campuses, with their technology dominated backgrounds and different communications, learning, and social preferences, it is important to better understand this generation whose needs and expectations will help shape the future of higher education. The findings show that Generation Z learners enrolled at a minority serving institution enjoy computer classes, feel that using computers comes easy to them; are experts in the use of social media, mobile operating systems, using a smart phone, searching the Web, and email.; want to be more technologically literate, more skilled in computer software applications, and are interested in learning about cyber security. In terms of the future, most believe that technology will play a major role in their future career where employers will want job applicants with strong technology skills, and where the workplace will require them to analyze information to inform decision making.

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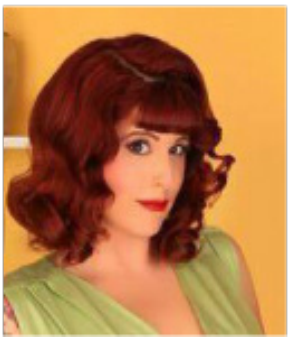
BIOGRAPHIES



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SOUTH AFRICA'S QUEST FOR SMART CITIES: PRIVACY CONCERNS OF DIGITAL NATIVES OF CAPE TOWN, SOUTH AFRICA

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ABSTRACT

Contribution	This study contributes to scientific literature by detailing the impact of specific factors on the privacy concerns of citizens living in an African city.
Findings	The findings reveal that the more that impersonal data is collected by the Smart City of Cape Town, the lower the privacy concerns of the digital natives. The findings also show that the digital natives have higher privacy concerns when they express a strong need to be aware of the security measure put in place by the city.
Recommendations for Practitioners	Practitioners (i.e., policy makers) should ensure that it is a legal requirement to have security measures in place to protect the privacy of the citizens while collecting data within the smart city of Cape Town. These regulations should be made public to appease any apprehensions from its citizens towards smart city implementations. Less personal data should also be collected on the citizens.
Recommendation for Researchers	Researchers should further investigate issues related to privacy concerns in the context of African developing countries. Such is the case since the population of these countries might have unique cultural and philosophical perspectives that might influence how they perceive privacy.
Impact on Society	Cities are becoming "smarter" and, in the context of developing countries, privacy issues might not be such a major concern as is the case in the developing world.
Future Research	Further qualitative studies should be conducted to better understand issues related to perceived benefits, perceived control, awareness of how data is collected, and level of privacy concerns of digital natives in developing countries.

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Keywords smart cities, privacy concerns, digital natives, developing countries, South Africa

INTRODUCTION

Several cities around the world are moving towards acquiring the "smart city" status and several African cities are joining this quest (Anthopoulos & Fitsilis, 2013; Watson, 2015). A smart city is a city that incorporates the use of Information and Communication Technologies (ICT) and the Internet of Things (IoT) in the management and monitoring of city resources (J. Lee, Hancock, & Hu, 2014). Cities such as Vienna and Barcelona are establishing themselves as world leaders in the smart city movement (March & Ribera-Fumaz, 2016; Schleicher, Vogler, Inzinger, & Dustdar, 2015).

The concept of smart cities in the African context is new and still needs more exploration (Chourabi et al., 2012; Nfuka & Rusu, 2010). Moreover, smart city implementations in African cities are still lagging behind those of European cities (Watson, 2015). Nonetheless, many African cities such as Cape Town in South Africa and Nairobi in Kenya have implemented smart city projects such as free Wi-Fi in public places and cashless payment systems for public transport (Albino, Berardi, & Dangelico, 2015; J. Lee et al., 2014). In addition, many of the smart city services that can be found in self-described European smart cities such as Barcelona can also be found in Cape Town (Volkwyn, 2017).

Data is constantly being produced and consumed in smart cities (Kitchin, 2015). Data from different sources are integrated together, with the aim of acquiring a full picture of the city's status in terms of safety and economic vitality and in terms of resources usage (March & Ribera-Fumaz., 2016). As a result, generating and using this data often raises issues around data security and data privacy (Li, 2012).

RESEARCH PROBLEM

With this current period being coined as 'the digital age', it is not surprising that one of the challenges of our time is privacy (Acquisti, Taylor, & Wagman, 2016). In today's society, the threat of personal data being abused for financial gain, social discrimination, or coercion is real (Edwards, Hofmeyr, & Forrest, 2016). In the past, there have been several instances where people's personal information was collected by government agencies without their awareness. An example of such an incident was when it was revealed by WikiLeaks that a United States government agency called the National Security Agency (NSA) collected personal information such as phone records, emails, bank transactions, travel records, and Internet searches of millions of people (N. Lee, 2015). It cannot be assumed that these highly publicised incidents of people's information being used without their awareness and consent went unnoticed by digital natives in Cape Town, South Africa.

Smart city projects have been known to bring benefits to cities such as sustainable economic development (Castro, Jara, & Skarmeta, 2013). However, one may wonder how certain factors influence the privacy concerns that come along with the implementation of smart cities, particularly in the African context. In a time when information can be easily transferred, accessed ,and even shared, it is no surprise that people may have inclinations to be very protective of their personal information (Elhai, Levine, & Hall, 2017).

RESEARCH PURPOSE

Many studies have been done on smart cities in Europe and in emerging economies like the Far East. However, Backhouse (2015) states that "little has been done to understand how this concept is playing out on the African continent, although many African cities are pursuing smart city agendas" (p. 1). The objective of this study is, therefore, to investigate the impact of awareness, perceived benefits, types of collected data, and perceived control on the privacy concerns of digital natives living in the smart city of Cape Town, South Africa.

In line with the objective of the study, the research question is:

What is the impact of need for awareness, awareness of data collection method, perceived benefits, types of data collected, and perceived control on the privacy concerns of digital natives living in the smart city of Cape Town, South Africa?

The study specifically investigated the privacy concerns of the citizens (foreign & local) of Cape Town born between the years of the late 1980s to mid-1990s. While the privacy concerns of non-citizens (i.e., visitors) are also relevant, the study specifically focuses on citizens as they are the ones who reside in the city on a long term basis. This was investigated using a quantitative approach.

Importance of the Study

It is important to study the implementation of smart cities in Africa as research shows that by 2050 almost 70% of the world's people will live in cities (Shanahan et al., 2017). Law makers of African cities need to find efficient ways to accommodate all these people and encourage them to use smart cities technologies. The purpose of this is to reduce the likelihood of African cities investing massive amounts of money into a smart city projects that may end up eventually failing (Backhouse, 2015).

Literature Review

This section examines the current literature relating to the characteristics and implementations of smart cities in Cape Town, South Africa and the privacy concerns associated with smart cities.

Characteristics of Smart Cities

Cities around the world are attempting to transform into smart cities, in order to be more economically competitive and promote sustainable growth (Roche, Nabian, Kloeckl, & Ratti, 2012). According to past studies, the most common characteristics of Smart Cities are "Smart" Governance, "Smart" Environment, "Smart" Living Environment, and a "Smart" Economy.

- "Smart" Governance relates to the use of digital technology in public and government organisations as well as in social services (Rosati & Conti, 2016). Having an efficient and intelligent transportation systems is what makes a city 'smart' in relation to governance (Kondepud et al., 2016). An example of a city's smart governance initiative is the usage of Information Technology (IT) (e.g., Smart LEDs) to monitor and lower the Energy consumption within the city (Chourabi et al., 2012).
- "Smart" Environment relates to sustainable resource management through the use of ICT (Caragliu, Nijkamp, & Del Bo, 2011). A city with a "smart" environment makes use of big data, IoT, and various other technologies in the running and planning of the city's infrastructure and during the provision of city services (Chourabi et al., 2012).
- A "Smart" Living Environment provides benefits for the people living in the city such as free public Wifi, access to e- health, access to smart building services and access to e-education solutions (Kondepud et al., 2016).
- A "Smart" Economy promotes the use of electronic business processes in the city such as e-banking, e-shopping, and e-auction (Kondepud et al., 2016).

Smart City Implementation in Cape Town

Cape Town has often declared that it aims to be a more competitive city with rapid economic growth and economic development (Anthopoulos Fitsilis, 2013; Maumbe, Owei, & Alexander, 2008). Urban development is a priority in Cape Town, as the city continuously receives flocks of South Africans from rural areas and non-south Africans looking for employment and accommodation (Odendaal,

2006). E-government is one the main focus points of Cape Town's smart city strategies (Lourie, 2017). Another focus area in Cape Town's smart city agenda is to provide social and economic development to its citizens by improving ICT skills (Lourie, 2017).

Cape Town has started to use more technology in its day-to-day management (Volkwyn, 2017). In particular, smart metering is being used for electricity and water in 65% of the city's large administrative buildings (Baud, Scott, Pfeffer, Sydenstricker-Neto, & Denis, 2015). In the past, Cape Town has also introduced smart city projects such as the SMART Cape Access (Khati, 2013). The aim of the SMART Cape Access Projects was to provide Cape Town citizens with free access to technology (Valentine, 2004). The project was started in July 2002 and resulted in the installation of 36 Internet enabled computers in six public libraries in poorer areas across the city (Valentine, 2004).

More recently, Cape Town city management has rolled out public Wi-Fi in many areas around the city and actively endeavoured to improve the city's broadband infrastructure in order to reduce the digital divide (Volkwyn, 2017). According to Volkwyn (2017), in order to make Cape Town "Smarter" there has also been an increase in the usage of Closed-Circuit Television (CCTV) cameras in the city. In particular, city management has installed 560 cameras in and around the city in order to make the city safer (Volkwyn, 2017).

Reports on smart city projects in Cape Town often omit information on privacy concerns of the citizens (Smit, Makanga, Lance, & de Vries, 2009). One possible reason for this omission is that smart city initiatives often overshadow the privacy concerns that these projects may bring about (van Zoonen, 2016).

Privacy Concerns in Smart Cities

In a city that relies on smart technologies, everyday activities performed by people leave trails of data on their interests, habits, and intentions (Acquisti et al., 2016). Research shows that people around the world are unknowingly constantly revealing information about themselves to commercial entities, governments, and sometimes to hackers (Acquisti et al., 2016). However, studies show that what data is deemed as private and sensitive varies from person to person, based on one's own cultural and societal definition of privacy (Alashoor, Aryal, & Kenny, 2016; Taddicken, 2014).

When individuals have higher privacy concerns, they will more likely want to protect their data and are less likely to disclose their information to entities that they do not trust (Beuker, 2016). Nonetheless, several research findings also show that, despite the possible privacy concerns in smart cities, these are often overshadowed by the possible benefits of the data collected (van Zoonen, 2016). These findings are in line with the "The Price of Convenience (PoC)" theory (Ng-Kruelle, Swatman, Rebne, & Hampe, 2002) which states that most people are willing to forgo their privacy concerns and privacy rights for the conveniences received in return (Hann, Hui, Lee, & Png, 2007).

Privacy Concerns in South Africa

Threats related to the leakage of personal information of citizens in South Africa may not be common but still occur. Olinger, Britz, and Olivier (2007) write that, in June 2004, it was reported by several South African newspapers that "the South African Post office would sell the personal information of the registered citizens contained in its National Address Database (NAD)" (p. 32). The personal information compromised of data such as the individual's name, identity number, home address, and telephone numbers that were taken from the Ministry of Home affairs in South Africa (Olinger et al., 2007). Even though there are legal protections in South Africa against the misuse of personal information by someone else, illegal interceptions of electronic communication by various people and institutions in South Africa still occur (Harris, Goodman, & Traynor, 2013). In order to specifically look at the privacy concerns of citizens in an African city in relation to smart city implementation, Backhouse (2015) states that future empirical studies are needed to unpack the various nuances of smart city agendas in the African context.

Privacy Concerns in Africa

Research has shown that the widely acknowledged and practiced African philosophy of Ubuntu has greatly influenced the perceptions around privacy in Africa in terms of values and social thinking (Anteneh, Belanger, Borena, & Ejigu, 2015). The philosophy identifies "personhood", which is the rights afforded to a person, as being determined not only by the individual person but largely by the community he or she lives in (Muyia & Nafukho, 2017). Ubuntu values initiatives and actions that will collectively benefit the community even more than the rights of the individual (Makulilo, 2015). In Africa, it can thus be perceived that privacy is determined by the collective society as opposed to being determined by one's own personal beliefs (Borena, Belanger, & Egigu, 2015), which is in contradiction with current western values when it comes to the usage of technologies (Borena et al., 2015). It is said that the concept of privacy and the concept of an individual being self-autonomous is a western concept that has no roots in the African culture (Makulilo, 2015).

By virtue of the fact that it is a generally accepted theory that Africans live in and have a collectivist culture (Harris et al., 2013), it is also theorised that Africans put no value on digital privacy (Olinger et al., 2007). However, Makulilo (2015) notes that this assumption is not necessarily true, and it does not mean that because of the collectivist culture in Africa, there is a lack of understanding and value of privacy in African countries. Makulilo (2015) hypothesised that the desire for African countries to engage in the global e-Commerce market, will force many African governments and people to reconsider their ideas of privacy.

The Multidimensionality of Privacy Concerns in Smart Cities

Research shows that people's informational privacy concerns are affected by not only personal psychological factors, but also external influences (Hsu & Shih, 2009). Consensus in existing research indicates that there are four main factors that influence informational privacy concerns. These are Perceived Benefits, Type of Data Collected, Awareness, and Perceived Control.

- *Perceived Benefits:* Research shows that, for most individuals, if they perceive more benefits than risks, they are then willing to accept the risks and thereupon disclose information. Beuker (2016) and Barth and de Jong (2017) state that, even though people may claim to value their informational privacy, in truth, once they estimate the benefits from the information disclosure, personal information can then be traded. In line with the theory of "The Price of Convenience (PoC)", it is often found that the calculated value of the benefits often outweighs the estimated costs of information disclosure (Culnan & Bies, 2003; Olivero & Lunt, 2004).

- *Type of Data Collected:* According to research, privacy concerns are often determined by the type of information that is being disclosed. Van Zoonen (2016) states that most people consider certain data types as more personal than others, and what people deem as personal information is not always consistent and is dependent on individuals' own definition. Generally speaking, the types of information can be categorised in two groups: personal information and impersonal information (van Zoonen, 2016). Impersonal information includes data such as gender, languages spoken, and home town while personal information contains data such as profile pictures, emails, phone numbers, and personal views/preferences (Beuker, 2016). Research shows that many people believe and fear that snippets of personal information can easily be combined into highly personal consumer profiles (Harris et al., 2013; Tene & Jules, 2013). Impersonal data, on the other hand, is likely to illicit low levels of privacy concerns as this data tends to reveal nothing about individual people (van Zoonen, 2016).

- *Awareness:* Uncertainties on how personal information is collected, used, and shared result in high levels of privacy concerns (Beldad, 2011). An individual's decisions of whether or not to share personal data in a particular environment often depends on an awareness and evaluation of the information supplied about the privacy policies implemented in that particular

environment (Beldad, 2011). According to Dinev and Hart (2014), most people need to have an awareness of the risks involved before making a decision.

Uncertainties often stem from environments that are ambiguous and complex (Dinev & Hart, 2014). Research shows that peoples' uncertainties regarding the usage and the processing of their personal information often triggers feeling of information privacy violations, which could lead them to a disengage from the environment or cause disruptions in the environment (Weltevrede, 2011). Being aware of the methods and technologies used in the data collection of one's personal information is also another factor that influences privacy concerns (van Zoonen, 2016).

- *Perceived Control:* According to Beldad (2011), most people tend to favour the ability to filter the flow of their personal data regardless of the environment they are in. Beldad (2011) further theorises that when people have control of how their personal information is collected, used and shared, this lowers their privacy concerns. Several studies have identified that an individual having a perception of control over their personal data is an important factor in encouraging people to partake in smart city initiatives (Stewart & Segars, 2002). Control over one's personal information can be exercised in two ways: before and after the information is disclosed (Beldad, 2011). Moreover, control over one's personal information can be achieved through various means such as choice, consent, access to the data, and the ability to provide correction of the data (Beldad, 2011).

Digital Natives in Cape Town

Research shows that in the western world it is often perceived that because digital natives grew up with technology, the way they think, behave, and act is shaped by digital technologies (Gu, Zhu, & Zuo 2013; Hoffmann, Lutz, & Meckel, 2014). Identifying digital natives in South Africa and other developing countries is not as easy as it is in the western world due to vast wealth gaps in many developing countries (Thinyane, 2010). A digital native in South Africa was born in a time where there was an increase in the usage of technologies in the world, but because of their economic background and racial discrimination, they might not exhibit the same technological proficiencies and inclinations as those of digital natives in western world (Thinyane, 2010). The legacy of Apartheid in South Africa also had an impact on the uptake of technology by people who fit in the age group of the world's digital natives (Thinyane, 2010). Many of South Africa's digital natives still do not have access to the technologies that were made popular when they were born (Maumbe et al., 2008). Understanding the patterns of access and use of technology by South African digital natives is essential in to hypothesise and understand their privacy concerns (Thinyane, 2010).

Research shows that age influences the behaviour and perceptions of a user of technology. Brown and Czerniewicz (2010) argue that this view is not true in the South African context. Brown and Czerniewicz (2010, p.48) agree with Thinyane (2010) in arguing that in South Africa "age is not a determining factor in students' digital lives; rather, their familiarity (awareness) and experience (exposure) using ICTs is more relevant". In South Africa, those who demonstrate digital native attributes are an elite minority (Brown & Czerniewicz, 2010). The digital native population in South Africa consists of a varied group that has a wide variety of information technology competences (Thinyane, 2010). However, research shows that although in the African region only one in ten young people may be digital natives, it is these young people who are often their nation's drivers in terms of using the Internet and technologies (International Telecommunication Union, 2013).

Summary of the Literature

The literature review found that there is a growing trend of incorporating smart city initiatives in cities all around the world. Although smart city initiatives have the potential to bring various benefits, literature shows that these benefit can sometimes be overshadowed by security and privacy concerns.

In the African context, these privacy and security concerns differ from those of the western world due to differences in culture, economic capabilities, and access to technologies. Cape Town is currently involved in several smart city projects. Therefore, in order to encourage participation in these smart city initiatives, privacy concerns need to be investigated.

THEORETICAL FRAMEWORK & HYPOTHESES

THEORETICAL FRAMEWORK AND CONSTRUCTS

As discussed in the previous section, the main factors that might influence the privacy concerns of people living in smart cities are Perceived Control, Awareness, Perceived Benefits, and Type of Data Collected. The awareness construct was split in two so as to separately investigate the citizens' need for awareness of practices and policies and their actual awareness of methods and technologies used to collect data. A summary of these factors are provided in Table 1.

Table 1. Factors impacting privacy concerns in smart cities

Constructs	Description
Perceived Control	The extent to which citizens perceive that they have control over how their personal information is collected and if they have an option to opt-out of the data collection process (Stewart & Segars, 2002).
Awareness of data collection	This construct relates to an awareness of the methods and technologies that are used to gather/collect data in a smart city (Stewart & Segars, 2002).
Need for awareness	The extent to which citizens need to be aware of smart city's privacy practices and polices – in terms of rules determining access of the data (Beldad, 2011).
Perceived benefits	The perceived benefits and conveniences received in return for granting access to personal data (Ng-Kruelle et al., 2002).
Type of data collected	The perceived nature of the data that is collected (Ng-Kruelle et al., 2002).

The framework that was used in this study is shown in Figure 1. The dependent variable is the levels of privacy concerns of citizens living in the smart city of Cape Town. The independent variables were summarised in Table 1.

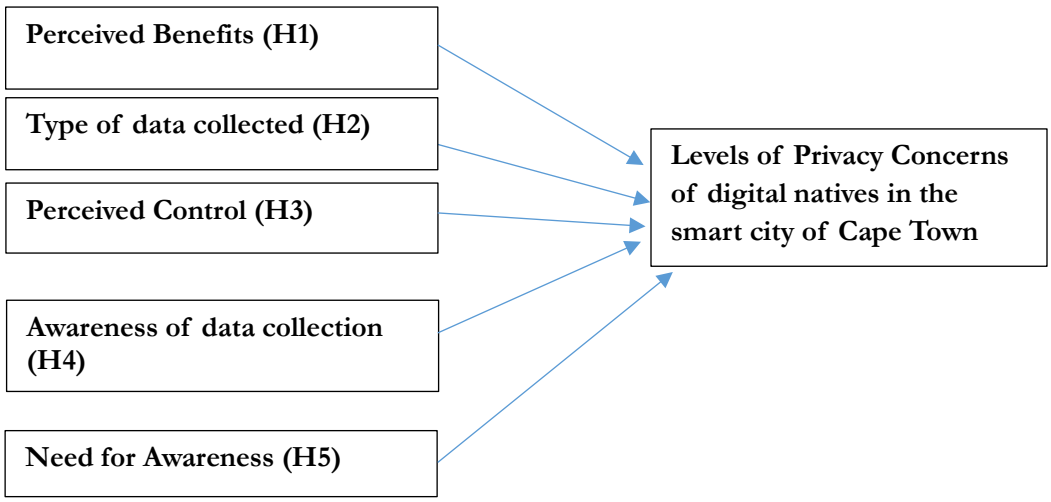

Figure 1: Theoretical Framework

HYPOTHESIS

The hypotheses derived for the study are:

H1: The more digital natives perceive to receive benefits from providing personal data to the smart city of Cape Town, the lower their privacy concerns.

H2: The more impersonal the data being collected by the smart city of Cape Town is, the lower the privacy concerns of the digital natives.

H3: The more digital natives perceive to have control on the data collected about them by the smart city of Cape Town, the lower their privacy concerns

H4: The more the digital natives are aware of how their personal data is collected by the smart city of Cape Town, the lower their privacy concerns

H5: The higher the need to be aware of the security measures put in place during the collection and storage of their personal information by the smart city of Cape Town, the higher the privacy concerns of the digital natives

RESEARCH METHODOLOGY

RESEARCH APPROACH AND PHILOSOPHY

The study adopted a positivist philosophy as the data to be collected is objectively observable and quantifiable. In particular, the study involves finding a cause and effect type of relation. A deductive approach to theory was also chosen as positivists and quantitative studies are usually deductive in nature (Greener & Martelli, 2014). The research strategy was quantitative and involved the collection of numerical data for the purpose of getting precise measurements which can then be converted into useable statistics (Bhattacherjee, 2012).

Since the aim of this study was to identify the current privacy concerns of a certain group of people in Cape Town, a cross- sectional approach was best suited as it provides a present-day "snapshot" of a point of view (Greener & Martelli, 2014).

RESEARCH METHODS

Instrument

An online survey questionnaire of closed questions was the chosen research instrument in this study. An online questionnaire was chosen as it provided anonymous access to groups and individuals who would otherwise be difficult to reach in a short amount of time and in large numbers through other channels. Online surveys also kept the costs for the study to a minimum (Wright, 2005).

In addition to demographics questions, the survey consisted of questions that correspond to each of the constructs in the research framework, namely, Perceived benefits, Type of data collected, Perceived Control, Awareness of Data Collection, Need for Awareness, and Levels of Privacy Concerns.

A Likert scale was used to allow the respondents to indicate their opinions, attitudes, or feelings about a particular issue. A Likert scale with an odd number of options was used. In particular, a 5 point Likert scale of 1 =Strongly disagree, 2 =Disagree, 3 = Both Agree and Disagree, 4 =Agree, 5 = Strongly agree was used.

In order to protect the identity and views of the research population used, all surveys responses were anonymous. Importance was put in maintaining the confidentiality of the data collected and produced in this research. The codes of ethics prescribed by the University of Cape Town were followed while researching was being done.

The online survey questionnaire was sent with a brief introduction note, stating the purpose of the study and a brief description of the study. The introductory note stated that participation in the research was voluntary and participants could opt out of the survey questionnaire at any time.

Participant recruitment

In developed countries, people born in the late 1980s and early 1990s are considered to be digital natives as they are presumed to have grown up in the age of technology (Boyd, 2013). However, due to large wealth inequalities within the South African population, there exist differences in exposure to technologies within this age group (Triegaardt, 2009). Hence, the research population of this study has been limited to Cape Town citizens born in the late 1980s and early 1990s but who also grew up with an exposure and awareness of the popular technologies. Participants were allowed to partake in the survey if their response to the following question was "yes": "Did you have access to a computer and/or Internet during your primary school years (access of this can come from anywhere and is not limited to home access)?"

A combination of non-probability convenience sampling and Judgmental sampling (purposive sampling) approach was used. Convenience sampling selects cases based on their availability and willingness to participate in the study (Palinkas et al., 2015). A Judgment sampling approach was used as the researchers had to rely on logic and judgment to pick the sample population (Palinkas et al., 2015). The sample size was that of 100 responses.

The survey questionnaire was distributed using the online survey tool Qualtrics. The link to the Qualtrics questionnaire was sent via email and on social media in order to target the required population. The emails were sent to mostly university students in the Cape Town as it can be assumed that a large number of digital natives can be found on a university campus. The universities were randomly chosen.

Data analysis methods

Once the data gathering period was concluded the data was extracted from Qualtrics and imported into the statistical analysis software Statistica for basic statistics tests that summarised and described the characteristics of the data gathered. Before being imported, the data was cleaned and coded in Excel in order to ensure it was free of errors and was analysable.

Reliability and item analysis was done using Cronbach's alpha tests. The relationships between the independent and dependent variables were found using Spearman Rank Order correlation analysis and multiple regression analysis tests.

DATA ANALYSIS

The findings are presented in this section. First, the reliability and consistency of the model was tested through the Cronbach's Alpha test. The data was then tested for normality. A descriptive tests analysis of the data was also conducted. The hypotheses were tested using correlation and multiple regression tests based on the normality of the data. Correlation analysis measured the strength of the relationships between variables whereas regression estimated what the relationship was (Saunders, Lewis, & Thornhill, 2009).

RELIABILITY TESTING

Cronbach's alpha tests were performed for each of the constructs (i.e., Perceived Benefits, Types of Data Collected, Awareness and Perceived Control) and were used to measure the internal consistency of responses pertaining to each construct (Bhattacherjee, 2012). A Cronbach's alpha of at least 0.6 is normally required (Bhattacherjee, 2012). Initial results of the Cronbach's Alpha test are shown in Table 2.

Table 2. Cronbach's Alpha Reliability Test Results

Construct	Cronbach's alpha
Perceived Benefits	0.45
Awareness	0.81
Types of data collected	-0.46
Perceived Control	0.72

As can be seen in Table 2, the Cronbach's Alpha values for the Awareness and Perceived Control constructs were acceptable (i.e., > 0.6). This was not the case for the Perceived Benefits and Types of Data Collected constructs. Further investigations into the results for the Perceived Benefits construct, showed that the second question on benefits (*I consider better distribution of city resources such as water, and electricity a benefit of living in a smart city*) had to be omitted so that the Cronbach's alpha for that construct could increase to 0.58 (approx. 0.6).

The negative Cronbach's Alpha result for the Types of Data Collected construct was due to having two similar questions which were inversely formulated:

1. I do not mind it when Cape Town uses data that specifically identifies me in the running of the city,

and

2. I do not mind it when Cape Town uses data about me if it does not specifically identify me (impersonal data/unidentifiable data).

The first question was omitted resulting in a Cronbach's Alpha result of 0.6 for the construct.

An overall instrument's reliability was then tested to assure the reliability and consistency of the instrument as a whole and produced a Cronbach's Alpha of 0.9 and a standardised alpha value of 0.9. Table 3 shows the final results of the Cronbach's Alpha tests performed for each construct and for the overall instrument's reliability after relevant questions were removed from the model.

Table 3. Final Cronbach's Alpha Reliability Test Results

Construct	Cronbach's alpha
Perceived Benefits	0.6
Awareness	0.9
Types of data collected	0.6
Perceived Control	0.7
Overall instrument's reliability	0.8

TEST FOR CONSTRUCT NORMALITY AND DISTRIBUTION

Each construct was tested for normality using the Shapiro-Wilk's (SW) and Kolmogorov-Smirnov. With a $p - value < 0.001$, the SW test is statistically significant for the test items in the constructs. Consequently, all the constructs are non-normally distributed.

DESCRIPTIVE TESTS

63% of the participants were female, 34% were male, and 3% chose not to disclose their gender. In addition, the participants consisted of digital natives from Cape Town born between 1985 and 1995. Most of the participants (77%) were born between 1991 and 1995 and 23% between 1985 and 1990.

HYPOTHESES TESTING

Since the objective of this study is to assess the relationship between the independent variables Perceived Benefits, Types of Data Collected, Awareness, and Perceived Control on the dependent variable (i.e., Level of Privacy Concerns), Spearman correlation tests were first conducted. The value obtained from the Spearman correlation test is called the correlation coefficient (Saunders, Lewis, & Thornhill, 2009). A positive correlation coefficient indicates a positive relationship between the two variables, while negative correlation coefficients indicate a negative relationship (Saunders et al., 2009). The closer the Spearman value is to ±1 the stronger the monotonic relationship between the variables (Saunders et al., 2009). The Spearman correlation test is useful for this study as it can be used on data that comes from Likert Scale variables and can be used for data that is non-parametric (Saunders et al., 2009).

Multiple regression analysis was also employed. Multiple regression analysis was used to determine the probability of the relationship between each individual independent variables and the dependent variable "Levels of Privacy Concerns" occurring by chance (Saunders et al., 2009).

H1: The more digital natives perceive to receive benefits from providing personal data to the smart city of Cape Town, the lower their privacy concerns.

As can be seen in Table 4, no support can be found for Hypothesis 1 as there is no statistically significant negative correlation between the Level of Privacy Concerns of Cape Town smart citizens and the two of the questions related to Perceived Benefits (Q3: 0.43, Q4: 0.38). Only Question 1 on Perceived Benefit has a negative correlation with Level of Privacy Concern (Q1: -0.23).

Table 4. Spearman's Rank Order Correlations: Perceived benefits and Levels of Privacy Concerns

	Spearman Rank Order Correlations MD pairwise deleted Marked correlations are significant at p <.05000		
Variable	**Benefit Q1**	**Benefit Q3**	**Benefit Q4**
Level of Privacy Concern	- 0.23	0.43	0.38

Moreover, the results of multiple regression analysis revealed an R value of 0.50. The degree of correlation is therefore moderate, and only 25.5% of the total variation in the dependent variable Levels of Privacy Concerns can be explained by the independent variable Perceived Benefits. Hence, the study indicates that Perceived Benefits does not significantly influence the levels of privacy concerns of digital natives living in the smart city of Cape Town.

This result is not in line with the findings of other studies such as those in the van Zoonen (2016) study on informational privacy concerns. These results are also in contrast to the theory concepts of "Price of Convenience (POC)" talked about in the literature review of this paper.

H2: The more impersonal the data being collected by the smart City of Cape Town, the lower the privacy concerns of the digital natives

As can be seen in Table 5, there is a signification negative correlation between the Type of Data Collected and the Level of Privacy Concerns in support of Hypothesis 2(Q1: -0.41) at 95% confidence level.

Table 5. Spearman's Rank Order Correlations: Type of data collected and Levels of Privacy Concerns

	Spearman Rank Order Correlations MD pairwise deleted Marked correlations are significant at p <.05000
Variable	**Impersonal Data Q2**
Level of Privacy Concern	-0.41

The results of the regression analysis also revealed that the more impersonal data is collected by the Smart City of Cape Town, the lower the privacy concerns of the digital natives. An R value of -0.39 was obtained indicating that the association is inversely correlated. The "types of data collected" construct shows a statistically significant correlation of a confidence level of 0.00007 (>99%).

The research findings of this study therefore indicate that the more digital natives felt that impersonal data was being collected by the smart City of Cape Town, the lower their privacy concerns. This is consistent with research findings from the van Zoonen (2016) study.

H3: The more control digital natives perceive to have control on the data collected about them by the smart city of Cape Town, the lower their privacy concerns

The results from Table 6 indicate that no support can be found for Hypothesis 3 as there is no statistically significant negative correlation between the Level of Privacy Concerns of Cape Town digital natives and three of the questions related to Perceived Control (Q2: 0.06, Q3: 0.86, Q4: 0.86). Only Question 1 on Perceived Control has a negative correlation with Level of Privacy Concern (Q1: -0.01).

Table 6. Spearman's Rank Order Correlations: Perceived control and Levels of Privacy Concerns

	Spearman Rank Order Correlations MD pairwise deleted Marked correlations are significant at p <.05000			
Variable	**Control Q1**	**Control Q2**	**Control Q3**	**Control Q4**
Level of Privacy Concern	-0.01	0.06	0.86	0.86

The results of the regression analysis also indicate that the variable Perceived Control does not significantly influence the levels of privacy concerns. In particular, a R value of 0.10 and a positive B coefficient of 2.41 was obtained.

Hence, the findings indicate that there is no statistically significant negative correlation between Perceived Control and the level of privacy concerns of digital natives living in the smart City of Cape Town. This result is different from those of other international studies (e.g., Beldad (2011). This difference might be explained by the practiced African philosophy of Ubuntu. Ubuntu places the rights afforded to a person as being determined not only by the individual person but largely by the community he or she lives in. This entices an individual to not put an importance on having control of what information is known about them or how it is used (Anteneh et al., 2015).

H4: The more the digital natives are aware of how their personal data is collected by the smart city of Cape Town, the lower their privacy concerns

Table 7 indicates that no support can be found for Hypothesis 4 as there is no statistically significant negative correlation between the Level of Privacy Concerns of Cape Town digital natives and all of the questions related to awareness of the method of data collection (Q1: 0.004, Q2: 0.020, Q3: 0.86).

Table 7. Spearman's Rank Order Correlations: Awareness of Method of Data Collection and Levels of Privacy Concerns

	Spearman Rank Order Correlations MD pairwise deleted Marked correlations are significant at p <.05000	
Variable	**Awareness Method Q1**	**Awareness Method Q2**
Level of Privacy Concern	0.004	0.02

The results of the regression analysis also indicate that the Awareness of Data Collection Method does not significantly influence the levels of privacy concerns. In particular, a R value of 0.09 and a positive B coefficient of 2.08 was obtained.

Results from the test carried out on this hypothesis, therefore, indicate that the test item does not show a statistically significant correlation to the dependent variable of Levels of Privacy Concerns of digital natives living in the smart City of Cape Town. This result is different from those of international studies (e.g., Beldad (2011)) and could possibly also be explained by the African philosophy of Ubuntu. In the widely adopted African philosophy of Ubuntu, whether or not an individual has an awareness of what rights pertain to them as a person does not influence the actual rights that are afforded to them as an individual (Antenehet al., 2015).

H5: The higher the need to be aware of the security measures put in place during the collection and storage of their personal information by the smart city of Cape Town, the higher their privacy concerns of the digital natives

As shown in Table 8, support could be found for Hypothesis at a 95% confidence level. The table shows that there is a statistically significant positive correlation between the Level of Privacy Concerns of Cape Town digital natives and all of the questions related to the need to be awareness of security measures put in place during data collection (Q1: 0.22, Q2: 0.72).

Table 8. Spearman's Rank Order Correlations: Awareness of Security Measures and Levels of Privacy Concerns

	Spearman Rank Order Correlations MD pairwise deleted Marked correlations are significant at p <.05000	
Variable	**Awareness Security Q1**	**Awareness Security Q2**
Level of Privacy Concern	0.22	0.72

The results of the regression analysis also revealed that the digital natives' need to be aware of the security measures positively significantly correlates to the levels of privacy concerns of living in a smart city at a confidence level of 87%. In particular, an R value of 0.32 and a positive B value of 1.98 were obtained.

Since the correlation between the dependent and independent variables is a positive one, the more the respondents placed an importance on knowing the security measures put in place in the collection and storage of data collected about them, the higher their privacy concerns. This is in line with other international studies (e.g., Stewart & Segars, 2002).

DISCUSSION

The study was conducted using a positivist and quantitative approach and five hypotheses were tested. Of these five hypotheses, only two were shown to have statistical significance as shown in Table 9.

The findings reveal that the more impersonal data is collected by the Smart City of Cape Town, the lower the privacy concerns of the digital natives. This is in line with van Zoonen (2016) who also found that the collection of impersonal data illicits low levels of privacy concerns, given the type of data that is being collected (e.g., gender, language spoken etc.).

The findings also show that the digital natives of Cape Town have higher privacy concerns when their need to be aware of the security measure put in place by the city is high. This is in line with past studies which also found that people's uncertainties regarding how their personal data is used and processed often triggers feeling of information privacy violations (Weltevrede, 2011).

Table 9. Hypotheses Results

Hypothesis	Result
H1: The more digital natives perceive to receive benefits from providing personal data to the smart city of Cape Town, the lower their privacy concerns.	Rejected
H2: The more impersonal the data being collected by the smart city of Cape Town, the lower the privacy concerns of the digital natives.	Accepted
H3: The more control digital natives perceive to have control on the data collected about them by the smart city of Cape Town, the lower their privacy concerns	Rejected
H4: The more the digital natives are aware of how their personal data is collected by the smart city of Cape Town, the lower their privacy concerns	Rejected
H5: The higher the need to be aware of the security measures put in place during the collection and storage of their personal information by the smart city of Cape Town, the higher their privacy concerns of the digital natives	Accepted

In the study Hypothesis 1 was rejected. This is not in line with past studies which found that people are willing to accept risks and disclose information when they perceive more benefits than risks in doing so (Beuker, 2016; Barth & de Jong, 2017). Hypotheses 3 and 4 were also rejected, in contrast to what has been said in literature (Beldad, 2011; Stewart & Segars, 2002).

Possible reasons as to why these hypotheses were rejected might relate to the philosophy of Ubuntu and other cultural beliefs that have rendered privacy concerns not as crucial or central to one's life in Africa, as compared to Western Cultures (Borena et al., 2015). Furthermore, it has been stated in literature that what data is deemed as private and sensitive varies from person to person, based on one's own cultural and societal definition of privacy (Alashoor et al., 2016; Taddicken, 2014).

It is important to understand the privacy concerns of the digital natives because, in a world that is more and more driven by sophisticated technologies, it can be argued that these digital natives are best able to navigate and use these technologies in the future. Cities need the technologically wise and

experienced to define, discuss, and evaluate the impact of different technologies in our societies in terms of ethics and liabilities (Prensky, 2009). In addition, cities should also consider the concerns of digital natives because recent history has shown that digital natives have been known to use their technological abilities to drive movements and unrest for change in the cities, which has now been coined as digital activism (Weltevrede, 2011).

This study contributes to scientific literature by detailing the impact of specific factors on the privacy concerns of citizens living in an African city. For city law makers in Cape Town, this study has practical implications as it provides information on relevant focus areas on which the law makers could pay attention to, with the aim to encouraging and appeasing any apprehensions from its citizens towards smart city implementations.

While these study's findings add to the body of knowledge, there were, however, limitations in the findings. Most of the participants in the study were university students, and a wider net should have been cast on finding participants. The sample size in future similar studies should be bigger. Income bracket, work industry, race, and gender are some of the attributes which were not taken into consideration in this study and should be taken into consideration in future similar studies.

CONCLUSION

Past studies indicate that there are four main factors that influence the privacy concerns of citizens living in smart cities. These factors are Awareness, Perceived Benefits, Types of Data Collected, and Perceived Control. However, these studies have mostly been conducted in developed countries and little is known about their impact in emerging smart cities in developing countries. This study investigated the impact of Perceived Benefits, Type of Data Collected, Perceived Control, and Awareness on the Level of Privacy Concerns of digital natives living in Cape Town, South Africa.

Only two of the five hypotheses were shown to have statistical significance. For the purpose of delving deeper into the reasons why some of the hypotheses could not be proven, it would be useful to make use of open ended questions. The open ended questions could be implemented through a mixed method research approach that would allow for an in-depth exploration on how the independent variables in this study influence the dependent variable. The use of open ended questions in a qualitative study could also be used to further identify other factors that might influence privacy concerns of digital natives living in the smart city of Cape Town.

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APPENDIX - QUESTIONNAIRE

A smart city is a city that incorporates the use of Information communication technologies (ICT) and the internet of things, in the managing and monitoring of city resources. A smart can use several technologies such as surveillance cameras and smart energy consumption meters in the running of the city. The concept of smart cities is used in various city management areas such as public safety, infrastructure design and infrastructure monitoring.

Data is constantly being produced and consumed in smart cities, data such as vehicle movements, visitor movements, energy consumption, neighbourhood sentiments and crowd control data. Data from different sources in smart cities is often integrated together in the aim of gaining a picture of the city's status in terms of safety, economic vitality and in terms of city resources usage.

Where you born between the years of 1985 to 1995	Yes	No
Please indicate your age		
Please indicate your gender	Male	Female
Do you have a place of residence in the city of Cape town?(You do not have to own the residence and can be renting or living with family or in university residence)	Yes	No
Did you have access to a computer/ and or internet during your primary school years? (access of this can come from anywhere, and is not limited to home access)	Yes	No

Benefits					
Kindly indicate the extent to which you agree or disagree with the following statements	Strongly disagree	Disagree	Both Agree and Disagree	Agree	Strongly agree
1. I consider better city service delivery a benefit of living in a smart city. 2. I consider better distribution of city resources such as water, and electricity a benefit of living in a smart city. 3. I believe that smart city initiatives will threaten rights to privacy. 4. I believe that smart city initiatives will negatively affect people's rights to confidentiality.					

Types of data collected					
Kindly indicate the extent to which you agree or disagree with the following statements	Strongly disagree	Disagree	Both Agree and Disagree	Agree	Strongly agree
5. I do not mind it when city of Cape Town uses data that specifically identifies me in the running of the city. 6. I do not mind it when the city of Cape Town uses data about me if it does not specifically identify me (impersonal data/unidentifiable data).					

Control					
Kindly indicate the extent to which you agree or disagree with the following statements	Strongly disagree	Disagree	Both Agree and Disagree	Agree	Strongly agree
7. I need to have control over what data is collected about me by the city of Cape Town. 8. I need to have the option of being able to opt out of data being collected about me by the city of Cape Town. 9. I need to have control over the technologies used to collect data about me by the city of Cape Town 10. I need to have control over how data is collected about me by the city of Cape Town					

Awareness (Methods of data Collection)					
Kindly indicate the extent to which you agree or disagree with the following statements	Strongly disagree	Disagree	Both Agree and Disagree	Agree	Strongly agree
11. Being aware of how data about me is collected by the city of Cape Town is important to me. 12. Being aware of what technologies are used in the collection of data about me by the city of Cape Town is important to me.					

Awareness (Need to be aware)					
Kindly indicate the extent to which you agree or disagree with the following statements	Strongly disagree	Disagree	Both Agree and Disagree	Agree	Strongly agree
13. Knowing how the data collected about me by the city of Cape Town is distributed to other departments in the City of Cape Town and other entities is important to me. 14. Knowing how the data that is collected about me is used by the city of Cape Town is important to me.					

Privacy concerns					
Please rate your level of privacy concerns in the following scenarios, 5 being very concerned and 1 being no concern.	1	2	3	4	5
15. The city of Cape Town collects personal data (identifiable data) about me. 16. The city of Cape Town collects impersonal data about me (non-identifiable data). 17. My personal data is collected by the city of Cape Town and is used for bettering city management, city planning, enhancing city services and providing better support to local citizens. 18. I am aware of who, and/or what is collecting data about me in the City of Cape Town. 19. The method of data collection by the City of Cape Town involves surveillance and specifically identifies individuals. 20. The method of data collection by the city of Cape Town involves surveillance but does not specifically identify individuals. 21. When I am aware of the methods used in the collection of data on me by the city of cape town. 22. When I am aware of how data collected about me by the city of Cape Town is used. 23. When I feel that I have control over what data is collected about me by the city of Cape Town. 24. When I feel I have control over how data is collected about me by the city of Cape Town. 25. When I feel I have control over how much data is collected about me by the city of Cape Town 26. When I am aware of how data collected about me by the city of Cape Town is shared among departments in the city of Cape Town and with external entities. 27. When I do not know the security measures put place in the collection and storage of my personal data by the City of Cape Town. 28. When I know the accuracy of the data collected about me by the city of Cape Town. 29. When I know who has legitimate access to the personal information collected about me by the City of Cape Town.					

BIOGRAPHIES

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ADDRESSING INFORMATION LITERACY AND THE DIGITAL DIVIDE IN HIGHER EDUCATION

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ABSTRACT

Aim/Purpose — The digital divide and educational inequalities remain a significant societal problem in the United States, and elsewhere, impacting low income, first-generation, and minority learners. Accordingly, institutions of higher education are challenged to meet the needs of students with varying levels of technological readiness with deficiencies in information and digital literacy shown to be a hindrance to student success. This paper documents the efforts of a mid-Atlantic minority-serving institution as it seeks to assess, and address, the digital and information literacy skills of underserved students

Background — A number of years ago, a historically Black university in Maryland developed an institutional commitment to the digital and information literacy of their students. These efforts have included adoption of an international certification exam used as a placement test for incoming freshmen; creation of a Center for Student Technology Certification and Training; course redesign, pre and post testing in computer applications courses; and a student perception survey.

Methodology — A multi-methodological approach was applied in this study which relied on survey results, pre and post testing of students enrolled in introductory and intermediate computer applications courses, and scores from five years of placement testing. Student pre and post test scores were compared in order to examine degree of change, and post test scores were also assessed against five years of scores from the same test used as a placement for incoming freshmen. Finally, a

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	student perception and satisfaction survey was administered to all students enrolled in the courses under consideration. The survey included a combination of dichotomous, Likert-scaled, and ranking questions and was administered electronically. The data was subsequently exported to Microsoft Excel and SPSS where descriptive statistical analyses were conducted.
Contribution	This study provides research on a population (first-generation minority college students) that is expanding in numbers in higher education and that the literature reports as being under-prepared for academic success. Unfortunately, there is a paucity of current studies examining the information and technological readiness of students specifically enrolled at minority serving institutions. As such, this paper is timely and relevant and helps to extend our discourse on the digital divide and technological readiness as it impacts higher education. The students included in this study are representative of those enrolled in Historically Black Colleges or Universities (HBCUs) in the United States, giving this paper broad implications across the country. Internationally, most countries have populations of first-generation college students from under-served populations for whom a lack of digital readiness is an also an issue therefore giving this study a global relevance.
Findings	The digital divide is a serious concern for higher education, especially as schools seek to increasingly reach out to underserved populations. In particular, the results of this study show that students attending a minority serving institution do not come to college with the technology skills needed for academic success. Pre and post testing of students, as well as responses to survey questions, have proven the efficacy of computer applications courses at building the technology skills of students. These courses are viewed overwhelmingly positive by students with respondents reporting that they are a necessary part of the college experience that benefits them academically and professionally. Use of an online simulated learning and assessment system with immediate automated feedback and remediation was also found to be particularly effective at building the computer and information literacy skills of students. The total sample size for this study was over 2,800 individuals as data from 2690 IC^3 tests administered over a five year period were considered, as well as 160 completed surveys, and pre and post testing of 103 students.
Recommendations for Practitioners	Institutions of higher education should invest in a thorough examination of the information and technology literacy skills, needs, and perceptions of students both coming into the institution as well as following course completion.
Recommendation for Researchers	This research should be expanded to more minority serving institutions across the United States as well as abroad. This particular research protocol is easily replicated and can be duplicated at both minority and majority serving institutions enabling greater comparisons across groups.
Impact on Society	The results of this research help to shed light on a problem that desperately needs to be addressed by institutions of higher education, which is the realities of the digital divide and the under preparedness of entering college students in particular those who are from low income, first generation, and minority groups
Future Research	A detailed quantitative survey study is being conducted that seeks to examine the technology uses, backgrounds, needs, interests, career goals, and professional expectations with respect to a range of currently relevant technologies.

Keywords digital divide, information literacy, first generation college students, technology readiness, HBCU, minority learners, technology assessment, digital literacy, under prepared students, IC3, computer skills, computer concepts course, computer education, generation z, computer skills assessment, UMES, University of Maryland Eastern Shore, SAM, Cengage, skills assessment management, Certiport, technological competency

INTRODUCTION

Institutions of higher education are challenged to meet the needs of students with varying levels of technological readiness with technology skill deficiencies shown to be a hindrance to student success. First generation college students, and minority learners, are even more likely to be on the negative end of the digital divide. More specifically, when the perceptions and experiences of freshmen attending Historically Black Universities has been examined, not only is technology access and ownership found to be less prevalent than what has been reported out of majority institutions, but HBCU freshmen are found to be less prepared to use the internet, core computer applications, and digital library/scholarly resources for academic pursuits (Buzzetto-Hollywood, 2017). This paper reports the results of a study that examined the technological readiness of students attending a Mid-Atlantic minority serving university, the efficacy of computer software applications courses, and the usefulness of a simulated learning and assessment system in building the computer and information literacy skills of students. A multi-methodological approach was applied which relied on survey results, pre and post testing, and scores from five years of placement testing.

Founded in 1886, the University of Maryland Eastern Shore (UMES) is a Historically Black, 1890 land grant institution. It is a member of the University system of the State of Maryland and primarily serves first generation, low income, and minority learners. The student population is approximately 3400, as of the fall of 2016, with a student body that is approximately 78% African-American, 9.6% white, 1.4% Hispanic, and 11% international, primarily coming from the continent of Africa and/or from the Caribbean region. The gender distribution of the University is 64% female and 36% male. The freshmen-to-sophomore retention rate is 71%, and the graduation rate is 41%. The student to faculty ratio is 15 to 1 and 85% of students receive financial aid. Situated in the historic town of Princess Anne, UMES has a 1100 acre rural campus and is located on the far south eastern corner the State. Uniquely situated, it is the only research and doctoral degree granting institution of the University System of Maryland on the Eastern Shore of Maryland and its programs in Construction Management Technology, Aviation Sciences, and Hospitality and Tourism Management are unique to both the state and the region. UMES was ranked in the top 25 among Historically Black Colleges and Universities (HBCU) in 2014 (University of Maryland Eastern Shore, 2014) and the acceptance rate for applying students was 62.4% with the majority of students coming from the Mid-Atlantic region, more specifically the Baltimore and Washington D.C. urban centers.

The University of Maryland Eastern Shore, like all other U.S. institutions, has a required general education curriculum designed to build a comprehensive core educational base upon which a student's major concentration is constructed. According to the Middle States Association of Colleges and Schools, the competencies identified in the Middle States' Characteristics of Excellence Standard 12, General Education are written and oral communications, scientific and quantitative reasoning, critical analysis and reasoning, technological competency, and information literacy. The same five competencies are also required by the Maryland Higher Education Commission in order to meet the Student Learning Outcome and Assessment Report standards.

In terms of technological competency, the overarching desired student learning goal is that students be able to use technology in the analysis and communication of ideas and in the management, organization, and examination of information. Specific Student Learning Outcomes are that students able to:

- describe essential components of a computer system;
- define and identify the basic components of a database;
- identify and define basic internet terminology and activities;
- demonstrate the ability to create and edit documents, author reports and newsletters, prepare mailings, create templates, merge documents, prepare brochures and posters, and create tables and charts;
- demonstrate their knowledge and skills to create and edit spreadsheets, conduct calculations, and create and print graphs;
- use an email program to organize, compose, edit, and send messages;
- use presentation software for the delivery of professional presentations, the preparation of slide shows, and the development of web-enabled video files; and
- use a variety of search services to locate and evaluate resources.

A survey of UMES entering freshmen in 2009 found that, with respect to their prior and current use of digital technologies, most students self-reported that they were strong in the use of Email, the World Wide Web, and basic use of Microsoft Word. Less experience, however, was found when other key applications used to develop spreadsheets, create databases, prepare presentations, and develop newsletters, brochures, reference lists, and mailings were considered. In 2010, in response to the survey findings as well as feedback from faculty involved with the teaching and coordination of the computer concepts courses, a committee was formed and the technological and information literacy learning goals of the University were reexamined. It was decided that a significant population of freshmen may be adept users of social technologies yet lack the foundational digital skills to effectively perform basic academic tasks essential for success in college. As such, they fall behind simply because they aren't able to access, process, utilize, and exchange information at the speed of their peers. A detailed review of available options was considered and it was decided that an instrument designed to provide external professional validity for meeting digital literacy would be adopted and used as a placement test for freshmen. Several options were considered and the IC³ examination was selected.

The IC³ is the abbreviation and registered trademark of the "Internet and Computing Core Certification." The IC³ is a global certification program that is designed to certify an individual's digital literacy skills. IC³ is the first computer certification to be recognized by the National Skill Standards Board (NSSB) (Certiport, 2016). Since 2011, at UMES all freshmen students are required to take IC³ exam. Each IC³ examination consists of multiple choice, matching, and "hands on" performance-based questions. The exam is comprised of three major coverage areas: computer fundamentals, key applications, and living online (see Figure 1.)

The IC³ Fast Track has no established passing score; rather this decision is left to the discretion of the adopting institutions. The test is based on a combined score of 1000 points generated through completion of three sections. The passing score for UMES was established by the Office of the Vice President of Academic Affairs at the time of adoption and was set at 500 out of 1000. As of the fall of 2016, 2690 IC³ Fast Track examinations had been administered to students.

The IC³ is used to assess students' technological readiness, identify student weaknesses, and provide remediation services through use of the Internet and Computing Mentor remediation system. The tutoring functionality of the Internet and Computing Mentor enhances the digital learning experience for users by offering multiple levels of assistance. If a question is answered incorrectly, the system will graphically guide them in finding the correct answer. In addition, study guides enable prescriptive/just-in-time learning. Finally, the Mentor's reporting capabilities allow users to assess current status of skill sets, required remediation, skills progression, and testing readiness.

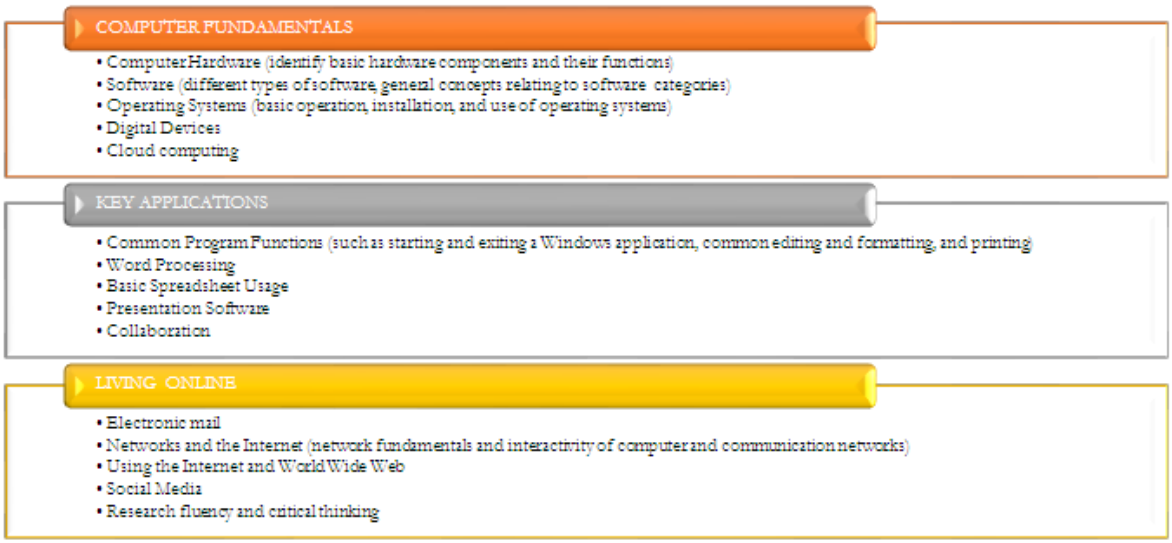

Figure 1: IC3 Exam Sections

In addition to use of the IC³, computer concepts and applications courses offered by the University were redesigned and a Center for Student Technology Competency and Certification (CSTCC) was created, which delivers Microsoft Adobe and Comptia Certifications, runs technology workshops, administers IC³ testing, provides remediation services, avails technical assistance and a staffed lab space, and supports students registered in core computing courses including providing assistance with e-portfolios and the SAM simulated learning and assessment system.

Students receiving a passing score on their first attempt have been encouraged to continue forward throughout their degree program and to take whatever technology course is required for their program (usually BUED 212: Computer Concepts). Particularly, high scoring students are encouraged to take the more advanced BUAD 213: Business Software Applications as well as to attend voluntary Microsoft Office Specialist training sessions in order to earn professional certification. Students who do not pass on their first attempt have been able to attend review sessions and utilize the Internet and Computing Mentor in order to enhance and build their skills as well as prepare for, and take, retests. For students, who either fail to return for retesting or who do not pass after two attempts, no specific additional program has been introduced; however, they are urged by representatives of the UMES CSTCC to attend additional trainings and enroll in BUED 212: Computer Concepts without hesitation. It is important to note, that student participation in remediation and/or training sessions is completely voluntary.

The two courses that were redesigned as part of this initiative include BUED 212: Computer Concepts (an introductory general education course required by most majors at the University, and therefore taken by the majority of all students) and BUAD 213. BUAD 213: Business Software Applications is an intermediate level course. BUAD 213 is required for business and STEM majors. While, some students elect to take both BUED 212 and BUAD 213; the 212 is not a pre-requisite for 213. Both BUAD 212 and BUAD 213 are offered both in-person and online, and highlights include information literacy sessions held with the assistance of library staffers, a critical thinking research project, skill building using the SAM (Skills Assessment Management) system, and the development of e-portfolios.

In 2017 an evaluation of 5 years' worth of IC3 test scores were conducted (Buzzetto-Hollywood, 2017) concluding that freshmen students arrive with a basic level of information literacy, a rudimentary knowledge of computer fundamentals, and are well-versed in social media and the World Wide Web. However, when it comes to the use of core computer applications, students were found to be woefully deficient. This paper builds on and extends the findings of this earlier study. It more specifi-

cally considers the impact and efficacy of the computer concepts and applications courses. Additionally, this paper delves deeper into the examination of the technological readiness of students attending a Mid-Atlantic minority serving university through a survey of students following course completion.

LITERATURE REVIEW

There is a common and growing misbelief that students enter higher education with the computer skills necessary for success, therefore, making computer applications courses unnecessary; however, the research shows major skill deficiencies among students (Buzzetto-Hollywood, Elobeid, & Elobaid, 2017; Hanson, Kilcoyne, Perez-Mira, Hanson, & Champion, 2011; Mishra, Cellante, & Kavanaugh, 2015). Hargittai (2005) explains that students express this inflated sense of confidence in their digital literacy because they have mastered the small portion of familiar technologies that they use on a daily basis.

Information literacy is the ability to collect, evaluate, assemble, reflect upon, and use information in order to learn and inform problem-solving and decision making (Bruce, 2003). Technological literacy, which is increasingly being tied into information literacy, is the understanding of the uses, functions, and purposes of technology for the achievement of goals (Buzzetto-More, 2009; Pearson & Young, 2002). Both are skills that are increasingly playing an important role in lifelong learning and that are dependent on the ability to engage in critical and reflective thinking (Bruce, 2003; Buzzetto-More, 2009).

Mishra et al. (2015) explained that, while students are generally proficient in the locating of information online through search engines, they are less skilled in the use of productivity software commonly found in business and industry. In particular, they noted that technology terminology, use of spreadsheets and databases, operating systems, core software applications, computer ethics, and cyber security are all areas which they found lacking when students were pretested prior to taking a college-level introductory computing course. As a result, they concluded that entering freshmen have not developed the basic technology skills in order to be successful in academia and the workplace and that computer concepts courses are crucial at rectifying these deficits.

Similiarly, Nataraj (2014) concluded that students do not develop the necessary technology skills in high school which must, therefore, be addressed by colleges early in the academic experience. Nataraj used pre and post testing of freshmen students enrolled in a course titled Introduction to Computers and found that an introductory computer course offered early in the academic experience result in a significant improvement in students' computer literacy.

Heerwegh, DeWit, and Verhoeven (2016), understanding the crucial role that computers play in the training of future scientists as well as in the profession, tackled the misconception that most students have mastered basic ICT skills. They built on the body of research that has examined the technological inequities of students finding that ICT self-efficacy was greater for students who believed computer are both useful and necessary for their work as well as the belief that the individual has control over computing technologies.

Following an examination of the extent that computer-related factors affect the success of nontraditional college students, Henson (2013) concluded that reduced confidence adversely affects the entire college experience for students and, ultimately, successful employment. After further considering a number of indicators, the author concluded that high school access was the most significant factor in determining computer efficacy in college students. In a follow up paper, Henson (2014) went on to explain that fewer high school graduates and limited numbers of skilled employees are predicted to cause labor shortages in technical fields unless more is done to increase the computer efficacy of non-traditional college students.

First-generation college students are those whose parents have not attended college or earned a four-year degree. They represent about 20% of students entering college and have been found to face additional psychological challenges due to a lack of intergenerational continuity, fewer resources, breakaway guilt, and a lack of familiarity with college expectations (Banks-Santilli, 2015).

A detailed study that focused on the digital and information literacy skills of primarily first-generation students attending a mid-Atlantic historically Black university was conducted (Buzzetto-Hollywood et al., 2017). According to the data:

- incoming college freshmen have a very basic level of information and technological literacy;
- arrive with a rudimentary knowledge of computer fundamentals;
- are proficient in the use of email, social media, conducting online searches, and navigation of the World Wide Web;
- are terribly deficient when it comes to the use of core computer applications used for academic and professional productivity.

Socio-economic factors and issues of the digital divide are consistently found to be significant. Subramony (2014) explains that the digital divide remains one of the biggest social challenges in modern times despite the ubiquitous nature of technology. This was similar to a study by Ritzhaupt, Liu, Dawson, and Barron (2013) who examined 5,990 students from 13 school districts across the state of Florida and found that the digital divide remains prevalent in the United States. It was further confirmed by Buzzetto-Hollywood et al. (2017) who found that students attending a mid-Atlantic historically Black university arrived on campus with severe deficiencies when it came to the use of core computer applications.

Almost one-fifth of U.S. households don't have internet access, and these families are more likely to include first-generation college and low-income college students (Williams, 2017). This was especially highlighted in a 2016 Pew Research Poll (Anderson, 2017), which revealed that lower income households have lower levels of tech adoption, are less likely to use the internet as a source for learning, and are less likely to be confident in their digital technology skills. Conversely, individuals with high incomes were found to own multiple devices capable of accessing the internet and World Wide Web. Also, 2/3 of adults living in high-earning households have home broadband services, a smartphone, a desktop or laptop computer, and a tablet, compared with 17% of those living in low-income households. Additionally, many lower-income Americans are relying more on smartphones as their only technological device. In 2016, one-fifth of adults living in households earning less than $30,000 a year were "smartphone-only" internet users, who owned a smartphone but did not have broadband internet at home. This is an increase from 12% in 2013 and contrasts with only 4% of those living in households earning $100,000 or more who fell into this category in either year. Finally, disparities in online access were found in what Pew has called the "homework gap," referring to the divide between school children with respect to technology and internet access.

In a large-scale study reported by Library Journal (Dixon, 2017), first-year college and university students enter with widely varying levels of information literacy that is compound by a national funding crisis that has left so many K–12 public schools without functioning school libraries and trained school librarians/media specialists. According to the report, less than one-third (28%) of first generation college students enter with proper research skills, which means that they're unable to establish a research topic and design objectives, conduct effective searches, use optimal electronic information databases and resources, evaluate the credibility of sources, and properly cite sources. Further, the article explained that first-year students sometimes lack an understanding of what they need to learn or how research can benefit them. This problem is exacerbated by student's overconfidence, apathy, and short attention spans which make them less willing to attend or absorb new training. Other librarians cited problems such as student apathy and a lack of attention span as additional challenges.

Similarly, a study in Spain showed the presence of "asymmetries" among university freshmen when it came to use of ICTs and concluded that the inequalities that exist among university students are the source of an important problem (Ricoy, Feliz, & Couto, 2013). Further, a 2013 paper published in the Journal of Higher Education (Relles & Tierney), which examined the technology skills of low income students enrolled in remediation courses, found that a lack of computer literacy and the technology demands placed by the remediation software required further exacerbated the preparation gap and academic challenges of students. Finally, Zielezinski (2017) found that bridging the digital divide is an urgent need and that, despite the preponderance of hardware and software in American K-12 schools, it is not equitably applied with K-12 schools in low-income neighborhoods primarily using technology for remediation purpose.

Specifically targeting minority-serving institutions, a study conducted at the University of Maryland Eastern Shore and Fayetteville State University (Buzzetto-More & Sweat-Guy, 2007) examined the perceptions and experiences of freshmen students at two Historically Black Universities with respect to their technology ownership and usage and their information acquisition habits. The findings showed that technology access and ownership is less prevalent than what has been reported out of majority institutions, but more importantly, that HBCU freshmen are less prepared to use the internet and digital library/scholarly resources for academic pursuits.

There are 101 accredited HBCUs in the United States educating nearly 300,000 students at tuitions averaging 30% less than those charged by comparable institutions. Approximately 80% of their students are African American, and >70% are from low-income families. While they account for only 3% of public and not-for-profit private institutions receiving federal student aid, they enroll 10% of African American college students nationwide, produce 17% of the bachelor's degrees earned by African Americans, 24% of the degrees earned by African Americans in science, technology, engineering and math, and are the top producers of African American Ph.Ds (UNCF, 2017). HBCUs have never abandoned their mission of providing educational opportunities to students who may be otherwise marginalized; however, they are currently facing a number of challenges including declining enrollment numbers and lower-than-average graduation and retention rates (Seymour & Ray, 2015). Nevertheless, HBCUs are found to provide deeply supportive educational environments that are unparalleled elsewhere with black graduates of HBCUs more likely than black graduates of other institutions to be thriving (Seymour & Ray, 2015). Responsible for creating the Black middle class, they were found in a 2017 Brookings report to provide a foundation for economic growth and development that, with more investment, can revive some of America's most struggling cities (Perry, 2017).

METHODOLOGY

This study sought to examine the efficacy of institutional efforts to address the digital literacy skills of students. A multi-methodological approach was applied, which relied on placement test scores, survey results, and pre and post skill testing. Pre and post testing of students enrolled in BUED 212 was conducted in the spring of 2017using the IC^3 test administered during the second and 15th week of the academic term. Instructor permission had to be obtained before the assessment could be administered, and the test could only be administered to in-person course sections held on campus in order to comply with Certiport Authorized Testing Center agreement requirements. As such, students enrolled in the fully online sections could not be included. Pre and post test scores were compared in order to consider degree of change. Additionally, post test scores were compared to five years 5 years of IC^3 scores of incoming freshmen used as a placement test. Finally, an online student perception and satisfaction survey was administered to all students enrolled in the courses under consideration during the fall of 2017. The survey included a combination of dichotomous, Likert-scaled, and ranking questions and was administered using the Survey Monkey system. The data was subsequently exported to Microsoft Excel and SPSS where descriptive statistical analyses were conducted. During the analyses the following hypotheses were explored.

H_1- Computer applications courses are effective at building the technology skills of students.

The computer concepts and applications courses BUED 212 and BUAD 213 were considered when examining this hypothesis. With the introductory course, BUED 212, emphasis is placed on various computer concepts with respect to hardware, networking technologies, and software applications. Contemporary computer software for word processing, presentation delivery, spreadsheet design, and basic database development relevant to business and industry are explored. The intermediate BUAD 213 course covers computing concepts; basic networking topologies and concepts; the internet and World Wide Web; using and configuring the MS Windows Operating System; intermediate/advanced desktop publishing using MS Word 2016; advanced presentation design, customization, and delivery in MS PowerPoint 2016; email communications and time management in MS Outlook 2016; use of MS Access 2016 to create and customize a database, prepare forms, run reports, filter data, and run queries; information literacy skills; and use of MS Excel 2016 to create spreadsheets, apply mathematical and statistical functions, manage and protect large notebooks, prepare pivot tables and pivot charts, create a variety of formulas including logical functions to inform decision making, advanced charting and conditional formatting, trend analyses and forecasting, and development of macros.

In the spring of 2017, four sections of BUED 212, representing 58 students, were considered and pre and post testing utilized. The scores were subsequently compared and an improvement of >20% was set as the target. The BUED 212 scores were also compared to 5 years of IC^3 scores of incoming freshmen.

Finally, a survey was administered to students who had completed BUED 212 and BUAD 213 and responses to three Likert-scaled survey statements were considered in the analyses with means of >3.0 set as the target. The statements were the following: 1) my technology skills have improved as a result of this course, 2) I have become more skilled at using computer applications as a result of this course, and 3) this course has helped me become better prepared for my future career.

H_2- Students attending a minority serving institution do not come to college with the technology skills needed for success.

This preponderance of literature indicates that students entering higher education are arriving with deficiencies in their computer skills, and this is a particular issue among minority students. This hypothesis was measured with two five-point Likert-scaled survey statements: 1) My high school prepared me with all the computer skills I needed to succeed in college, and 2) I wish I had come to college with better computer applications skills. It was decided that if a mean of >3.0 was achieved on one and <3.0 on the other, then the threshold for affirming the hypothesis had been met.

H_3- Computer applications courses are a necessary part of a college curriculum.

This hypothesis is predicated on the idea that students in higher education do not possess the computer applications and technological skills necessary for academic and career success and that accordingly computer applications courses offered early in a student's college experience remedy these deficiencies and enhance students' skills. This hypothesis was measured with an examination of agreement to a Likert-scaled survey statement, "It is important for college students to take computing courses." Whereas if means of >3.0 was achieved, then the threshold for affirming the hypothesis was viewed as having been met.

H_4- Use of a simulated learning and assessment system is perceived as effective by students learning computer concepts.

Skills Assessment Manager (SAM) is an online learning environment designed to help students master Microsoft Office skills and computer concepts. SAM engages students in self-paced learning through interactive guided tutorials and real world simulation projects that are system graded and that provide automatic and targeted feedback. This hypothesis was tested with a Likert-scaled survey statement, "Use of the SAM system enhanced my under-standing of course con-tent." If means of >3.0 is achieved, then the threshold for affirming the hypothesis is viewed as having been met.

FINDINGS

The sample size for this study was well over 2,800 individuals coming from three distinct data sets. The first group of participant data came from 2,690 IC^3 tests administered over a five year period as placement tests where scores were scrutinized. The second set of participant data came from 160 completed surveys from the fall of 2017 of students enrolled in BUED 212 and BUAD 213 representing >71% and >90% response rates respectively. This survey data was collected and basic statistical analyses applied. The third data set came from a random sample of 65 students enrolled in BUAD 212 who were selected to complete pre and post testing. These three points of data were used to test five hypotheses. In this section, each of the hypotheses are tested and related back to the literature.

H_1- Computer applications courses are effective at building the technology skills of students.

In the spring of 2017, four sections of BUED 212 representing 65 students were considered and pre and post testing utilized. The scores were subsequently compared and an improvement of >20% was set as the target. Additionally, completion scores were compared to 5 years of IC^3 scores of incoming freshmen as well as student responses to a survey question. The results are depicted in multiple tables.

Table 1 presents the IC^3 scores of 2690 entering freshmen who had taken the test between 2011 and 2016. Students are allowed multiple attempts on the test with students who do not pass on their first attempt able to attend review sessions and utilize the Internet and Computing Mentor in order to enhance and build their skills in preparation for retesting. It is important to note that student participation in remediation and/or training sessions is completely voluntary. Table 1 presents the final scores for students, whether or not they choose retesting, and indicates an average final pass rate of 73% based on a passing score of 500 out of a possible 1,000.

Table 2 presents the results of the BUED 212 students IC^3 pre and post testing from the spring of 2017 where the findings show an initial mean score of 532 with a pass rate of 58% on the pre-test administered in the second week of the academic term and a mean score of 672 with a pass rate of 88% on the post test administered during the 14th week of the term. With a pass rate improvement of greater than the 20%, the threshold set to validate the hypothesis was met.

Table 3 presents the student responses to the Likert-scaled survey questions. With respect to the statement "*My technology skills have improved as a result of this course"* there was a mean of 4.17, a standard deviation of 0.898, and a confidence interval at 95% of 0.139. Additionally, responses to the Likert-scaled survey question "*I have become more skilled at using computer applications as a result of this course"* were also examined and a mean agreement of 4.23, a standard deviation of 0.859, and a confidence interval at 95% of 0.133 were found. Finally, responses to the Likert-scaled survey question "*This course has helped me become better prepared for my future career"* were examined and a mean of 4.04, a standard deviation of 0.942, and a confidence interval at 95% of 0.146 were observed.

Table 4 examines skill level attainment by category as measured by the degree of change from the pre and posttest as administered in BUED 212. Accordingly, the computer fundamentals portion of the test includes knowledge of basic hardware components and their functions, types and uses of software, basic use of operating systems, cloud computing, and digital devices. The pass rate went from 52.7% to 75.9%, an overall pass rate increase of 23.2% or a pass rate percentage change of 44%. The living online section is based on knowledge of network fundamentals and the interactivity of digital computer and communications networks, use of the Internet and World Wide Web, social media, searching, research fluency, and electronic mail. The pass rate went from a 63.6% to a 96.6% an overall pass rate increase of 33% or a pass rate percentage change of 52%. The key applications section considers a student's ability to use core computer applications in order to engage in word processing, basic spreadsheet usage, presentation software, printing and editing, and collaboration. The pass rate increased by from 43.6% to 75.9%, an overall pass rate increase of 32% or a pass rate percentage

change of 51%. Based on these findings, the most significant area of improvement for students following completion of an introductory computer fundamentals course was in the area of computer applications; however, positive skill level attainment was shown across categories.

As a result of the findings, Hypothesis 1 is affirmed and is evidence that computer concepts and software applications courses offered early in the academic experience result in a significant improvement in students' computer literacy. These finds are consistent with what has been reported in the literature (Buzzetto-Hollywood, 2017; Mishra et al., 2015, Nataraj, 2014).

Table 1: IC³ Exam Results Of Entering Freshmen 2011-2016

Academic Year	N	Weighted	Final Pass Rate	UMES Passing Score *Out Of 1000*	Mean Score	Variance
2011-2012	172	0.0639	62.21%	500	530.2	11.1
2012-2013	624	0.2319	75.8%	500	573.1	10.4
2013-2014	489	0.1817	71.12%	500	561.3	11.1
2014-2015	589	0.2189	70.54%	500	566.9	12.3
2015-2016	816	0.3033	76.23%	500	571.4	12.1
TOTAL	**2690**	**1.00**	**73.34%**	**500**	**557**	**11.4**
WEIGHTED	**2690**	**1.00**	**73.06%**	**500**	**566.34**	**11.5**

Table 2: IC³ Exam Results Of BUED212 For 4 Sections

Academic Year Spring 2017	Number Of Students	Pass Rate	Target/Passing Score *Out Of 1,000*	Mean Score
Pretest 2/2017	55	58%	500	532.5
Posttest 5/2017	58	88%	500	672.4
CHANGE		**+51%**		+139.9 points

Table 3: Student Perceptions Of Course Learning

N=160	**My technology skills have improved as a result of this course**	**I have become more skilled at using computer applications as a result of this course**	**This course has helped me become better prepared for my future career**
Mean	*4.17*	*4.23*	*4.04*
Standard Deviation	*0.898*	*0.859*	*0.942*
Confidence @95%	*0.139*	*0.133*	*0.146*

Table 4: IC3 BUED 212 Exam Results By Section For Skill Level Attainment				
Spring 2017	N	**Computer Fundamentals Pass Rate**	**Living Online Pass Rate**	**Key Applications Pass Rate**
2/2017	55	52.7	63.6	43.6
5/2017	58	75.9	96.6	75.9
% Change		44%	52%	74%

H_2- Students attending a minority serving institution do not come to college with the technology skills needed for success.

This preponderance of literature indicates that students entering higher education are arriving with deficiencies in their computer skills and that this is a particular issue among minority students. This hypothesis was measured with two five-point Likert-scaled survey questions. The first question "*My high school prepared me with all the computer skills I needed to succeed in college*" had a low mean indicating disagreement of 2.94, a standard deviation of 1.294, and a confidence interval at 95% of .203. The second question "*I wish I had come to college with better computer applications skills*" had mean indicating agreement of 3.56, a standard deviation of 1.166, and a confidence interval at 95% of 0.183. With a mean on the first question of less than <3.0 and a mean for the second question of greater than >3.0 the hypothesis is viewed as having been met. These findings are demonstrated in Table 5 and show that students attending a minority serving institution do not feel that their high schools adequately prepared them with the technological skills needed for college and that most students wish they had arrived on campus more prepared. These findings are further supported with Table 6 that considers weighted IC^3 exam scores for 2690 entering freshmen with a mean score of 566.34 out of 1,000 observed. Holistically, all of this information is considered positive confirmation that students do not come to college with the technology skills needed for success and are consistent with what has been reported by Hanson et al. (2011), Marakas, Johnson, and Clay (2007), Mishra et al. (2015), and Nataraj (2014) as well as in the literature focusing on the technological readiness of students attending minority institutions, such as Buzzetto-Hollywood et al. (2017), Buzzetto-More and Sweat-Guy (2007), Relles and Tierney (2013), and Zielezinski, (2017).

Table 5: Student Perceptions Of Their Technological Readiness For College

N=160	**My high school prepared me with all the computer skills I needed to succeed in college**	**I wish I had come to college with better computer applications skills**
Mean	*2.94*	*3.53*
Standard Deviation	*1.294*	*1.166*
Confidence @95%	*.203*	*0.183*

Table 6: Ic^3 Exam Results Of Entering Freshmen 2011-2016			
Academic Year	N	Mean Score Out Of 1,000	Variance
2011-2016	**2690**	**566.34**	**11.5**

H_3- Computer applications courses are a necessary part of a college curriculum.

This hypothesis was measured by considering agreement to the statement "*It is important for college students to take computing courses*." These results are presented in Table 7 and show a mean indicating agreement of 4.12, a standard deviation of 0.931, and a confidence interval at 95% of 0.144. With a mean of >3.0 achieved, the threshold for affirming the hypothesis is viewed as having been met. These finds are consistent with what has been reported in the literature (Buzzetto-Hollywood, 2017; Mishra et al, 2015; Nataraj, 2014).

Table 7: Student Perceptions Of The Necessity Of Computer Applications Courses

N=160	**It is important for college students to take computing courses**
Mean	*4.12*
Standard Deviation	*0.931*
Confidence @95%	*0.144*

H_5- Use of a simulated learning and assessment system is perceived as effective at enhancing learning by students learning computer concepts.

This hypothesis was measured by considering agreement to the statement "*Use of the SAM system enhanced my understanding of course content*" These results are presented in Table 8 and show a mean indicating agreement of 4.38, a standard deviation of 0.847, and a confidence interval at 95% of 0.157. With a mean of >3.0 achieved, the threshold for affirming the hypothesis is viewed as having been met. These results are consistent with what has been reported in the literature by such authors as Buzzetto-More and Ukoha (2009), Husain (2010), and Joyce (2016).

Table 8: Efficacy Of A Simulated Learning And Assessment System

N=160	**Use of the SAM system enhanced my understanding of course content.**
Mean	*4.38*
Standard Deviation	*0.847*
Confidence @95%	*0.157*

DISCUSSION

All too many individuals in higher education falsely believe that students enter college with the information and digital literacy necessary for success, therefore, rendering additional coursework unnecessary. This paper extends what has already been found in the literature whereas major skill deficiencies of students entering higher education are consistently found (Buzzetto-Hollywood et al., 2017; Dixon, 2017; Mishra et al., 2015; Hanson et al., 2011; Relles & Tierney, 2013) through an examination of five years of student performance on an international assessment of digital and information literacy. Further, student perception surveys were included in this study and, similar to what has been reported by ECAR (Dahlstrom, Walker, & Dzuiban, 2014), students expressed that they wished they had come to college more prepared to use computer software applications and that their high school had not adequately prepared them for use of technology in higher education.

The practical implications of this study are that computer applications courses remain an effective enhancement to students' college experience. In particular these courses are especially relevant with underserved and underprepared learners. This study used an approach similar to Mishra et al. (2015) and Nataraj (2014) in that utilized pre and post testing of students in order to determine the efficacy of computer applications and concepts courses. Where this study extended the discourse further is that it also included an analyses of survey questions that considered student perceptions of the importance and usefulness of courses with students reporting that it is important for college students to study computing.

Use of a performance-based simulation in computing courses was also explored as a teaching strategy through the examination of student responses to a Likert-scaled survey question. According to the findings, use of the SAM system helped students learn and understand course concepts that, individuals like Husain (2010) explain, transforms computing education to a more effective and constructivist learning experience.

The findings of this study indicate that institutions of higher education should invest in a thorough examination of the information and technology literacy skills, needs, and perceptions of students both coming into the institution as well as following course completion. This investigation should be ongoing in order to reflect the evolving technology skill expectations desired in higher education and the workplace. Student surveys should also be used to explore student perceptions and satisfaction with regard to course content, coverage, and teaching strategies and tools.

LIMITATIONS

The greatest limitation of this study is that is focused exclusively on students attending a single institution. However, at the same time, this study provides research on a population that is expanding in numbers in higher education and that many educators, and much research, reports as being underprepared for academic success (Adams, 2012; Allen, 1987; Morgan & VanLegen, 2005; Pearson & Young, 2002).

CONCLUSIONS

The digital divide is a serious concern for higher education, especially as schools seek to increasingly reach out to underserved populations. In particular, this paper documents the efforts of a mid-Atlantic minority serving institution as it seeks to assess and address the digital and information literacy skills of underserved students. The results of this study show that students attending a minority serving institution do not come to college with the technology skills needed for academic success, with readiness even lower for first generation college students. Pre and post testing of students as well as survey questions have proven the efficacy of computer applications courses at building the technology skills of students. These courses are viewed overwhelmingly positive by students with respondents reporting that they are a necessary part of the college experience that benefits them academically and professionally. Use of an online simulated learning and assessment system with immediate automated feedback and remediation was also found to be particularly effective at building the computer and information literacy skills of students.

The results of this research should shed light on a problem that desperately needs to be addressed by institutions of higher education, which is the realities of the digital divide and the under preparedness of entering college students, in particular those who are from low income, first generation, and minority groups. This research should be expanded to more institutions across the United States as well as abroad. This particular research protocol is easily replicated and can be duplicated at both minority and majority serving institutions enabling greater comparisons across groups.

As part of a commitment to assurance of learning, institutions of higher education should invest in a thorough examination of the information and technology literacy skills, needs, and perceptions of

students both coming into the institution as well as following course completion. These types of activities are a necessary for continuous improvement.

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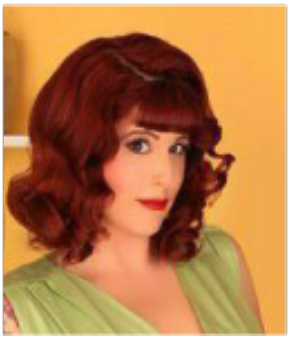
BIOGRAPHIES



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PERFORMANCE EXPECTANCY, EFFORT EXPECTANCY, AND FACILITATING CONDITIONS AS FACTORS INFLUENCING SMART PHONES USE FOR MOBILE LEARNING BY POSTGRADUATE STUDENTS OF THE UNIVERSITY OF IBADAN, NIGERIA

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ABSTRACT

Aim/Purpose	This study examines the influence of Performance Expectancy (PE), Effort Expectancy (EE), and Facilitating Conditions (FC) on the use of smart phones for mobile learning by postgraduate students in University of Ibadan, Nigeria.
Background	Due to the low level of mobile learning adoption by students in Nigeria, three base constructs of the Unified Theory of Acceptance and Use of Technology (UTAUT) model were used as factors to determine smart phone use for mobile learning by the postgraduate students in the University of Ibadan.
Methodology	The study adopted a descriptive survey research design of the correlational type, the two-stage random sampling technique was used to select a sample size of 217 respondents, and a questionnaire was used to collect data. Descriptive statistics (frequency counts, percentages, mean, and standard deviation), test of norm, and inferential statistics (correlation and regression analysis) were used to analyze the data collected.

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Contribution	The study empirically validated the UTAUT model as a model useful in predicting smart phone use for mobile learning by postgraduate students in developing countries.
Findings	The study revealed that a significant number of postgraduate students used their smart phones for mobile learning on a weekly basis. Findings also revealed a moderate level of Performance Expectancy ($\bar{x}$ =16.97), Effort Expectancy ($\bar{x}$ =12.57) and Facilitating Conditions ($\bar{x}$=15.39) towards the use of smart phones for mobile learning. Results showed a significant positive relationship between all the independent variables and use of smart phones for mobile learning (PE, r=.527*; EE, r=.724*; and FCs, r=.514*). Out of the independent variables, PE was the strongest predictor of smart phone use for mobile learning (β =.189).
Recommendations for Practitioners	Librarians in the university library should organize periodic workshops for postgraduate students in order to expose them to the various ways of using their smart phones to access electronic databases.
Recommendations for Researchers	There is a need for extensive studies on the factors influencing mobile technologies adoption and use in learning in developing countries.
Impact on Society	Nowadays, mobile learning is increasingly being adopted over conventional learning systems due to its numerous benefits. Thus, this study provides an insight into the issues influencing the use of smart phones for mobile learning by postgraduate students from developing countries.
Future research	This study utilized the base constructs of the UTAUT model to determine smart phone use for mobile learning by postgraduate students in a Nigerian university. Subsequent research should focus on other theories to ascertain factors influencing Information Technology adoption and usage by students in developing countries.
Keywords	Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Conditions (FC), mobile learning, smartphone use

INTRODUCTION

Postgraduate education is an integral part of universities' intellectual activities aimed at equipping graduate students with advanced knowledge and requisite skills needed for optimum performance in their respective disciplines. Thus, postgraduate students are required to undergo specialized training in the form of course works, practicals, and research in their areas of interests for the award of higher degrees. In the distant past, postgraduate research in tertiary institutions was dominated by the use of printed materials as primary sources of information (Okite-Amughoro, Makgahlela, & Bopape, 2014). This required the students to be physically present either in the libraries or the classrooms to access information and learn. However, the advent of Information and Communication Technology (ICT) has revolutionized the process of learning and research in postgraduate education, as postgraduate students now can acquire knowledge via electronic means, thus, bringing to the fore the concept of mobile learning.

Wang, Wu, and Wang (2009) defined mobile learning as the delivery of learning to students anytime and anywhere through the use of wireless Internet and mobile devices, including mobile phones, personal digital assistants (PDAs), smart phones, and digital audio players. It also refers to educational

provision where the sole or dominant technologies are handheld or palmtop devices (Traxler, 2005). Mobile learning represents a learning process through which students acquire knowledge outside the classroom environment and obtain vital information for their study through the use of portable technological devices linked to the Internet. Mobile learning is transforming the face of educational technology globally since students at all levels of education can enjoy access to educational resources anytime anywhere (Oyelere, Suhonen, Shonola, & Joy, 2016).

Mobile learning presents a viable means through which postgraduate students can access scholarly information in this information age where electronic media such as databases, websites, e-books, and e-journals have replaced printed materials as the major source of scholarly information. Mobile learning offers postgraduate students a unique opportunity to navigate through the diverse information available in the various electronic media in order to improve their knowledge on different topics. According to Lavin, Moreno, and Fernandez (2008), mobile learning is enabled by integrating various hardware and software technologies into multimedia applications facilitating the communication of educational content in a number of different formats for university students. Mobile learning also enables postgraduate students to learn at their own pace in different locations and retrieve information pertinent to their academic activities in a flexible and efficient manner especially through the use of smart phones.

Smart phones as products of mobile technology have aided mobile learning as they ensure that postgraduate students can access and retrieve information from the Internet in different electronic formats wherever they are. In fact, within the Nigerian context, anecdotal evidence reveals a prevalence of smart phone use among students, which could increase their chances of engaging in mobile learning. Adedoja, Botha, and Ogunleye (2012) also noted that there is a high likelihood that students in Nigeria will engage in mobile learning, as smart phones are increasingly more accessible and less expensive, with alternative ways of powering them that has reduced reliance on the power supply, which is erratic.

However, in as much as mobile learning offers some benefits to postgraduate students, there are some challenges to mobile learning by these students. Galatis and White (2013) stated that the most serious issue faced by mobile learning is the lack of a solid theoretical framework that can guide effective instructional design and evaluate the quality of programs that rely significantly on mobile technologies. Alhajri (2016) also categorized the challenges to mobile learning as institutional challenges; integration to technology challenges; technical challenges; design challenges; evaluation challenges; cultural and social challenges.

In the Nigerian context, Ifinedo (2013) highlighted low concentration as a major barrier to mobile learning by students in Nigerian universities. Ifinedo further argued that, while in the traditional classroom learning style it is possible for students to undertake a course that spans over an hour, the mobile learning counterpart cannot sustain the concentration span of students for that long. This connotes that the performance of mobile learning with the use of smart devices could be described as low. This might be the case as a result of some distractions that the use of smart phones or related devices may bring. In addition, Shonola and Joy (2014), in their study, identified challenges to mobile learning in Nigerian universities to include inadequate infrastructure, poor funding, regulatory issues, altitudinal barrier, and failure to modify the curriculum to accommodate mobile learning.

These challenges could negatively affect the adoption of mobile learning, especially within the Nigeria context, even though the smart phones are accessible and appear to be prevalent. Chaka and Govender (2014) affirmed that despite increasing accessibility of smart phones to students in Nigeria, their adoption rate for mobile learning seems to be low. This perceived low rate of adoption, which may be fueled by the challenges already highlighted, could be traced to the performance and effort expectancies associated with the use of smart phones for mobile learning. Also, it could also be traced to the facilitating conditions provided by government or the management of the universities to ensure the use of smart phones by the students is enhanced.

Performance expectancy (PE), effort expectancy (EE) and facilitating conditions (FC) are constructs within the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh, Morris, Davis, and Davis (2003) to predict user acceptance and subsequent usage of a system/Information Technology. Performance expectancy is one of the constructs of the Unified Theory of Acceptance and Usage of Technology (UTAUT) model that has received considerable attention from several researchers in different fields of human endeavors (Bugembe, 2010; Khayati & Zouaoui, 2013; Tossy, 2014; Venkatesh et al., 2003). These researchers stated, in their studies, that performance expectancy is a key construct that determines adoption and eventual usage of information systems. Performance expectancy is largely determined by indicators such as perceived usefulness, intrinsic and extrinsic motivation, job-fit, relative advantage, and outcome expectations of the Information Technology (Wu, Yu, & Weng, 2012).

Performance expectancy refers to the degree to which an individual perceives that using a system will help him or her to attain a gain in job performance (Venkatesh et al., 2003). It can also be defined as the degree to which postgraduate students perceive that using smart phones will enable them achieve improved performance in their academic activities. Performance expectancy is of direct relevance to the use of smart phones for mobile learning by postgraduate students in universities. This is because postgraduate students rely on the use of smart phones to access adequate information pertinent to their intellectual activities. Owing to their improved search capabilities, smart phones enable postgraduate students to retrieve vast amount of information in different disciplines. Thus, if a postgraduate student perceives that the use of smart phone for mobile learning will contribute meaningfully in enhancing his or her academic performance, he or she may be favorably disposed to use it.

Effort expectancy is also a construct of the UTAUT model that measures the level of ease of use associated with the use of an information technology. Venkatesh et al. (2003) viewed effort expectancy as the degree of ease associated with the use of an information system. It connotes the level of expectation of postgraduate students that the use of smart phones will not be characterized by physical and mental efforts. Effort expectancy is based on the idea that there are relationships between the effort put forth at work, the performance achieved from that effort, and the rewards received from the effort (Ghalandari, 2012).

Effort expectancy has a direct link to the use of smart phones for mobile learning by postgraduate students. This is because the use of smart phones for mobile learning by postgraduate students is likely to be influenced by how easy or complex it is to retrieve relevant information with smart phones within the shortest time possible. Hence, if postgraduate students realize that it is very easy to use their smart phones for mobile learning, they might not refrain from using them.

Furthermore, facilitating conditions as a construct in UTAUT refers to the extent to which an individual perceives that organizational and technical infrastructures required to use the intended system are available (Ghalandari, 2012). Facilitating conditions are factors in an environment that make possible the use of smart phones for mobile learning by postgraduate students. Facilitating conditions are largely determined by indicators such as perceived behavioral control and compatibility. The effective use of smart phones for mobile learning by postgraduate students hinges on the availability of organizational resources (human and materials) and appropriate technical infrastructure required for their optimum performance. This implies that the degree to which postgraduate students believe that organizational resources and technical infrastructure exist to support the effective use of smart phones for mobile learning could determine if they will actually use their smart phones for mobile learning or not.

Therefore, the use of smart phones for mobile learning could be a function of these UTAUT constructs. In order to empirically test this, the study is set to examine the influence of performance expectancy, effort expectancy, and facilitating conditions on the use of smart phones for mobile learning by postgraduate students in University of Ibadan, Nigeria.

Description of the Mobile Learning Framework in the University of Ibadan, Nigeria

The University of Ibadan, Nigeria's premier university, has over the years developed a framework that supports mobile learning. The Information Technology and Media Services (ITeMS) of University of Ibadan has developed and continues to develop and maintain functional university-wide wireless networks extending to different faculties, departments, and centers. This has made it possible for staff and students who are registered to connect to the Internet at any time of the day to access electronic information resources for learning and research purposes. Access to the Internet within the University also facilitates the use of online discussion forums by the lecturers and students, which makes it possible for learning to continue outside the four walls of the classroom.

The University, in an attempt to enhance mobile learning, provides tablets for the students who are on the distance learning program. With the tablets, students can have access to a learning management system (with access to virtual classroom and course and lecture materials), open educational resources (OERs), and the electronic library from the website of the Centre (www.dlc.ui.edu.ng). In order to ensure that staff and students take proper advantage of this framework that supports mobile learning, seminars and workshops are organized periodically.

Research Problem

Postgraduate students in Nigeria have access to a variety of smart phones that can be used for mobile learning. However, anecdotal evidence has revealed that some postgraduate students rarely use their smart phones for mobile learning; instead, they use them largely for socialization purposes. That is why some scholars have described the adoption of mobile learning by students in Nigeria as low. Could this be that the postgraduate students did not consider their smart phones useful for mobile learning? Are they possibly of the opinion that it could be difficult to use their smart phones for mobile learning? Are they negatively affected by the level of infrastructural support that did not facilitate the use of their smart phones for mobile learning? It is against this backdrop that this study is set to examine the influence of performance expectancy, effort expectancy, and facilitating conditions on the use of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria.

Research Questions

This study provides answers to the following research questions:

i. What is the frequency of use of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria?
ii. What is the performance expectancy of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria?
iii. What is the effort expectancy of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria?
iv. What are the facilitating conditions influencing the use of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria?

Hypotheses

The following null hypotheses will be tested in the study at 0.05 level of significance:

1. There is no significant relationship between performance expectancy and use of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria.
2. There is no significant relationship between effort expectancy and use of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria.

3. There is no significant relationship between facilitating conditions and the use of smart phones for mobile learning by postgraduate students at the University of Ibadan, Nigeria.
4. There is no joint influence of performance expectancy, effort expectancy, and facilitating conditions on the use of smart phones for mobile learning by postgraduate students at the University of Ibadan, Nigeria.

LITERATURE REVIEW

Quite a number of scholars have used UTAUT to provide empirical insights into the acceptance of different technologies by different individuals in a variety of settings (Venkatesh, Thong, & Xu, 2016). However, the studies that relate to the main objective of this study will now be reviewed. Jackman (2014) used the UTAUT theoretical model to examine the acceptance of mobile learning by 600 undergraduate students at the University of the West Indies, Cave Hill Campus, Barbados. The questionnaire was the research instrument and results showed smart phone was the most used mobile device as noted by close to four-fifths of the respondents: 460 (76.6%). It was also reported that there was a significant positive relationship between performance expectancy and behavioral intention to accept mobile learning (r=.51). Similarly, effort expectancy (r=.27) and facilitating conditions (r=.47) also had a positive correlation with the intention to accept mobile learning. The researcher also did a regression analysis that revealed the relative influence of the independent variables with the following beta values: performance expectancy (β =.303); effort expectancy (β =.139); and facilitating conditions (β =.277) Thus, performance expectancy significantly predicted the behavior intention to use mobile devices for mobile learning the most by the respondents.

Kim-Soon, Ibrahim, Ahmad, and Sirisa (2015) examined the factors influencing intention to use mobile technologies such as smart phone, tablet, laptop, and personal digital assistants for learning by 400 students (diploma, degree, master, and PhD) of four technical universities in Malaysia through the use of a questionnaire. Results showed that most of the respondents (87 (21.8%)) used the mobile technologies for learning somewhat frequently. One of the factors that influenced the use of the mobile technologies was performance expectancy (r-.513**). On the other hand, findings revealed that there was a negative relationship between effort expectancy and use of mobile technologies for learning by the respondents (r =-.083).

Ugur, Koc, and Koc (2016) did an analysis of mobile learning acceptance by considering the influence of performance expectancy, effort expectancy, and facilitating conditions among 491 college students in University of Sakarya, Turkey. The multiple regression that was conducted revealed that all the three UTAUT model constructs significantly predicted behavioral intention to use mobile learning by the respondents. More specifically, the beta values of the variables independently were; performance expectancy (β =.389), effort expectancy (β =.210) and facilitating conditions (β =.043). This shows that, like the result of reported by Jackman (2014), performance expectancy is a key predictor of behavioral intention to accept mobile learning by the college students.

Zainol Yahaya, Yahaya, and Zain (2017) studied performance expectancy, effort expectancy, and facilitating conditions as factors influencing mobile learning among 150 accounting students of higher institutions in Malaysia. The data collection instrument for the study was the questionnaire that was adopted from the original scales of UTAUT developed by Venkatesh et al. (2003). Findings showed a significant positive relationship between performance expectancy and acceptance of mobile learning (r=.266*), effort expectancy and acceptance of mobile learning (r=.582*), and facilitating conditions and acceptance of mobile learning (r=.643*).

Yeh and Tseng (2017) explored the behavioral intention of using mobile payments in Taiwan by 174 college students by considering the influence of factors like performance expectancy, effort expectancy, and facilitating conditions. The convenience sampling method was used, and a validated questionnaire was used to collect data. Results revealed that out of the three UTAUT factors, only effort expectancy (r=-0.096) had a negative relationship with the use of mobile payments. Performance

expectancy (r=0.235**) and facilitating conditions (r=0.510**) have significant positive relationship with use of mobile payments. The authors reasoned that effort expectancy had a negative relationship with use of mobile payment probably because the respondents were savvy in the use of smart phones and this might give them the confidence that the use of mobile payment would not be difficult.

In a recent study conducted in Nigeria, Chaka and Govender (2017) studied the perception and readiness of 320 students towards mobile learning in three colleges of education in the North Central Geo-Political Zone of the country. In addition to the perception and readiness, the extent to which performance expectancy, effort expectancy, and facilitating conditions (rephrased as mobile learning conditions) influence students' intention to adopt mobile learning was also examined. Findings showed that performance expectancies (β =.105), effort expectancies (β =.242), and mobile learning conditions (β =.452) significantly predicted intention to use mobile learning by the respondents. The authors concluded that mobile learning conditions are critical to mobile learning readiness and adoption by the students.

In addition to the studies conducted on the influence of UTAUT constructs on mobile learning, various studies have also examined the pros and cons of the various mobile technologies (laptops and tablets) in relation to the use of smart phones for mobile learning. Jacob and Isaac (2008) conducted a survey on the mobile devices adopted for mobile learning purposes by 151 undergraduate students in a Malaysian university. Almost all the respondents (90%) noted that laptop was the best/efficient form of mobile devices for mobile learning that was available at that time. Although, results showed that the most popular mobile devices among the respondents were pen drives and cell phones, while laptop was ranked 3rd and smart phone 6th respectively.

Foti and Mendez (2014) investigated the mobile devices adopted for mobile learning by forty-six postgraduate students in an Occupational Therapy program in Stockton University, New Jersey, United States of America. A large section of the students who preferred laptops for mobile learning noted that the bigger screens and keyboards of laptops made it the better tool for learning activities such as note-taking, research, and completing assignments. However, Ozok, Benson, Chakraborty, and Norcio (2008) argued that despite the popularity of laptops, they have limitations in terms of mobility when compared with other devices like smart phones and tablets.

Kljunic and Vukovac (2015) researched into the use of mobile devices for learning by 461 students of higher institutions in Croatia. The researchers compared the use of smart phones and tablets for mobile learning by the respondents. From the findings, over four-fifths of the students (83.7%) possessed a smart phone as against (18.7%) that indicated that they owned a tablet. It was also reported that out of the 126 students that answered the question on the use of mobile device for educational purposes, 37.3% used smart phones more than tablets and 15.1% noted that they used tablets more than smart phones. In addition, a small proportion of the students (11.9%) affirmed that they used the devices equally for educational purposes.

Ali (2017) surveyed the use of mobile devices in the student learning process in the Lahti University of Applied Sciences, Finland with an emphasis on Reppu (a service provided by Lahti UAS that makes it possible for students who are enrolled to submit assignments). The study made use of qualitative and quantitative research techniques to collect data from 21 students (undergraduates and postgraduate). Findings showed that a significant number of the respondents (85.7%) noted that they used Reppu on their mobile devices like smart phones to access course and information materials as compared to (4.8%) that used laptops for the same purpose. The researcher observed that the reason for this may be that it could be more convenient to use mobile devices as opposed to the use of laptops.

From the literature review, performance expectancy of smart phones for mobile learning seems to be the most determining factor that predicted adoption and usage. The review also revealed that smart phones at present are being deployed for mobile learning more than other mobile devices like laptops

and tablets. Thus, it is very important to zero in on smart phones and examine how performance expectancy, effort expectancy, and facilitating conditions influence their use for mobile learning, especially among postgraduate students.

Conceptual Model

The conceptual model for the study was developed from the researchers' view of the interactions that could exist between the variables of the study based on the review of the literature. The model proposes a direct relationship between the independent variables and the dependent variable. Specifically, it is assumed that there is a relationship between the performance expectancy and use of smart phones for mobile learning. Also, there could be a link between effort expectancy and use of smart phones for mobile learning. It is also evident from the model that a relationship is proposed between facilitating conditions and use of smart phones for mobile learning. In addition, the model also seeks to test the influence of the three independent variables on the dependent variable (Figure 1).

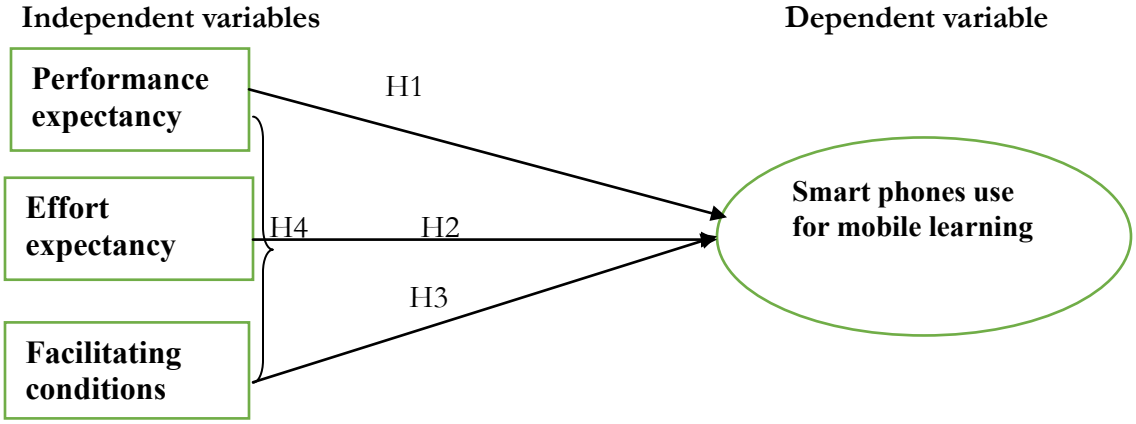

Figure 1: Conceptual model for the study

Research Methodology

Population and Sample

The population of this study consists of all postgraduate students of the University of Ibadan, Nigeria. According to the data collected from the Records Office of the postgraduate school of the institution, there are 13,307 postgraduate students in thirteen faculties, three institutes, and seven centers. In order to get the sample size, the two-stage random sampling technique was used. At the first stage, three faculties were randomly selected through balloting; the faculties were Education with a population of 1654, Agriculture and Forestry (1230), and the Social Sciences (1445). The second stage involved the use of 5% sampling fraction to determine the sample size of 217. This was done by calculating 5% of the number of postgraduate students in the three faculties earlier selected at random. The researchers collected data by personally visiting the faculties during the free periods of the students. Adequate time was given for the respondents to complete the questionnaire, after which they were retrieved personally by the researchers.

Research Instrument

Questionnaire was the research instrument used for data collection. The items for the three independent variables were adapted from the scale developed by Venkatesh et al. (2003). The questionnaire has five sections with Section A focusing on the demographic information of the respondents with three items. Section B collects information on the use of smart phones for mobile learning with six items and two-point response format (agree and disagree). Section C captures the responses of

the students on the performance expectancy of smart phone use for mobile learning with eight items and four-point response format (strongly agree, agree, disagree, and strongly disagree). Section D has questions on the effort expectancy of smart phone use for mobile learning with seven items and four-point response format (strongly agree, agree, disagree and strongly disagree). Lastly section E collects information on facilitating conditions for smart phone use for mobile learning also with four-point response format (strongly agree, agree, disagree and strongly disagree) *see* Appendix A.

RELIABILITY OF INSTRUMENT

The content validity of the questionnaire was conducted with the use of the Cronbach's Alpha. The result for each of the scale is contained in Table 1. The Cronbach's Alpha values for all the scales are greater than 0.70. Thus, the instrument is reliable and valid.

Table 1 Reliability of scales used

Reliability Statistics		
Construct	**Cronbach's Alpha**	**No. of Items**
Use of smart phones for mobile learning	.782	6
Performance expectancy	.734	8
Effort expectancy	.709	7
Facilitating conditions	.711	7

DATA ANALYSIS METHODS

A total number of 217 copies of the questionnaire were administered to the postgraduate students in the University of Ibadan, Nigeria out of which 186 were retrieved and found valid for analysis giving a response rate of 86%. Descriptive statistics (frequency counts, percentages, mean, and standard deviation), test of norm, and inferential statistics (correlation and regression analysis) were used to analyze the data collected.

RESULTS

DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The demographic details (program, gender, age, and personal income) of the respondents were analyzed using descriptive statistics (frequency counts and percentages), and the result is presented in Table 2. Results showed that the master's students (89.2%) participated more in the study than the doctoral students (10.8%). Findings revealed that majority of the respondents were males (55.4%), while females constitute 44.6% of the respondents. Most of the respondents (48.4%) were within the age range of 20-30, while only one respondent (0.5%) was between 61-70 years of age. Close to two-fifths of the respondents (39.2%) earned between #20,000 and #40,000 and (1.6%) had a monthly income that was above #100,000.

Table 2: Demographic details of respondents

S/N	**Demographic Details**	**Categories**	**Frequency (n=186)**	**Percentage (%)**
1	Programme	Masters PhD	166 20	89.2 10.8
2	Gender	Male Female	103 83	55.4 44.6

S/N	Demographic Details	Categories	Frequency (n=186)	Percentage (%)
3	Age	20-30	90	48.4
		31-40	74	39.8
		41-50	19	10.2
		51-60	2	1.1
		61-70	1	0.5
4	Personal monthly Income	Less than #20,000	44	23.7
		#20,000 - #40,000	73	39.2
		#40,000 - #60,000	26	14.0
		#60,000 - #80,000	22	11.8
		#80,000 - #100,000	18	9.7
		Above #100,000	3	1.6

N=186

Answers to Research Questions

Research question one: What is the frequency of use of smart phones for mobile learning by postgraduate students at the University of Ibadan, Nigeria?

The frequency of use of smart phones for mobile learning by the respondents is presented in Table 3. Most of the respondents (39.2%) used their smart phones for mobile learning on a weekly basis while five respondents (2.7%) used their smart phones for mobile learning occasionally.

Table 3: Frequency of use of smart phones for mobile learning by the postgraduate students of the University of Ibadan

Smart phone use frequencies						Mean $\bar{X}$	STD
Daily		**Twice a week**		**Weekly**			
N	**%**	**N**	**%**	**N**	**%**		
58	31.2	23	12.4	73	39.2	2.27	1.308
Monthly		**Occasionally**		**Never**			
N	**%**	**N**	**%**	**N**	**%**		
19	10.2	5	2.7	8	4.3		

Research question two: What is the performance expectancy of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria?

In order to determine the level of performance expectancy of smart phone use for mobile learning by the respondents, a test of norm was conducted (See Appendix B). The scale between 0-10 shows that the level of performance expectancy is low, the scale between 11-21 indicates that the level of performance expectancy is moderate, and the scale between 22-32 shows that the level of performance expectancy is high. Thus, the overall mean for performance expectancy as indicated by the responses of the postgraduate students is 16.97, which falls within the scale 11-21. Therefore it could be deduced that the level of performance expectancy of smart phone use for mobile learning by the postgraduate students is moderate (Table 4).

Table 4: Performance expectancy of smart phones for mobile learning by postgraduate students of the University of Ibadan

S/N	Items	Mean $\bar{X}$	STD
1	My smart phone enables me to access scholarly information relevant to my academic activities	1.77	.794
2	I can learn more efficiently with the use of my smart phone	1.65	.651
3	The use of smart phone does not improve my academic performance	2.76	.940
4	Implementation of literature search and information retrieval are easy with smart phone use	2.22	.953
5	There is no advantage associated with the use of my smart phone for mobile learning	2.72	.968
6	The electronic information resources that can be accessed motivates me to use smart phone	1.93	.953
7	I am convinced that smart phone use will add value to my learning activities	1.95	.834
8	Using smart phone for mobile learning enables me to follow the trend in learning globally	1.97	.891
	Weighted score	16.97	6.984

Research question three: What is the effort expectancy of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria?

The level of effort expectancy of smart phone use for mobile learning was also measured with the test of norm (see Appendix B). The scale between 0-8 indicates low effort expectancy, the scale between 9-16 depicts moderate effort expectancy, and the scale between 17-24 shows that high effort expectancy. The overall mean for effort expectancy as indicated by the responses of the postgraduate students is 12.57 which falls within the scale 9-16. Thus, the postgraduate students were of the view that the effort required to use smart phones for mobile learning was moderate (Table 5).

Table 5: Effort expectancy of smart phones for mobile learning by postgraduate students of the University of Ibadan

S/N	Items	Mean $\bar{X}$	STD
1	The use of smart phones for mobile learning is not characterized with stress	2.37	1.006
2	I do not require much technical expertise to effectively use my smart phone for mobile learning	2.03	.958
3	I can access electronic information resources anywhere and anytime through my smart phone use	1.81	.807
4	The use of smart phones for mobile learning reduces cost, time and effort associated with conventional learning system	1.92	.850
5	Constraints of smart phones terminals such as small screens, low battery life and inconvenient input make it difficult to use smart phones for mobile learning	2.26	.976
6	The use of smart phones for mobile learning is not frustrating	2.18	.904
	Weighted score	12.57	5.501

Research question four: What are the facilitating conditions influencing the use of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria?

In order to determine the level of facilitating conditions influencing the use of smart phone use for mobile learning by the respondents, a test of norm was conducted (See Appendix B). The scale between 0-9 shows that the level of facilitating conditions is low, the scale between 10-19 connotes that the level of facilitating conditions is moderate, and the scale between 20-28 indicates that the level of facilitating conditions is high. Thus, the overall mean for facilitating conditions is 15.39 which fall within the scale 10-19. Therefore it could be deduced that the level of facilitating conditions that could support the use of smart phones for mobile learning by the postgraduate students is moderate (Table 6).

Table 6: Facilitating conditions in the use of smart phones for mobile learning by postgraduate students in the University of Ibadan

S/N	Items	Mean $\bar{X}$	STD
1	There is adequate training on the use of smart phones for mobile learning in my university	2.63	1.016
2	The use of smart phones for mobile learning is encouraged by my lecturers	2.04	.917
3	The presence of unstable power supply hinders the effective use of smart phones for mobile learning in my university	1.99	.909
4	Limited Internet connection and inadequate bandwidth in my university do not motivate me to use my smart phone for mobile learning	2.34	1.034
5	I have the skills and abilities to use smart phones for mobile learning	2.03	.961
6	I need to improve my ICT skills in order to effectively use my smart phone for mobile learning	2.04	.963
7	I find it very difficult to use my smart phone for mobile learning because it is quite complex	2.32	1.082
	Weighted score	15.39	6.882

TEST OF HYPOTHESES

Hypothesis one: There is no significant relationship between performance expectancy and use of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria.

Table 7 shows that there is a moderate significant positive relationship between performance expectancy and use of smart phones for mobile learning ($r = .527^{*}$; $df = 185$; $p < 0.05$). This means that the more the postgraduate students perceive the use of smart phones for mobile learning as beneficial for their academic activities, the more they use them. Thus, the null hypothesis is rejected.

Table 7: Relationship between performance expectancy and use of smart phones for mobile learning

Variables	N	r	df	Remark
Performance expectancy Use of smart phones for mobile learning	186	.527*	185	Significant

Hypothesis two: There is no significant relationship between effort expectancy and use of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria.

Table 8 presents the result of the correlation analysis, and findings revealed that there is a strong significant positive relationship between effort expectancy and use of smart phones for mobile learning ($r = .724^{*}$; $df = 185$; $p < 0.05$). This means that the more smart phones are easier to use for mobile learning, the more postgraduate students will use them for such. With this, the null hypothesis is rejected.

Table 8: Relationship between effort expectancy and use of smart phones for mobile learning

Variables	N	r	df	Remark
Effort expectancy Use of smart phones for mobile learning	186	.724*	185	Significant

Hypothesis three: There is no significant relationship between facilitating conditions and the use of smart phones for mobile learning by postgraduate students in the University of Ibadan, Nigeria.

Table 9 shows that there is a moderate significant positive relationship between facilitating conditions and use of smart phones for mobile learning ($r = .514^{*}$; $df = 185$; $p < 0.05$). This indicates that increase in the facilitating conditions will lead to an increase in the use of smart phones for mobile learning by postgraduate students. This leads to the rejection of the null hypothesis.

Table 9: Relationship between facilitating conditions and use of smart phones for mobile learning

Variables	N	r	df	Remark
Facilitating conditions Use of smart phones for mobile learning	186	.514*	185	Significant

Hypothesis four: There is no joint influence of performance expectancy, effort expectancy and facilitating conditions on the use of smart phones for mobile learning by postgraduate students at the University of Ibadan, Nigeria.

Table 10 shows the joint contribution of performance expectancy, effort expectancy, and facilitating conditions to the prediction of use of smart phones for mobile learning. The table shows a coefficient of multiple correlation ($R=.653$ and a multiple R^2 of .542). This means that 54.2% of the variance was accounted for by the three predictor variables when taken together. The significant of the composite contribution was tested at $P<.05$. The table also shows that the analysis of variance for the regression yielded F-ratio of 276.7833 ($P<0.05$). This implies that the joint contribution of the independent variables to the dependent variables was significant and the other variables not included in this model may have accounted for the remaining variance. Thus the null hypothesis is rejected.

Table 10: Joint contribution of performance expectancy, effort expectancy, and facilitating conditions to the prediction of use of smart phones for mobile learning

Model Summary					
R	R Square	Adjusted R Square		Std. Error of the Estimate	
.653[a]	.542	.429		5.43210	
ANOVA[a]					
Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	24651.345	3	8217.115	276.7833	.000[b]
Residual	5432.887	183	29.6879		
Total	30084.232	186			

Table 11 reveals the relative contribution of the three independent variables to the dependent variable. The regression formula for the joint contribution of the independent variables is
y=f (PE, EE, FC)

Where y= use of smart phones for mobile learning
PE= Performance expectancy
EE= Effort expectancy
FC= Facilitating conditions
$Y= \beta_1 PE+ \beta_2 EE+ \beta_3 FC$

The relative contribution is expressed as beta weights, performance expectancy ($\beta = .189$, $P< .05$), effort expectancy ($\beta = .132$, $P< .05$), and facilitating conditions ($\beta =.091$, $P<.05$). Hence out of the independent variables, it is performance expectancy that significantly predicts use of smart phones for mobile learning by the postgraduate students.

Table 11: Relative contribution of performance expectancy, effort expectancy, and facilitating conditions to the prediction of use of smart phones for mobile learning

Coefficients

Model	Unstandardized coefficient		Standardized coefficient	T	Sig
	B	Std. Error	Beta		
Constant	2.2761	.153			.000
Performance expectancy	.476	.096	.189	.962	.000
Effort expectancy	.506	.067	.132	.662	.000
Facilitating conditions	.252	.043	.091	.464	.001

Dependent variable: Use of smart phones for mobile learning

PRESENTATION OF ALL FINDINGS

Table 12 presents all the main findings of the study. This is provided in order to ensure that at a glance the results can be ascertained which also makes it easy to compare the results of the different variables.

Table 12: Presentation of all major findings

S/n	Variables	Results	Remark
1	Frequency of use of smart phones for mobile learning	Highest %=39.2	Weekly basis
2	Performance expectancy (PE)	Mean=16.97	Moderate
3	Effort expectancy (PE)	Mean=12.57	Moderate
4	Facilitating conditions (FC)	Mean=15.39	Moderate
5	Relationship between performance expectancy and use of smart phones for mobile learning	r= .527*	Moderate significant positive relationship
6	Relationship between effort expectancy and use of smart phones for mobile learning	r= .724*	Strong significant positive relationship
7	Relationship between facilitating conditions and use of smart phones for mobile learning	r= .514*	Moderate significant positive relationship
8	Joint influence of PE, EE, FC on use of smart phones for mobile learning	R^2=.542 (54.2%)	Significant
9	Relative contribution of PE, EE and FC to the prediction of use of smart phones for mobile learning	PE (β= .189) EE (β=.132) FC (β=.091)	Mostly significant (1st) 2nd 3rd

DISCUSSION OF FINDINGS

Results revealed that a significant number of postgraduate students (39.2%) used their smart phones for mobile learning on a weekly basis. This could be as a result of the fact that some of these students are employed (either part time or full time) secularly or privately. Thus, they might not get to use their smart phones for mobile learning on a daily basis because of the other activities that compete for their time and attention. This supports the findings of the study conducted by Kim-Soon et al. (2015) in Malaysia where they reported that most of the respondents noted that they used their mobile devices for learning somewhat frequently.

The level of performance expectancy (mean=16.97), effort expectancy (mean=12.57), and facilitating conditions (mean=15.39) associated with the use of smart phones for mobile learning as noted by the respondents was moderate. As for the level of performance expectancy, the result indicates that most of the postgraduate students did not benefit fully from the opportunities associated with the use of smart phone for mobile learning. The majority of students also had the view that it required an average effort to use their smart phones for mobile learning, thus revealing that the use of smart phones for mobile learning is not entirely effortless. In addition, from the point of view of the respondents, the level of infrastructure that should aid the use of smart phones for mobile learning was average. This perception by most of the respondents could bring about a low level of adoption of smart phones use for mobile learning if nothing is done to bring about a more favorable perception. This agrees with the results of the study done by Jackman (2014) in Barbados where the respondents indicated that their level of performance expectancy and facilitating conditions towards use of mobile device for mobile learning was average.

Findings also revealed that there was a positive significant relationship between performance expectancy (r= .527*), effort expectancy (r= .724*), facilitating conditions (.514*), and use of smart phones for mobile learning by the postgraduate students. This has validated the importance of the UTAUT constructs in the acceptance and use of smart phones for mobile learning. This aligns with

the results of the studies done by Jackman (2014), Ugur et al. (2016), Zainol et al. (2017) and Chaka and Govender (2017) where there was a significant positive relationship between the UTAUT constructs (performance expectancy, effort expectancy and facilitating conditions) and use of mobile devices for mobile learning.

The joint contribution of the independent variables to the dependent variable was significant (R^2=.542), but it was performance expectancy (β= .189) that strongly predicted the use of smart phones for mobile learning by most of the postgraduate students. The benefits derivable from the use of smart phones for academic activities play a prominent role in determining their use for mobile learning. This has corroborated the results of the studies by Jackman (2014) and Ugur et al. (2016) where they also reported that performance expectancy was a strong predictor of mobile learning by students.

CONCLUSION

The study has revealed that a significant percentage of the postgraduate students used their smart phones for mobile learning on a weekly basis. The results have also shown that the respondents had a moderate level of performance and effort expectancies of the use of smart phones for mobile learning. Similarly, the postgraduate students rated the level of facilitating conditions that should enhance the use of smart phones for mobile learning as moderate. Even though PE, EE, and FC had a significant relationship with smart phone use for mobile learning, PE had the greatest influence as supported by previous studies (Jackman, 2014; Kim-Soon et al., 2015; Ugur et al., 2016). These results should stimulate further interests among researchers on how the level of EE, FC, and most especially PE associated with the use of smart phones for mobile learning can be enhanced. If this is done, postgraduate students will be able to effectively deploy their smart phones for mobile learning activities that include research, the outcome of which may lead to societal development.

RECOMMENDATIONS

In order to enhance the level of performance and effort expectancies, lecturers should collaborate with librarians in the university library with a view to organizing periodic workshops on the use of smart phones for mobile learning. This will build the capacity of the postgraduate students on how they can effectively use their smart phones to access electronic information resources and also engage in other academic activities. The Information Technology and Media Services (ITeMs) should improve on the existing mobile learning framework, particularly in the aspects of bandwidth management and access to the wireless network by the postgraduate students. Furthermore, to increase the level of facilitating conditions that could enhance smart phone use for mobile learning by postgraduate students, the management of the university should continue to work assiduously to provide stable electricity supply and access to fast internet connectivity within the university campus.

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APPENDIX A (QUESTIONNAIRE)

UNIVERSITY OF IBADAN
DEPARTMENT OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES

Dear Respondent,

This questionnaire is aimed at collecting data on the use of smart phones for mobile learning by postgraduate students in University of Ibadan. We therefore solicit for your honest response as information provided will be used purely for academic purposes and will be treated with utmost confidentiality.

Thanks for your anticipated cooperation.

Onaolapo, S. & Oyewole, O.

Each section of the questionnaire is meant to collect specific data on the above named title. Please read through each section carefully and indicate by ticking appropriately.

NOTE: Mobile learning represents the learning process through which students acquire knowledge outside the classroom environment through the use of wireless and internet mobile devices like smart phones.

SECTION A: BIO DATA

1. Faculty: _____

2. Academic programme: Masters ( ) M.Phil. ( ) M.Phil. PhD ( ) PhD ( )

3. Gender: Male ( ) Female ( )

4. Age range: 20-30 ( ) 31-40 ( ) 41-50 ( ) 51-60 ( ) 61-70 ( )

5. Marital status: Single ( ) Married ( ) Separated ( ) Divorced ( ) Widowed ( )

6. Personal monthly income: Less than N20,000 ( ) N20,000-40,000 ( ) N40,000-N60,000 ( ) N60,000-N80,000 ( ) N80,000-N100,000 ( ) More than 100,000 ( )

SECTION B: Use of smart phones for mobile learning

7. How often do you use your smart phones for mobile learning?

a. Daily ( ) b. Weekly ( ) c. Twice a week ( ) d. Monthly ( ) e. Occasionally ( ) f. never ( )

SECTION C: Performance Expectancy of smart phone use for mobile learning

8. What is your performance expectancy of the use of smart phone for mobile learning?

Please tick using this scale Strongly Agree (SA) Agree (A) Disagree (D) Strongly Disagree (SD)

Items	**SA**	**A**	**D**	**SD**
My smart phone enables me to access scholarly information relevant to my academic activities				
I can learn more efficiently with the use of my smart phone				
The use of smart phone does not improve my academic performance				
Implementation of literature search and information retrieval are easy with smart phone use				
There is no advantage associated with the use of my smart phone for mobile learning				
The electronic information resources that can be accessed motivates me to use smart phone				
I am convinced that smart phone use will add value to my learning activities				
Using smart phone for mobile learning enables me to follow the trend in learning globally				

SECTION D: Effort expectancy of smart phone use for mobile learning

9. What is your performance expectancy of the use of smart phone for mobile learning?

Please tick using this scale Strongly Agree (SA) Agree (A) Disagree (D) Strongly Disagree (SD)

Items	**SA**	**A**	**D**	**SD**
The use of smart phones for mobile learning is not characterised with stress				
I do not require much technical expertise to effectively use my smart phone for mobile learning				
I can access electronic information resources anywhere and anytime through my smart phone use				
The use of smart phones for mobile learning reduces cost, time and effort associated with conventional learning system				
The use of smart phone for mobile learning enhances my search capabilities				
Constraints of smart phone terminals such as small screens, low battery life and inconvenient input make it difficult to use smart phones for mobile learning				
The use of smart phone for mobile learning is not frustrating				

SECTION E: Facilitating conditions of smart phone use for mobile learning

10. What are the facilitating conditions influencing your use of smart phone for mobile learning?

Please tick using this scale Strongly Agree (SA) Agree (A) Disagree (D) Strongly Disagree (SD)

Items	SA	A	D	SD
There is adequate training on the use of smart phones for mobile learning in my university				
The use of smart phones for mobile learning is encouraged by my lecturers				
The presence of unstable power supply hinders the effective use of smart phones for mobile learning				
Limited Internet connection and inadequate bandwidth in my university do not motivate me to use my smart phone for mobile learning				
I have the skills and abilities to use my smart phone for mobile learning				
I need to improve my ICT skills in order to effectively use smart phone for mobile learning				
I find it very difficult to use my smart phone for mobile learning because it is quite complex				

APPENDIX B

MAXIMUM NORM SCORE OBTAINABLE FOR INDEPENDENT VARIABLES

1. **Performance expectancy (PE)**

Maximum scores obtainable from the 8-item scale on PE (4 x 8) = 32
The average score is (4 + 3 + 2 + 1) / 4 = 10/4 = 2.5
Interval score (32/3) = 10.6

Interval table for Performance Expectancy (PE) of respondents

Interval	Overall mean score image	Remark
0 - 10		Low
11–21	16.97	Moderate
22–32		High

2. **Effort expectancy (EE)**

Maximum scores obtainable from the 6-item scale on PE (4 x 6) = 24
The average score is (4 + 3 + 2 + 1) / 4 = 10/4 = 2.5
Interval score (24/3) = 8

Interval table for Performance Expectancy (PE) of respondents

Interval	Overall mean score image	Remark
0 - 8		Low
9 – 16	12.57	Moderate
17 –24		High

3. Facilitating Conditions (FC)

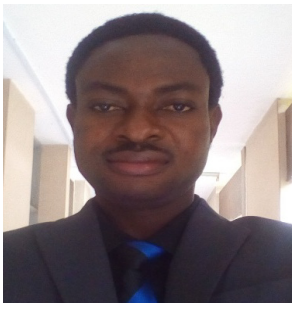
Maximum scores obtainable from the 7-item scale on PE (4 x 7) = 28
The average score is (4 + 3 + 2 + 1) / 4 = 10/4 = 2.5
Interval score (28/3) = 9.3

Interval table for Performance Expectancy (PE) of respondents

Interval	Overall mean score image	Remark
0 - 9		Low
10–19	15.39	Moderate
20– 28		High

BIOGRAPHIES

Sodiq Onaolapo is a postgraduate student in the Department of Library, Archival and Information Studies, Faculty of Education, University of Ibadan, Nigeria. He possess a Bachelor of Library and Information Studies (BLIS) First Class Honours, and a Masters of Library and Information Studies degree. He is a Certified Librarian of Nigeria (CLN) and a member of the Nigerian Library Association (NLA). His research interests include Information Technology acceptance and use, indexing and abstracting services, and Integrated Library Management Systems.



Olawale Oyewole is a doctoral student in the Department of Library, Archival and Information Studies, Faculty of Education, University of Ibadan, Nigeria. He is currently a part-time lecturer in the Department and a course facilitator with the Distance Learning Centre of the University of Ibadan. His research interests include academic integrity, digital plagiarism, application of information and communication technology to library services and distance learning education. He is a Certified Librarian of Nigeria (CLN) and a member of the Nigerian Library Association (NLA).

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21ST CENTURY SKILLS: STUDENT PERCEPTION OF ONLINE INSTRUCTOR ROLE

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ABSTRACT

Aim/Purpose: This research inquires how students perceive the role of Technology Education and Cultural diversity (TEC) instructors in improving their 21st century skills. In addition, this study examines the students' preferred learning style: face to face, synchronous and asynchronous.

Background: 21st century skills include, among others, collaboration, Information and Communication Technology (ICT) skills, higher order thinking, and multicultural communication. These skills are core elements for modern life and are the focus of this study as teacher critical career and life skills. This article presents the uniqueness of the TEC model, which provides a strategy to develop gradually various 21st century skills for teacher training in a multicultural technologically rich environment.

Methodology: This study examined (a) the level of ICT skills students acquire from the courses; (b) students' perceptions of the instructor role in developing 21st century skills; and (c) students' preferred learning style. A questionnaire was delivered to 99 students, who participated in courses based on the TEC model. Students from eight different Teacher Education Colleges and different cultural backgrounds – Arabs, Jews, religious, and secular – participated in this study.

Contribution: This study could shed light on the instructor's role as a facilitator in developing students' 21st century skills in a multicultural society. This study may provide a model and ideas for policy makers in teacher training programs to employ 21st century skills along with continuous development and adaptation to suit the rapid changing reality. A larger study needed to examine additional aspects of the 21st century skills in the teacher training programs in general and in multicultural societies in particular.

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Findings	The findings show that students complete the course with a high level of ICT skills, and that their preferred learning communication style was face-to-face (F2F) (45.45%) and blended method (43.43%), over the fully online (11.11%). Regarding online learning, students mostly preferred the mixed method of synchronous and asynchronous (59%), followed by asynchronous (29%), and synchronous (12%). As to student preference of the instructor role of enhancement, the results were prioritized as follow: Higher order thinking (M=3.99), online group collaboration (M=3.87), multicultural communication awareness (M=3.82), pedagogical use of digital tools (M=3.73).
Recommendations for Practitioners	Teacher education lecturers ought to: (1) design the online courses in a way that integrates F2F meetings and both synchronous and asynchronous methods; and (2) employ the wide range of skills in TEC courses that comply with 21st century principles; hence, the importance of widening such courses in teacher education colleges.
Recommendations for Researchers	It is recommended to perform a similar study using a pre-post method, as well as taking into consideration cultural uniqueness (such as language differences) and group comparison, where we can identify the effective components of the course design that would lead to a higher level of 21st century skills competencies among teachers.
Impact on Society	21st century skills are life skills, hence developing these skills in an appropriate educational setting reflects better utilization among all the members of society.
Future Research	More research should be done to widen the knowledge and address the importance of the instructor role as a course designer and facilitator in order to turn 21st century learning into a more meaningful and relevant one.
Keywords	21st century skills, online collaborative learning, course design, instructor role, TEC model

INTRODUCTION

Learning theories emerged in the 20th century, with three major theoretical frameworks shaping the study of learning (Harasim, 2017).

The Israeli Ministry of Education (2011) adopted collaboration as a constructivist learning pedagogy. Implementing this pedagogy in a technological framework made "online collaboration" an innovative learning experience desired by modern educational policies. 21st century skills comprise the skills needed to manage our lives effectively within a complex reality and an interconnected world. Collaboration, cooperation, teamwork, and effective communication, are all core elements in 21st century skills (P21 Partnership for 21st Century Learning, 2015).

It is the responsibility of education to provide students with these critical skills for the challenge of a continuously changing digital world in a multicultural diverse society.

Modern societies are characterized by the mobility and immigration of people across different countries, while social exclusion of minorities and culturally diverse communities still occur in the public sphere (Babacan, 2005). Stereotypes exist between communities, and are reflected in discriminations and tensions in everyday life. Hence various educational and social inclusion programs should be implemented in order to build a better diverse world, especially in our digitally connected communities.

This study was held in the Israeli teacher training system. Israeli society is divided by continuous tension between different cultures and religions (Ghanem, 2001). This division is directly reflected in the educational system, mainly in the separation into three school and college subsystems: secular Jewish, religious Jewish and the Arab sector. Arab students constitute about 27% of the Israeli educational

system, the religious Jewish sector constitutes about 30%, and 43% belongs to the general/secular Jewish education system (Viceblai, 2013).

This division maintains stigmas and ignorance between students, and meeting or collaborating between the different cultures is rare because of many logistical and psychological barriers. This is a critical challenge in the 21st century, since technology is highly used in Israel and communication channels are available, while students do not have the appropriate skills for collaboration in a multicultural environment. Hence, the importance of Technology, Education and Cultural diversity (TEC) programs, in which students from different colleges – Arab/Jews, secular/religious – learn online collaboratively in a systematic gradual model (Hoter, Shonfeld, & Ganayem, 2009; Shonfeld, Hoter, & Ganayem, 2013).

The instructors (lecturers and teachers) of TEC courses are also from different cultures and colleges. Those programs aim to develop collaborative skills among culturally diverse students which will help in reducing stigmas (Walther, Hoter, Ganayem, & Shonfeld, 2015). The technology of the 21st century enables us to overcome the logistical and psychological barriers of face to face meetings and also promotes trust building between people of diverse backgrounds (Walther & Bunz, 2005; Amichai-Hamburger, 2012). The TEC model adopts different 21st century skills, with instructors acting as a role model for the students by the methods they use to integrate technology and to collaborate in their work. The TEC model also adopts these skills in the instructional design of the courses, as well as in their contents and assignments.

The students in college courses work collaboratively in small multicultural groups of six members to solve tasks. An online forum, along with other Computer Mediated Communication (CMC) environments, are available to students through the Learning Management System (LMS). Successful online collaboration is an important learning target as well as a social one (Walther & Bunz, 2005; Amichai-Hamburger, 2012). The role of the instructors is critical in designing, facilitating and supporting the students for a successful learning process (Harasim, 2017).

This study examines the ICT skills acquired by students and developed throughout the course, their online learning style preferences, and their perceptions of the instructor role in developing various 21st century skills such as online group collaboration, higher order thinking skills (HOTS), pedagogical use of tools and multicultural awareness. This study can shed light on the future design of online courses that aim among other things to develop students' 21st century skills and multicultural awareness.

The following presents a literature review concerning 21st century skills, online collaborative learning, online learning styles, instructor role and the TEC model.

LITERATURE REVIEW

21ST CENTURY SKILLS

The current century is known as the Knowledge Age in which knowledge has key social, economic value, political and media power. The widespread phenomena of new digital environments and mobile technologies led to the creation of new theories and models in education, mainly connectivism and collaborativism, to address the needs and opportunities of the 21st century (Harasim, 2017).

Many suggestions exist nowadays for a set of skills needed for a successful life in the 21st century. The P21 (P21 Partnership for 21st Century Learning, 2015) developed a framework that describes the knowledge, skills, and expertise that students must master to succeed in work and life. This framework categorized the 21st century skills into the following categories, which is also adapted in the Israeli educational system:

- Key subjects and 21st century themes: (1) formal subjects, such as languages, math and others; and (2) interdisciplinary subjects, such as finance, global health literacy in a higher level of awareness and understanding.
- Learning and innovation skills: this category includes skills that prepare students for a complex life, and includes critical thinking and problem solving, creativity and innovation, communication and collaboration.
- Information, media and technology skills: information, media, ICT, literacy; accessing, analyzing, creating, and applying.
- Life and career skills: skills needed to meet the challenges of modern life such as flexibility, cross-cultural skills, leadership, etc.

Jacobson-Lundeberg (2016) showed how teaching 21st century skills modified the lives of college student and empowered them, despite the fact that those students came from a marginalized socio-economic community. Andrade (2016) showed how using ICT integrated pedagogy (flipped classroom) enhanced 21st century skills among students.

The study of teacher training in Israel shows that educators and mentors are still modeling traditional technology in education through presentation and demonstration use despite the fact that the Israeli Ministry of Education (2011) has adapted the 21st century skills to its educational system (Goldstein & Asaf, 2014; Goldstein & Tesler, 2017).

Since ICT is part of our daily life, it is critical to integrate ICT in education side by side with the use of the special opportunities of ICT to develop other 21st century skills. Multicultural communication and cooperation is much more possible in a rich ICT environment. TEC courses not only teach ICT skills in education, its instructional design model uses various pedagogical models and teaching strategies such as flipped classroom, synchronous and asynchronous strategies, to convey modeling to the learners.

Online Collaborative Learning

Collaborativism theory Online Collaborative Learning (OCL) addresses the needs and opportunities of the knowledge age within a process of social interaction (Harasim, 2017). Online collaboration learning proposes to be joint student work in the same activity or assignment, which can be in the range of the different collaboration levels proposed by Salmon (2012).

Learning as a process of knowledge construction always has a social component. As described by Harasim (2017) "OCL theory provides a model of learning in which students are encouraged and supported to work together to create knowledge: to invent, to explore ways to innovate, and, by doing so, to seek the conceptual knowledge needed to solve problems rather than recite what they think is the right answer". The OCL theory encourages learners to be active and engage collaboratively in order to construct their knowledge. Discussion in the learning process seems to be essential and not supplemental or optional. Harasim (2017) proposes that resources should be chosen to support the discussion, and not the opposite. Concerning knowledge construction as the learning target, Harasim (2017) proposes three key phases: (a) idea generation (brainstorming); (b) idea organizing (comparing, analyzing etc.); and (c) intellectual convergence (synthesizing). This can be a framework for group work in learning tasks. In OCL classrooms, the teacher's role shifts from being that of a provider/entertainer to being more of a facilitator as students take on more responsibility for the learning process and for generating discourse (Harasim, 2017).

Since 2000, there has been a rapid growth in the institutions offering distance education courses and the number of students taking online courses, and this policy is supported and widened by most academic institutions (Allen & Seaman, 2014). Online courses have a growing role in higher education; hence the special attention of this study and many other recent studies that try to examine instructional strategies toward enhancing learning outcomes. According to the Online Report Card (Online

Learning Consortium, 2015), the number of students in the U.S. enrolled in at least one online course has increased from 10% in 2002 to 30% in 2010, and the attitude of Science, Mathematics and Computer Science instructors are more positive than Social Science and Art instructors toward online learning. Also in Israel, online collaboration is on the agenda of the Israeli education system, and has increased in online learning discourse (Israeli MOE, 2011).

Collaboration in education is an important factor for success. Digital development has enhanced and widened the ways in which collaboration can be made, and enabled collaboration to be implemented between geographically and culturally distanced people. Studies show that collaboration promotes and improves learning and is an important means for personal development (Barkley, Cross, & Major, 2014). It is more and more recognized how collaboration promotes innovation and success in life.

Online collaboration is defined as being a critically required skill for life and work in our changing digital era. 21st century skills, among other factors, provides collaboration, ICT skills, higher order thinking, and multicultural communication. These skills are core elements in Israeli 21st century skills curricula (Israeli MOE, 2011). Collaborating effectively can develop interpersonal communication and ICT skills, which are essential for modern life and workplaces. Through innovative pedagogy and unique learning experiences, teachers should develop these skills. Faculty members are expected to design their online courses and assignments in a way that facilitates effective online collaboration.

Stephens and Roberts (2017) proposed four sequential phases, called the FCOG strategy for Facilitating Collaboration in Online Groups, in order to enhance student engagement. The strategy is composed of the following phases: (1) creating groups; (2) establishing expectations; (3) communication tools; and (4) assignments and activities.

Interpersonal student interaction is an important factor for student engagement (Faulkner, Doamekpor, & Yeboah, 2013). Hence the importance of designing activities that enables appropriate online interpersonal communication. Stephens and Robert (2017) proposed three online group assignments that can enhance interpersonal communication within the group: (1) open assignments with no right answer (such as debate, information seeking etc.); (2) multiple perspectives on a topic (such as multicultural comparison, examining a subject from various point of views etc.; and (3) creating authentic products, in which they can integrate and apply their knowledge and skills.

The distance education context for this study is not independent learning but rather a context of collaborative, constructivist learning within a community of learners.

Online Learning Styles

The emergence of asynchronous and synchronous communications technology has made integrating different online learning styles possible such as distance learning, blended learning, and integration of synchronous and asynchronous learning styles.

A study comparing learner satisfaction and learning outcomes in online and face-to-face learning environments with similar format, found that students in the face-to-face course held slightly more positive perceptions about the instructor and overall course quality than the online course (Johnson, Aragon, Shaik, & Palma-Rivas, 2000).

Ganayem and Daher (2006) found that student preference of the online courses learning method was based on five categories: Emotional aspect, effectiveness, interaction, course type, and the technological aspect. Students favored synchronous learning over asynchronous learning in the emotional aspect. Garrison, Anderson and Archer (2001), in their model "community of inquiry", emphasize three essential elements: Social presence, teaching presence, and cognitive presence. These elements enable the students to practice a unique and successful educational experience. Salmon (2012) also emphasized the instructors' presence in a successful online learning. Various studies proposed the

importance of designing rich activities to enable appropriate interpersonal communication in online learning with the instructor and between students (Faulkner et al., 2013, Harasim, 2017).

Instructor Role

Innovative pedagogical design and active involvement of the instructor is highlighted by various studies for successful online learning. Special focus is given in the literature concerning the critical role of the instructor in the success of OCL. Harasim (2017) sees the role not only as a facilitator of the resources and activities, but as a knowledge representative of the learned domain, ensuring student integration of the concepts, practices, standards and principles of the subject being studied:

> In the OCL theory, the teacher plays a key role not as a fellow-learner, but as the link to the knowledge community, or state of the art in that discipline. Learning is defined as conceptual change and is a key to building knowledge. Learning activity needs to be informed and guided by the norms of the discipline and a discourse process that emphasizes conceptual learning and builds knowledge (Harasim, 2017).

Many studies in the past have found that online courses require significantly larger workloads, and report that instructors think teaching online was more difficult than teaching in-class. Hartman, Dziuban, and Moskal (2000) reported that 90% of the instructors surveyed in 32 online courses believe that online courses were more difficult to teach, and that they demand increased interactions with students.

Garrison et al. (2001) have developed the model of Community of Inquiry (CoI), which they defined as follows: "An educational community of inquiry is a group of individuals who collaboratively engage in purposeful critical discourse and reflection to construct personal meaning and confirm mutual understanding." The researchers proposed three essential elements of a community of inquiry:

- Social presence: the ability of participants to identify with the community in a trusting environment developing inter-personal relationships.
- Teaching presence: the design, facilitation, and direction of students toward personally meaningful and educationally worthwhile learning outcomes.
- Cognitive presence: the extent to which learners are able to construct their knowledge through sustained reflection and discourse.

Positive integration of all these elements enable students to have a unique and successful educational experience that can lead to deep academic learning, as well as the development of higher order thinking skills such as critical thinking, synthesis and evaluation.

Robert (2003), on the other hand, proposed six strategy dimensions of online teaching approaches, as a range of practices in the following dimensions:

1. Focus of use: presenting information to constructing knowledge.
2. Nature of use: informative to discursive.
3. Role of teacher: student self-learning to teacher actively present and involvement.
4. Time and place of use: a-synchronous use to synchronous based timetable.
5. Role of student: reactive to proactive.
6. Relationships with students: from no relationships to enable building relationships.

Researchers are still studying the elements leading to successful educational experiences in this dynamic digital world. Several studies show practical aspects that can be associated with successful online discussion such as appropriate technology, clear guidelines and expectations, student technological preparation, appropriate topics, instructor presence and assessment (Salmon, 2012; Garrison et al., 2001). In addition to these, Wach (2017) also includes the online intercultural experience and in her study, she indicates the critical role of intercultural online experience in broadening cultural knowledge and awareness.

The instructor role in the knowledge age is still critical. The digital age shifted the instructor role from the classical role of information resource to a more complicated one, in which the instructor should master the 21st century skills modeling the process and the outcomes that he or she are facilitating.

TEC Model

TEC model is a framework for designing effective online collaborative courses in a multicultural setting. The goal is to build bridges among learners from different cultures in a gradual collaborative method and to start by working collaboratively in small multicultural groups through effective use the Internet and other cutting-edge information technologies.

Trust building in learning groups should be gradual and should move through different stages of interaction and collaboration, starting from dialogue to peer review to parallel collaboration to sequential collaboration and finally to synergistic collaboration (Salmon, 2012; Hoter et al., 2009). Based on this perception, the TEC courses developed the tasks and utilized technology respectively, as will be presented in the following chart of the TEC model (Figure 1).

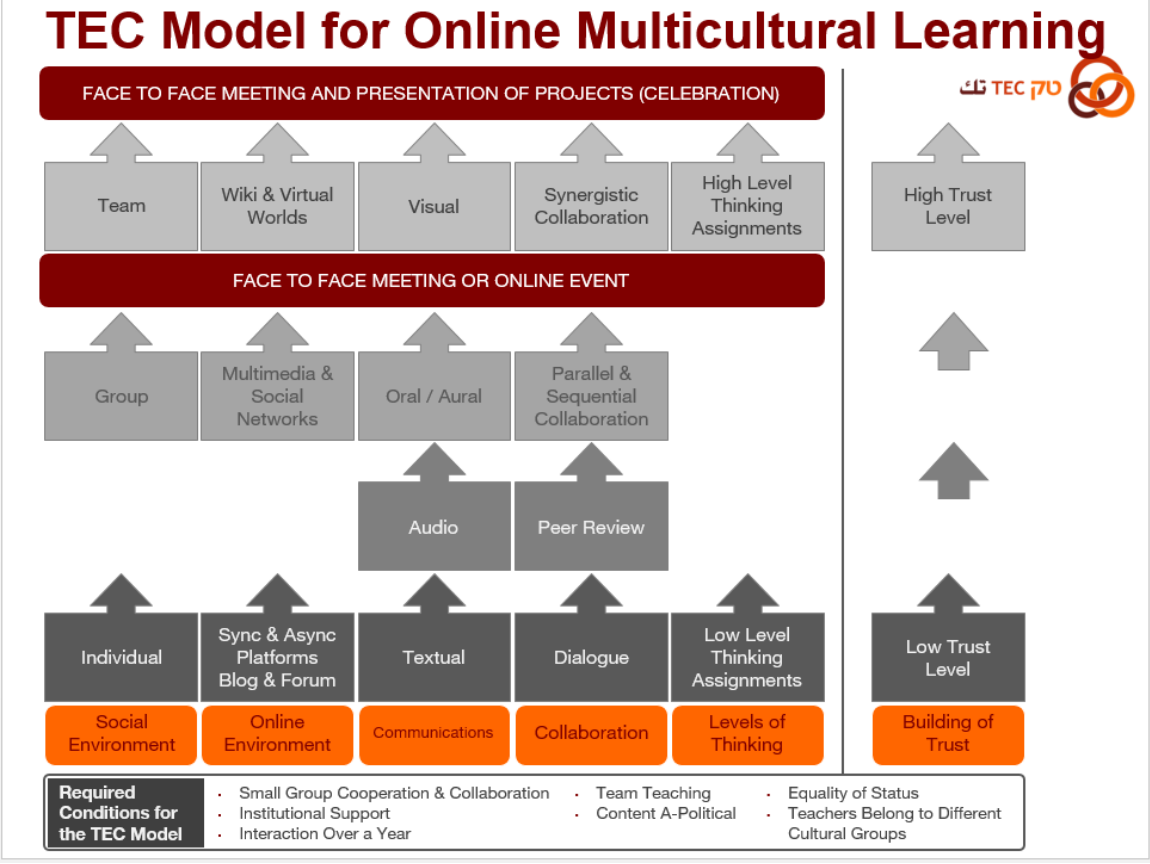

Figure 1. TEC model for online multicultural learning

The TEC model is based on the Pettigrew and Tropp (2000) model that expands the contact hypothesis (Allport, 1954). The contact hypothesis lays down the conditions for successful contact between two or more groups, to an online collaborative model. The contact hypothesis was developed by Allport to create effective intergroup interactions based on: (1) equal-status; (2) intergroup cooperation; (3) common goals; and (4) institutional/authority support.

Pettigrew and Tropp (2000) refined their conditions and required that contact should be cooperative rather than competitive between partners of equal status, between groups rather than individuals, long-term rather than short-term, supported by the institution, and capable of leading to the development of a "super-ordinate identity"; that is, one that transcends local, regional, or national identity.

Face-to-face meetings provoke many logistical, political, and cultural barriers such as prejudice and stigmas. The Internet provided new opportunities for online interaction and meetings, and researchers began to examine the adaptation of the contact hypothesis to online rather than face to face since the mid-90s (Amichai-Hamburger & McKenna, 2006; Hoter, Shonfeld, & Ganayem, 2009).

A number of CMC projects have been carried out among diverse populations, specifically populations in conflict, based on the contact hypothesis. Probably the most documented one is the online project on Dissolving Boundaries, carried out from 1999 to 2008 between two different religious sectors, Northern Ireland and the Republic of Ireland (Austin & Anderson, 2008). The Dissolving Boundaries project accompanied by research concluded that online communication has affected children's perceptions and prejudices.

In Israel, efforts to use CMC between Arab and Jewish populations have met with inconsistent results. Mollov and Lavie (2001) examined discussions that focused specifically on Jewish and Islamic religious practices through email exchanges between Israelis and Palestinians. They concluded that a one-to-one religious dialogue was a means for building Israeli-Palestinian understanding. However, group encounters that focused on political concerns did not result in reducing biases (Ellis & Maoz, 2007).

The TEC model, based on Allports' principles, proposed a number of conditions in order to develop successful contact between learners from different cultures in conflict:

- Full support by each participating institution.
- Involve collaboration among groups rather than among individuals.
- Deal with non-conflicting issues (until building dialogue skills and trust between individuals).
- Be based on a need for participant collaboration rather than competition.
- Ensure participants have equal status.
- Progress gradually over a period of at least one year, with gradual use of communication technology; beginning with exchanges via the Internet followed by text and voice exchange and finally, after a positive online experience, by face-to-face encounters among the partners.
- Employ teachers who themselves come from the different cultural groups and who "team teach" the course in a collegial environment.

It adds the gradual development of contact between the groups by progressing from individual work to online synergetic collaborative work, and from asynchronous textual communication to synchronous audio communication and to the final stage of face-to-face communication.

THE CONCEPTUAL FRAMEWORK OF THE STUDY

TEC courses are identified as online collaboration teaching and learning in a multicultural environment. TEC courses are based on the TEC model developed by the TEC center, the Mofet Institute (Hoter et al., 2009), which reflects the online expansion of the contact hypothesis (Allport, 1954). Its aim is to build successful connections and trust building between groups in conflict.

TEC courses following the TEC model have been offered annually since 2005, and are designed for the diverse teacher education colleges in Israel. Participants, instructors and students, belong to different religions and cultural backgrounds, secular Jews, religious Jews and Arabs in Israel. Advanced Internet learning environments are used as the teaching and learning platforms.

This study is related to two of the TEC courses taking place in the 2016 academic school year (2015-2016): (1) an advanced learning environment course (SVIVOT), an interdisciplinary course (which

focuses on computerized tools and online teaching methods including forums, blogs, wikis, film editing programs, and more); and (2) a TEC science disciplinary course (ECOLOGY).

Different subjects are taught online by the lecturers (instructors), and students are then required to work collaboratively in small-multicultural groups of six members each.

The courses are based on weekly interactions in synchronous and asynchronous online sessions. The Blackboard platform was used for the synchronous sessions every other week, and the Moodle LMS for asynchronous learning. Moodle was the main online environment of the course enabling students to interact at their convenience. This LMS includes learning materials, tasks, and discussion forums. A separate forum for each small multicultural group is opened for group discussions around their work on the tasks and anything else they decide to share with each other.

A team teaching approach from the three different cultures is used in all TEC courses. The instructors themselves work in a cooperative, non-competitive environment, representing the role model of a synergetic collaborative team for the students. Communication among the groups begins with the text-based forums, the lowest level of communication, and as the course progresses, the online communication develops to audio communication, and it keeps progressing for a few months until they meet face-to-face and reach oral communication.

Each participating teacher education college assigns an instructor and registers students for the different TEC courses. Students are then grouped into small culturally diverse groups within the TEC course, and each group is assigned one instructor who will accompany the group's interaction and work in an online setting throughout the academic year. Participants then work in small multicultural groups; each participant comes from a different college and a different culture, and the instructors become partners in the projects.

The tasks are relevant to teacher education and to student needs, and mostly require higher-level thinking skills. In each of the learning units, students receive a list of assignments necessitating the use of different technological tools and skills. To assess the students' work, a clear structured rubric for each assignment is developed. Examples of assigned tasks outputs include the development of an educational game and the creation of an educational video clip.

The tasks require different stages of collaboration and Higher Order Thinking Skills (HOTS), which are gradually developed along the course line. TEC courses emphasize developing ICT skills among students through exposure to new technological tools and requiring the implementation of those tools pedagogically in all course tasks.

At the end of the first academic semester or in the middle of the academic school year, students meet face-to-face in one of the participating colleges; they socialize, jointly develop a group product (such as logo, digital document, etc.), and submit it as a group task. At that point, the group's interests have become paramount and the cultural differences are transformed from threatening barriers to an enriching experience. Teamwork is part of the ideology and is modeled through team teaching by the culturally diverse course instructors.

The participants receive an individual as well as a group grade in which both cooperation and collaboration are taken into consideration. This is explained for each assignment in the rubric of the activity. Thus, participants understand the importance of collaborating and cooperating with their partners in order to achieve the maximum grade.

TEC courses develop various ICT and life skills: ICT skills, pedagogical use of ICT, collaboration, HOTS, and multicultural awareness.

The study focuses on the following research questions:

1. What is the level of ICT skills among TEC alumni?
2. How do the students perceive the role of TEC instructors in developing 21st century skills:
    - Collaborative work

- HOT (Higher Order Thinking)
- Pedagogical use of digital tools
- Multi-cultural awareness

3. What is the preferred learning style by the students: synchronous, asynchronous or F2F?

METHODOLOGY

The study was conducted using the descriptive quantitative method which gives an overall picture of the situation, and allows for examining the interrelations between relevant variables. A closed online survey was provided for the students of the TEC courses at the end of the academic year as an anonymous course feedback. The study compares several indices within the same school year. A detailed description of the research instrument is presented in the Instrument section.

Data was collected and evaluated for reliability by external research professionals, following a descriptive and comparative analysis conducted using the SPSS program. In addition, several relationships were studied as described in the results sections.

PARTICIPANTS

Students who participated in the TEC courses were in their final academic year towards a B.Ed. degree in the Teacher Education colleges. The TEC courses which participated in this study were Advanced Online Learning Environments (SVIVOT), and TEC Science course (ECOLOGY).

The aim of the TEC courses was to provide an online platform for collaboration among students from different cultures, in synchronous and asynchronous methods (mainly Blackboard and Moodle). In those courses, various online pedagogical tools were used (Padlet, Google Drive, Socrative, etc.). SVIVOT students learnt the educational use of the internet, integrating technology in the classroom, and planned a computerized lesson, while ECOLOGY students learnt the Ecology subject according to the TEC model.

The students were from different cultures and colleges: Jewish colleges (secular and religious) and Arab colleges (Table 1). They were majoring in different disciplines offered in their Colleges of Education, and their ages varied from high school graduates (18 years) to about 40 years old, more females than males.

Table 1. Research population - colleges and students

College Name	Frequency	Valid Percent
Beit Berl	16	16.2
Alqasimi College	16	16.2
Arab College Haifa	11	11.1
Kay College	9	9.1
Ohalo College	24	24.2
Talpiot	13	13.1
Kibbutzim	9	9.1
Others	1	1
Total	99	100

TEC courses are offered in the different colleges. Some colleges offer it as part of the elective course work, and others as part of the requirements towards earning the B.Ed. degree in different learning tracks (see Table 2). Students from each college were enrolled and distributed into different work groups in each of the TEC courses.

Table 2. Research population – students' learning track

Educational Level	Frequency	Valid Percent
Kindergarten	5	5.1
Elementary	35	35.4
Secondary	43	43.4
Other	16	16.2
Total	99	100

99 students participated in the study after completion of the academic year; 10% were male and 90% female. Teacher education colleges in Israel have a majority of females, where the school teaching profession is perceived as a female job. The Central Bureau of Statistics (CBS, 2017) shows that 81.4% of the teachers in Israel are female. 57.6% participated in the SVIVOT course, and 32.3% in ECOLOGY, while 10.1% of them participated in two courses.

The students reported that they studied in the following sectors: 35.4% Arabs, 44.4% general Jewish sector, 16.2% religious Jewish while they listed that they are affiliated with the following sectors: 55.6% Jewish sector, 44.4% Arabs (35.4% Muslims, and 2% Christians and 7% Druze) (Table 3 and Table 4). About 53% of the participants have Hebrew as their mother tongue and 43% are Arabic-speakers, as can be seen in Table 5.

Table 3. Research population: students' cultural sector

Education Sector	Frequency	Valid Percent
Religious Jewish	16	16.2
General Jewish	44	44.4
Arabic	35	35.4
other	4	4
Total	99	100

Table 4. Research population – students' religion

Sectors	Frequency	Valid Percent
Jewish	55	55.6
Muslim	35	35.4
Christian	2	2
Druze	7	7.1
Total	99	100

Table 5. Research population - student's mother tongue

Mother tongue	Frequency	Valid Percent
Hebrew	52	52.5
Arabic	43	43.4
English	1	1
Others	3	3
Total	99	100

INSTRUMENTS

This study is based on a closed questionnaire, which was developed by eight leading ICT instructors from eight different Teacher Education Colleges, and from different cultures. The survey is repeated each year in TEC courses, and instructors revise it according to previous experience and technological developments.

The survey was reviewed in two rounds: by TEC instructors and remarks were attended to and corrected, then a group of students not attending the courses were asked to fill out the questionnaire and take notes, and the instructors rewrote the questions according to the notes gathered. The instructors then took part in answering the questionnaire, took notes again, and worked together to correct the answers where needed. The content validity was found to be satisfying. The reliability (Alpha Cronbach) was calculated for each variable by its items, as listed in Table 6.

The research questionnaire consists of four major categories: ICT skills, instructor role in developing 21st century skills, preferred learning communication style, and demographic questions:

Section I: ICT skills. Students were asked to rate their technological skills in using various online environments (portable devices, synchronous sessions, social network, collaborative tools, and virtual world); a new variable was calculated as the average of five items: using mobile communication, using social media, participating in synchronous sessions, participating in virtual reality environments, using collaborative tools (such as Google drive, Web 2.0). The items were rated on a scale from 1 to 5.

Section II: Group instructor role in developing 21st century skills among students in the following dimensions: collaboration work, HOT (Higher Order Thinking), pedagogical use of digital tools, and multicultural awareness. Students were asked to rate several items on a scale from 1 to 5.

Section III: Preferred learning communication style: Students were asked to mark their preferred learning method: F2f, blended learning and full distance online learning, and were then asked to rate their preferences regarding distance learning; asynchronous, synchronous and mixed (synchronous and asynchronous) methods.

Section IV: Background information demographic intermediate variables were added to identify the TEC course, group, gender, religious affiliation, majoring subject, college, language.

In addition, data was collected from the feedback given after each of the seven learning units. Students were asked to evaluate the unit via an online form using the Likert scale from 1 to 5 (Not at all - Slightly - Moderately -Very - Extremely).

Section V: Course evaluation: two additional variables were calculated from the course unit feedback:

a) **Group collaboration**: This item was on a scale from 1 to 5, reflecting the student's rate of his/her group collaboration in solving the unit task. Group collaboration rate was calculated as the average score of all group members' feedback.
b) **Instructor support**: This item was on a scale from 1 to 5, reflecting the student's rate of their instructor support to his/her group while solving the unit task. Group instructor support was calculated as the average score of all the group members' feedback.

Table 6 indicates the reliability (Alpha Cronbach values) for the study variables:

Table 6. Reliability of the survey

Dimension	Reliability (Alpha Cronbach)	Items
Collaboration work	0.88	to lead students in online collaborative work to instruct students to collaborate in a multicultural environment to develop collaborative work skills among students to maintain a polite communication in the working group to solve problems among group members
HOT	0.89	to develop activities leading to thinking developing to involve students in assessment to arouse creative thinking in the workgroup to challenge students with new topics
Pedagogical use of digital tools	0.82	to orient students with the different learning platforms to teach students the use of different tools in digital environments
Multicultural communication	0.91	to interest students with new cultures to instruct students to work in a multicultural environment

RESULTS

The findings relate to three major issues: (1) ICT skill level; (2) The role of the instructor in developing 21st century skills: a. Collaborative work; b. HOT; c. Pedagogical use of digital tools; d. Multicultural awareness; (3) Preferred learning styles: synchronous and asynchronous.

The following presents the study research questions followed by results:

RQ1: What is the level of ICT skills among the students – TEC alumni?

Most students reported high to extreme use of the ICT items on a scale from 1 to 5, mainly the portable device with mean = 4.31, and synchronized session with mean = 4.10, and collaborative digital use with the mean = 4.02.

75% of the students considered themselves skillful in using ICT skills of mobile communication by reporting their levels "very" to "extreme". 70% reported themselves to be skillful in the use of social networks, about 73% for synchronized sessions, about 48% for the virtual world, and 73% for collaborative digital tools.

A new calculated variable was created of the mean of all items; (M= 3.99, SD= 0.81), which indicates that most students acquired a high level of ICT use, as described in Table 7.

Table 7. ICT skills analysis

	N	Maximum	Mean	Std. Deviation	Variance	Kurtosis
Portable devices	99	5	4.31	0.98	0.97	2.52
Social networks	99	5	3.97	1.07	1.15	0.07
Synchronized session	99	5	4.1	0.92	0.84	0.71-
Virtual world	99	5	3.53	1.20	1.45	1.04-
Collaborative digital tools	99	5	4.02	1.02	1.04	0.20-
***ICT skills (mean_q1)**	**99**	**5**	**3.99**	**0.81**	**0.65**	**0.33-**

RQ2: How students perceived the role of TEC instructors in developing 21st century skills;

a. *Collaborative work*
b. *HOT*
c. *Pedagogical use of digital tools*
d. *Multi-cultural awareness*

Students rated the group instructor role in developing 21st century skills in four dimensions: collaboration work, HOT (Higher Order Thinking), pedagogical use of digital tools, multicultural communication. Students were asked to rate several items on a 1 to 5 scale, and reliability was then calculated for the subitems of each dimension, and only the items with high reliability were used in the calculation as listed below:

A. Group Collaboration Work

This variable was measured as the mean of the following items, where Alpha Cronbach = 0.8;

- to lead students in online collaborative work
- to instruct students to collaborate in a multicultural environment
- to develop collaborative work skills among students
- to maintain a polite communication in the working group
- to solve problems among group members

Examining the higher rated answers (degrees 4 and 5 on the Likert scale) results in a high contribution of the instructor in developing various 21st century skills among TEC students. About 67% of students reported that the instructor should lead the group to collaborate in the group. 71% of the students preferred that the instructor train the students to collaborate in a multicultural environment. About 73% of the students reported their preference of the instructor to develop collaborative work skills among students within the group; 73% of them preferred that instructors develop online collaborative learning skills to ensure polite group communication; while 54% students reported that the instructor should solve group problems. Table 8 listed the percentage of high rated answers:

Table 8. Group collaboration analysis

Item	Percentage of high rated answers (4+5)
To lead students in online collaborative work	66.7
To instruct students to collaborate in a multicultural environment	71.7
To develop collaborative work skills among students	72.8
To maintain a polite communication in the working group	72.7
To solve problems among group members	53.6

The new variable "student perception of group instructor regarding group collaboration" is the mean of all items with (M= 3.87, SD= 0.91), which indicates that most students prefer and expect an active role of the instructor to facilitate and develop the group work. Table 9 shows the statistics of the items used to measure the instructor role in collaboration.

Table 9. Instructor role analysis

	N		Mean	Std. Deviation	Minimum	Maximum
Instructor role: Collaboration item	Valid	Missing				
To lead students in online collaborative work	99	0	3.88	1.15	1	5
To instruct students to collaborate in a multicultural environment	99	0	3.94	1.11	1	5
To develop collaborative work skills among students	99	0	3.92	1.14	1	5
To maintain a polite communication in the working group	99	0	4.03	0.96	1	5
To solve problems among group members	99	0	3.58	1.18	1	5
*** Mean -** student perception of group instructor regarding group collaboration	**99**	**0**	**3.87**	**0.91**	**1**	**5**

Students were asked to rate their group collaboration after each task, the mean value of all group tasks was found to be 4.18, (SD = 0.42) which indicated high intergroup collaboration (see Table 10).

Table 10. Descriptive Statistics of Students evaluation of their group collaboration
(From Unit tasks feedback of group collaboration)

Statistics	Value
N	99
Mean	4.18
Median	4.28
Std. Deviation	0.42
Variance	0.18
Range	1.54

Students rated the group instructor role (or support) in their group collaboration in the rate of 3.58, in the students' task feedback (see Table 11).

Table 11. Students' evaluation of their group instructor support

Statistics	Value
N	99
Mean	3.58
Median	3.62
Std. Deviation	0.66
Variance	0.43
Range	2.44

Significant correlation was found between the group collaboration factor and instructor support with spearman r= .54 ($p<0.01$) (see Table 12). This finding supports the earlier finding that students perceive the instructor role as a group facilitator in leading the group to work collaboratively and at the same time students reported that their groups worked collaboratively.

Table 12. Correlation between group collaboration and instructor support (based units' feedback)

		From tasks feedback of group collaboration	Instructor support
From tasks feedback of group collaboration	Correlation Coefficient	1	.539**
	Sig. (2-tailed)		0
	N	99	99
** Spearman's rho, Correlation is significant at the 0.01 level (2-tailed).			

B. Higher Order Thinking Skills and Innovation

This variable was measured as the mean of the following items, were Alpha Cronbach = 0.89;

- to develop activities leading to thinking development

- to involve students in assessment
- to arouse creative thinking in the workgroup
- to challenge students with new topics

About 67% of the students perceived that the instructor role (higher rated answers) in facilitating the group work should include developing activities leading student to develop thinking strategies; 69% thought that the instructor role should emphasize and motivate creative thinking within the group; 70% reported that the instructor role is to involve the students in the assessment process; and 72% reported that instructor role is to challenge students with new subjects. Table 13 presents the percentage of high rated answers of the different HOT items:

Table 13. Instructor role in HOT

Instructor role: Items for HOT	Percentage for high rated answers
To develop activities leading to thinking developing	66.7
To involve students in assessment	69.7
To arouse creative thinking in the workgroup	68.7
To challenge students with new topics	71.8

The new variable "higher order thinking skills and innovation" is the mean of all items with (M= 3.99, SD= 0.89), which indicates a higher students' rate of instructor contribution in this aspect, leading, motivating, and challenging the students through their collaborative work as presented in Table 14.

Table 14. HOT Analysis

	N	Maximum	Mean	Std. Deviation	Variance	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
To develop activities leading to thinking developing	99	5	3.9	1.04	1.071	0.58-
To involve students in assessment	99	5	4.01	1.04	1.071	0.03-
To arouse creative thinking in the workgroup	99	5	3.96	1.05	1.1	0.20
To challenge students with new topics	99	5	4.1	0.98	0.969	0.19-
***Mean - Higher order thinking skills and innovation**	**99**	**5**	**3.99**	**0.89**	**0.79**	**0.14-**

C. Pedagogical Use of Digital Tools

This variable was calculated as the mean of the following two items (Alpha Cronbach = 0.82):

- To orient students with the different learning platforms
- To teach students the use of different tools in digital environments

58% of the students think that the instructor's role is to orient the students with the different learning platforms LMS, while 66% think that the instructor should teach the students suitable tools for the digital environments for pedagogical use. Table 15 presents the percentage of high rated answers:

Table 15. Instructor role in digital pedagogy

Instructor role: Items for pedagogical use	Percentage for high rated answers
To orient students with the different learning platforms	57.6
To teach students the use of different tools in digital environments	65.6

The new variable "pedagogical use of digital tools" is the mean of the two items with (M= 3.73, SD= 1.03), which indicates the students' perception of the instructor's role in teaching and training for pedagogical tools and environments. About 68% of the students highly rated this role, as can be seen in Table 16.

Table 16. Skills in digital pedagogy

	N	Maximum	Mean	Std. Deviation	Variance	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
To orient students with the different learning platforms	99	5	3.62	1.15	1.32	0.51-
To teach students the use of different tools in digital environments	99	5	3.84	1.10	1.2	0.53-
***Mean - Pedagogical use of digital tools**	**99**	**5**	**3.73**	**1.03**	**1.07**	**0.43-**

D. Improving Multicultural Awareness

This variable was calculated as the mean of the following two items (Alpha Cronbach = 0.91):

- To interest students with new cultures
- To instruct students to work in a multicultural environment

62% of the students think that the instructor's role is to interest students of new cultures and to voluntarily empower the multicultural awareness within the group, while 68% of the students think that the instructor should teach students to work in a multicultural environment.

Table 17 shows the high rated answers:

Table 17. Instructor role in multicultural awareness

Instructor role: multicultural awareness	Percentage for high rated answers
To interest students with new cultures	61.6
To instruct students to work in a multicultural environment	67.7

The new variable "improving multicultural awareness" is the mean of the two items with (M= 3.82, SD= 1.1), about 70% of the students rated highly the role of the instructor as leading multicultural awareness (see Table 18).

Table 18. Descriptive statistics of multicultural awareness

	N	Maximum	Mean	Std. Deviation	Variance	Kurtosis
Instructor role: cultural awareness	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
To interest students with new cultures	99	5	3.76	1.16	1.35	0.34-
To instruct students to work in a multicultural environment	99	5	3.89	1.13	1.28	0.16
***Mean - Improving multicultural awareness**	**99**	**5**	**3.82**	**1.10**	**1.21**	**0.11**

RQ3: What is the preferred learning style for the students; Synchronous, asynchronous or F2F?

Students were asked to mark their preferred learning method in three different questions:

1. Preferred learning style among: F2F, blended learning, and full distance online learning

45.45% preferred face to face method, and 43.43% preferred the blended method, while only 11.11% preferred fully online method (see Figure 2).

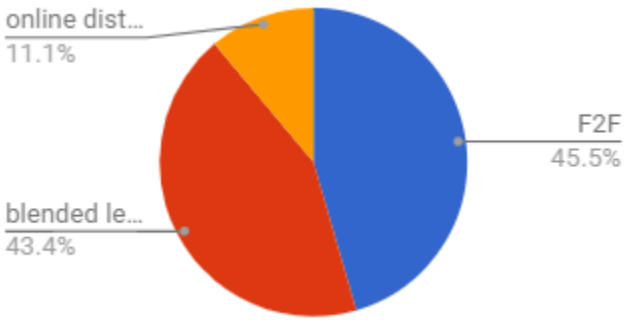

Figure 2. Preferred learning style

2. Preferred online distance learning among: asynchronous, synchronous and mixed (synchronous and asynchronous)

Most of the students preferred the mixed method (59%), a smaller number preferred the a-synchronous style (29%), and the rest preferred synchronous meetings, as can be seen in Figure 3:

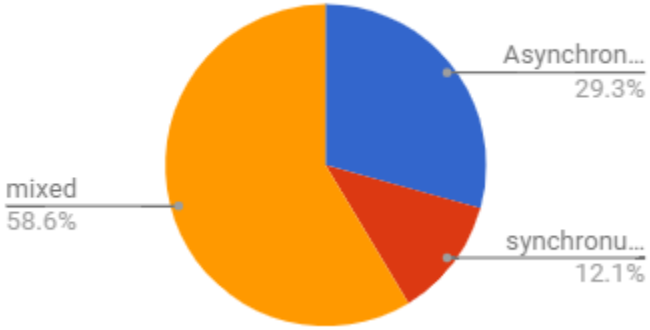

Figure 3. Preferred online learning style

3. On the scale of synchronous to asynchronous student's preference of learning style, students tended to prefer the asynchronous over the synchronous learning style, with the mean 3.58 on a scale of 1.synchronous to 5.asynchronous (see Figure 4).

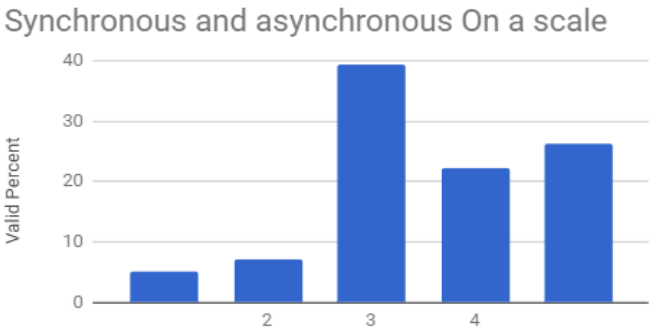

Figure 4. Synchronous and asynchronous on a preference scale

DISCUSSION

This study showed that TEC students were found to have high ICT skills, and high awareness of the need for developing 21st century skills through instructors. It was also found that about half of the students still prefer the face to face learning style, and a blended online learning (of synchronous and asynchronous), with a tendency towards asynchronous meetings.

TEC courses have culturally diverse students, and the ICT skills may empower them in their life and as future teachers. Student ICT skills were highly ranked among students with (M=3.99), and this indicates that most students acquire a high level of ICT skills through the course material, which is a major factor of the 21st century skills defined as Information and media and technology skills. Among the main goals in TEC center is to promote ICT skills and integrate them with pedagogical methods of teaching. Andrade (2016) and Goldstein and Asaf (2014) found this goal to be important in their research and the critical need to implement it in teacher training. TEC experience will give skilled graduating novice teachers confidence in life in general and empower their teaching skills in particular.

On the other hand, we see from the results that more than 25% of TEC students have ranked their ICT skills below satisfaction level. This will reflect on the future school teachers who will rely mainly on their material knowledge rather than relying on ICT integrated pedagogy. The Ministry of Education policy has removed ICT lessons from the schools, and requested that ICT become integrated in the disciplinary lessons. Hence, a major challenge faces most of the schools, and mainly the teachers that lack those skills. Israel in particular has a high rate of Internet use, more than 90% of the youth are using the Internet in a very intensive way (ISOC-IL, 2017), and most Israeli students (72% of the youth 13-18 years old) find the schools in Israel to be technologically dissatisfying. Goldstein and Asaf (2014) found that most of the pre-service teachers graduate with no practical experience in ICT integration in teaching. In most teacher education courses there were only basic forms of ICT integration while digital pedagogical models remained unpracticed. They concluded that the challenge today was the integration of ICT in education among college lecturers, school mentor teachers, and pre-service teachers. Voogt et al. (2017) also reported that teacher preparation for ICT-based teaching even in advanced countries is still insufficient to reach the goal of UNESCO (2009), which defined a teacher in the 21st century as one who is skilled in building diverse learning environments for enrichment and management of teaching with ICT. Teacher training programs still seem to follow the model of traditional technology in education (Goldstein & Asaf, 2014).

The use of pedagogical digital tools is an essential aspect in a teacher's career. TEC courses provide and train on various career skills that teachers need to acquire through their education and teaching practices, and which they will try to convey to their students through their courses. 68% of the TEC course students think that it is the instructor's role to promote the use of digital tools within the group work. Hence, the uniqueness of TEC courses in richness with advanced online teaching through various pedagogical models such as flipped classroom, synchronous and asynchronous strategies, small group collaboration etc. TEC courses accord with the studies of Jacobson-Lundenberg (2016) and Andrade (2016). Jacobson-Lundenberg showed how teaching 21st century skills have modified the lives of college students and empowered them, despite the fact that those students came from a marginalized socio-economic community. Andrade (2016) showed how using ICT integrated pedagogy (flipped classroom) enhanced 21st century skills among students.

Since ICT is part of our daily life, it is crucial to integrate ICT in education side by side with the development of other 21st century skills. TEC courses not only teaches ICT skills in education, its model is designed to integrate gradually with various online pedagogical models that may give an answer to the need of developing 21st century skills among teachers who will be more prepared to continue this process in schools with their pupils.

Despite the high ICT skills acquired by students and their successful experience in TEC courses (online distance learning), they do not prefer distance learning. In this study, we found that students in TEC courses complete their academic school year with a high level of ICT skills. About 43.43% of the participants still prefer face-to-face (F2F) learning communication style, 45.45% prefer the blended method, and 11.11% prefer full online learning. Of those preferring the online learning style, 59% preferred a mixed method of the synchronous and asynchronous methods, followed by 29% preferring the asynchronous method, and only 12% preferring the synchronous method. A study comparing learner satisfaction and learning outcomes in online and face-to-face learning environments with similar format, students in the face-to-face course held slightly more positive perceptions about the instructor and overall course quality than the online one (Johnson et al., 2000). Ganayem and Daher (2006) found that student's preference of learning style is based on five categories: emotional aspect, effectiveness, interaction, course type, and technological aspect. Garrison et al. (2001) emphasize in their model "community of inquiry" three essential elements: social presence, teaching presence, and cognitive presence. These elements enable the students to experience a unique and successful educational process. Salmon (2012) also emphasized the instructors' presence in a successful online learning. Various studies proposed the importance of designing rich activities to enable an appropriate interpersonal communication in online learning with the instructor and be-

tween students (Faulkner et al., 2013, Harasim, 2017). It seems that the F2F learning style still has a higher social presence relative to online learning despite the high use of social media in our era, hence the need for developing more presence in online teaching and learning.

TEC instructors were found to be the facilitators for enhancing 21st century skills among students in TEC courses. Student results were found to be prioritized as follow: Higher Order Thinking (M=3.99), online group collaboration (M=3.87), multicultural communication awareness (M=3.82), pedagogical use of digital tools (M=3.73). This complies with the Garrison model (Garrison et al. 2001), and OCL model of Harasim (2017) where the teacher's role shifted from being that of a provider/entertainer to being more of a facilitator as students took more responsibility for the learning process and for generating discourse. Students in TEC are required and encouraged to work collaboratively by the instructors through designing innovative online collaborative tasks.

Group collaboration is a critical factor for effective learning in the 21st century. Despite the importance of the instructor's role in general and this skill in particular, it is also recommended to support and facilitate student responsibility in developing and leading their own group collaboration. The result of this study indicates that most student still think that the traditional role of instructor is to lead and facilitate group work. In order to enhance effective group collaboration, Stephens and Roberts (2017) proposed in their research the four phases of establishing group work, the FCOG strategy: (1) Creating groups; (2) Establishing expectations; (3) Communication tools; (4) Assignments and activities. In TEC courses all phases are taken into consideration, while the "establishing expectations" phase is not emphasized. We recommend revising this phase to ensure group collaboration effectiveness.

TEC students indicated that the instructors facilitated HOT activities in their learning process, most of the students (about two thirds) expect the instructor to challenge them with higher order thinking activities (M=3.99). HOT is one of TEC model goals, and it is also emphasized by Harasim (2017), in addition to knowledge products that can be characterized as invention and innovation; new ideas, solutions, tools and technologies, as well as new applications of these inventions in new ways of doing things and of doing new things. Also in OCL classrooms, the teacher's role shifted from being that of a provider/entertainer to being more of a facilitator as students took more responsibility for the learning process and for generating discourse. Students' expectations meet OCL model that support high-level skills such as critical thinking, analytical thinking, synthesis, and evaluation.

One of the 21st century skills is preparing the students for a diverse, multicultural global world. Multicultural communication and cooperation is much more productive in a rich ICT environment. TEC courses not only teach ICT skills in education, but also intend to enhance multicultural understanding and acceptance in an indirect way; through group collaborative work on an educational task. 70% of TEC students reported that they rate highly the role of the instructor as a multicultural facilitator in group work. Working collaboratively in small multicultural groups enables the participants to identify with the community in a trusting environment while developing inter-personal relationships (Garrison et al., 2001). TEC group identity based on Pettigrew and Tropp (2000) transcends local, regional, or national identity and emphasizes the small multicultural group work, according to the TEC model. Walter and his colleagues (2014) reported in the study that: (1) prejudice among Israeli Jews and Arabs declined in yearlong virtual teams; and (2) interpersonal factors correlate with better attitudes toward outgroups as a whole. It seems that working in small multicultural groups even without dealing with cultural and identity issues, can promote the awareness of other cultures. The TEC results meet the results of a similar project in Northern Ireland and the Republic of Ireland (Austin & Anderson, 2008) and Arab Jewish online group work on Jewish and Islamic religious practices (Mollov & Lavie, 2001). However, group encounters that focused on political concerns did not result in reducing biases (Ellis & Maoz, 2007). Wach (2017) showed in her study the critical role of an intercultural online experience in broadening cultural knowledge and awareness.

The contact hypothesis of Allport (1954) and its enhancement by Pettigrew and Tropp (2000) and later by the TEC model (Shonfeld et al., 2013) emphasize the issue of collaboration rather than competition. While the issue of the learning content is not sufficiently elaborated in those models, we think that the content should be carefully selected by an experienced multicultural team in a way that the content can enhance collaboration and gradually reflect cultural richness.

This study showed that the TEC model is appropriate to enhance 21st century skills among learners, and the instructor has a critical role in leading the process.

CONCLUSION

In TEC courses, instructors succeeded in facilitating 21st century skills among students such as ICT skills, online pedagogy, online collaboration, and multicultural awareness. Hence, it is worth widening TEC courses in all Teacher Education colleges in order to meet the expectations of the 21st century teacher.

Online distance learning still lacks effective social presence, so it is essential to enrich those courses with a social presence in order to overcome the logistic and psychological obstacles of F2F meetings of distanced people (in location or in attitudes) and meet students preferences for face to face encounters. There is a need to deepen the study and implement new ideas to enhance the sense of presence of the instructors as well as advanced stages of collaboration among group members.

It is possible to enhance the TEC model by highlighting "group expectations" and by elaborating the issue of learning content in the context of cultural awareness. In addition, adding a qualitative aspect to the study may explore other added values and limitations of the TEC model as well as the expected skills by the participants.

LIMITATIONS

This study was based on a final survey among TEC students, although it might be more accurate to measure the 21st century skills among the participants before and after participating in TEC courses in order to compare the results among the same research population. In addition, perception of 21st century skills might be confused among the participants with their practical skills. In this case, it is possible to add an experimental part to the study before and after studies in TEC courses.

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BIOGRAPHIES

Asmaa Ganayem is the first researcher on Internet usage and the digital gap in Arab society in Israel, technology entrepreneur, expert on the development and assimilation of innovative pedagogical models in teaching and learning. Co-founder and co-director of the TEC Center at the MOFET Institute, and lecturer at Al-Qasemi Academic College of Education. She was chosen as Woman of the Year on the Internet by surfers in the Arab sector in 2011 and 2016. She completed her MA in Information Systems in Berlin, and her PhD in Internet Research at the University of Haifa

Wafa Zidan is a Lecturer in the Arab Academic College of Education in Haifa. A pedagogical trainer, instructor, and a researcher in the field of online teaching, educational technology, and distance learning courses in the college. She developed a course and teaches it for early childhood caregivers; on how to utilize technology in early childhood. Ms. Zidan is a team member of the TEC (Technology, Education and Cultural diversity) center in the Mofet Institute, which develops, researches and implements technological projects in multicultural settings among Arabic and Hebrew speaking schools. She is also part of the Professional development team for School Teachers.

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STUDENTS' APPROACHES TO E-LEARNING: ANALYZING CREDIT/NONCREDIT AND HIGH/LOW PERFORMERS

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ABSTRACT

Aim/Purpose	This study examines differences in credit and noncredit users' learning and usage of the Plant Sciences E-Library (PASSEL, http://passel.unl.edu), a large international, open-source multidisciplinary learning object repository.
Background	Advances in online education are helping educators to meet the needs of formal academic credit students, as well as informal noncredit learners. Since online learning attracts learners with a wide variety of backgrounds and intentions, it is important understand learner behavior so that instructional resources can be designed to meet the diversity of learner motivations and needs.
Methodology	This research uses both descriptive statistics and cluster analysis. The descriptive statistics address the research question of how credit learners differ from noncredit learners in using an international e-library of learning objects. Cluster analysis identifies high and low credit/noncredit students based on their quiz scores and follow-up descriptive statistics to (a) differentiate their usage patterns and (b) help describe possible learning approaches (deep, surface, and strategic).
Contribution	This research is unique in its use of objective, web-tracking data and its novel use of clustering and descriptive analytic approaches to compare credit and noncredit learners' online behavior of the same educational materials. It is also one of the first to begin to identify learning approaches of the noncredit learner.

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Findings	Results showed that credit users scored higher on quizzes and spent more time on the online quizzes and lessons than did noncredit learners, suggesting their academic orientation. Similarly, high credit scorers spent more time on individual lessons and quizzes than did the low scorers. The most striking difference among noncredit learners was in session times, with the low scorers spending more time in a session, suggesting more browsing behavior. Results were used to develop learner profiles for the four groups (high/low quiz scorers x credit/noncredit).
Recommendations for Practitioners	These results provide preliminary insight for instructors or instructional designers. For example, low scoring credit students are spending a reasonable amount of time on a lesson but still score low on the quiz. Results suggest that they may need more online scaffolding or auto-generated guidance, such as the availability of relevant animations or the need to review certain parts of a lesson based on questions missed.
Recommendations for Researchers	The study showed the value of objective, web-tracking data and novel use of clustering and descriptive analytic approaches to compare different types of learners. One conclusion of the study was that this web-tracking data be combined with student self-report data to provide more validation of results. Another conclusion was that demographic data from noncredit learners could be instrumental in further refining learning approaches for noncredit learners.
Impact on Society	Learning object repositories, online courses, blended courses, and MOOCs often provide learners the option of moving freely among educational content, choosing not only topics of interest but also formats of material they feel will advance their learning. Since online learning is becoming more prolific and attracts learners with a wide variety of backgrounds and intentions, these results show the importance of understanding learner behavior so that e-learning instructional resources can be designed to meet the diversity of learner motivations and needs.
Future Research	Future research should combine web-tracking data with student self-report to provide more validation of results. In addition, collection of demographic data and disaggregation of noncredit student usage motivations would help further refining learning approaches for this growing population of online users.

Keywords	learning object repository, learning approaches, noncredit learners, cluster analysis, web-tracking data

INTRODUCTION

Learning object repositories, online courses, blended courses, and MOOCs often provide learners the option of moving freely among educational content, choosing not only topics of interest but also formats of material they feel will advance their learning. Since online learning attracts learners with a wide variety of backgrounds and intentions, it is important to understand learner behavior so that e-learning instructional resources can be designed to meet the diversity of learner motivations and needs. Advances in online education are helping educators to meet the needs of formal academic credit students and informal noncredit learners, as well as targeting instructional needs of high versus low performers. Researchers have examined a variety of differentiated learner behaviors or characteristics of students participating in online learning. For example, research has shown that there are distinct differences between credit learners (those working towards an academic certificate or degree) and noncredit learners (those using online learning to advance their own understanding). In an online humanities course where some participants were working towards academic credit and others were

taking it more like a MOOC for noncredit, the academic credit students earned significantly higher final grades (Almeda et al., 2018). Kursun (2016) found online credit students scored significantly higher on quizzes, intrinsic and extrinsic goal orientation, and perception of course value. Extrinsic goal orientation refers to the degree to which a learner is focused on obtaining rewards, grades, or positive evaluation from others. Intrinsic orientation involves the learner's participation in an activity for reasons such as self-driven challenge, curiosity, or mastery (Pintrich, Smith, García, & McKeachie, 1991).

Other research has identified classifications of learners based on their patterns of engagement with video lectures and assessments (Kizilcec, Piech, & Schneider, 2013). The researchers classified these MOOC (Massive Open Online Courses) participants as completing, auditing, disengaging, and sampling. Completing learners are those who complete the majority of assessments; auditing are those who did assessments infrequently or at all; disengaging are those who did early assessments but then had a marked decrease in engagement; and sampling are those whose engagement with course materials was only evident early in the class. Research using both e-learning usage logs (Akçapınar, 2016) and self-report use of e-learning materials (Speth, Lee, & Hain., 2006; Speth, Namuth, & Lee 2007) has shown that academic students can be categorized as deep, strategic or surface. In the deep approach, the learner actively attempts to understand the material for the knowledge gain whereas in a surface approach the learner takes a passive participation to barely fulfill the academic or knowledge requirements (Biggs, 1987; Entwistle, 1977; Entwistle & Ramsden, 2015; Marton & Säljö, 1976). In a strategic approach, the learner takes an organized approach where the motivation is to score higher in assessments; learners modify their learning behavior based upon the assessment requirements (Gordon & Debus, 2002). In a noncredit situation, learners modify their learning behavior based on personal goals or external motivation for learning the material.

Student time on task in traditional face-to-face courses has historically been considered an important prerequisite for successful learning (Bransford, Brown, & Cocking, 2000; Stallings, 1980). Time variables also represent evidence of student engagement and effort with the material, which have been shown to be related to student learning in online courses (Kim, Park, Cozart, & Lee, 2015; Puzziferro, 2008). Previous research has examined student use of time across various MOOC course components, finding little use of discussion and most time spent on lecture videos (Breslow et al., 2013). Other research with learning object repositories found that most user time was spent on lessons, followed by animations and quizzes (Nugent et al., 2017). Time spent on quizzes (whether a score is part of a grade or the learner is using the quiz to self-assess knowledge) can also be considered a reflection of effort since the quiz is the element with the most overt connection to learning. A study examining the predictive levels of demographic, motivational, and usage data found that interaction with assessments was one of the few significant and consistent usage predictors of learning (Miller, Soh, Samal, Kupzyk, & Nugent, 2015). While understanding student and learner perceptions and uses of online education materials is important, little research literature exists regarding broader academic student outcomes in agriculture sciences that result from using these electronic education tools (Vickrey, Golick, & Stains, 2018). Even less is known for noncredit learners as most studies focus on course completion data (Albelbisi, Yusop, & Mohd Salleh, 2018).

In addition to considering learning approaches by credit and noncredit students, it is also important to consider the variety of ways online learning tools and materials are utilized. For example, learning object repositories contain small, portable educational materials that individually focus on a single learning objective and can be used in diverse educational settings including face-to-face courses/educational events, completely online offerings or a mixture (Koutsomitropoulos & Solomou, 2018; Namuth, Fritz, King, & Boren, 2005; Nugent et al., 2016; Simpson, 2016;). An entire course can also be completely online or a mixture of both online and face-to-face components (hybrid-delivered). In a pilot study addressing baseline statistics knowledge required of graduate level social work students, Davis and Mirick (2017) compared results of credit students who took a traditional full semester-long face-to-face course with credit students who took a shortened non-credit hybrid

course. Results showed no significant differences in student statistical abilities, anxiety towards statistics, or belief about the importance of statistics in the social work profession.

The objective of this study is to examine differences in credit and noncredit users' learning and usage of the Plant Sciences E-Library (PASSEL, http://passel.unl.edu), a large international, open-source multidisciplinary learning object repository. The primary study focus is on these usage differences, but secondary analyses identify and differentiate subpopulations of learners who scored high or low on quizzes.

Research questions were the following:

(1) What is the difference in usage of online instructional materials by credit and noncredit learners?

(2) What are the differences in usage between high and low quiz scoring credit and noncredit students?

(3) What learning approaches are being used by high quiz scoring credit and noncredit students? By low quiz scoring credit and noncredit students?

This paper will describe the e-learning repository content and outline the methodological and data collection/analysis approaches. Results comparing on-line learner behavior of credit and noncredit learners will be presented, along with cluster analysis results comparing high and low performers. The discussion section elaborates on these differences and suggests learning approaches for each of the four learner categories: a) high performing noncredit, b) low performing noncredit, c) high performing credit, and d) low performing credit. Finally, the summary and conclusions section outlines the contribution to the literature in this field, discusses limitations, and provided recommendations for both practitioners and researchers.

METHODS

RESEARCH APPROACH

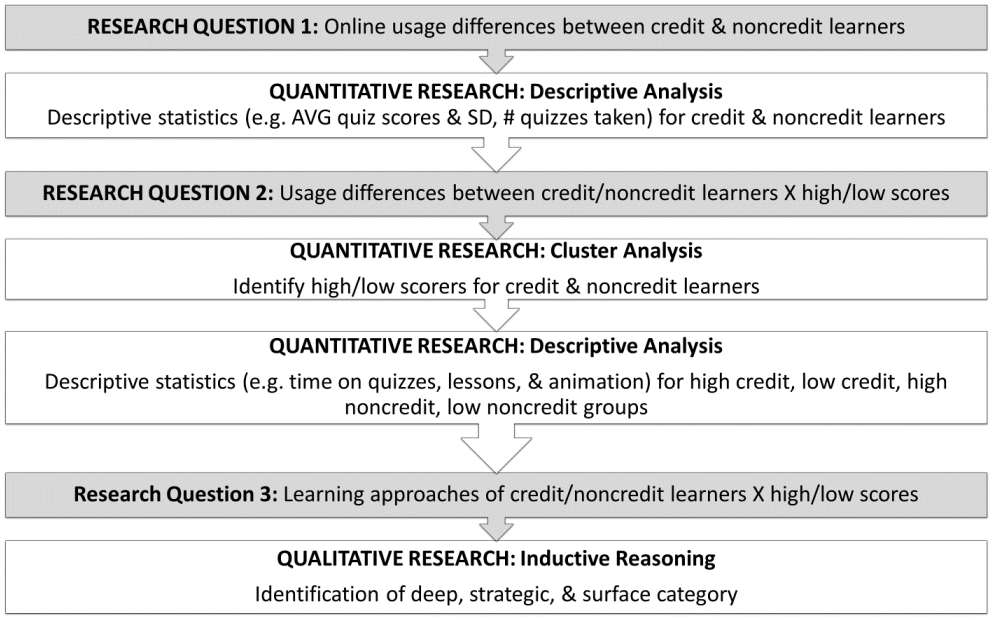

Figure 1. Flowchart of methods/approach

This research uses descriptive statistics to address the primary research question of how credit learners differ from noncredit learners in using an international e-library of learning objects. The study also uses cluster analysis to identify high and low credit/noncredit students based on their quiz scores and follow-up descriptive statistics to differentiate their usage patterns and to help describe possible learning approaches (deep, surface, and strategic). A flowchart showing the methods/approach is found in Figure 1.

E-Learning Repository Context

This research was conducted with an established learning object repository, the Plant and Soil Sciences eLibrary^{PRO} (PASSEL) (http://passel.unl.edu). This collection of short lessons, quiz banks, illustrative animations, and video clips has been used globally since 1999 in illustrating complex, applied scientific concepts to a variety of learners in academic settings as well as personal enrichment. Built using Open Source Technologies, PASSEL is the result of collaborations across several academic institutions and nonprofit and industry partners. Some of these include U.S. land grant universities such as University of Nebraska, The Ohio State University, Colorado State University, New Mexico State University, and Montana State University. Examples of international institutions and nonprofits include Universidad de Costa Rica, Salinas de Hgo, SLP, Mexico, Mykolayiv National Agrarian University, and the CGIAR Generation Challenge Programme–Integrated Breeding Platform. Two agricultural industry partners are Pioneer and Monsanto. Funding has been provided from sources such as American Distance Education Consortium, U.S. Department of Agriculture, and National Science Foundation. At the outset, content lesson authors recognized some of their learners required basic, introductory materials while others were ready for more advanced instruction. In addition, the educational goals of potential learners to the site vary considerably. Some learners could be at the high school level, others seek formal, academic credits to apply towards a graduate degree program or professional certification, and still others may simply be curious about a given subject area. Therefore, the learning object approach afforded the greatest flexibility in addressing this wide scope of learner needs.

At the time of the data analysis described later in this paper, PASSEL had 13 collaborating U.S./international universities, 131 lessons, and 128 animations. It operates under learner control, so that each student can spend as much time as required to reach mastery, as determined by a quiz score or one's own internal confidence. Since the PASSEL database represents a rich learning environment that involves multiple topics, use in multiple courses, and use by a variety of international student and professional audiences, it represents an ideal source to study and characterize learner usage behaviors.

Data Collection Procedures

This research study used web-tracking data to address differences between credit and noncredit learners and between students scoring high and low on the quizzes. The study received institutional review board approval as a secondary data analysis. Usage was determined through time spent with the online material. Key variables analyzed in the research included time spent in an online session, as well as time spent with various content modality materials:

1. Lessons: text plus pictures, discussion questions, and videos
2. Glossary (hyperlinks)
3. Animations (dynamic visuals with text showing relationships and processes)
4. Quizzes

The PASSEL e-learning platform maintained logs of activity by recording data about learner clicks while the learner was logged in and using the platform. This study explores trace data (816,979 log entries) obtained from 803 registered users of the PASSEL repository for approximately 4.5 years from August 2010 through February 2015. Registered users had access to all PASSEL learning materials, including quizzes. Users accessed the material using a web browser (Google Chrome, Mozilla

Firefox, Internet Explorer, etc.) connected to the Internet. The user access logs contain a time stamp, session identifier, a user identifier, and a text string, which is the web browser GET request to the web server. Parsing the GET string allowed extraction of the type and identifier of learning material accessed (e.g., lesson page, animation, glossary, and quiz question). In essence, this log maintained user data about every mouse click that loaded a new material in a user's web browser. When a user was not in an active session, a new session identifier was used for logging during a learning session. The assigned session identifier was removed when the web browser was closed.

For purposes of this study, we categorized archived learner data as either *credit learner* or *noncredit learner* based upon the PASSEL class or community the user was enrolled in. A *credit learner* was someone who was enrolled in a college academic credit course that was utilizing the PASSEL resource. This could be an undergraduate or a graduate level course. Data were unavailable to know exactly how each academic course instructor chose to use the PASSEL materials, but we know from informal conversations that it varied widely, including:

1. Providing students with a list of PASSEL learning objects to use simply as supplemental material (so not required of students);
2. Using as practice quizzes, of which select questions would be used in graded quizzes;
3. Using PASSEL quizzes as a certain percentage of the students' course grade. Even when PASSEL quizzes were requirements of a student's grade, most of the time students were given unlimited quiz tries and time to complete them in order to reach their desired score. Quizzes typically contain 10 multiple choice questions, drawing from quiz banks to allow students to see different questions each time they take a quiz.

A *noncredit* learner was someone who was not enrolled in an academic credit-leading course. These learners also varied greatly. They represented those participating in a professional development training (possibly to earn continuing education credit towards a professional license or even a simple certificate of completion). Other noncredit learning uses could include an instructor testing materials for possible use in a course they teach (credit or noncredit). Additional examples could be professionals looking for explanations on a science principle to help them with a challenge faced on their job, a student researching a concept for a class project, or someone merely interested in a topic for self-learning.

Classes or learning communities which were known to have both credit and noncredit learners were not included in this study, due to anonymity of individual student data and therefore inability to separate them based on credit-pursuing goals or lack thereof.

Data Analysis

Two different analysis approaches were used in this study. First, descriptive statistical analysis was done at a macro level to explore the online usage behavior of learners and define the baseline for the two types of learners (credit and noncredit). Looking at these two groups distinctly allows us to generalize our findings at the level of credit and noncredit learners and compare the overall differences between the two groups, addressing the first research question. Descriptive statistics were computed from the user logs for the time credit and noncredit learners spent in a session, lesson, animation, glossary, and quiz. Graphs of the time spent on task distributions were skewed by a very few large estimates (i.e., minutes), which we suspected represented learners taking a break and walking away from the computer. To account for this occurrence, median times are reported rather than averages. We also computed statistics for each learner average quiz score and number of quizzes taken.

Further, both credit and noncredit user groups were subdivided into clusters of learners based upon quiz performance measures (i.e., high quiz scores and low quiz scores). Clustering approaches for partitioning learners have been successfully used in past research to discover patterns reflecting user behaviors such as starting and replying to discussion forum threads and participating in chats (Tala-

vera & Gaudioso, 2004), recognizing learner detrimental learning behaviors (Amershi & Conati, 2006), and identifying *completing, auditing, disengaging,* and *sampling* learners in MOOCs (Kizilcec et al., 2013). Talavera and Gaudioso (2004) focused on using clustering techniques for identifying patterns in collaborative behavior among learners using an online learning platform; Amershi and Conati (2006) used clustering for adaptive support for learner interaction with the online system. Kizilcec et al. (2013) used longitudinal patterns of engagement using video lectures and assessments as features to cluster engagement trajectories of learners.

We employed a widely used clustering algorithm known as *k*-means (Madhulatha, 2012) which identifies a given number of *k* clusters by minimizing the distance measure of the *n*-dimensional features. In our dataset, we used average quiz score, quiz score standard deviation, total number of quizzes taken, and number distinct lessons where the quiz came from for each learner recorded in PASSEL as clustering features. Using average quiz score and score standard deviation as features for clustering ensured grouping PASSEL users based on similar quiz scores and variability; adding the total number of quizzes enabled clustering learners who had similar number of quizzes from unique lessons. Since we could represent only three variables on the 3D diagram, we selected to use number of quizzes as the metric for visualization. This decision is supported by the moderately high (.59) correlation between the number of lessons and total number of quizzes.

The *k* value (number of clusters) was determined a priori by visually inspecting the *k* clusters by incrementing the values of *k* and qualitatively observing the *k* clusters. However, the qualitative method involves ambiguity and subjectivity. We used a common method, called the elbow method, to remove this subjectivity (Madhulatha, 2012). The simple idea behind the elbow method is to incrementally increase the value of *k* and for each incremental value compute the sum of squared error (SSE) between each member of the cluster and the cluster centroid. Plotting SSE against *k* will decrease the value of SSE as *k* is increased. At a certain value of *k*, the marginal decrease in the SSE will be very low and the curve will display an elbow effect. One may select the value of *k* at the hinge of the elbow. In this study, our goal was to choose a small value of *k* that has a low SSE. Figure 2 shows that while the method is not perfect and is prone to heuristic processes, one can definitely see a flattening out near eight clusters, and the elbow starting near eight clusters represents where we selected that the dataset has diminishing returns by increasing *k*.

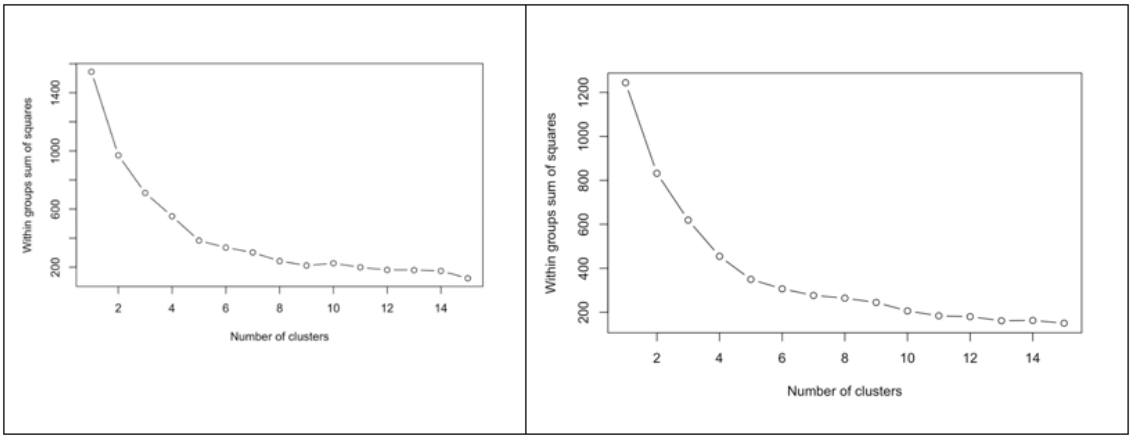

Figure 2. Sum of squared error plotted for the noncredit dataset (left) and credit dataset right) with the mean quiz score, score standard deviation, and total number of quizzes taken as data features.

Separate cluster analyses were run for credit and noncredit learners to identify high and low quiz scoring clusters. Finally, we used usage descriptive statistics for these high/low clusters to address research question 2 and as the basis to develop learning approach profiles (research question 3).

RESULTS

DESCRIPTIVE STATISTICS FOR CREDIT/NONCREDIT

In the first steps of analyzing the historic 816,979 log entries from 803 users, those who never took a quiz were removed, leaving 518 users with useable data. Next, descriptive analytics were run to gain an overall understanding of learner time spent on key learning objects, as well as quiz scores, to indicate an estimated measure of knowledge obtained. Table 1 presents overall descriptive statistics for credit and noncredit learners; there are 186 credit individuals and 332 noncredit. The table indicates each group's average score and standard deviation on all quizzes they took. Also notice the median time each group spent in a session (from time user logged on until logged off), as well as median time on animations, glossary words, within lesson text pages and taking a quiz. Finally, the table indicates the number of quizzes taken by individuals within each group, which could be taking the same quiz multiple times or taking multiple quizzes a single time.

Table 1. Credit versus noncredit usage – Descriptive analysis

Category	*n*	Average Score / Standard Deviation (%)	Session Median (minutes)	Animation Median (minutes)	Glossary Median (minutes)	Lesson Median (minutes)	Quiz Median (minutes)	Number Quizzes Taken	Number Modules / Standard Deviation
Credit	186	53.16 / 13.53	9.8	6.60	.11	15.88	15.43	27.31	8.25 / 7.84
Non-credit	332	44.31 / 10.69	18.93	8.37	.13	11.38	13.88	9.49	3.54 / 4.55

In comparing credit versus noncredit users' overall statistics, we find that credit students scored higher on quizzes (53%) than noncredit (44%), took quizzes more times (27 versus 9), and spent more time on lessons (15.88 min versus 11.38 min) and quizzes (15.43 min versus 13.88 min). However, noncredit spent much longer in a session (18.93 min) and more time in an animation (8.37 min). Neither group significantly used the glossary (only 0.1 min). To clarify, in general a session median length is 9.8 minutes for a credit learner. During this 9.8-minute period of time, a user may access an animation, a glossary word, read a lesson, and take a quiz or any combinations of these tasks. When the user is working on an intensive task, such as reading a lesson, their session length would be more than 9.8 minutes. However, there are also sessions when the user either did not visit any lesson or was simply browsing the lesson where their session time will be much shorter, which is all reflected in the median session length of 9.8 minutes. Therefore, median times reported for each task represent the general time a user spends on that task in a single session.

To better understand what might be leading to higher quiz scores (or not), cluster analysis on the credit and noncredit users was conducted in order to identify high and low scorers.

CLUSTER ANALYSIS FOR CREDIT LEARNERS

Figure 3 presents graphical results of the cluster analysis for credit learners which identifies Cluster #1 as being the high quiz scorers and Cluster #4 as those scoring low on quizzes, also taking into account two other variables (number of quizzes taken and the standard deviation of scores). In deciding between clusters with similar average quiz scores, we focused on the one with a lower standard deviation (suggesting less variation in scores) and lower numbers of quizzes taken (suggesting few repeats of quizzes). As an example, Cluster #4 was clearly the lowest scoring group, so we chose a high scoring cluster with comparable numbers for standard deviation and number of quizzes. Notice that the standard deviation of Cluster #1 is low, which shows each quiz taken by users in this group was high scoring compared with Cluster #6 where the average scores were high, but the

standard deviations are higher. Clusters #8, #7, #3, #5, and #2 all have similar average quiz scores, but they separate into different clusters because of differences in standard deviation (#3 is lower compared with #5). Similarly, Cluster #8 users took fewer number of quizzes compared with Cluster #2. The average score value in each cluster is calculated by averaging the average quiz percentage score earned by individuals in that cluster. The standard deviation in each cluster is then the deviation of those averages among the cluster. The size of each bubble varies by the number of unique quizzes an individual person took.

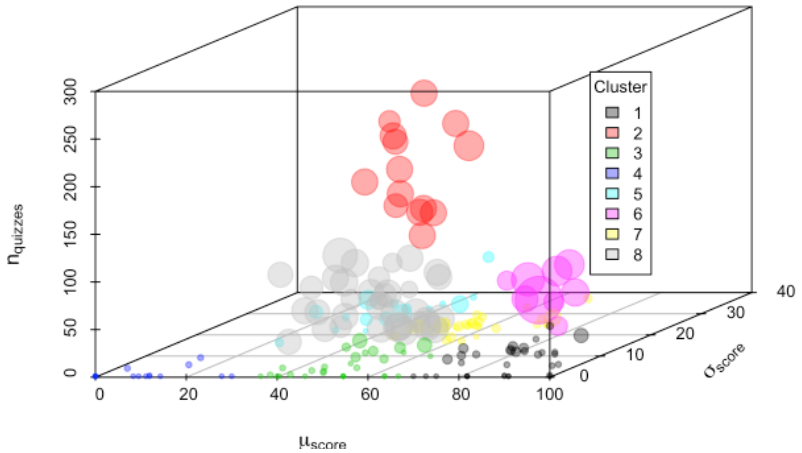

Figure 3. Cluster analysis of credit learners identifying high scorers (Cluster #1) and low scorers (Cluster #4), where n = number of quizzes taken, μ = average score achieved on those quizzes, and σ = standard deviation of the quiz scores. The size of each bubble varies by the number of unique quizzes an individual person took.

Cluster Analysis for Noncredit Learners

Figure 4 presents graphical results of the cluster analysis for the noncredit learners, which identifies Cluster #5 as being the high scorers and Cluster #7 as the low scorers. Following selection procedures used with credit learners, the high scorers were selected based on the few number of quizzes taken and low standard deviation in scores.

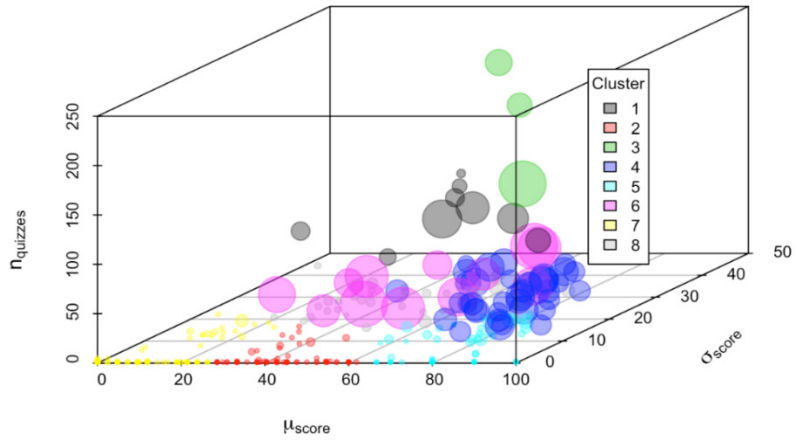

Figure 4. Cluster analysis of noncredit learners identifying cluster 5 as high and cluster 7 as low quiz scoring, where n = number of quizzes taken, μ = average score achieved on those quizzes and σ = standard deviation of the quiz scores. The size of each bubble varies by the number of unique quizzes an individual person took.

Descriptive Statistics for Credit and Noncredit High versus Low Quiz Scorers

Table 2 reports the average quiz scores, median time spent on learning objects, and number of quizzes taken for four subcategories of PASSEL users identified through the cluster analysis: credit students with high quiz scores, credit students with low quiz scores, noncredit with high quiz scores and noncredit with low quiz scores. The total population size of these subcategories was 201. There were similar usage statistics for high and low credit scorers in terms of time spent in a session, animation, and glossary. However, high scorers spent far more time on a lesson (26.32 min) in comparison to low scorers (14.43 min), and on a quiz (14.65 min vs. 2.84 min). Noncredit comparisons showed some differences in length of time in a session, with the low scorers actually spending more time (18.67 min/low vs. 13.68 min/high). Median time on a lesson was similar between the two (5.67/high vs. 6.05/low), as well as time on animation (9.42 min/high vs. 9.65 min/low). In contrast to the credit students, noncredit low scorers spent more time on the quiz than did the high scorers (5.53/high vs. 6.75/low).

Table 2. Credit and noncredit high versus low quiz scorers – Descriptive analysis

Category	Average Score / Standard Deviation	Cluster Number	*n*	Session Median (minutes)	Animation Median (minutes)	Glossary Median (minutes)	Lesson Median (minutes)	Quiz Median (minutes)	Number Quizzes Taken
Credit high	83.57 / 8.76	1	33	6.68*	3.52	0.05	26.32	14.65	4.03
Credit low	10.47 / 9.36	4	15	5.32	3.62	0.13	14.43	2.84	1.27
Noncredit high	78.08 / 10.42	5	56	13.68	9.42	0.05	5.67	5.53	2.50
Noncredit low	10.84 / 8.50	7	97	18.67	9.65	0.27	6.05	6.75	2.00

* .68 represents fraction of the minute: 6 minute + .68*60 ~ 6 minutes 40 seconds

DISCUSSION

Credit and Noncredit Usage Differences

Little research has compared the online usage and learning approach of credit and noncredit learners. What has been done tends to look at data such as course completion or course final grades (Albelbisi et al, 2018; Almeda et al., 2018; Davis & Mirick, 2017). This research reports differences at a more micro-level of how the different learner types utilized the same learning objects. In comparing credit versus noncredit statistics, we find that credit students scored higher on quizzes than noncredit, which is in line with previous research (Almeda et al., 2018; Kursun, 2016). This result could be partially explained by the fact that they took the quiz more times and spent longer on lessons and quizzes. Credit students also spent more time on lessons than noncredit. However, noncredit learners spent much longer in a session (18.93 min) and more time in animation (8.37 min). This suggests that noncredit learners may spend more time searching for personally relevant material, while credit students use the syllabus and assignments to direct their allocation of time spent online. Credit learners use material required for the course; noncredit learners seek personally meaningful information. Noncredit learners' extended time on animation suggests they value material that explains relationships and processes of more complicated and abstract material or provides a pictorial summary of material. In considering the wide variety of PASSEL noncredit users, we suggest that non-

credit global learners gravitate towards highly graphical material and include teachers looking for something to use in their classes to help explain more complex relationships and processes. The fact that neither group used the glossary much mirrors research showing that the glossaries are used considerably less than other types of materials (Nugent et al., 2017).

Credit /Noncredit and High/Low Quiz Score E-Material Usage Differences

We further refined credit/noncredit differences by looking at high and low quiz scorers in each group. The descriptive statistics clearly showed that the high credit scorers spent more time on individual lessons and quizzes than did the low scorers. It could be logically expected that this more in-depth attention would translate into higher quiz scores and can be inferred that the motivation for understanding the material and receiving a good grade differed between the high and low scorers. In contrast, the most striking difference for the noncredit learners was in session times, with the low scorers spending more time in a session, suggesting more browsing behavior. The difference in time spent for high versus low scorers on a lesson and quiz for the high versus low quiz scorers was far less for noncredit than credit. It is also interesting to note that the two noncredit clusters spent less lesson and quiz time than the noncredit users overall, suggesting that the high performers had some prior knowledge of the material and required less time to review lesson and take the quiz. In contrast, the low scorers, with hypothesized less background knowledge, browsed or scanned the material.

Potential Learning Approaches in Using E-Materials—Learner Profiles

Using results of the cluster analysis and accompanying descriptive usage statistics, we developed suggested learner profiles for the four groups (high/low quiz scorers x credit/noncredit).

Profile of high quiz scoring credit students

Of all four groups this one had highest quiz score (84%), spent longest time on quiz (15 min), and took the quiz more times (4). This group also had the lowest standard deviation on the quiz score (8.76), meaning that there was relatively little difference in quiz scores among multiple attempts of each learner. The 26 minutes' lesson usage is the highest of all four groups and higher than the estimated lesson time provided by project developers (20 min). These usage statistics and comparisons suggest that these learners are concerned with quiz scores and grades. They recognize the value of lesson material and spend needed instructional time processing the content, and they take the quiz multiple times to achieve good scores.

Learning approach: The characteristics seen in these users are similar to what we would expect in *deep learners* due to their high quiz scores and the long time they were spending on lessons. To recap the definition earlier, *deep learners are motivated to learn material for the sake of gaining knowledge.*

Profile of high quiz scoring noncredit students

These students scored somewhat lower than the credit high performers on the quiz (78% vs. 84%) and spent less time on the quiz (6 vs. 14 min) and lesson (6 vs. 26 min). They also took fewer quizzes. However, they spent more time in a session (14 min) and animation (9 min). Their relatively high quiz score (78%) and the fact that they took fewer quizzes than their high performing credit counterparts suggest that this group has some background knowledge that allowed them to maximize their time to view the lesson and complete the quiz. The long session times suggest that this group is spending time seeking material applicable to their career or particular situation. The longer use of animation implies that they value the animations' depiction of relationships between more complex concepts and principles.

Learning approach: The characteristics seen in these users are similar to what we would expect in *strategic learners* as they appeared to select only those materials relevant to them personally or for their careers, rather than spending extended amounts of time on the lesson material as we would expect in a *deep learner* approach.

Profile of low quiz scoring credit students

This student group had a very low average quiz score (10%). They spent the shortest time in a session (5 min) of the four selected groups, little time on animation (4 min), and very short time on quiz (3 min). They typically took the quiz only once. However, they spent a reasonable amount of time on the lesson (15 min).

The usage statistics suggest that these learners focus on particular lesson material and spend a reasonable amount of time processing the content. They have little concern for a grade (as evidenced by little time on quiz and not re-taking quiz even with the low score). We characterize these learners as ones who will attend to particular relevant lesson material.

Learning approach: The characteristics seen in these users are perplexing but seem to best align with that of *strategic learners* because they spend a good amount of time in the lesson material. It may be that, for this group, the quiz did not directly account for a grade received in the academic course grade.

Profile of low quiz scoring non-credit students

The low performing non-credit students were similar to their credit counterparts in that they had very low quiz scores (11%). Of the four cluster groups, they spent the longest time in a session (19 min) and animation (10 min). Their relatively short time on a lesson (6 min) was basically the same as a high scoring noncredit student, providing additional evidence that the high scoring noncredit learners had some background knowledge. It is interesting that the noncredit low scorers spent more time on the quiz (7 min) than on the lesson. This suggests that, in contrast to their low scoring credit counterparts, they had some motivation to assess and increase knowledge and were perhaps hoping to score high enough to meet any grade requirements. It is also possible that they were seeking to use the quiz as a learning vehicle, valuing the feedback it provided, or for review, as suggested by Speth et al. (2007).

Usage results suggest that these students lack content background knowledge and spend considerable time looking for relevant material, using surfing strategies. They may also be seeking alternative avenues to learn content material such as animations (to more quickly grasp more complex relationships and processes) and quizzes (as a learning vehicle).

Learning approach: The characteristics seen in these users are similar to what we would expect in *surface learners* due to shorter time spent on lessons. The longer time in a session would suggest they are bouncing around the site without finding answers because their quiz scores are low.

Conclusions and Future Work

This research is unique in its use of objective, web-tracking data and its novel use of clustering and descriptive analytic approaches to compare credit and noncredit learners' online behavior of the same educational materials. It is also one of the first to begin to identify learning approaches of noncredit learners. Our research adds to the research literature on learning approaches (Akçapınar, 2016; Speth et al, 2007). Most learning approaches instruments are geared to credit learners. For example, the *Approaches and Study Skills Inventory for Students* (ASSIST) (ETL Project, n.d.) uses language such as *schoolwork*, and the *Study Process Questionnaire* (SPQ) (Biggs, Kember, & Leung, 2001) makes reference to passing exams and assessments. By using behavioral as opposed to self-report data, we found that students appear to approach learning in various ways, with distinct differences between credit and noncredit learners. Use of behavioral web-tracking data, which logs student

learning processes, has major advantages over self-report. However, comparing clustering approach profile designations with self-report data would provide more validation of results.

Another limitation is that demographic data is not available to know the background or prior knowledge of any PASSEL participant, credit or noncredit. Clearly future research using web-tracking data could benefit from more understanding of the learners themselves, including basic demographic data such as age, gender, school classification, as well as their reason for seeking out such online material. While existing research with credit students typically includes some of this critical information, the same is not necessarily true for noncredit students, who vary widely in their motivations, background knowledge, and intentions. Are they taking using the PASSEL materials for CEU (Continuing Education Unit) credit, as supplemental material, or for personal knowledge gain? What was their motivation for taking quizzes? Are they using the quiz as a self-check for their knowledge gain or as an overview to the material? It is also possible that the quiz is being used for basic learning by focusing on the feedback provided and retaking the quiz repeatedly rather than spending time only in the lesson. We also acknowledge that multiple choice quizzes are not the only measure of learning. Noncredit learners, in particular, may be more interested in developing particular skills that could be better measured by essay or performance measures. Understanding these underlying motivations of noncredit students will provide critical insight into their learning approach.

As a first step in looking more closely at credit and noncredit learners, we focused specifically on clusters of users who scored high and low on the quizzes. We believe that use of cluster analysis provides a way to make sense of large data generated in online learning object repositories by segmenting large learner populations, leading to more in-depth study of individual clusters. Looking at usage data from the original eight clusters, as opposed to the two high and low clusters, could provide a more comprehensive view of learner behavior and underlying learning approaches.

These results also provide some preliminary insight for instructors or instructional designers. For example, low scoring credit students are spending a reasonable amount of time on a lesson but still score low on the quiz. Results suggest that they may need more online scaffolding or auto-generated guidance such as the availability of relevant animations or the need to review certain parts of a lesson based on questions missed from the quiz.

In summary, this study capitalized on a large dataset of web-tracking usage data from an international learning object repository that was used by both credit and noncredit learners. This research made novel use of clustering and descriptive statistics to identify similarities of usage data with that of deep, strategic and surface approaches to learning. By using these data analytic approaches, we were able to discern usage differences in credit and noncredit learners (descriptive statistics) and identify sub-populations (cluster analysis) for additional analysis. By combining these two data analytic approaches, we were able to answer some basic questions regarding differences in credit and noncredit learners and students scoring high and low on online quizzes. The study also highlights areas for future research, including the need for more demographic data about the learners, as well as their motivations for seeking online material and how they define "success" in learning (it may not be completion of an entire course module and/or "passing" a quiz) (Albelbisi et al., 2018; Clow, 2013). This information could provide greater insight into the online behavior of noncredit learners, who vary widely in their reasons and motivation for pursuing online instruction. Future research could also benefit from the use of performance-based learning measures instead of objective assessments and a larger sample of credit and noncredit learners to provide validation of these results and improve generalizability of results.

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PLAGIARISM MANAGEMENT: CHALLENGES, PROCEDURE, AND WORKFLOW AUTOMATION

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ABSTRACT

Aim/Purpose	This paper presents some of the issues that academia faces in both the detection of plagiarism and the aftermath. The focus is on the latter, how academics and educational institutions around the world can address the challenges that *follow* the identification of an incident. The scope is to identify the need for and describe specific strategies to efficiently manage plagiarism incidents.
Background	Plagiarism is possibly one of the major academic misconduct offences. Yet, only a portion of Higher Education Institutes (HEIs) appear to have well developed policies and procedures aimed at dealing with this issue or to follow these when required. Students who plagiarize and are not caught pose challenges for academia. Students who are caught pose equal challenges.
Methodology	Following a literature review that identifies and describes the extent and the seriousness of the problem, procedures and strategies to address the issue are recommended, based on the literature and best practices.
Contribution	The paper alerts academics regarding the need for the establishment of rigorous and standardized procedures to address the challenges that follow the identification of a plagiarism incident. It then describes how to streamline the process to improve consistency and reduce the errors and the effort required by academic staff.
Recommendations for Practitioners	To ensure that what is expected to happen takes place, HEIs should structure the process of managing suspected plagiarism cases. Operationalization, workflow automation, diagrams that map the processes involved, clear information and examples to support and help academics make informed and consistent decisions, templates to communicate with the offenders, and databases to record incidents for future reference are strongly recommended.

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Future research	This paper provides a good basis for further research that will examine the plagiarism policy, the procedures, and the outcome of employing the procedures within the faculties of a single HEI, or an empirical comparison of these across a group of HEIs.
Impact on Society	Considering its potential consequences, educational institutions should strive to prevent, detect, and deter plagiarism – and any type of student misconduct. Inaction can be harmful, as it is likely that some students will not gain the appropriate knowledge that their chosen profession requires, which could put in danger both their wellbeing and the people they will later serve in their careers.
Keywords	academic integrity, plagiarism, higher education, cheating, policy, procedure

INTRODUCTION

Academic misconduct encompasses a broad spectrum of misbehaviors. Among them, cheating on examinations, fabricating results, colluding, purchasing of essays, and plagiarism – the duplication of ideas without the corresponding acknowledgement (Bretag, 2013; Park, 2003).

According to the Daily Mail Online (2016), 50,000 students have been caught cheating in exams or essays in the past three years in the UK alone. Following investigations, a mere 1% of them has been judged guilty of academic misconduct.

Clarke and Lancaster (2006) coined the term 'contract-cheating' to describe the situation where students purchase bespoke academic assessments and submit the work as if it was their own. As Wolverton (2016) reported, a new cheating economy has emerged and policing this kind of cheating is extremely hard. Internet-based essay writing services are flourishing as it is now easy and cheap to search, find, and pay someone to complete your coursework. Ghost-written essays are another outstanding challenge that has become endemic. How prevalent is the phenomenon? The 2015 MyMaster essay cheating scandal revealed that around 1,000 students from 16 Australian HEIs had submitted assignments that had been paid for through these services (Visentin, 2015).

The scope of the present paper is to review the literature on plagiarism, one of the many aspects of academic misconduct, and recommend best practices. Plagiarism is considered a serious academic offence and all related incidents should be addressed carefully by HEIs. Despite this, many academics perceive managing plagiarism to be a daunting task, often because their educational institutions have underdeveloped procedures (Bretag, 2013; Glendinning, 2014).

A Google Scholar search for 'plagiarism' performed in the fall of 2018 showed a response of 473,000 related articles. Of interest, 30,100 of these were published in 2017 alone, thus suggesting the concern this topic raises. Following this finding, a small-scale literature review was performed to examine the existing research in this area. Our search showed that, thus far, the majority of studies in plagiarism have focused on student and institutional attitudes towards plagiarism (Jager & Brown, 2010; Tennant & Duggan, 2008; Vehviläinen, Löfström, & Nevgi, 2018; Wilkinson, 2009), reasons why and how students plagiarize (Dias & Bastos, 2014; Klein, 2011; McCabe, 2005), cultural influences on plagiarism (Hayes & Introna, 2005; Kam, Hue, & Cheung, 2017; Stappenbelt, Rowles, & May, 2009), understanding of academic writing, academic integrity, and institutional policies (Bretag, 2013; Gullifer & Tyson, 2014; Power, 2009), views on plagiarism deterrence and detection (Jones & Sheridan, 2015; Levine & Pazdernik, 2018), current policies and systems attempting to address plagiarism, or the lack of these (Hu & Sun, 2017; Kaktiņš, 2014; Macdonald & Carroll, 2006; Mellar, Peytcheva-Forsyth, Kocdar, Karadeniz, & Yovkova, 2018), and plagiarism in the digital age (Moorman & Pennell, 2017; Nilsson, 2016; Sutherland-Smith, 2015). Despite the vast literature on plagiarism, however, little attention has been given to examining the effectiveness of policies, processes, and systems in addressing this problem (see Glendinning, 2014).

While many HEIs have clear protocols of plagiarism that are followed to the letter (see Henderson, Whitelaw, & Jose, 2014), a great deal of them have been found to be inconsistent when it comes to acting (Joob & Wiwanitkit, 2014; Park, 2003). The current highly commercialized and competitive academic climate and the financial viability of HEIs may interfere with their adherence to academic integrity guidelines and regulations. There are several reasons why inaction is rather problematic, if not harmful. First, because it may inadvertently encourage or at least defuse an unacceptable practice. Second, because students who rely on cheating to pass exams are unlikely to gain the appropriate knowledge that their chosen profession requires – something that could put in danger both their wellbeing and the people they will later deal with in their careers. As such, it is imperative that HEIs reflect on what they wish to be known and remembered for, and what caliber of students they expect to graduate. Instilling a culture that values academic integrity above all else should be a priority (Macdonald & Carroll, 2006; Macfarlane, Zhung, & Pun, 2012; Park, 2003).

When HEIs are determined to act, unclear, cumbersome or unstandardized processes in managing student plagiarism may result in inaction or inappropriate action, unnecessary efforts, and unfair outcomes (Gibson, Ivancevich, Donnelly, & Konopaske, 2011). For instance, Tennant, Rowell, and Duggan (2007) identified substantial variation in the range and spread of the penalties available for plagiarism among UK HEIs and in the procedures involved in their recommendation.

The literature review found no studies examining the actual systems that HEIs use to manage plagiarism incidents from start to finish. An in-depth examination of a sample of 12 large Australian HEI websites showed that although nearly all included elaborate and widely dispersed Institutional Policies, Statutes and Regulations, Codes of Conduct and Guidelines, only two of them included a practical and easy to use web-based system for reporting, processing, and recording plagiarism incidents. The rest suggested the academics should report the incidents, presumably using traditional emails or printed reports. Similarly, although some HEIs had established protocols for reporting and recording academic misconduct, in the documentation that was publicly available (noting that much is staff restricted), the process appeared to be lengthy and inefficient. Academics were instructed to download proformas and submit them to the Head of School or Dean as appropriate. Academic Registrars were to keep a record of all findings of academic misconduct and penalties imposed, but there was no mention of a method or system.

In this paper I urge authorities to develop the appropriate structures and automate the processes to manage student plagiarism cases. I begin by discussing some of the challenges academics face in detecting plagiarism and then describe the process and provide step by step guidelines for developing efficient systems. The focus is placed on how academics and institutions can address the challenges that *follow* the identification of an incident.

The Importance of Plagiarism Checks

Students who plagiarize by presenting someone else's work or ideas as their own pose a dual challenge. The first one is when the student is not caught. Surprisingly, a second – and often more intricate – challenge emerges when a student is caught. Consider the first scenario. Students who plagiarize and are not caught present two serious issues: one for academia, and one with even broader consequences for society. The credibility of a HEI is measured, among other variables, by the caliber of the students and professionals it produces (Hazelkorn, 2015). Graduates who have systematically plagiarized but have not been detected affect, or should affect, the HEI's research funding, ranking, and ultimately its reputation. Most HEIs are liable to the taxpayers and the society and should therefore safeguard the quality of education it provides and the graduates it produces, because the second issue, the consequences at the broader societal level, may be severe. For instance, students who receive grades and degrees they do not deserve can become incompetent professionals (see Martin, Rao, & Sloan, 2009). Lawyers who may jeopardize their clients' rights, doctors who misdiagnose and put at serious risk the health of their patients, and surgeons bound to perform mala praxis. According to Nonis and Swift (2001), students who engaged in dishonest acts in college are more likely to

engage in dishonest acts in the workplace. Considering these potential consequences, every institution should strive to prevent, detect, and deter plagiarism – and any type of student misconduct.

The second major challenge for academics arises when the instructor suspects that the student may have incurred in plagiarism and is planning to pursue the case. To illustrate the complexity of this process, consider the following scenario. An academic has just received 200 student assignments. Using detection software supplied by the HEI, s/he performs a plagiarism check. The originality report shows that 20 students have serious issues in citing work, thus suggesting that they have plagiarized. The academic is now required to make several important decisions, which for inter-rater reliability purposes should be consistent to those of other colleagues. This is to say, the academic should follow the same standards and procedures as his/her colleagues to avoid bias.

While institutions may vary in how they approach student plagiarism, there is consensus among scholars that certain steps must be taken when addressing this issue (see Lampert, 2014; Vehviläinen et al., 2018). Such steps involve (a) detection and selection of cases with high similarity; (b) careful examination of the evidence (e.g., comparison of the script and the sources), including contacting students or colleagues for further information if needed (e.g., to establish whether the offence was intentional, who copied from whom); (c) completion of a detailed report form; (d) decision, which may require consultation with other parties (e.g., unit convenor, chair, authorized officer, administration); (e) communication of the decision to involved parties; and (f) recording on student records (see also Bretag & Mahmud, 2009). Figure 1 summarizes this process.

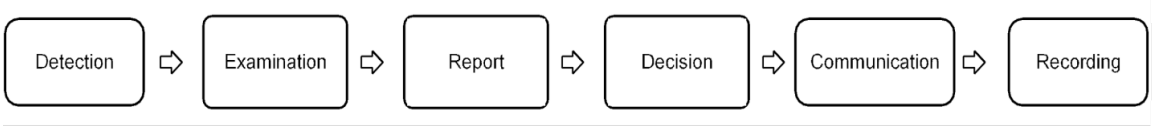

Figure 1. Steps in dealing with plagiarism

Strategies to Deter Student Plagiarism

Previous research examining the reasons why students cheat has provided useful information for the development of models aimed at preventing plagiarism (Academic Integrity Project, 2013; Bretag, 2013; Macdonald & Carroll, 2006; Park, 2003, 2004; Sims, 2002). Prevention is always the best medicine. Although this is not the focus of this paper, the following key aspects have been found to be helpful in deterring student plagiarism: (a) optimal training on academic writing and referencing skills; (b) education on academic integrity and what constitutes plagiarism; and (c) full awareness of the consequences of engaging in it (Devlin, 2006). Stoesz and Yudintseva (2018) in their review reported that online formats or short face-to-face sessions can result in plagiarism behavior change, particularly if practice or hands-on experiences are included.

In terms of methods, to improve academic writing it is suggested to break down the learning process into steps. Institutions could first focus on teaching the student how to paraphrase a concept from a given article and further learn how to cite it properly. Likewise, it is equally important that the student learns how to convey ideas in a concise way – a literary device that is in fact an essential skill in academic writing. On the other hand, as positive reinforcement has been shown to be a successful approach when applied to education (Wheldall & Merret, 2017), students should be praised when their academic writing has shown improvement. As per methods aimed at reinforcing the student integrity, the use of audio-visual tutorials explaining the expectations that the institution holds about their students is recommended. Ideally, this will be presented both in the students' induction program and within each foundation and core subject to be undertaken. The implementation of prevention programs is likely to reduce plagiarism, although some students are still expected to engage in plagiarism,

as certain personality traits (i.e., low levels of conscientiousness) are associated with proneness to plagiarism (Wilks, Cruz, & Sousa, 2016).

National Policies on Plagiarism

Many countries have developed strategies to promote academic integrity and address the challenges presented by academic misconduct at a national level (Bretag et al., 2011; Morris & Carroll, 2015; Murray & Rowell, 2009). These comprehensive guidelines require HEIs to promote and maintain assurances of quality, standards, and academic integrity within their alumni. One such example of a national initiative can be found in UK (Macdonald & Carroll, 2006). To comply with Quality Assurance Agency (QAA) requirements, HEIs in the UK must possess codes of conduct, policies, and procedures on managing academic misconduct. Likewise, Australia's Tertiary Education Quality and Standards Agency (TEQSA) has issued a Guidance Note on Academic Integrity, setting out broad requirements for HEIs. Such is the case in the US and some EU countries whose quality assurance organizations have developed similar frameworks. Yet, many non-English speaking countries tend to be more lenient towards student plagiarism (see Foltýnek & Glendinning, 2015).

Teaching and learning differs both across as well as within cultures. As a result, plagiarist attitudes and practices are likely to be dependent on complex culturally situated influences (Handa & Power, 2005). For example, regions with high levels of trust such as Sweden and Scandinavia tend to exert less control on students, precisely because of the confidence factor (Charron & Rothstein, 2018). Cultures such as the Chinese are dominated by moralistic and regulatory discourses, and as such tend adopt a punitive element and react with sanctions (see Hu & Sun, 2017).

Remarkably enough, there is wide variation in definitions of plagiarism and in approaches to dealing with plagiarism and academic integrity policies among HEIs within the same country; for instance, in Canada (Eaton, 2017), Australia (Bretag et al., 2011), China (Hu & Sun, 2017), and Germany, Finland, and Austria (Glendinning, 2013). As Mcgrail and Mcgrail (2015) demonstrated by exploring the policies published in the web sites of US research-intensive institutions, "there is no specific agreement nor standard treatment of plagiarism for undergraduate work" (p. 23). This is not to say that these countries do not have clear guidelines, but rather they do not seem to have national policies that unify common criteria. In view of these extensive variations, Bretag and her colleagues (2011) recommended aligning policy and practice. Whether these systems are effective is the subject of our next discussion.

Glendinning (2014) surveyed EU students, teaching staff and senior managers. The aim was to determine how well institutional procedures were understood and implemented, and whether outcomes within and between institutions were consistent and aligned with policies. Results indicated that 71 per cent of all academics (N = 5,000) agreed that their institution has policies and procedures for dealing with plagiarism. However, academics from certain EU countries, including Italy, Spain, France, Portugal, Belgium, Finland, Bulgaria, and Germany, were less confident. Senior management respondents (70 per cent) expressed doubt about the consistency of approach to penalties for students. According to Glendinning, it appears that systemic failures are common, and review and reforms of policies across all levels of higher education governance are required. Glendinning concluded that "HEIs in many parts of Europe had poorly defined policies and systems for assurance of academic integrity. In some countries and institutions where policies were in place, there was little evidence of monitoring and review" (p. 17). Of interest, Glendinning found that obstacles for implementation include dangers of possible litigation by the accused students against the HEI, and the reputation of a HEI that reports large numbers of such cases.

Two additional operational factors, which do not appear to have received the required attention, turn the reporting of plagiarism incidents a difficult task. The first is the complexity and subjectivity of decision-making once plagiarism has been detected (Carroll, 2016). The second is the amount of administrative work involved in pursuing suspected plagiarists, which staff perceives to be fiddly and

cumbersome (Morris, Buswell, & Robertson, 2010). Indeed, to carefully collect data, investigate, compile, and present the evidence can be extremely time consuming, and require substantial human resources. The lengthy and unpleasant disciplinary procedures that ensue may deter some staff from reporting plagiarism (Atkinson & Yeoh, 2008). Holbeck et al. (2015) explored these and other challenges that seem recurrent when implementing plagiarism procedures. Online faculty members reported they "were more inclined to follow the protocol if plagiarism reports were easier to submit, took less time to submit, and the submission forms were integrated into the learning management system" (p. 202). In addition, as Hyland (2001) noted, due to the complexities of the line between paraphrasing and plagiarism, some staff may find providing feedback to students who have plagiarized uncomfortable.

Finally, Jones (2006), in his review of the academic regulations from Scottish HEIs where law is taught, reported that there was no universal methodology for recording offences. In some HEIs the recording of plagiarism breaches was not mandatory or only serious instances were recorded. As a result, some HEIs did not record a single instance of plagiarism during the three academic years under examination. Jones pointed out that this may lead to inequalities for students who have been found to have plagiarized at different institutions, as they may receive very different references after graduation.

Hence, automating this process could be a key to increasing adherence to the protocol, reducing workload and improving consistency. Incidents can be processed effortlessly and efficiently only when the whole process is carefully mapped and structured. Workflows and decision trees can assist the decision makers, while automated checks can improve consistency among staff.

DEALING WITH PLAGIARISM

The University Policy Benchmarking Project (Freeman, 2010) conducted a comparative analysis of policy frameworks in 16 Australian and New Zealand HEIs, identified good practice exemplars and features and established models for HEI policy management. Once again, it was evident that governance and policy varied among the HEIs studied. In terms of plagiarism policies, some HEIs adopted a progressive, educative approach, whereas others a more legalistic and punitive approach. The report outlines several recommendations for a comprehensive plagiarism policy, including a clear definition of plagiarism, student and staff responsibilities, procedures for educating students, detailed and fair procedures for investigating suspected cases of plagiarism, differential responses and penalties to different levels of plagiarism, and student appeal and grievance procedures. Finally, it highlights the need to maintain records in a central academic register or database.

An innovative online Australian HEI commissioned an external software company to consult with the authorized officer of the HEI and develop an online system that would simplify and automate the process of handling suspected plagiarism incidents and recording the data. Following six months of development, and a semester of testing with a single department, the system was fully deployed with success. This section delineates the challenges involved in each step of the process and presents a workflow (see Figure 2) and some recommendations on how to streamline dealing with suspected plagiarism incidents.

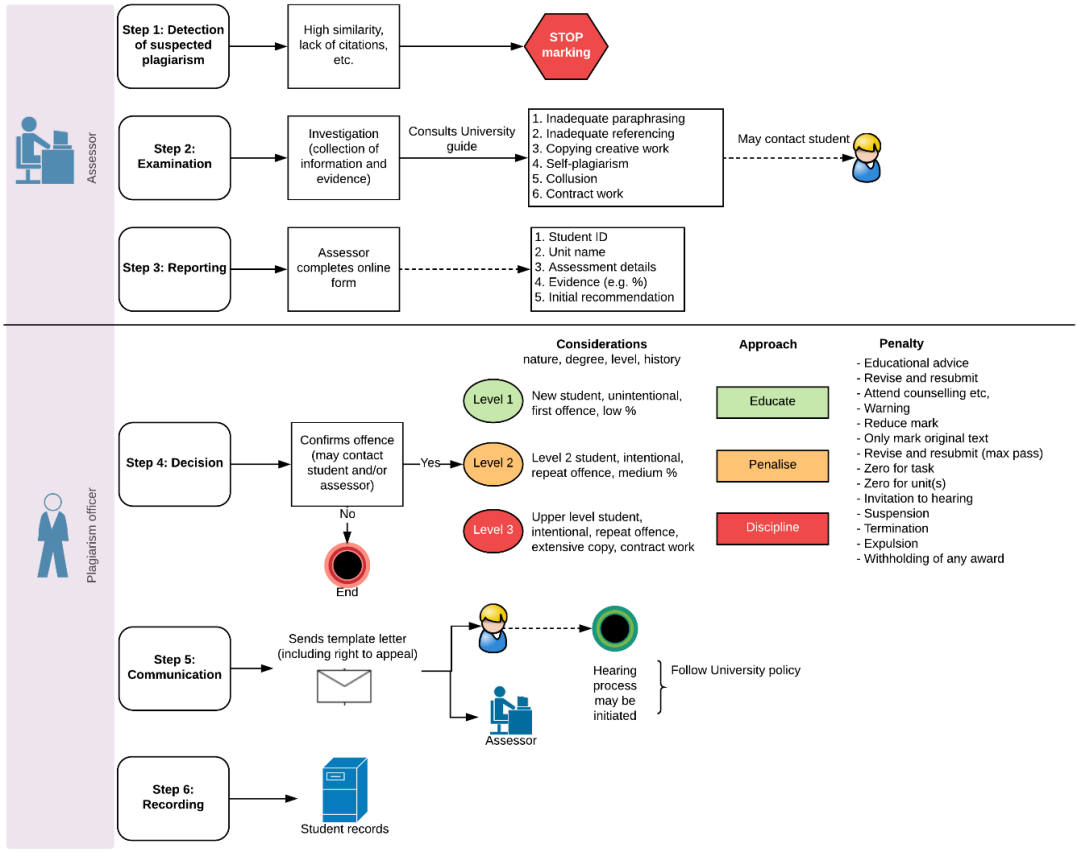

Figure 2. Suspected plagiarism management workflow

Step 1: Detection

Plagiarism can be detected either manually or with the assistance of specialized software. Rogerson (2017) described the clues, patterns, and irregularities that set off the 'alarm-bell' in an academic's mind (e.g., irrelevant material, irregularities in references). Digital detection, on the other hand, involves sophisticated and relatively accurate software that retrieves and presents the evidence so that it's easy to identify. As already alluded, only in the past couple of decades have academics been able to use such methods to confirm their suspicions about a submitted assignment. These web-based systems compare a student's work with other online sources or past submissions. Commercial software applications include Turnitin [http://turnitin.com/] at a cost of a couple of dollars per student for institutional subscriptions, and SafeAssign [https://www.blackboard.com/safeassign/index.html], which is available to institutions with Blackboard enterprise accounts. Free plagiarism detection sites are also available, although some of these are reputedly fronts for essay banks or essay mills.

Not all 'text matching software' are equally effective at finding matches to sources and not all HEIs use them. These tools are highly accurate in detecting verbatim plagiarism, but they still require human engagement, are they not able to detect when the student has employed 'essay mills' to produce his/her work (a.k.a. 'contract cheating'). Other limitations include their capacity to match relevant sources in other languages and sources that have not been made available online. They are also not able to detect when a student copied entire concepts without doing this word for word. Gipp (2013) addressed this issue by developing a Citation-based Detection System (CbDS) that uses citation patterns rather than text comparisons to detect heavily disguised plagiarism. Similarly, Meuschke, Siebeck, Schubotz, and Gipp (2017) developed software that focuses on the detection of semantic text

relatedness and structural similarity. While a 100 per cent of accuracy may be unfeasible in the short term, plagiarism detection software is undoubtedly improving their technologies at a very fast pace. For the latest review of existing plagiarism detection techniques see Chowdhury and Bhattacharyya (2018).

While most scholars would agree that plagiarism detection software offers substantial assistance in the detection of plagiarism, there is disagreement as to whether students should be allowed to view their similarity report prior to their final submission. In a study exploring the impact of student awareness in the use of plagiarism detection software for their works, Youmans (2011) found that this did not reduce student plagiarism. However, that study only recruited students with previous plagiarism records. Stappenbelt and Rowles (2010), on the contrary, found that allowing students to check their work before submitting the final draft can help them improving their paraphrasing skills, while raising awareness for the need to acknowledge sources. Thus, assuming that students review the report they obtain for each submission, they make the necessary changes and do not submit last minute, this should result in a substantial drop of plagiarism. A counterargument is this method allows students to 'cheat' by editing their work to avoid matches to the sources used.

Step 2: Examination of the Evidence

Even when the HEI uses plagiarism detection software, the examination of the evidence is a manual process, which still requires effort, especially for borderline cases. As a result, academic staff is notoriously reluctant to do what is expected from them to do in instances of suspected plagiarism (Ellis, 2012). In addition, to correctly apply the software tools requires a certain level of training. Examples include adjusting the settings on text recognition, exclusion of quotes or references, and the interpretation of the similarity reports. With regards to the latter, originality reports help instructors identify the text within the submitted papers that is highly similar to other sources (e.g., student papers, articles, or online material).

Yet, there are no clear guidelines in terms of the percentage of similarity that may justify further examination and action. In fact, the question 'how much is too much' has been the cause of much frustration, particularly for new students and academics (Graham-Matheson & Starr, 2013). A high percentage of similarity is most likely a good indicator, but no system is perfect. A manual check is always required. Instructors should carefully examine and drill down into the report to check for similarities between the paper and the sources, review the parts that have been highlighted, exclude quoted material, commonly used phrases, references, and compare these to the original sources.

Often, the instructor may need to request permission from another HEI's instructor to access a copy of the source material their student has used to examine the similarities. At other times, for example, when it is not obvious who copied from whom, an informal investigation and communication with the students in question may be required.

Step 3: Reporting

Once the required information has been collected, the instructor needs to submit a report to the Academic Department and to the Registrar. The report should include details about the student, the unit, the assessment, the amount of similarity, and past episodes if any. In addition, the report should also include any relevant comments from the academic.

As mentioned, most of the HEIs sampled for the purposes of this study required academics to download proformas, record the details of the incident, and submit them to the Head of School or Dean using traditional emails or printed reports. The amount of administrative work involved in pursuing suspected plagiarists, which may deter some academics from reporting cases (Morris, Buswell, & Robertson, 2010), and the complexity and subjectivity of decision-making (Carroll, 2016) can be reduced by using web-based forms or tailor-made software. Such systems can automate the process and significantly reduce the effort required. By autocompleting certain fields, these reporting

proformas can accelerate the steps and make it easier for the academics to follow the protocol (Holbeck et al., 2015). For instance, entering the student ID number can bring up the students' record, units studied during the current period, past incidents, among other important pieces of information. Of course, date and time stamping can also occur automatically, thus eliminating extra unnecessary effort.

What is even more useful, these systems can reduce the complexity and subjectivity of decision-making (Carroll, 2016) by guiding the instructor with a simple decision tree that incorporates the institution's policy, the related definitions, and guidelines how to proceed – all in one place. Once completed, the report and the instructor's recommendation can be automatically shared and submitted to other parties (e.g., Department Chair, Authorized Officer, Registrar) before it is communicated to the student, as described in Step 6 below.

Step 4: Decision Making

When deliberating about the possible response to plagiarism (i.e., whether a punitive or an education approach), academics need to examine the extent of plagiarism and the student's intent to cheat. Policies in most HEIs distinguish between poor academic writing and plagiarism. The former is due to lack of knowledge or skills, while the latter is usually characterized by intention. To conclusively establish intent may be quite difficult. In this respect, the Australian Centre for the Study of Higher Education has created a guideline and criteria to assist staff in the classification of incidents (see the full report in James, McInnes, & Devlin, 2002).

The most prominent criterion is the extent of similarity to other sources. Yet, a high match does not necessarily warrant intention. For instance, the student may have used an excessive amount of quotations but cited or referenced the corresponding sources. While the responsibility always lies on the student, it is nonetheless true that many academics often omit to remind that direct quotes, even when appropriately attributed to the source, should not exceed 10 per cent of the material. A low similarity report, on the other hand, does not necessarily rule out plagiarism. For example, if in a 3,000 words essay the only plagiarist act involves the verbatim copy of a 200 words paragraph without providing a citation, the software will most likely report a low overall percentage. However, the little incidence in the report, this surely represents an act of plagiarism that warrants attention. Additionally, before deciding the action to be taken on the plagiarist, the instructor needs to ensure that the incident was not accidental, inadvertent, or due to fixating on the language of the original author. Often, students who do not fully understand the concept of plagiarism – generally first year students – tend to make mistakes in quoting, citing, or paraphrasing. In other occasions, students forget the source from which they got a given idea and further use it for their assignments without acknowledging the actual source – a phenomenon known as cryptomnesia (Brown & Murphy, 1989).

To determine intention, decision makers should also consider the level of the student and whether it is a first or a repeat offence. Likewise, institutions should also be aware that certain international students belong to cultures whose education systems have been more lenient about the use of sources without the corresponding citation. To illustrate some of the difficulties in making the right decision, I present a case of poor academic writing followed by a more serious case.

(a) A student addresses the criteria in a well written assessment. However, in-text citations are scattered throughout the paragraphs and end-of-text referencing is very poor. The originality report shows a high similarity to several sources. From the written work it is evident that the student has done the reading and the research required to complete the assessment. The work of others has been referenced and acknowledged in places but not as well in other areas, which suggests a lack of understanding by the student around referencing, paraphrasing, and summarizing. As this is a first level student with no previous history of plagiarism, the instructor ensures the incident is recorded for future reference and determines that it was poor academic practice and not intentional plagiarism. As such, the

instructor decides that the best approach is to focus on educating the student. Readings and links to resources and policies are provided, a warning is issued, and a small reduction in marks may be applied.

(b) The originality report shows a high similarity with sources that have not been referenced or paraphrased. The assessor examines the report closely and discovers that the student has extensively copied multiple quotes and slabs of text from multiple sources including e-books and websites. The entire assessment is a patchwork of work from multiple authors and may lack logical structure and flow. The student in question pleads ignorance even though he has already completed several units. The instructor disregards the poor argument of the student and decides to adopt a punitive approach.

A final consideration is that the perceived seriousness of plagiarism may vary depending on the subject area and the faculty. For example, in law school, where findings of dishonesty are an impediment if not a bar to practice, penalties tend to be highly rigorous. Such punishments, however, are usually not the case in engineering faculty, where practitioners often reproduce standard technical descriptions without attribution.

Procedures. Although dealing with plagiarism protocols may differ among institutions, the goal is to standardize the logistics, reduce the effort required, and improve the consistency among cases and instructors. Once an incident is identified the instructor is expected to prepare and submit a report. Template forms (preferably online) that include the required information are recommended to reduce the effort and the time required to gather and submit the evidence. These should include a preliminary assessment and recommendation, preferably using dropdown menus with prefilled options and courses of action for each level of plagiarism. Next, a notification is to be sent to the head academic or unit chair – preferably automatically.

For low level cases, instructors ought to be able to decide and determine the sanction or penalty. However, in more serious offences, due to the potentially severe implications for the student or the HEI in case of appeals, it is imperative to ensure that each decision is accurate and well justified. Issues of concern include incorrect classifications and false accusations. False positives, on the other hand, refer to instances when a student's work is wrongly identified as plagiarism. Obviously, false negatives can occur too – that is, students who have copied work and are not picked or identified as such. In addressing this issue, Carroll (2007) concluded that rather than looking for evidence 'beyond all reasonable doubt', the standard of proof should be 'on balance of probability'.

Penalties. Poor academic writing normally does not carry penalties. Rather, the aim is to educate the student, build a culture of academic integrity and promote good practice to celebrate achievement in academic writing. For this purpose, options usually include a combination of educational advice, requirements to study writing and referencing material, requests to revise and resubmit, an informal warning, or a small reduction in marks.

As the degree of seriousness of the plagiarism offence increases, so do the sanctions. Curtin University (2015) recommends the following system of penalties, which are ranked from a minor to a major level of seriousness. Students may be asked to attend counseling, a lecture, or a workshop; repeat the assessment with reduced maximum mark; receive a reduced or nil grade in respect of the assessable item in which the academic misconduct occurred; have their assessment voided; suspension of student's rights for a short or longer period; exclusion from attendance; denial of access to facilities or services; exclusion; termination from the course; expulsion from the HEI; or rescission of any award.

Consistency. Inter-rater reliability, fairness and consistency within instructors of the same institution is another matter of concern. In view of the large variation in the treatment of plagiarism cases found in earlier research (Tennant et al., 2007), Tennant and Rowell (2010) developed the Benchmark Plagiarism Tariff, which may serve as "a reference against which institutions can compare their own

procedures, and use as an informed and practical framework when updating or constructing new penalty Tariffs for academic misconduct" (p. 13).

As mentioned, other safeguards include clear HEI step by step guides and cross-checks by more experienced academics or dedicated academic integrity staff. Judgments on culpability or decisions on penalties should not be made by untrained academics. Hence, to achieve consistency and reduce errors, senior members of staff (e.g., the chair or the authorized officer) should overview all cases, determine or approve the final decision, decide on appropriate sanctions, or recommend the case to a discipline committee.

Step 5: Communication

Once a final decision has been made, someone must communicate it to the student in the most appropriate way. A professional and firm, yet polite and respectful official notification letter should be sent to the student, seeking to resolve the matter in a manner that encourages understanding, consensus, and acceptance. Due to the seriousness of the situation, the process of writing carefully phrased letters to students who may appeal their case is cumbersome and fiddly for academics (Morris et al., 2010). Again, a system that simplifies the process and reduces the effort required would benefit academics and institutions. Hence, using standard templates for each level of offence is recommended. These should include (a) a description of the problem and the nature of the offence; (b) links to HEI policies and educational resources; (c) the outcome; and (d) the process to be undertaken should the student wishes to appeal. Once the academic has made the decision and the penalty, and selects the template based on the level of the offence, the automated solution can generate a letter and prefill the student details that were entered in the previous steps. All the academic must do is to press the send button, and a copy is emailed to the student, the authorized officer and the registrar.

Step 6: Recording

In institutions where the protocol for dealing with student plagiarism is underdeveloped, it is not unusual to find that some instructors rely on practices that are rather precarious. This includes relying on their memory, maintaining their own records, and circulating emails to check whether other colleagues within the same department have had any issue with a specific student. While it is essential that the instructor makes an informed decision when dealing with student plagiarism, one that is free from preconceived bias, the student's history on plagiarism should always be considered. However, an issue of concern with plagiarism records is who has access to such sensitive personal information. Confidentiality requirements present a challenge, and as such data should be handled and stored appropriately and be inaccessible by other parties. The most common student administrative management systems used by Australian HEIs are Callista and PeopleSoft (Paulsen, 2002). These platforms allow an authorized user, among other things, to record student plagiarism.

Yet, as discussed, even among HEIs that require academics to keep records, the exact process is usually left to the discretion of each department or faculty (Jones, 2006) who may invent their own systems. Alternatively, academics are required to report the outcome to the academic registrar, usually by submitting emails or printed forms. Instead, the proposed automated solution removes the manual effort required and stores all related information and documentation on a plagiarism or academic misconduct database, which is maintained by the registrar.

Discussion and Conclusion

Plagiarism is a serious academic misconduct and as such it should be dealt with corresponding seriousness. Although there is no doubt that discipline reinforces integrity, much like traffic fines reinforce speed limits, as many researchers have illustrated (Devlin, 2006; Sims, 2002; Stoesz & Yudintseva, 2018), the first and best line of defense against plagiarism is education and prevention. Following

that, mechanisms for detection and management of incidents fortify institutions and academics to guard against breaches of academic integrity.

Nevertheless, due to the sensitivity and the difficulty in handling each individual case, plagiarism represents one of the biggest challenges for academia. This paper identified the importance of detecting student plagiarism for the HEIs and the society, and the gap between what National policies recommend and what HEIs do when managing suspected plagiarism cases, due to the challenges that academics face in examining and determining an outcome. The focus of the paper was on the need to establish appropriate support systems for managing students who breach academic integrity.

Based on the review of the literature, a Benchmarking Project with a comparative analysis of several HEI policy frameworks, and the experience acquired from developing a successful application in an innovative Australian HEI, I described the workflow and provided recommendations for the challenges that academics may face in each stage and level. The six stages in dealing and managing suspected plagiarism cases are detection, examination of the evidence, reporting, decision and selection of an appropriate and fair penalty, communication of the decision to the involved parties, and recording of the incident on a database. When institutions establish a framework that standardizes the process as outlined in this paper, HEIs can address the challenges and accomplish the objective of managing plagiarism cases more efficiently for both students and staff.

As I argued throughout the paper, automation and recording of cases are two key and vitally important aspects that have not received the appropriate attention. Automation can assist HEI academics and administrators streamline the process, minimize the errors and the effort required, improve consistency in outcomes, and ensure that the actions that are expected actually take place. Reducing the time required to deal with plagiarism will result in lower costs and allow for a more effective use of academic and administrative time. Recording incidents can ensure serial offenders won't get away and will receive fair treatments rather than mock their instructors and the HEI.

The proposed system has been developed and tested by a medium to large (approx. 10,000 students) Australian HEI with success, according to its two authorized officers and the management. A limitation is that no empirical data have been collected yet. Although the efficiency of the proposed process and automation system may be difficult to assess as a whole due to confounding variables, future research can examine the efficiency of individual components as measured by the reduction in administrative workload, for instance, or the consistency in penalty outcomes (e.g., Badge, Green, & Scott, 2011; Scott, Rowell, Badge, & Green, 2012).

While opportunities to cheat are becoming more available due to technology, the world is becoming more aware and sensitized to ethics and their violations. HEIs more than ever need to protect those students who study hard and safeguard the quality of education they provide and the graduates they produce. If these challenges are not dealt appropriately at the HEI, they may have a spillover effect in society.

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E-SAFETY IN THE USE OF SOCIAL NETWORKING APPS BY CHILDREN, ADOLESCENTS, AND YOUNG ADULTS

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ABSTRACT

Aim/Purpose	Following the widespread use of social networking applications (SNAs) by children, adolescents, and young adults, this paper sought to examine the usage habits, sharing, and dangers involved from the perspective of the children, adolescents, and young adults. The research question was: What are the usage habits, sharing, drawbacks, and dangers of using SNAs from the perspective of children, adolescents, and young adults?
Background	Safety has become a major issue and relates to a range of activities including online privacy, cyberbullying, exposure to violent content, exposure to content that foments exclusion and hatred, contact with strangers online, and coarse language. The present study examined the use of social networking applications (SNAs) by children, adolescents, and young adults, from their point of view.
Methodology	This is a mixed-method study; 551participants from Israel completed questionnaires, and 110 respondents were also interviewed.
Contribution	The study sought to examine from their point of view (a) characteristics of SNA usage; (b) the e-safety of SNA; (c) gender differences between age groups; (d) habits of use; (e) hazards and solutions; and (f) sharing with parents and parental control.
Findings	Most respondents stated that cyberbullying (such as shaming) happens mainly between members of the group and it is not carried out by strangers. The study found that children's awareness of the connection between failures of communication in the SNAs and quarrels and disputes was lower than that of adolescents and young adults. It was found that more children than adolescents and young adults believe that monitoring and external control can prevent the dangers inherent in SNAs, and that the awareness of personal responsibility increases with age. The SNAs have intensified the phenomenon of shaming, but the phenomenon is accurately documented in SNAs, unlike in face-to-face communication. Therefore, today more than ever, it is possible and necessary to deal with shaming, both in face-to-face and in SNA communication.

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Recommendations for Practitioners	Efforts should be made to resolve the issue of shaming among members of the group and to explain the importance of preserving human dignity and privacy. The Internet in general and SNAs in particular are an integral part of children's and adolescents' life environment, so it can be said that the SNAs are part of the problem because they augment shaming. But they can also be part of the solution, because interactions are accurately documented, unlike in face-to-face communication, where it is more difficult to examine events, to remember exactly what has been said, to point out cause and effect, etc. Therefore, more than ever before, today it is possible and necessary to deal with shaming both in face-to-face and in the SNA communication, because from the point of view of youngsters, this is their natural environment, which includes smart phones, SNAs, etc.
Recommendations for Researchers	The study recommends incorporating in future studies individual case studies and allowing participants to express how they perceive complex e-Safety situations in the use of social networking apps.
Impact on Society	Today more than ever, it is possible and necessary to deal with shaming, both in face-to-face and in SNA communication.
Future Research	The study was unable to find significant differences between age groups. Further research may shed light on the subject.
Keywords	e-safety, social networking apps, WhatsApp, shaming, cyberbullying, privacy

INTRODUCTION

Following the widespread use of social networking applications (SNAs) by children, adolescents, and young adults, The study sought to examine from their point of view (a) Characteristics of SNA usage; (b) the e-safety of SNA; (c) gender differences between age groups; (d) habits of use; (e) hazards and solutions; and (f) sharing with parents and parental control.

SOCIAL NETWORKING APPS (SNAS)

Safety has become a major issue and relates to a range of activities including online privacy, cyberbullying, exposure to violent content, exposure to content that foments exclusion and hatred, contact with strangers online, and coarse language. Cyberbullying is defined as an activity aimed at harming another person by means of verbal or visual messages, using video, audio, and software programs (Genachowski, McDowell, Copps, Clyburn, & Baker, 2009; Livingstone & Görzig, 2014; Livingstone & Smith, 2014; Ringrose, Harvey, Gill & Livingstone, 2013). The common forms are harassment, flaming, denigration, impersonation, outing, trickery, exclusion, cyber stalking, cyber threats, the spreading of viruses, attacks against websites, breaking into computers, and more (Genachowski et al., 2009; Livingstone & Görzig, 2014; Livingstone & Smith, 2014; Ringrose et al., 2013; Zilka, 2017, 2018a, 2018b).

Social Networking Apps (SNAs), such as WhatsApp and Facebook, are the most popular online apps used by Children and adolescents (Alexa Internet Inc., 2011; Knight & Weedon, 2014; Lenhart, Purcell, Smith, & Zickuhr, 2010; Miller, 2008; Stevens, Gilliard-Matthews, Dunaev, Woods, & Brawner, 2016; Zilka, 2016). The fabric of our social interactions has recently extended to integrate SNAs, which are now widely used as a medium for communication and networking (Boyd, 2014; Brettel, Reich, Gavilanes, & Flatten, 2015; Valkenburg & Peter, 2009). SNAs allow people to connect with each other and to form new connection interactions (Ellison, Steinfield, & Lampe, 2007; Sheldon, 2008). According to estimates, 81% of online teenagers use social media sites (Madden et al., 2014).

The number of children and youths using social networks is on the rise. Children report spending about 39 hours/month online (Norton Online Living Report, 2009), and although young people use the Internet for both instrumental and communication purposes, the latter is particularly salient in their lives (Dowdell, Burgess, & Flores, 2011; Subrahmanyam & Greenfield, 2008; Zhang & Leung, 2014). By 2006, more than 90% of American teenagers (ages 12 to 17) were using the Internet, and 55% of them reported that they surfed social networking sites (Lenhart, Madden, & Smith, 2007).

Children's and Adolescent's Social World and the SNAs as an Arena for Satisfying Their Needs

Do children supplement face-to-face communication with online communication? Livingstone (2008) invited children to compare communication online and offline, finding that, for 50% of 11-16 year old internet users across Europe, it is a bit or even much easier to be themselves on the internet than face-to-face; further, 45% say they talk about different things on the internet than when speaking to people face-to-face, and 32% say that on the internet they talk about private things which they do not share with people face-to-face. For most children, then, face-to-face and online communication are not especially distinct, but for up to half, the internet offers possibilities for more varied, intimate or authentic communication – something qualitative research shows that teenagers especially can find difficult to manage in face-to-face situations.

As social creatures, individuals aspire to a sense of belonging to a social group, in order to gain recognition and affection from others. Interpersonal relationships play an important role in satisfying these basic human needs (Baumeister & Leary, 1995; Maslow, 1943). Friendships satisfy several essential psychosocial needs for children and adolescents, which are not satisfied by other types of relationships. Friends allow individuals to develop intimacy, empathy, and perspective-taking skills, as well as skills for conflict resolution. They also provide companionship, emotional acceptance, and a sense of connectedness, inclusion, and affiliation (Buhrmester, 1990). Studies show that adolescent friendships are reliable predictors of overall wellbeing, self-esteem, and social adjustment (Berndt, 1996; Hartup, 1992).

The present study examined the use of social networking applications (SNAs) by children, adolescents, and young adults. The study sought to examine the following from their point of view:

(a) characteristics of SNA usage;
(b) the e-safety of SNA;
(c) habits of use;
(d) hazards and solutions;
(e) sharing with parents and parental control.

The research question was: What are the usage habits, sharing, drawbacks, and dangers of using SNAs from the perspective of children, adolescents, and young adults?

METHODOLOGY

This study used a mixed-methodology. The data were collected in 2016.

Sample

The study sample included 551 respondents from Israel, of whom 71.1% were female and 28.9% were males. For the purpose of the study, the respondents were divided into three research groups: children (up to age 15; 31%), adolescents (ages 15-18; 34%), and young adults (ages 18-24; 35%), with a median age of 18.4 (SD = 3.7). Participants in the study, the adolescents and the parents of minors, signed a written consent to participate in the study. Those who did not sign, and minors who parents did not sign the written consent, did not participate in the study.

Tools

This study used a quantitative mixed-methodology with a qualitative element. 551 participants completed questionnaires, and total of 110 children, adolescents, and young adults were interviewed. The media preference tools were based on previous studies: Ofcom (2010, 2016); Livingstone, Haddon, and Görzig (2012); Livingstone and Bober (2005); Livingstone, Mascheroni, and Murru (2014); Millwood-Hargrave and Livingstone (2009); and Livingstone, Ólafsson, and Staksrud (2013).

Below is the description of the research tools:

1. **Socio-demographic questionnaire**. Such as gender, age, country of birth and economic situation.
2. **Habits of use and fulfillment of needs in SNAs**. Fourteen items, such as: "Why do you think so many children, adolescents, and young adults use SNAs?" "What needs do SNAs satisfy for you?" "What do you like about SNAs?" "What you don't you like about SNAs?" "In how many groups do you participate in SNAs?" "How many messages, on average, do you send per day?"
3. **Effects and characteristics**. Fifteen items assessed on a 5-point scale: 1=not at all, 5=to a very large extent. For example: "Do SNAs help you solve problems in your daily life?" "Do SNAs create problems in your daily life?"
4. **Comparison between face-to-face and SNA communication.** Responses to these eight questions: (a) Where do you feel that there is more feedback; (b) Where do you feel that it is easier to communicate with others; (c) Where do you feel that there are more problems in understanding messages (d) Where do you feel that there is more cooperation; (e) Where do you feel that there is more planning activities and events; (f) Where do you feel that there is more pleasure; (g) Where do you feel that there is more mutual help; (h) Where do you feel that there is more responsibility for and control of the conversation.
5. **Personal interviews.** A total of 110 were interviewed: children (15 male+27 female), adolescents (20 male+20 female), and young adult (11 male+17 female). Interviewees were asked questions to clarify the quantitative findings and to help us understand the reasons behind the findings. The semi-structured interviews covered all the subjects included in the research topics, but the order of questions was determined by the dynamics of the interview. The interviewees wanted to share events they lived through, positive and negative experiences, and some gave detailed descriptions.

Findings

The findings are presented in the following order: patterns of usage of SNAs; the effect and characteristics of SNA usage; hazards associated with SNA usage; solutions for avoiding the risks associated with SNAs; comparison of hazards and solutions in SNAs; and parental control.

Patterns of SNA Usage

Extent of various activities in the course of a week: Distribution indices, connections, and differences. The activities were divided into five main groups, as detailed in Table 1 and Table 2.

Table 1. Extent of various activities in the course of a week: Distribution indices, connections, and differences (M=hours per week; Members = face-to-face meetings)

	Distribution ind.			Correlation coef. (Pearson)				t-Test for the row-column difference			
	M	SD	Cronbach α	SNAs	Members	Phone conversations	Independent digital activity	SNAs	Members	Phone conversations	Independent digital activity
SNAs	10.21	5.75									
Members	6.06	4.84		0.260**				14.27**			
Phone conversations	5.69	4.72		0.420**	0.241**			17.89**	1.34		
Independent digital activity	5.50	3.67	0.750	0.428**	0.221**	0.466**		20.18**	2.33*	1.01	
Reading	1.82	2.22	0.493	0.062	0.084	0.032	0.055	31.81**	18.83**	17.20**	20.14**

** p<.01 , * p<.05

Analysis of the connections between the various activities reveals that there are positive and significant correlations between the use of SNAs, meeting with members, telephone calls, and independent digital activity on the Internet. The relationships indicate that these activities are interrelated and reinforce each other. Comparing the amount of time devoted to the various activities shows that the time spent on SNAs (10.2 hours) is significantly higher than the time devoted to all other activities. There was no significant difference between time spent on phone calls (5.69 hours) and time spent meeting friends (6.06 hours), nor between the time spent on phone calls and independent digital activities (5.50 hours), but the time dedicated to friends was significantly higher ($t = 2.33$, $p < .05$) than the time devoted to digital network activity.

Table 2. Scope of engagement in various activities by age group (hours per week)

Activities	Children	Adolescents	Young adults	Total	F Differences between groups
SNAs	8.52	11.06	10.26	10.38	5.564**
Members	5.16	6.64	5.94	6.13	2.441
Phone conversations	4.55	6.06	5.70	5.70	3.475*
Digital activity	5.82	5.91	5.16	5.56	0.157
Reading	0.89	1.71	2.21	1.83	7.557**

** p<.01 , * p<.05

As shown in Table 2, a significant difference was found ($F(2,482) = 5.564$, $p < .01$) in the extent of use of SNAs among children (M = 8.52), adolescents (M = 11.06), and young adults (M = 10.26). Comparison of the amount of time devoted to phone calls revealed that there was a significant difference between children (M = 4.55), adolescents (M = 6.06) and young adults (M = 5.70).

Effect and Parameters of SNA Usage

Characteristics of participants in SNA and face-to-face communication by age group are shown in Table 3 and Figure 1. In some of the tables below, respondents could indicate more than one answer, so that percentages may add up to more than 100%. The questions asked: How old are your friends at SNA? How old are your face-to-face friends?

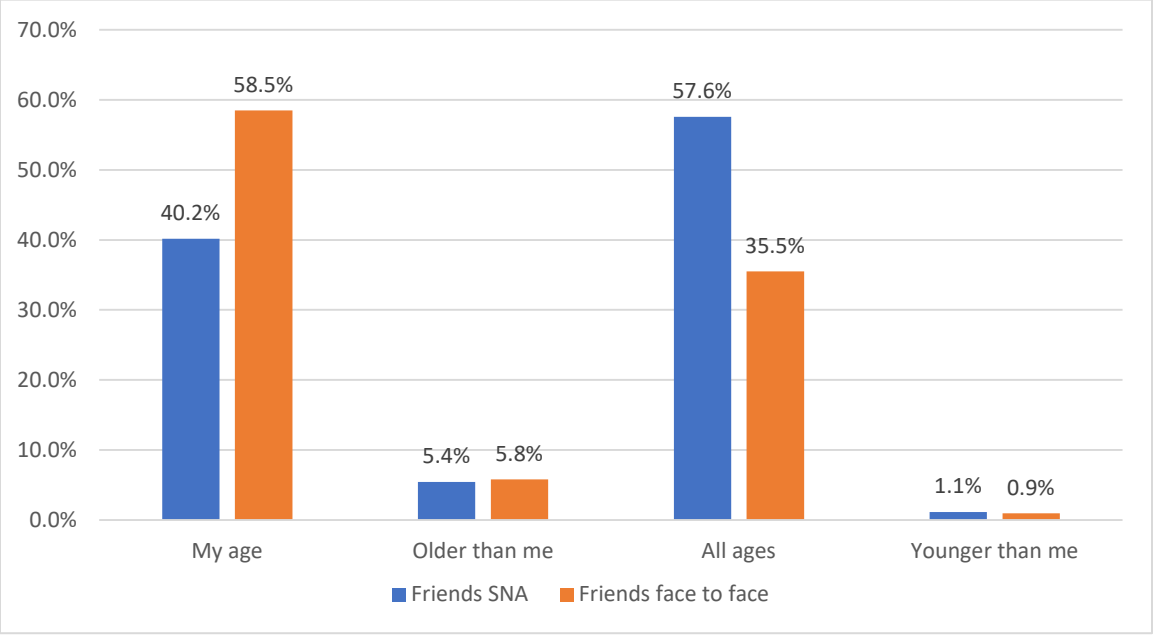
Table 3. Characteristics of participants in SNA and face-to-face communication by age group

		Children	Adolescents	Young adults	All respondents	F Differences between groups
Characteristics of participants in SNAs	My age	50%	38%	39%	40%	6.285**
	All ages	47%	61%	57%	58%	4.683**
Characteristics of participants in face-to-face	My age	79%	69%	51%	59%	8.674**
	All ages	16%	36%	40%	36%	5.805**

**p<.01 *,p<.05

It was found that the percentage of children (50%) who reported that their friends in SNA are of the same age was higher than that of adolescents (38%) and young adults (39%). Examination of the characteristics of respondents who reported that they have friends of all ages in the SNAs shows age differences: 47% of the children reported that their friends in the SNAs were of all ages, compared with 61% of the adolescents and 57% of the young adults.

A survey of the distribution of friends in SNAs and face-to-face is illustrated in Figure 1 below. Respondents could specify more than one answer, so that percentages may add up to more than 100%.



*Respondents could indicate more than one answer

Figure 1: Distribution of SNA Members and Face to Face*

HAZARDS OF SNA USAGE

Table 4 presents the results of the qualitative analysis of the aspects reported by participants when responding to the question regarding what, in their opinion, are the hazards inherent in the use of SNAs.

Table 4. Hazards of SNA usage by age group
(Multiple responses were possible, so the sum of the responses need not total 100%)

	Children	Adolescents	Young adults	All respondents	F Differences between groups
Bullying and offending	47%	43%	38%	41%	3.024*
Exposure to inappropriate content	13%	20%	26%	22%	3.955*
Invasion of Privacy	29%	37%	45%	40%	2.716
Damage to Interpersonal communication	6%	17%	23%	19%	5.366**
Disputes and quarrels	20%	15%	4%	10%	8.357**

** p<.01 * ,p<.05

It was found that the percentage of children who perceived exposure to inappropriate content in the SNAs as a danger (13%) was lower than that of adolescents (20%) and young adults (26%). The percentage of children who believe that the possible damage caused by SNAs to interpersonal relationships of is a risk (6%) is lower than that of adolescents (17%) and young adults (23%).

SOLUTIONS TO SNA-RELATED HAZARDS

Table 5 details the results of the qualitative analysis of the aspects mentioned by the respondents regarding the question about how to avoid the dangers inherent in SNA usage.

Compared to children (19%), a higher percentage of adolescents (36%) and young adults (36%) believed that risks in SNAs can be prevented by assuming personal responsibility. Compared to children (14%), a smaller proportion of adolescents (5%) and young adults (10%) believed that risks in SNAs could be avoided by reducing use. It was found that 30% of the children believed that external enforcement and control can prevent the risks association with the SNAs. This rate is higher than that of adolescents (13%) and young adults (16%) who hold the same opinion.

Table 5. Preventing SNA-related hazards by age group

	Children	Adolescents	Young adults	All respond-ents	F Differences between groups
Personal responsibility	19%	36%	36%	34%	6.031**
Reduced use	14%	5%	10%	9%	7.477**
External enforcement and control	30%	13%	16%	17%	7.855**
Publicizing and awareness	3%	25%	25%	22%	2.766
Technological monitoring	4%	8%	12%	9%	0.898

** p<.01 * ,p<.05

Comparing the SNA-Related Hazards and Solutions

The qualitative analysis of the perception of the problems and dangers associated with the use of SNAs in relation to the perceived solutions of SNAs is summarized in Table 6.

Respondents gave examples of problems and solutions in SNAs. Respondents could specify more than one answer,

Parental Control

An absolute majority of parents use SNAs. As shown in Figure 2, 94% of mothers and 89% of fathers use the applications. Two percent of the parents check their children's phone, the rest do not.

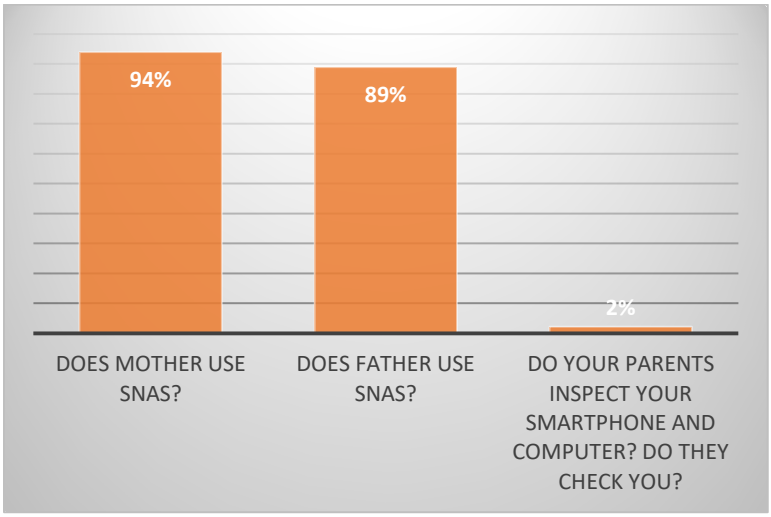


Figure 2. Parents' use of SNAs and supervision of children

The qualitative analysis of the respondents' explanations of the reasons why their parents do not check their phone, by age group, summarized in Table 6. Respondents could specify more than one answer, so that percentages may add up to more than 100%.

Table 6: Analysis of the respondents' explanations of the reasons why their parents do not check their phone, by age group

	Children	Adolescents	Young adults	All respondents	F Differences between groups
Preserving privacy (I do not let them)	14%	16%	15%	15%	3.066*
Openness and mutual trust	10%	19%	16%	16%	0.954
They have no reason / I have nothing to hide	17%	7%	4%	7%	7.132**
I am an adult	0%	6%	12%	8%	6.334**

** p<.01 * ,p<.05

There were no age differences in openness and mutual trust between parents and children regarding parental supervision of phone use. The percentage of children who provided this reason was higher than that of adolescents (7%) and young adults (4%). Most of the respondents who opposed parental supervision were young adults.

DISCUSSION

This study sought to examine the issue of e-safety in the use of social networking applications from the perspective of children, adolescents, and young adults.

CHARACTERISTICS OF SNA USAGE

Analysis of the correlations between the scope of the various activities shows that there are positive and significant correlations between the use of SNAs, meeting with friends, telephone calls, and independent digital activity on the network. These correlations indicate that the activities in question are interrelated and largely augment each other. A similar finding was reported by Livingstone et al., (2012). The researchers used the concept of "interdependence": the more children use SNAs, the wider the range of opportunities that opens up to them, but they are exposed to higher risks than those who do not use SNAs.

Examination of SNA membership (Figure 1) reveals that it is "cross-age." Most respondents (57.6%) stated that their peers in the SNAs belong to all age groups. By comparison, only 35.5% of respondents indicated that their counterparts in face-to-face communication are of all ages. Only a minority of respondents stated that their counterparts in face-to-face communication are older (5.8%) or younger (0.9%). The findings revealed that, for respondents, the discourse between friends in SNAs and friends in face-to-face interaction is similar, but communication through social networks allows them to connect without restriction of time and place. For example, a 15-year-old girl said she and her cousin shared a hobby; they live in different cities, therefore most communication, information exchange, information sharing, finding of solutions, etc. is carried out through SNAs.

SNA-RELATED HAZARDS

The findings (Table 4) show that 41% of respondents believe that the hazards associated with SNAs are related to shaming, bullying, and harming others, including the distribution of offensive content

or exposure to it. Analysis by age group indicates that the percentage of young adults (38%) who believe that bullying and injury to others constitute a hazard in the use of SNAs is lower than that of children (47%) and adolescents (43%). The findings suggest that the two most significant dangers inherent in the use of SNAs pertain to the possibility of harming others and being harmed by them, and to invasion of privacy. Privacy-related issues are manifest in the fear of invasion of private content or installation resulting from visible presence on the network (such as disclosure of name, telephone number, location). This fear also reflects the distress resulting from lack of control over various possibilities of unauthorized spreading of posts (text, images, recordings, and videos) sent through SNAs. The findings revealed that the most significant hazard mentioned by the respondents is shaming originating from fellow members of an SNA group, rather than hazards originating from strangers. A similar finding was reported by Livingstone, Haddon, Vincent, Mascheroni, and Ólafsson (2014), who discovered that children learned to protect themselves from alien actors (not members of their groups), and that most cyberbullying was happening between group members. It follows that education toward preservation of privacy and refraining from contact with strangers succeeds. A similar result was reported in Zilka's study (2017), which found that the level of children's and adolescents' awareness of safe surfing is medium-high, and that the issue that worries children and adolescents most is cyberbullying by friends, and especially shaming. Therefore, efforts should be made to resolve the issue of shaming among members of the group, and to explain the importance of preserving human dignity and privacy. In the interviews, children and adolescents pointed out the issue of shaming as ever-present and ongoing. For example, they were photographed in embarrassing situations, they took pictures of those who photographed them in embarrassing situations, and so on. Some respondents said they had not read the "usage agreement" of any of the networks they used, but believed that they knew how to act. They thought that shaming was a powerful tool that could be used to convey important messages in a clear and direct way. For example, a lesson was conducted in a class of 15-year-olds on "smart consumption" in various fields. Children gave examples of sensible consumption of food, types of food, and quantity of food, and began to giggle and made offensive remarks about one of the students. The student did not respond to the offensive comments. At the end of the lesson, the student recorded in the SNA used by the class each of the offensive comments, with the name of the student who said it. When the comments were said in class face-to-face, the students giggled, but when they saw the notes posted in the SNAs, the class was outraged. Some were stunned by the abusive remarks addressed to the student, and others accused her of shaming. The students' comments were recorded in the exact language spoken in the classroom. SNAs are a powerful tool, and therefore the effect they create is strong.

The Internet in general and SNAs in particular are an integral part of children's and adolescents' life environment, so it can be said that the SNAs are part of the problem because they augment shaming. But they can also be part of the solution, because interactions are accurately documented, unlike in face-to-face communication, where it is more difficult to examine events, to remember exactly what has been said, to point out cause and effect, etc. Therefore, more than ever before, today it is possible and necessary to deal with shaming both in face-to-face and in the SNA communication, because from the point of view of youngsters, this is their natural environment, which includes smart phones, SNAs, etc.

Nineteen percent of the respondents (Table 4) stated that the difficulty in interpreting messages may cause problems in interpersonal communication and therefore lead to shaming. More young adults (23%) and adolescents (17%) admitted having problems related to interpersonal communication in the SNAs than did children (6%). At the same time, it was found that the percentage of young adults who cited SNAs as a cause of quarrels and arguments (4%) was lower than that of adolescents (15%) and children (20%). In other words, the children's awareness of the connection between failures of communication through SNAs on the one hand, and quarrels and arguments on the other is low. Increasing awareness of the difficulties in interpersonal communication in this environment may reduce arguments, quarrels, and shaming among children.

Thirty-four percent (Table 5) of the respondents believed that the hazards can be avoided through the personal responsibility of the users, who should be aware of the risks and dangers of using the SNAs and must use the applications in a controlled and intelligent manner. Twenty-two percent of respondents believed that it was possible to reduce the hazards by publicizing and raising public awareness of the issue, among others, through educational activities in schools and other frameworks. In addition, 17% believed that external control—for example, through the supervision carried out by other companies or organizations, and the use of censorship and blocking measures—can help prevent hazards. Nine percent of respondents believed that the hazards can be prevented by means of technological control, i.e., by developing measures that prevent certain users from behaving in certain ways, and at the same time enable the victims to use tools within the application against the dangers to which they are exposed. Thirty percent of the children believed that external enforcement and control can prevent the hazards of SNAs, which are higher than the rate of the adolescents (13%) and of young adults (16%) who believed so. As the age increases, awareness of personal responsibility increases as well, as does the understanding of the Internet environment as one in which restrictions are difficult to enforce, as was found in previous studies on the nature of the Internet (Zilka, 2017, 2018b; Livingstone, Haddon, & Görzig, 2012; McGonagle, 2011; Van Dijk, 2006).

Children, adolescents, and young adults felt that they were aware of the negative potential, as well as of the hazards inherent in the use of SNAs. These findings corroborate those of previous studies (Clark, 2013; Duerager & Livingstone, 2012; Lim, 2016; Zilka, 2014, 2016, 2017) that examined the awareness of the hazards to users of SNAs and of the Internet in general.

Parental Control

The study found that no parental control is usually exercised. Only 2% of respondents reported that their parents checked their smartphone and computer and monitored them (Figure 2); 15% of respondents (Table 6) said they would not allow parents to look at their smartphone and computer, usually because such monitoring was perceived as an invasion of their privacy. In contrast, 16% of respondents stated that there was openness and mutual trust between them and their parents, as well as some cooperation. They exposed and shared with their parents content and issues related to the use of social networks, and their parents limited the monitoring to this exposure, and exercised ethical control, by emphasizing their trust in their children's ability to use the SNAs appropriately. There were no age differences with regard to openness and mutual trust between parents and children in the process of parental supervision of SNA usage.

Conclusion

Today more than ever, it is possible and necessary to deal with shaming, both in face-to-face and in SNA communication. Therefore, efforts should be made to resolve the issue of shaming among members of the group, and to explain the importance of preserving human dignity and privacy. The Internet in general and SNAs in particular are an integral part of children's and adolescents' life environment, so it can be said that the SNAs are part of the problem because they augment shaming. But they can also be part of the solution, because interactions are accurately documented, unlike in face-to-face communication, where it is more difficult to examine events, to remember exactly what has been said, to point out cause and effect, etc. Therefore, more than ever before, today it is possible and necessary to deal with shaming both in face-to-face and in the SNA communication, because from the point of view of youngsters, this is their natural environment.

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