DOI: 10.20472/TEC.2018.006.006

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THE USE OF SOCIAL MEDIA AND ARTIFICIAL INTELLIGENCE TOOLS BY ONLINE DOCTORAL STUDENTS AT THE THESIS STAGE

Abstract:

Our paper aims to explore how the doctoral students made use of digital technologies - Social Media (SM) and Artificial Intelligence (AI) tools - in the thesis stage of their fully online doctoral studies and what impact those tools had on their studies. Data were collected from an online survey (n=28) and a series of semi-structured interviews (n=9). The analysis of the survey data informed the qualitative phase of data collection. Both survey and interview data show a similar pattern of digital technologies uses in which for our participants SM tools far outpaces the usages of AI tools. We argue that the unique characteristics of the online doctoral students might have determined the popularity of some digital tools. The study findings help us to better understand students digital experience as both individuals and learners.

Keywords:

Online doctoral studies, doctoral students, EdD programme, digital tools, social media, artificial intelligence

JEL Classification: I23

1. Introduction

Social media (SM) has been widely used in education for many years and with the rapid development of Artificial Intelligence (AI), together, they play a critical role in every aspect of teaching and learning in Higher Education (HE). SM is a way of interaction combining web-based applications and social software (Procter et al., 2010) that can be regarded as a collaborative conversational platform that is located in open or closed online communities. Popular SM tools such as Facebook, Skype, Youtube, Blogs and Twitter created from the Web 2.0 technologies are believed to improve learning outcomes and academic achievement (Junco, Heiberger, & Loken, 2010) as well as to promote networking and to strengthen the social relationships within a community of practice (Llorens & Capdeferro, 2011). At the same time, the relatively newly developed AI tools which associated with integrated semantic web technologies and include immersive 3D virtual worlds such as such as Second Life, Divvio, Joost, 3D avatars, is believed to provide learners with immersive, intuitive, and productive learning experiences (Rajiv & Lal, 2011). In this paper, we use “digital tools” as a overarching term to describe both SM and AI.

Although a relatively large amount of the literature has been conducted to understand how digital tools are perceived by students and to what extent they impact on their learning and social relationships, they remain mainly at school and undergraduate level. There are a very limited number of studies available on the use of digital tools for scholarly communication, high-level thinking and peer support among mature online students at post-graduate and doctoral level (Gu & Widén-Wuff, 2010; Labib & Mostafa, 2015). In response to this relatively unexplored research area, we have conducted this study aiming to enhance our current understanding of the use of digital tools by doctoral students in their final thesis stage.

The study was set in the context of a fully online professional doctorate programme in HE. This programme is a collaborative venue between an international University in Holland and a HE institution in the UK. The programme consists of a pre-thesis and a thesis stage. In the pre-thesis stages, students undertake nine different modules over a maximum of 4 years and work closely with their peers and tutors within a well-structured online learning environment. After completing all the taught modules, the students move on to their final thesis stage which normally lasts between 2 to 2.5 years. Very little peer communication and collaborative work is formally required during the thesis stage. Students are expected to conduct their thesis research individually with the support of a primary and secondary supervisor. Most authors of this paperwork as thesis supervisors in this online programme and hence have a great awareness of both the academic and emotional challenges students face during this final phase of their doctoral journey. The doctoral journey is an “intensely emotional, ego-threatening venture within a highly charged political environment” (Hawley, 2010, p.7), with attrition rates on some programmes at 50% or higher for online learners (Park & Choi, 2009; Perkins & Lowenthal, 2014). We feel that this is an interesting

and under-explored area lacking any comprehensive studies which have systematically gathered meaningful and authentic data to understand this issue. In addition, despite Boud and Lee's (2005) claim about the importance of doctoral students' capacity to use a range of tools and networks to become autonomous agents of their own learning, there is little empirical and theoretical evidence available on whether and how they make use of those resources in the thesis stage. Hopwood (2010) also points out that "relatively few accounts of doctoral education present students as agentically shaping their own learning, practices or wider social environments" (p. 194). The impact of these digital tools on their overall well-being and learning is under explored and hence needs urgent attention. As a contribution to fill in this lacuna our study intended to address the following objectives:

- Investigate the extent to which EdD thesis students are using digital tools to support their learning during the thesis stage;
- Establish which digital tools they are using;
- Understand how and for what purpose the students use those tools;
- Understand the impact those tools have on the final phase of their doctoral journey.

Four research questions were formulated:

1. Are EdD students using digital tools to support their learning in the thesis stage?
2. What digital tools are they using?
3. How do they use them?
4. What impact do these digital tools have on the final phase of their doctoral journey?

2. Literature review

Most of what is known about the use of the digital tool for educational purposes in the HE context has resulted from survey studies conducted mostly with students at undergraduate level. The main findings of those studies indicate that SM tools have been far more used than AI ones more for entertainment and communication purposes than for learning. In the particular setting of distance learning, while SM tools have been used on a much larger scale than artificial intelligent technologies, the use has also been out of the study domain (Rothkrantz, 2016).

2.1 Social media uses in Higher Education

In a survey of 150 Nigerian undergraduate students Eke, Obiora and Odoh (2004) found that social networking sites including Facebook, 2go, WhatsApp, Google+, YouTube, Yahoo, Skype, Blackberry messenger and Blog were mostly used for entertainment and communication purposes. These findings are corroborated by the results of similar studies in different socio-cultural contexts. Positive experiences with networking sites like Facebook and Twitter and video tools like Youtube were reported by the US students surveyed by Yaoyuneyong, Thorton, and Lieu (2013). In Malaysia, Goh, Hong and Goh (2013) found that the majority of the153 undergraduate students in their study claimed to use Facebook primarily for social purposes such as keeping up with family and friends.

Less consensus appears to exist in regard to the use of SM tools for educational purposes. Salmon, Ross and Pechenkina (2015) concluded that many of their students enjoyed and benefitted from using SM tools such as Facebook and Twitter to enhance their learning through collaboration with a diverse range of people with whom to network and exchange knowledge. These findings contradict Goh, Hong and Goh's results (2013) where only a minority of the students inquired who used Facebook for academic purposes were undecided about the effectiveness and suitability of Facebook as a learning tool. Goh, Hong and Goh's findings resonate the mixed feelings of online adult mid-career Canadian learners inquired by Aucoin (2014) about the value of using SM tools in their learning environments. Interestingly enough, some of Aucoin's respondents reported to use SM tools in their personal lives and far less in their working or learning lives.

Similar results had been reported in previous studies showing the little effectiveness of SM tools to enhance academic performance (Gupta, Singh & Marwaha, 2013; Li & Ranieri, 2010); and faculty members' disbelief in the value of Facebook for classroom teaching (Moran, Seaman, & Hester, 2011).

A more frequent use of SM tools for educational and professional purposes appears to occur among postgraduate students. Yadav and Vohra's (2016) findings of a survey of 116 postgraduate Social Sciences students in India revealed that SM tools were mainly used for searching relevant information and promoting their research work. These findings are confirmed by the outcomes of a survey of 300 doctoral students in India revealing that, apart from communication and entertainment purposes, the Web was often used to search subject databases, retrieve research-related materials, access e-journals and e-books, as well as for publishing and career information purposes (Shabna & Haneefa, 2016).

In the specific context of structured online learning, there is some scarce empirical evidence of a greater reluctance of faculty about the use of SM when compared with students. Roblyer, McDaniel, Webb, Herman, and Witty's (2010) survey of 62 faculty members and 120 students on the use of SM revealed that faculty and students differed in their current and anticipated uses of social networking sites as a social rather than an educational facility. The students were much more likely to use Facebook and were significantly more open to the possibility of using it and similar tools to support classroom work, while the faculty members were more likely to use more traditional tools such as email for communication purposes.

Technology may have an impact on the students' perceptions and use of SM tools for learning purposes. A recent experimental study conducted in China by Xiangming and Song (2018) with a total of 387 engineering students at graduate level on the use of "Rain Classroom", a mobile technology that provides real-time feedback from teachers to

students, revealed a statistically significant association of the use of “Rain Classroom” with learning engagement and willingness to share the learning experience. The effect of the type of technology used in formal contexts of instruction is also visible in the findings of Sun, Lin, Wu, Zhou, and Luo’s (2018) survey of 78 pre-service student teachers on the use of both mobile and web-based technology for learning purposes. The authors’ findings show how the use of an instant messaging mobile app helped the development of social interactions and team building among the student teachers, while the classic discussion board could be used later on for knowledge construction purposes. These two studies provide some evidence of the potential of mobile technologies such as instant messaging or similar ones to promote a sense of engagement, commitment and belonging among online learners.

These encouraging findings need to be approached with caution. Students with limited or no experience of using SM tools tend to be more reluctant and pessimistic about those tools (Goh, Hong & Goh, 2013), which suggests that “the use of these tools and their effect on students’ learning cannot be simply attributed to the use of technologies *per se* but to the way these technologies are used” (Crosta, Edwards, Wang, Reis-Jorge & Mudaliar, 2018, p. 1463). Hence, one possible way of putting SM tools to the best service of teaching and learning is to attract occasional and reluctant users to use web 2.0 tools for leisure and learning purposes, while encouraging occasional users to capitalise on the affordances of using these tools for learning purposes (Costa, Alvelos & Teixeira. 2016).

2.2 Artificial Intelligent tools used in Higher Education

Empirical research on the use of AI tools in the HE context is scarce comparatively with the more diffused use of social media ones. One of the studies available was recently conducted in Russia by Atabekova, Alexander and Shoustikova (2018) to investigate university students’ use of Google web-based artificial intelligent tools for informal learning purposes. The findings of this study point to the potential of such web-based tools to develop students’ self-diagnostic and self-control abilities, foster their motivation for social interaction in quasi-professional contexts, and enhance learners’ reproductive, productive, reflective and strategic skills. AI tools were also valued by Turkish HE students for allowing easier access to information and speeding up learning, and for being more reliable in terms of data and information safety (Yucel, 2017).

The affordances of web-based AI tools reported by Atabekova, Alexander and Shoustikova (2018) assume particular relevance in view of the need for these tools to become more understandable and easier to use by teachers and students (Morris, 2011). With the advancement of AI tools and the semantic web, it will be possible to develop new and more sophisticated software will with the potential to better determine the needs of learners and tailor their learning experiences accordingly (Crosta, Edwards, Wang, Reis-Jorge & Mudaliar, 2018).

The non-conformity of the findings of the studies reviewed above may be partly explained in light of geographical, cultural and timing factors. Ease of access to the net, academic background, and the time when the studies were conducted may help account for the different results. There is empirical evidence to support the potential of web-based tools to enhance online collaborative learning and students' engagement. However, given the speed of technological advancement and consequently how technology can be used, more investigation is required before falling into generalisations, especially in a particularly under-researched area such as the use of web-based digital technologies by postgraduate students for doctoral purposes. The present study aims to make some contribution to fill in this gap.

3. Methodology

An exploratory case study approach (Yin, 1993) with a two-phase design was employed. This approach aims to gain familiarity with, and understanding of the defined case and to acquire new insight and knowledge in order to form a more precise and in-deep investigation in the next step. In phase one, an online survey via Survey Monkey Gold © tool involving all EdD thesis students was distributed. The information gathered provided an overall view of the demographic information as well as the basic pattern of uses of digital tools. In phase two, a series of semi-structured online interviews were conducted to provide deeper insights into the survey results. This study complied with both institutions' ethics approval process to protect the dignity, rights and privacy of participants. A Participant Information Sheet and a consent form were sent to all participants before deciding if they wished to be part of the study. The participants' identities are kept anonymous throughout.

Phase 1

The study population consists of all the students in the thesis stage of the online doctoral program (n=170). In order to avoid potential ethical breaches, the authors' own students were not invited to take part in the study. The survey was adapted from Aucoin's (2014) model on the use of Web 2.0 applications (i.e. SM) and modified to include the use of Web 3.0 (i.e. AI) tools. Before formal data collection, the survey was piloted with one faculty member and two students currently in the taught modules stage to examine the feasibility of the instrument. The three pilot participants were then interviewed to provide clarity of their experiences and the evaluation of the survey. The information gathered was used to refine the survey to better suit this particular case. The final survey ascertains the types of digital tools participants were using in the thesis stage, the extent of their usage, and the purposes for which they used them. Additional information was also collected including nationality, gender, age, professional experience, people with whom they were connected with, in the thesis stage and how long they were involved in the thesis stage. The survey also asked the students to express their willingness to participate in the phase 2 interviews and to provide their email address for initial communication. Twenty-eight students

completed the online survey. The survey data was analysed using the basic statistics package provided by the online survey tool.

Phase 2

The semi-structured interviews involved nine volunteers who had completed the online survey. The interview protocol was developed and informed by a literature review of previous work as well as the analysis of the survey data. The semi-structured open-ended questions aimed to collect rich information in order to generate greater insight into the survey data to fully answer the research questions. The nine interviews were conducted via Skype. The interviews were audio-recorded and transcribed *verbatim* for the purposes of analysis with the use of the computer software NVivo version 12. Thematic Analysis techniques (Braun & Clarke, 2006) were employed to identify and analyse themes or patterns of meaning. The manual thematic analysis was done by three of the five authors individually and then the individual results were compared, discussed, re-analysed and combined with the NVivo analysis to form the final outcome. This approach is believed to improve the rigour of the data analysis process. We are currently in the process of finalising the re-analysis and discussion of the study findings and in this paper we will present our current results.

The combination of the survey and interview data served methodological triangulation (Denzin, 2009) and explanatory purposes. The use of qualitative data augmented the structured responses, thus providing the opportunity to gain insights into unexpected relationships and a better understanding of the phenomenon under investigation. This approach also enhanced the validity and reliability of the study (Cohen, Manion & Morisson, 2011). A substantial amount of care was taken to ensure the honesty and truth of the data achieved. This reflects the theoretical ground of exploratory case study approach employed in this study.

4. Data and findings

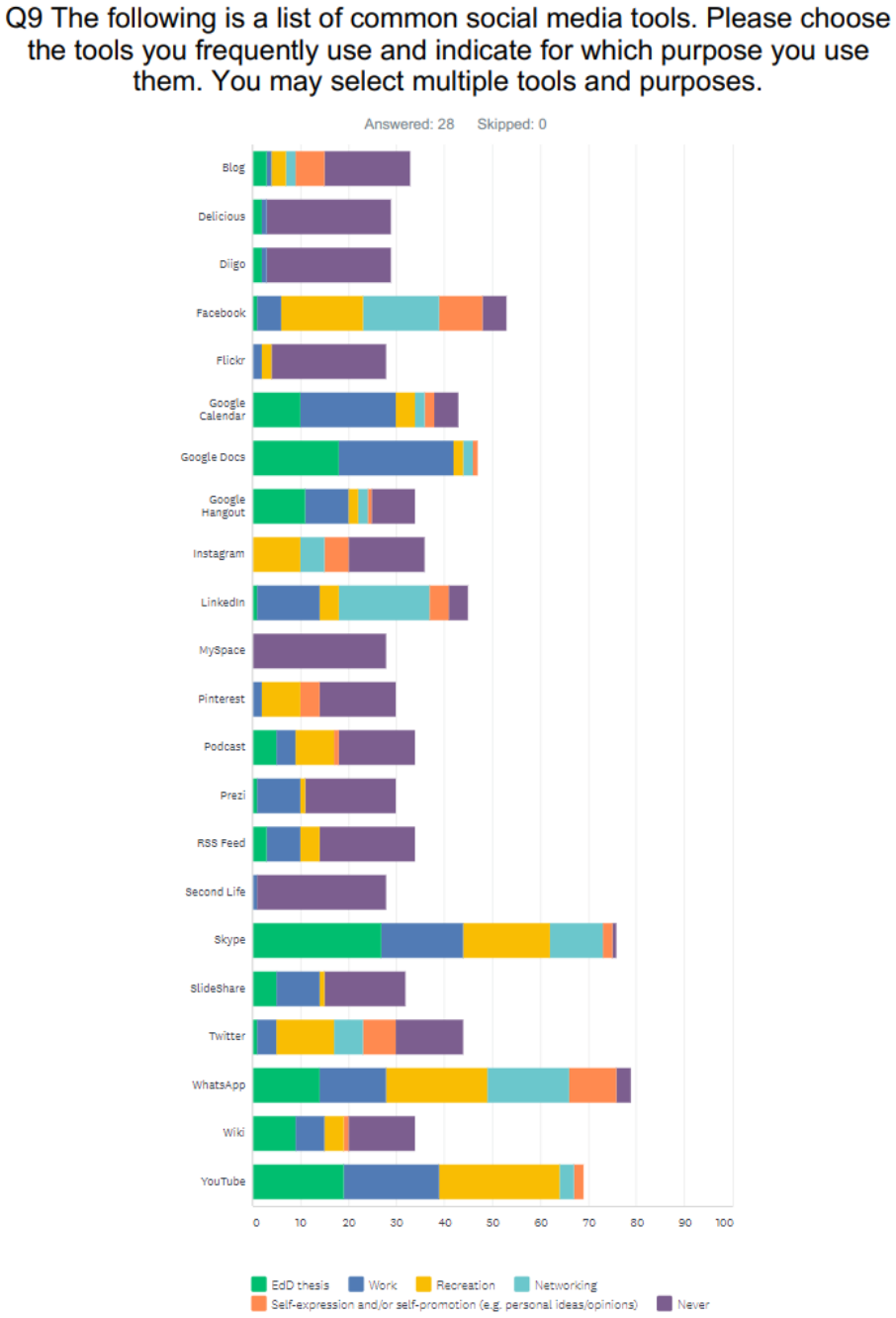
4.1 Survey data

The survey data revealed that the majority of the respondents (n=28) is in the age group of 40-60 years old (90%). Most of them hold a managerial or senior position at their workplace and have more than 10 years of professional experience (89%). 16 (57%) respondents considered their technology skills as “good” whereas 9 of them (32%) claimed to “know the basics”. Most of the respondents preferred learning through searching information from the Internet (64%), listening to audios/watching videos online (46%) and using text-based materials such as email and instant messaging (21%). Key survey findings are presented as follows:

- The most used SM tools in the EdD thesis stage are: Skype (96.43%), Youtube (67.86%), GoogleDocs (64.29%) and WhatsApp (50%). This is similar to those

students tend to use the tools at work but with the addition of “LinkedIn’ (46.43%). Facebook is the most commonly used SM tool for the purpose of “recreation” and “networking”. WhatsApp as a mobile application appears to be employed widely across all categories of activity (Fig. 1).

Figure 1: Use and purposes of social media tools (n=28)

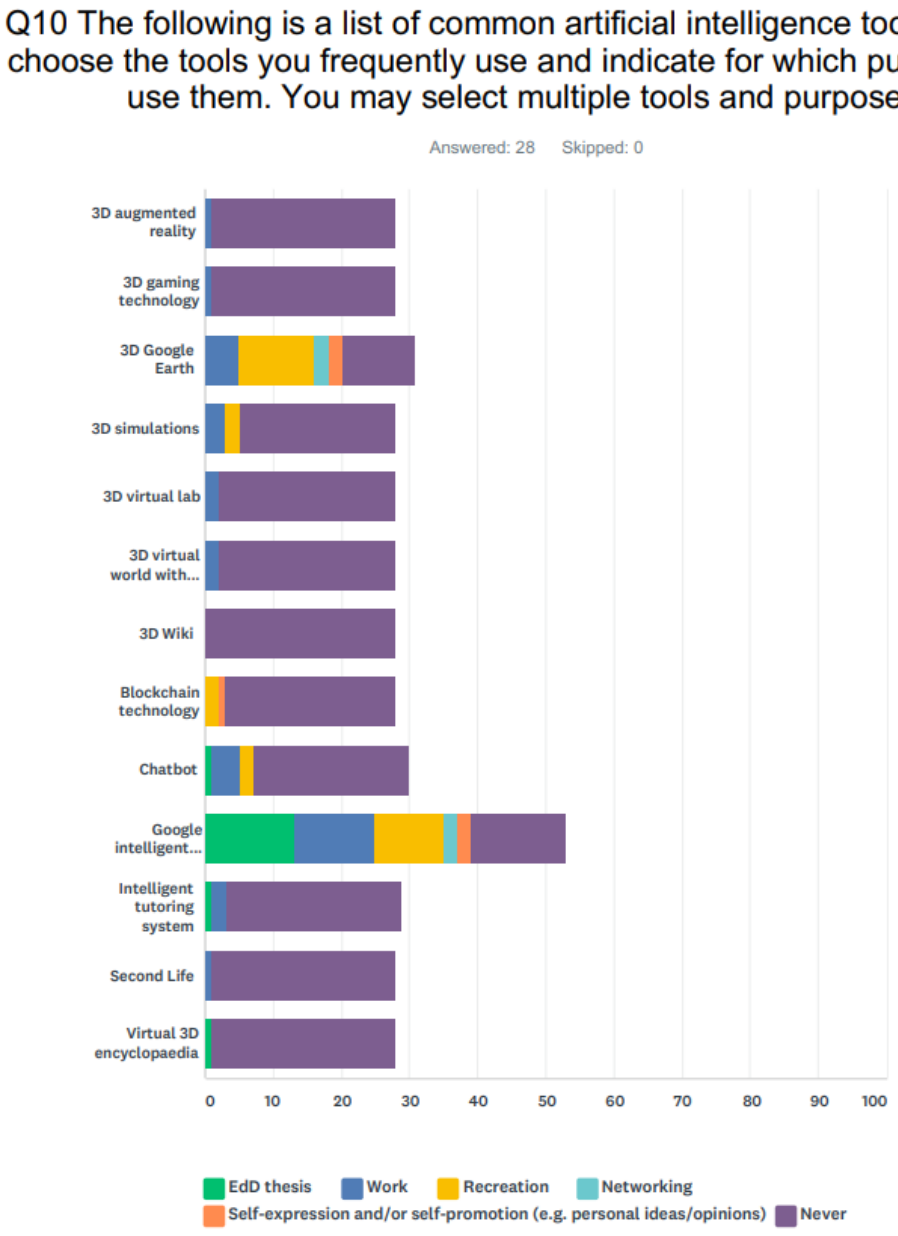


Source: Statistical analysis generated by Survey Monkey Gold ©

- On the contrary, the AI tools used are extremely limited. In fact, among thirteen AI

tools listed in the survey, only Google Intelligent Search Engine is being used for “EdD thesis” (47%), alongside for “work” (43%) and for “recreation” (36%). 3D Google Earth is another AI tool being used by the respondents, although it is not for thesis activities. Its uses are only for “recreation”(39%) and for “work” (18%) (Fig 2).

Figure 2: Use and purposes of artificial intelligent tools (n=28)



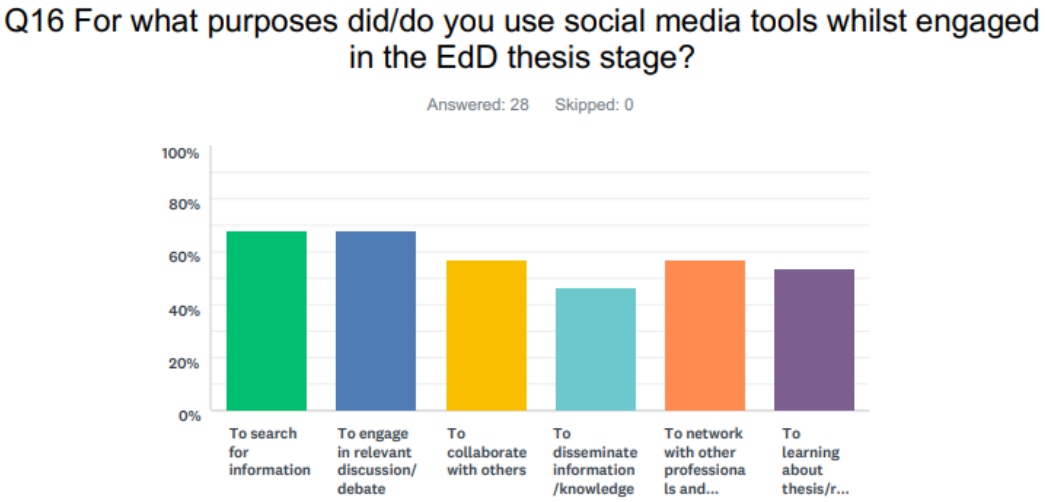
Source: Statistical analysis generated by Survey Monkey Gold ©

- Given a broad choice of SM options, the majority of the respondents (86%) had no overriding preference. They were content to use whatever was appropriate at the time. When asked the same question about AI alternatives, many chose not to indicate a

preference because of a variety of reasons including: “don’t know what they are” and “don’t know how to use”.

- SM tools are considered helpful in the EdD thesis stage for various reasons such as information search (67.86%) and engaging in relevant discussion and debate (67.86%) (Fig 3). The tools also enhance contact with supervisors and peers engender a sense of belonging to the wider learning community as illustrated by the following comments: “I used SM to share what I do with my other cohorts and communicate with my supervisors”; “It makes me feel less alone”; “Bonding with fellow EdD students made the journey more real”.

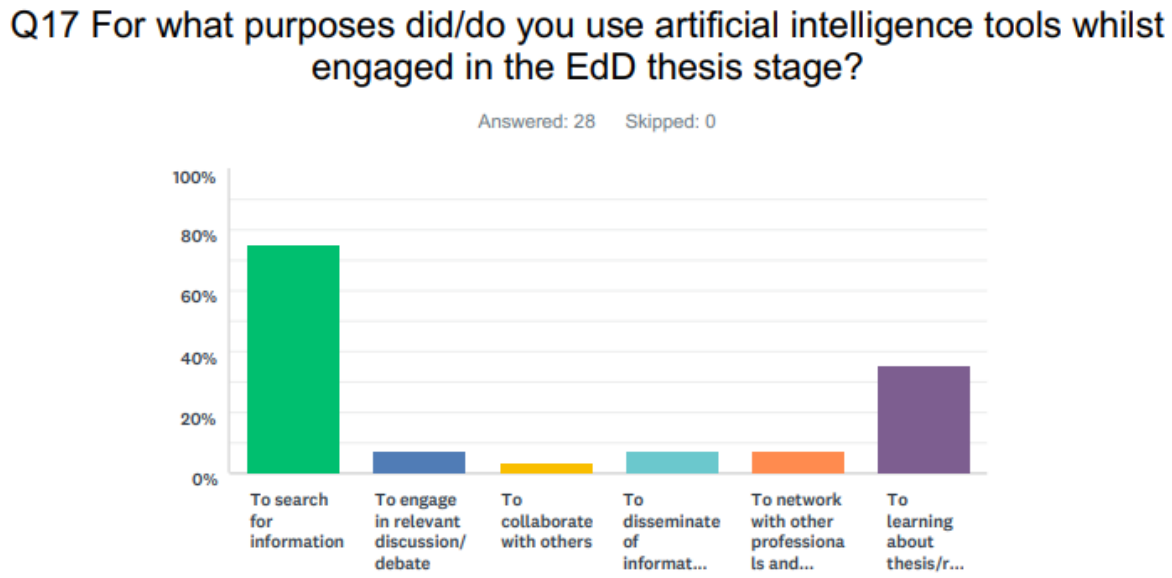
Figure 3: The purposes of using social media tools in the thesis stage (n=28)



Source: Statistical analysis generated by Survey Monkey Gold ©

- Searching for information (75%), and learning about thesis/research related topics (36%) were considered by the respondents to be the two main purposes for the use AI tools while engaged in the EdD thesis stage (Fig. 4). However, as has already be indicated many do not use them at all, apart from Google Intelligent Search Engine and Google earth.

Figure 4: The purposes of using artificial intelligence tools in the thesis stage (n=28)



Source: Statistical analysis generated by Survey Monkey Gold ©

4.2 Interview findings

The interviews were conducted with nine participants of different ages and nationalities and professional backgrounds. Four main themes emerged from the thematic analysis of the interview data: beliefs about digital tools, purposes for use, impact, and reasons for non-usage. Each main theme comprises a number of sub-themes that explain and examine the overall concept of the main theme (Table 1). Selected direct quotations from the interview transcripts are included to support the analysis.

Table 1: Themes and sub-themes emerging from the qualitative data

Themes	Sub-themes
Beliefs about digital tools	• Scepticism and unwillingness • Mixed feelings • Appreciation and willingness

Purposes	• Social
	• Professional
	• EdD thesis
	  ○ Information gathering and sharing
	  ○ Synchronous interaction
	  ○ Seeking help and support
	  ○ Time-saving

Impact	• A sense of belonging to a community • Personal development
Reasons for non-usage	• Security vulnerabilities • Technology, design and system barriers • Personal factors • Culture, societal and human influence

Source: Outcomes of the thematic analysis on nine interview transcripts

4.2.1. Beliefs about digital tools

The participants shared different feelings about using and learning about new digital tools. While some participants appreciated the benefits derived from using digital tools for them personally and for their studies, others revealed themselves sceptical about the affordances of digital tools and reluctant to use and explore them. Other respondents hold a mix feeling: in view of their awareness of the pros and cons of the tools they claimed to use them with caution. The quotes in Table 2 illustrate the different feelings expressed by the participants in their testimonials:

Table 2: Participants' feelings about using digital tools (illustrative quotes)

Appreciation and willingness	• *Well of course I needed them, the thing is I don't think I could do my thesis without the use of NVivo and Mendeley of course, and Skype. It's going to be very difficult, especially the online thesis we have done, without using these tools. – Participant 7.* • *I would love to, if someone would show me the advantages of using them, why not. – Participant 2.*
Scepticism	• *Honestly I do not know if it is because of my age but I think it is better to do face to face than using any of those tools…What we need is not more tools, but how to benefits from being in a cohort and getting to engage with the other people. The only tool I found very important for me was the residency. I do not think those social media are very social! – Participant 2.* • *Well I have tried them all, just to explore, see what they are about, but I have not found a good use or enough of a good reason to risk security breaches. – Participant 3.*

Mixed feelings	• *Well I think technology like SM and AI or anything else basically it is a useful tool if used well, but of course every technology has its good points and bad points. It's like the technology of fire; fire is good for warming you but also it can cause your house to burn down, so each of them have their benefits, I think SM and AI are necessary for human society and should be utilised widely but of course people should avoid getting into the bad side of those technologies*. *– Participant 7.*

Source: A selection of quotations from the interview transcripts

4.2.2 Purposes

Various digital tools were used for personal, professional and for EdD thesis purposes. For our participants each digital tool seemed to serve a well-defined purpose. For example, while Facebook was used mostly for social purposes (e.g. connecting with relatives and friends), LinkedIn was mainly used for professional contacts and networking. This is best illustrated in the following quotes of two participants:

> *SM in general I use for personal reasons because I am an expat in the country which I am residing, so it is a tool for me to help me catch up with the lives of my loved ones and sometimes I share information related to my life as well. – Participant 8*

> *I use it [LinkedIn] for contacts and also for discussions on issues affecting different areas of professional life. – Participant 1*

As for the EdD thesis, Skype, Youtube, Google Search, Google Doc and WhatsApp were referred by the participants as the digital tools most used on a regular basis. A closer look at the interviewees' responses revealed that these tools were used: (i) to search for, and share information; (ii) synchronous interaction, mainly with supervisors; and (iii) seek help and support. These digital tools were also valued as time-saving tools comparatively with more traditional resources (Table 2).

Table 3: Use of digital tools for EdD Thesis purposes (illustrative quotes)

Information gathering and sharing	• *I might ask a question like where is a good place I can find an article related to writing a literature review for example. So someone would share that with us and also provide a link.*" *– Participant 1.* • *Google is actually something I use quite often to seek information about. It is mostly Google Scholar that I use to find out some information about articles that would be interesting to my own work. – Participant 2.*
Synchronous interaction	• *Yes and this is what I like about having the option of using Skype. I can explain via email and then request Skype meeting. I feel it is easier to clearly explain what I am thinking face to face rather than when I just type an email.*" *– Participant 1.* • *I prefer to have a synchronous conversation. It does not delay my thought process as I do not have to wait for a reply.*" *– Participant 1.*
Seeking help and support	• *The EdD WhatsApp group was very supportive, it helped to locate documents, and have discussions on helping each other in terms of what is required. We talk about what books to purchase. For example, someone recommended a book on methodology; I bought it and thought it was excellent.*" *– Participant 5.* • *With Mendeley I can ask questions, I can talk to other advisors and find out what happens with their problems with the software, that help me address my own problems better. – Participant 4.*

Saving time	• *Those tools helped me really to gain a lot of time because I could use them whenever, I had some spare time. Of course, I was part-time student so we can go and do it whenever we have time. It is not like I could physically walk to the University of Liverpool library I would get information. – Participant 2.* • *I do think they are useful, it saves me a lot of time and gives me info I want. I mean Google gives you a lot of information to filter through and Google Scholar can give you things to filter through as well. As opposed to doing a general wide search, I find that the info that I get is really useful. – Participant 1.*

Source: A selection of quotations from the interview transcripts

4.2.3. Impact

One main objective of our study was to find out the impact of the use of the digital tools had on the final phase of the students' doctoral journey, that is, the thesis stage. As illustrated in the participants' testimonials on Table 4 below, the use of the digital tools was valued by the participants mainly for promoting a sense of belonging, enhancing learning, and boosting self-image and self-confidence.

For some participants, the use of the digital tools contributed to minimise the frustration caused by the feeling of isolation typical of distance education (Rush, 2015) and thus enhance a sense of belonging to their academic community, especially supervisors and peers to whom they could turn to for support and encouragement.

The involvement with the members of their academic community was critical to enhance learning through sharing ideas and concerns about their research projects, and discussing issues related to their topics for research and methodological choices. The multicultural nature of the online community was also a source of learning from different professional and academic backgrounds. The sense of belonging and collaborative learning was developmental in personal and professional terms. The involvement with their multicultural research community created opportunities for the participants to legitimate their professional practice, improve academic skills and become more assertive in accounting for their points of view and work as practitioner researchers. This was relevant to boost the students' self-confidence as doctoral students and practitioner researchers and consequently to improve their self-esteem.

Table 4: Impact of the use of digital tools during the Thesis stage (illustrative quotes)

A sense of belonging	• *At times I guess we all get to that point where we think it is too much and we want to give up, but then I would be able to reach out to my supervisors and say I am having a difficult time here and the response I would get is encouraging. I feel like I can approach anyone in that community for help or idea, feedback, perspective on things. That has been phenomenal for me rather than having to do this in isolation. – Participant 1.* • [...] *freedom of choice, personalised, and also emotional support I think, like in YouTube videos and other websites, when people share their frustrations, difficulties, you feel like you are not alone. You are not the only one that understands. – Participant 8.* • *What I found is Skype truly allowed me…especially with my past supervisor, who I was very sad to see go but he had other commitments…what I do want to say is that it helped me to forge a relationship with him that was very close. So the SM allowed me to forge a great relationship, even though he is no longer my supervisor. – Participant 5.*
Personal development as practitioner researchers	• *I had the benefit of learning from others' feedback, others' experiences, exploring other cultures, other point of view, especially when you have diversified students from different parts of the world. Each one of them has his own idea and his own thoughts, so, that enriched my topic that I've chosen for my thesis. – Participant 9.* • *It allowed me to appreciate the diversity of all backgrounds and perspectives. In this world of globalisation that is important to be able to appreciate the diversity and learning of the differences in cultures, and expanding our perspectives. – Participant 1.*

Self-image and self-confidence	• *LinkedIn. I used it extensively about ten years ago, I still have an account there, and that was extremely useful for making academic and professional contacts. The process of writing my biography or writing any comments or emails to somebody I did not know that process itself would focus me into a mind-set of being professional, of having a public image that was commensurate with professional life. Now to think of it, that was very developmentally useful for me. – Participant 4.* • *We have to defend our position, and I believe that the many articles and studies that I have researched, and because of the tool, like I said I have looked at many perspectives. I think that right now my dissertation is something that I can defend without thinking because of the exposure I have had to different views using the SM tools. Now I did plan to expand a little more and see if there was any videos that could bring this further to life, something that would increase my confidence of when I speak and when I write. So that is where my confidence has come from. – Participant 5.* • *I know that there is a certain community of practice out there that may be thinking the same way I am, or that may have carried out some similar study. To me that is important that I am not by myself but part of a community, a practice. It builds my confidence knowing that there are others who think that way. – Participant 5.*

Source: A selection of quotations from the interview transcripts

4.2.4. Reasons for non-usage

The analysis of the interview data revealed that although all participants used digital tools to a certain degree to serve different purposes, some of them held a very conservative view of the digital tools and expressed their unwillingness to use and explore their potentials. Two main reasons for not using digital tools were related to issues of security, and digital illiteracy. In some cases, the participants expressed a reluctance to make a frequent use of digital tools either for the fear of potential harm caused by security and privacy breaches or for a disbelief in the usefulness of digital tools as a source of learning and a preference for face-to-face interaction. In other cases, technology barriers, e.g. poor connection and digital illiteracy were referred to as main obstacles to the use of digital tools (Table 5).

Table 5: Main reasons for not using digital tools (illustrative quotes)

Issues of security	• *I think there are potential privacy issues that would have to be seriously considered first before we would advocate students using more SM. I mean it is still in its infancy, and we have to be really clear about potential uses and abuses. – Participant 3.* • *Well I have tried them all, just to explore, see what they are about, but I have not found a good use or enough of a good reason to risk security breaches. – Participant 3.*
Disbelief in online communication and learning	• *A lot of the instruction is still based in the instructionalism, or behaviourist technologies, and I don't think that is very beneficial, and, most language programmes on the internet or on the web or whatever are still based on behaviourist principles and I do not think they are very valuable. – Participant 4.* • *If a Prezi presentation could be developed by some sort of AI, videoing or recording researchers talking about concepts, that would be fantastic, I would love to do that. I can't see that happening, the semantic web isn't that developed yet. Still miles behind. – Participant 4.* • *I prefer like having a group of people, talking to them, physically in front a few and online but you know these are the way courses are. So, I was struggling a bit with like being in an online community. – Participant 9.*
Digital illiteracy	• *It is not something that happened very often but of course I can imagine that I had internet connection difficulties all of a sudden, like today. My big screen just collapsed, I do not know what happened. I have an IT manager as a husband, so I am very happy to have that back up. Would it have been only me, I would have been very nervous about using only that, because you never know what happens when you lose information. – Participant 2.* • *The challenges I have had are related to my skills in manipulating the tools. Sometimes if we do not know how to manipulate the tools then we cannot get the best from the tool. Then it is not the tool, it is my understanding and skillset in pulling what I need from this tool. – Participant 5.*

Source: A selection of quotations from the interview transcripts

A few participants pointed out cultural factors as a reason for not being digitally oriented users. In describing his different professional and family roles in his socio-cultural context, one participant explained:

> *In Japan the notion of social is not the same as the Western idea of social. It's very much situational sociality. For example, I am a husband, I am a father, I am a teacher, I am a musician, I have four different roles at least, and all of my roles are completely segmented from each other. I will never for example, talk to my musician friends about my work, or I will never talk to other fathers about my music. It's kind of weird, everything is so, err, segmented socially. There is not the idea of networks, it doesn't work that way. – Participant 4*

Fear of being misunderstood by different national peers was invoked by another participant as a deterring factor from greater involvement in online discussions:

> *For posting content is always a tricky thing. You have to be careful what you say, because the interpretation that can be gotten from what you post may be understood well or misunderstood. – Participant 1*

5. Discussion

In this section we briefly discuss the findings of our study with a particular focus on the four questions that guided our research. Questions 1, 2 and 3 are discussed together in section 5.1 and the research question 4 is discussed in section 5.2.

5.1. Using digital tools to support learning in the thesis stage

The findings of our study show that the EdD students do use a selection of digital tools to support their learning in the thesis stage and are generally aware of the various tools available. SM tools such as Youtube, Skype and WhatsApp proved to be the most popular ones among the thesis students for contacting with their thesis supervisors and peers within the thesis community and seeking visual presentation on thesis related topics. However, other well-established SM tools such as Blog and Podcast were never used. Facebook had great popularity among all the study participants (both survey and interviews) but its uses were limited to personal and professional activities.

These results are in line with the experiences reported by the students inquired by Goh, Hong and Goh (2013) and Gupta, Singh and Marwaha (2013). They also share similarities with some of the findings reported by Roblyer, McDaniel, Webb, Herman, and Witty's (2010) in their comparison between the use of social networking sites made by students and faculty members. Similar to their faculty members, some participants in our study also expressed a preference for more traditional tools such as email and websites for

communication and information gathering. One of our interview participants claimed that a pen and paper are all he needed for his thesis, while another participant questioned the social purposes of the SM tools. Furthermore, some of our students' concerns about security and privacy issues might have also contributed to their negative feelings about digital tools.

These results suggest a step backwards in terms of taking advantages and benefits from the significant evolution of Internet technologies. In this scenario, it is questionable the extent to which the SM tools available and the many yet to come to the market can be used productively by mature online doctoral students considering their characteristics as learners and the complexities of their online learning contexts.

Unlike with SM, our participants had little specific knowledge of AI tools except for Google Intelligent Search Engine. In fact, Google Intelligent Search Engine is the only AI tool the students claimed to use to access targeted information and resources useful to their theses. This echoes the findings from previous studies (e.g. Atabekova, Alexander and Shoustikova, 2018; Yucel, 2017). Although AI promises a great deal to transform the Internet from a platform of global interactivity and information sharing to an intelligent and efficient tool for information management, it's concepts and applications seemed to remain un-comprehensive and unfamiliar to most of our study participants. Apart from Google Intelligent Search Engine, other AI tools such as 3D Wiikis, SecondLife, Virtual 3D labs were never used or even heard of by the participants. Given the lack of use of the AI tools for our study participants, its impact on online doctoral students' in the thesis stage remains unclear. Therefore, it seems important to consider how AI tools are being introduced to our students and how they should be integrated into online learning settings such as the EdD programme in our study to do justice to their potential as research resources.

As a mobile application, WhatsApp was surprisingly welcomed by our study participants. Although this was beyond the scope of our study, the use of mobile technologies and applications and their impact on online doctoral students' work should be further investigated.

5.2. Impact of digital tools on the online thesis stage

The impact of digital tools on the work undertaken for the Doctoral thesis are four-fold: they contributed to enhance the students' emotional and social wellbeing and boost their self-confidence and self-esteem, and served as socio-cultural sources of learning, and a means of improving time management skills.

5.2.1. Emotional and social wellbeing

Doctoral students in general often experience a number of challenges and some drop out due to feelings of loneliness, lacking social networks and support, among other emotional

and social factors (Hawley, 2010). In our study, there is evidence that the use of digital tools contributed to some extent to the emotional and social well-being of the participants. The sense of belonging to a community via interacting and building relationships with others (both peers and supervisors) helped some of them to minimise the feelings of isolation and loneliness that are often caused by the nature and structure of distance learning.

The idea of community pertains to social cohesion: relationships, trust, shared interests, problems, and solutions among individuals (Bond & Lockee, 2014). Within a community, learning and new knowledge are associated to the social and affective dimensions, such as professional and emotional support. Lave and Wenger (1991) asserted that a community incorporates not only dialogue and task completion but reciprocal respect and support. People within a community comfort each other and opt to collaborate with one another to enhance knowledge (Bond & Lockee, 2014) hence improve their general well-being. To some participants, the digital tools such as Skype and WhatsApp provide a channel of emotional and social support so that they could be “travelling alone to individual destinations, but together on the route” (Piercy & Gordon, 2015, p. 397). However, we noted that, from our data, not all study participants have developed a sense of online community and this seems to corroborate the findings of Crosta, Manokore, and Gray (2016), who concluded that a majority of the online post-graduate students in their study did not feel their cohort resembled an authentic learning community.

5.2.2. Time management

Almost all the interview participants pointed out that time was one major factor that either encouraged or prevented them from learning about and using digital tools. It is interesting to notice how digital tools could shape the participants’ views and experiences as users of technology. While some digitals tools such as Google Intelligent Search Engine were motivating as time savers for allowing the participants to complete their tasks and access information instantly, other tools had an adverse effect since extra time and effort was required from the participants to get to grips with their usage and deal with technical issues. This illustrates indirectly one unique challenge faced by most online doctoral students, as they try to find a balance between managing full-time work and family commitments and meeting the demanding requirements of doctoral studies. Online learning is rigid and strict in terms of time requirements. All interview participants held professional positions at their institutions and had multiple roles as professionals and family members. Managing time well pertains to emotional well-being, and poor time management results in increased stress and pressure (Tracy, 2013). Time management is one biggest challenge for the online doctoral students and the digital tools certainly play a role in this regard either positively or negatively.

5.2.3. Appreciation of differences and diversity

The participants' testimonials revealed that engagement in a conversation with peers from different cultural and professional background helped them to better understand and appreciate differences and diversity. Understanding different epistemological and ontological perspectives and challenging one's own assumptions, beliefs, and values are critical to the development of new and diverse perspectives. Engaging in self and critical reflection and reflexivity is a deliberate, voluntary process the online doctoral students agree to engage in when entering a doctoral programme to improve practice. The gruelling intellectual demands of earning a doctorate implicate that doctoral students be open to criticism and show appreciation of differences as the first step towards being a qualified doctorate. Through interaction with diverse students via digital tools such as WhatsApp during the thesis stage, our students could reflect more deeply on and challenge social and political factors of transnational and their own contexts.

5.2.4. Improvement of self-esteem

Self-esteem is a combination of one's self-respect and self-confidence (Branden, 1969). Some researchers have claimed that self-esteem, can be negatively affected as we use digital tools for gathering and sharing information as well as interacting and engaging with others. This is particularly the case with youngsters and less experienced learners. Users of SM tools, such as Facebook and Instagram tend to expose their lives and end up making comparisons with others. This may cause people to envy others and their lifestyles and also to feel less obliged and ungrateful for their bounties (Steers, Wickham, & Acitelli, 2014; Jan, Soomro & Ahmad, 2017). While we do not object this observation, our study findings indicate otherwise. Some of our interview participants clearly stated that the use of SM contributed to boost their self-respect and self-confidence. The growth in their self-image was achieved by carefully articulating their ideas and options publicly (e.g. on LinkedIn), by learning from others (e.g. via Youtube) and by getting support from their learning community (e.g. via Skype and WhatsApp). In this regard, we would argue that, unlike young learners, our participants were all mature independent learners who have a rich life and work experience. They seemed to be very critical of new technologies and tended to remain cautious instead of becoming actively involved at the outset. It may take them some time to get familiar with and adhere to a digital tool. However, having recognised its potential they tend to use it appropriately to suit their specific needs. This again reinforces our beliefs that the use of digital tools and the outcomes of such use are determined by a number of variables related to the users' characteristics (i.e age, educational and professional background, life experience, knowledge base, etc) and their environment (i.e. cultural, political and social factors).

6. Conclusion

The exploratory case study reported in the present paper aimed at uncovering the use of digital tools by doctoral students at the thesis stage of a doctoral programme. The triangulation of quantitative data collected via a survey and qualitative data gathered via

one-on-one interviews allowed for a deep understanding of the participants' beliefs about, and purposes for using digital tools, and the affordances of those tools as educational resources. Both survey and interview data show a similar pattern with regard to the use of digital technologies. For our participants SM far outpaced the usage of AI tools. The unique characteristics of the doctoral students appear to have determined the preference for some digital tools over others. Although the study findings are not totally new, they are in connection to postgraduate education and it helps us to better understand our students' digital experience as both individuals and learners. Based on this understanding we believe that more explicit encouragement and support should be provided for the use of digital tools in the online Doctoral programmes, either through the integration of one specific course module or as part of the existing core modules in preparation for the thesis stage. However, more research is needed that addresses "when" and "how" such involvement with digital tools would be best incorporated in post-graduate programmes.

Acknowledgements

This research was supported by funds received from a Hybrid Teaching & Learning Research Grant, which was created by the Research Office in the Academic Quality and Accreditation Unit of the Laureate Network Office to support research that investigates the impact of digital teaching and learning methods on learning outcomes. For more information on the grant or the LNO Research Office, please contact LNOResearch@laureate.net.

References

ATABEKOVA, A.; BELOUSOV, A.; SHOUSTIKOVA, T. (2015). Web 3.0 Based Non-formal Learning to meet the third Millenium Education Requirements. University Students' Perceptions. *Procedia – Social and Behavioral Sciences*, 2015, Vol. 214, pp. 511-519.

AUCOIN, R. C. (2014). *A Study of Students' Perceptions of the Use of Web 2.0 Applications in Higher Education*. Unpublished EdD Thesis, University of British Columbia.

BOND, A. M.; LOCKEE, B. B. (2014). *Building Virtual Communities of Practice for Distance Educators,* Springer International Publishing, Cham, Switzerland.

BOUD, D.; LEE, A. (2005). 'Peer Learning' as Pedagogic Discourse. *Studies in Higher Education*, 2005, Vol. 30, No. 5, pp. 50-515.

BRANDEN, N. (2001). *The Psychology of Self-esteem*, 1st ed., Jossey-Bass, San Francisco, CA.

BRAUN, V.; CLARKE, V. (2006). Using Thematic Analysis in Psychology, *Qualitative Research in Psychology,* 2006, Vol. 3, No. 2, pp. 77-101.

COHEN, L.; MANION, L.; MORRISO, K. (2011). Approaches to Quantitative Data Analysis. In *Research Methods in Education*, 7th ed., pp. 604–621, Routledge, London, UK.

COSTA, C.; ALVELOS, H.; TEIXEIRA, L. (2016). The Use of Web 2.0 Tools by Students in Learning and Leisure Contexts. A Study in a Portuguese Institution of Higher Education. *Technology, Pedagogy and Education.* 2016, Vol. 25, No. 3, pp. 377-394.

CROSTA, L.; EDWARDS, A.; WANG, R.; REIS-JORGE, J. M.; MUDALIAR, M. (2018). How International

Online Students from a Professional Doctorate in Education are using Social Media and Artificial Intelligence Tools into the Thesis Stage? *Proceedings of EDULEARN18 Conference*. 2018, pp. 1461-1469.

CROSTA, L.; MANOKORE, V.; GRAY, M. A. (2016). From an Online Cohort towards a Community of Inquiry: International Students' Interaction Patterns in an Online Doctorate Program. *Journal of Interactive Online Learning. 2016, Vol.* 14, No. 2, pp. 45-57. Available at http://www.ncolr.org/issues/jiol/v14/n2.

DENZIN, N. K. (2009). *The Research Act: A Theoretical Introduction to Sociological Methods*, 3rd ed., Prentice Hall, Englewood Cliffs, NJ.

EKE, H. N.; C. O. OBIORA, C. O.; ODOH, J. N. (2014). The Use of Social Networking Sites among the Undergraduate Students of University of Nigeria. *Library, Philosophy and Practice, (e-journal)*, 2014, 1195. Available at http://digitalcommons.unl.edu/libphilprac/1195.

GOH, W. W.; HONG, J. L.; GOH, K. S. (2013). Students' Behavior and Perception of Using Facebook as a Learning Tool. *The 8th International Conference on Computer Science & Education (ICCSE 2013) April 26-28,* Colombo, Sri Lanka.

GU, F.; WIDEN-WULFF, G. (2011). Scholarly Communication and Possible Changes in the Context of Social Media: A Finnish Case Study. *The Electronic Library*, Vol. 29, No.6, pp. 762-776.

GUPTA, C. A. P.; SINGH, B.; MARWAHA, T. (2013). Relationship between Social Media and Academic Performance in Distance Education. *Universal Journal of Educational Research*, 2013, Vol 1, No. 3, pp. 185-190. DOI: 10.13189/ujer.2013.010307.

HAWLEY, P. (2010). *Being Bright is not enough: The Unwritten Rules of Doctoral Study,* 3rd ed., Charles C. Thomas, Springfield, IL.

HOPWOOD, N. (2010). A Sociocultural View of Doctoral Students` relationships and Agency. *Studies in Continuing Education*, 2010, Vol. 32, No. 2, pp. 103-117.

JAN, M.; SOOMRO, S. A.; AHMAD, N. (2017). Impact of Social Media on Self-esteem, *European Scientific Journal*, 2017, Vol.13, No.23, pp. 329-341.

JUNCO, R.; HEIBERGER, G.; LOKEN, E. (2010). The Effect of Twitter on College Student Engagement and Grades, *Journal of Computer Assisted Learning*, 2010, Vol. 27, No. 2, pp. 119-132. doi: http://dx.doi.org/10.1111/j.1365-2729.2010.00387.x.

LABIB, N.M.; MOSTAFA, R. H. A. (2015). Determinants of Social Networks Usage in Collaborative Learning: Evidence from Egypt. *Procedia Computer Science*, Vol. 65, pp. 432-441.

LAVE, J.; WENGER, E. (1991). *Situated learning: Legitimate Peripheral Participation,* Cambridge University Press, New York, NY.

LI, Y.; RANIERI, M. (2010). Are Digital Natives Really Digitally Competent? A Study on Chinese Teenagers. *British Journal of Educational Technology*, 2010, Vol. 41, No. 6, pp. 1029–1042.

LLORENS, F.; CAPDEFERRO, N. (2011) Facebook's Potential for CollaborativeEe-learning, *Revista de Universidad y Sociedad del Conocimiento (RUSC),* 2011, Vol. 8, No. 2, pp. 197-210. doi: http://dx.doi.org/10.7238/rusc.v8i2.963.

MORAN, M.; SEAMAN, J.; HESTER, T. (2011). *Teaching, Learning and Sharing. How Today's Higher Education Faculty Use Social Media*. Pearson, Boston, MA. Available at https://files.eric.ed.gov/fulltext/ED535130.pdf.

MORRIS, R. D. (2011). Web 3.0: Implications for Online Learning. *TechTrends*, 2011, Vol. 55, No.1, pp. 42-46.

PIERCY, H.; GORDON, F. (2015). Different but the Same: Doctoral Sstudents' Experiences of Multi-professional Education. *American Journal of Educational Research,* 2015, Vol. *3, No.* 4, pp. 393-398. doi:10.12691/education-3-4-2.

PROCTER, R.; WILLIAMS, R.; STEWART, J.; POSCHEN, M.; SNEE, H.; VOSS, A.; ASGARI-TARGH, M. (2010). Adoption and Use of Web 2.0 in Scholarly Communications. *Philosophical Transactions of the Royal Society of London A - Mathematical, Physical and Engineering Sciences,* 2010, Vol. 368, No. 1962, pp. 4039-4056. DOI: 10.1098/rsta.2010.0155.

RAJIV; LAL, M. (2011). Web 3.0 in Education & Research. *BVICAM's International Journal of Information Technology*, 2010, Vol. 3, No. 2, pp. 335-340.

ROBLYER, M. D.; MCDANIEL, M.; WEBB, M.; HERMAN, J.; WITTY, J. V. (2010). Findings on Facebook in higher education. A comparison of college student uses and perceptions of social networking sites. *Internet and Higher Education,* 2010, Vol. 13, pp. 134-140.

ROTHKRANTZ, L. (2016). On the Use of Social Media in Distance Learning. *CompSysTech '16 Proceedings of the 17th International Conference on Computer Systems and Technologies*, Palermo, Italy, June 23 - 24, 2016, pp. 347-354.

RUSH, P. (2015). Isolation and Connection. The Experience of Online Education, *International Journal of E-Learning & Distance Education*, 2015, Vol. 30, No. 2. Available at http://www.ijede.ca/index.php/jde/article/view/936/1597.

SALMON, G.; ROSS, B.; PECHENKINA, E.; CHASE, A. M. (2015). The Space for Social Media in Structured Online Learning. *Research in Learning Technology,* 2015, Vol. 23, No.1, pp. 1-14.

SHABNA, T. P.; HANEEFA, M. K. (2016). Web-Based Information Retrieval Pattern of Doctoral Students in Universities in Kerala. *Journal of Knowledge & Communication Management*, 2016, Vol. 6, No.1, pp. 1-13.

STEERS, M.; WICKHAM, R.; ACITELLI, L. (2014). Seeing Everyone Else's Highlight Reels. How Facebook Usage is Linked to Depressive Symptoms, *Journal of Social and Clinical Psychology*, 2014, Vol. 33, No. 8, pp. 701-731.

SUN, Z;, LIN, C. H.; WU, M;, ZHOU, L.; LUO, L. (2018). A Tale of Two Communication Tools. Discussion-Forum and Mobile Instant-Messaging Apps in Collaborative Learning. *British Journal of Educational Technology,* 2018, Vol. 49, No. 2, pp. 248-261.

TRACY, B. (2013). *Time Management,* American Management Association, New York, NY.

XIANGMING, L.; SONG, S. (2018). Mobile technology affordance and its social implications. A case of "Rain Classroom". *Journal of Educational Technology,* 2018, Vol. 49, No. 2, pp. 276-291.

YAOYUNEYONG, G.; THORNTON, A.; LIEU, J. (2013). Innovation and Web 2.0 in Business Education: Student Usage, Experiences with and Interest in Adopting Web 2.0 Tools*. International Journal of Technology in Teaching and Learning*, 2013, Vol. 9, No. 1, pp. 37-63.

YADAV, A. K. S.; VOHRA, N. (2016). Students' Usage and Experience of Web 2.0 Technologies. *Library Herald*,2 016, Vol. 54, no.1, pp. 64-81.

YIN, R. (1993). *Applications of Case Study Research*. Newbury Park, CA: Sage Publishing.

YUCEL, U. A. (2017). Perceptions of Pedagogical Formation Students about Web 2.0 Tools and Educational Practices. *Educ Inf Technol*, 2017, Vol. 22, pp. 1571–1585. DOI 10.1007/s10639-016-9508-7.