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Applying the Community of Inquiry e-Learning Model to Improve the Learning Design of an Online Course for In-service Teachers in Norway

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Abstract: Education authorities in Norway endorse online courses for in-service teachers to raise education standards and to promote digital competence. Naturally, these offerings present teachers with opportunities to integrate new theoretical perspectives and their professional experience in an online learning community. The inquiry into one's professional practice, enhanced by critical reflection in a group of fellow professionals, is considered essential for a lifelong learning practitioner, however, the emerging examples of instructional design tend to prioritise content delivery rather than professional discourse. In this paper, we demonstrate how the Community of Inquiry (CoI) framework could be adopted to transform learning design, which prioritises the delivery of individual assignments, into a more collaborative learning experience. Using the CoI instructional design principles and the associated questionnaire, we have investigated student perceptions of learning via an online course and formulated recommendations about how the course design can be refined to promote learning in the community. Despite the modest evidence, this investigation can serve as an example of how a concrete learning design can be improved based on this validated e-learning model.

Keywords: Community of Inquiry, continuing education, distance education, deep learning design, constructivist learning

1. Introduction

The first online courses in continuing education in Norway were designed as part of the government's initiative to raise the quality of teaching practice in primary education (Norge Kunnskapsdepartementet, 2011; 2014). The authorities endorsed the design of MOOC-based courses (Norway Ministry of Education and Research, 2014) to meet the demand for educators trained to the updated standards, including digital competence (Krumsvik, 2014). One of the first offerings for in-service teachers, Matematikk MOOC (n.d.), provides flexible and cost-effective education at scale (Tømte et al., 2016), however, the quality of online learning in terms of promoting twenty-first century skills such as dialogic communication, critical thinking, and innovation essential for lifelong learning, is yet to be explored (Kareluik et al., 2013). According to experts in the field (Aditomo et al., 2013; Damşa et al., 2015; Fossland and Ramberg, 2016; Koh, Herring, and Hew, 2010; Spronken-Smith et al., 2012), the quality of online learning can be improved by employing inquiry or project-based learning, where participants explore alternative solutions. Despite this, the emerging instances of online learning design concentrate primarily on technology-enabled content delivery and an individual's interaction with it.

A viable path to facilitate a shift from the learning design based on content acquisition to learning in the community is offered by the Community of Inquiry (CoI) framework. This is a socio-constructivist model for e-learning research and practice, which focuses on the inquiry and the examination of alternative perspectives by a group of learners. In this model, learning involves the construction of a shared understanding to which group members contribute their experience and critical reflection. The model includes principles of practice and a validated questionnaire, which can be applied to investigate aspects of learning in the community (Garrison, 2016; 2017). This article reports on a study which attempted to use this framework to align the Matematikk Mooc 1 online course (UiA, n.d.) with CoI learning design principles. The investigation is structured in three stages, guided by the answers to the following questions:

- What are the students` perceptions of the social, teaching and cognitive aspects of learning in the community in Matematikk Mooc 1?
- How did the current learning design impact the students` perceptions of collaborative learning in Matematikk Mooc 1?

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- Which CoI design principles could be reinforced to enhance learning in the community in Matematikk Mooc 1?

In the first step, we collected participant perceptions of collaborative learning to verify the status of the learning community on the online course. We then examined how the current learning design affected those perceptions. Lastly, we related the findings to the CoI instruction principles to find improvements to the course design.

We introduce the theoretical concepts related to the Community of Inquiry model followed by the significant body of research which applies the framework to concrete examples of learning design. We present the mixed-methods approach employed in the study of Matematikk Mooc 1, and a summary of findings. In conclusion, we offer suggestions on how the learning design of Matematikk Mooc 1 could be refined to boost collaborative learning.

2. Community of Inquiry – a model to guide learning design

The concept of the Community of Inquiry (CoI) was formulated by Garrison, Anderson, and Archer (1999) in their study tracing professional discourse in a text-based computer-mediated discussion forum. It is grounded in the socio-constructivist perspective on learning, according to which knowledge is constructed socially through the integration of alternative viewpoints in the course of inquiry, enhanced by reflection. In the context of instructional design, the CoI model indicates that a meaningful learning experience can be created through the interplay of three key elements: social, teaching and cognitive presence. These components represent different aspects of learning in the community.

Social presence involves the expression of a participant's socio-emotional identity in the online environment. It is concerned with how well course participants identify themselves with other members of the group, and can align their learning objectives and activities with those of the group. At the group level, it relates to group cohesion by setting a socio-emotional environment where trust, openness and a focus on the study are vital factors (Garrison, 2016; 2017).

Teaching presence involves the design of a learning experience as well as the facilitation and the direct instruction taking place during the course. It is responsible for setting and sustaining collaborative learning, primarily through managing both the socio-emotional climate and the inquiry process (Anderson et al., 2001). Strong leadership and a distinct learning design structure have been shown to increase student engagement in the collaborative environment (Garrison, Clevaland-Innes, and Fung, 2010; Shea and Bidjerano, 2009). It is not direct instruction that stimulates learning, however, but the design and the facilitation of activities promoting discussion and reflection (Garrison and Clevaland-Innes, 2005; Kupczynski, Wiesenmayer, and McCluskey, 2010; Vaughan and Garrison, 2006;). The quality of discourse and thinking shaped by the teaching presence distinguishes the learning community from any other social community that is typically dominated by casual interaction. The teaching presence also includes feedback and assessment to correct student misconceptions and to evaluate the progress of the inquiry process.

Cognitive presence is the essence of the CoI framework, in which the actual learning takes place. It is represented by the Practical Inquiry model (Garrison, Anderson, and Archer, 2001) which demonstrates how experience interplays with reflection during the dynamic inquiry stages: the triggering event, exploration, integration, and resolution.

The three components of the Community of Inquiry reflect the dynamic nature of learning in the community. They can be realised as shared responsibilities rather than fixed roles among the community participants. As learners gradually develop their metacognitive abilities, they can assume more control over the progress of an inquiry, with the tutor acting as a guide and a more experienced colleague. The three components described above are essential, interdependent, and provide a holistic representation of an educational experience.

The correlation between social, the teaching and the cognitive aspects in a learning community has been validated by numerous studies using the CoI questionnaire and factor analysis of the student perceptions of collaborative learning (Arbaugh et al., 2008; Yusuf, Mustafa, and Uğur, 2016). While the questionnaire can be used to evaluate the status of a learning community (Richardson et al., 2012), seven principles of practice and

the associated implementation techniques highlight the most salient responsibilities of the teaching presence (Vaughan, Garrison, and Cleveland-Innes, 2013). These principles can guide a tutor in forming and sustaining a learning community in which the facilitation of learning goes beyond the presentation of content and the assessment.

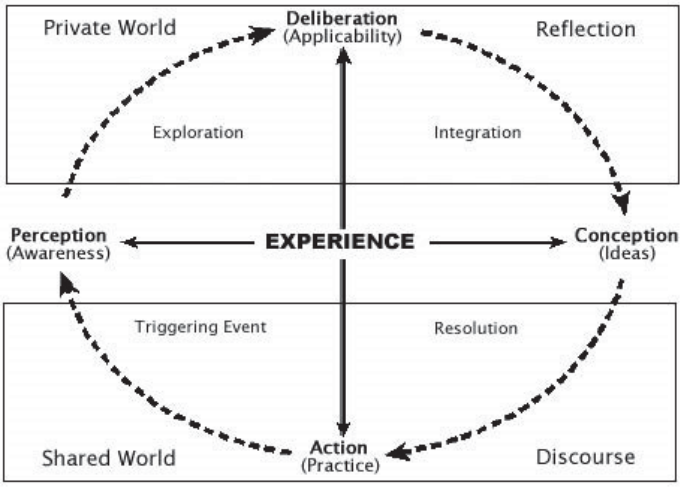

Figure 1: Model of Practical Inquiry (PI) by Garrison, Anderson, and Archer (2001)

The CoI model has been applied in several instructional design studies, either on its own or in combination with other e-learning design models such as Learning By Design, TPACK or the Quality Matters rubric (Makri et al., 2014; Swan et al., 2014; Szeto, 2015; Wisneski, Ozogul, and Bichelmeyer, 2015). It has typically been employed to validate and guide the design of online and blended courses in an academic context, where the objective was to develop higher-order thinking. From a broader perspective, the CoI model represents "epistemic engagement" in opposition to the presentational or performance-tutoring alternatives (Larreamendy-Joerns and Leinhardt, 2006). The latter approaches tend to rely on technology affordances to facilitate the acquisition of discrete, declarative or procedural knowledge. By contrast, the CoI model emphasises the social and the autonomous aspects of learning, oriented towards the holistic intellectual development essential for the professional practitioner in the twenty-first century.

3. The methodology

The investigation into the collaborative learning in the Matematikk Mooc 1 was intended as an example of a pragmatic approach based on the mixed-methods design (Creswell and Plano Clark, 2011; Griffin and Museus, 2011; Ivankova, Creswell, and Stick, 2006; Lund, 2012; Onwuegbuzie and Leech, 2005). In particular, the goal was to refine practice by aligning an existing learning design with the CoI model. The use of the questionnaire followed by interviews allowed for the triangulation of results and gave an insight into causal relations. The CoI questionnaire was used to collect student evaluations of collaborative learning during the course. Analysis of the responses revealed those aspects of instruction which diverted most from the CoI model. These were further explored in semi-structured interviews to establish how the course design affected student learning. Finally, by comparing the findings with the CoI design principles, we could indicate the potential for revision to enhance collaborative learning (Richardson et al., 2012; Vaughan, Garrison, and Cleveland-Innes, 2013).

Developed by Arbaugh et al. (2008), the CoI questionnaire elicits student perceptions of learning in the online community. It consists of 34 statements, including 13, 9 and 12 on teaching, social and cognitive presence, respectively. Students could mark their level of agreement using the Likert scale from 1 (strongly disagree) to 5 (strongly agree), with an additional "I don't know" option to capture a lack of opinion. It was translated into Norwegian and agreed on by two native speaking teachers. Numerous validation studies confirmed good construct validity and the high internal consistency of the scale (Arbaugh et al., 2008; Shea and Bidjerano, 2009; Yusuf, Mustafa, and Uğur, 2016). The dataset was collected and coded with the aid of the Questback online survey tool following informed consent, with optional participation and the privacy of respondents ensured.

The qualitative component was designed as a semi-structured interview to explore reasons for the low perception of the CoI components that emerged from the survey results (Kvale, 2007; Rowley, 2012). Five informants were selected through convenience sampling, and the interviews were conducted over the Skype VoIP communicator with an eCamm Call recorder to help transcription and verification (Deakin and Wakefield, 2014; Lo Iacono, Symonds, and Brown, 2016). The participants were informed about the purpose and the steps involved in the study before being asked for their consent. Since the interviews were to be held remotely, test calls were made to check the connection and the shared understanding of the interview questions.

4. The study findings, analysis and discussion

The CoI questionnaire elicited 46 responses from 320 enrolled participants within three weeks in the spring semester. The modest size of the sample determined the use of descriptive statistics (Muijs, 2011). The central tendency, the standard deviation and the skewness were calculated for each of the survey items. The dataset was structured into grouped variables representing the categories of cognitive (C), social (S) and teaching presence (T). By summarising the statistical indicators for each category of the CoI presence, we could obtain an indication of how the respondents perceived a specific aspect of learning in the community in relation to the other two elements.

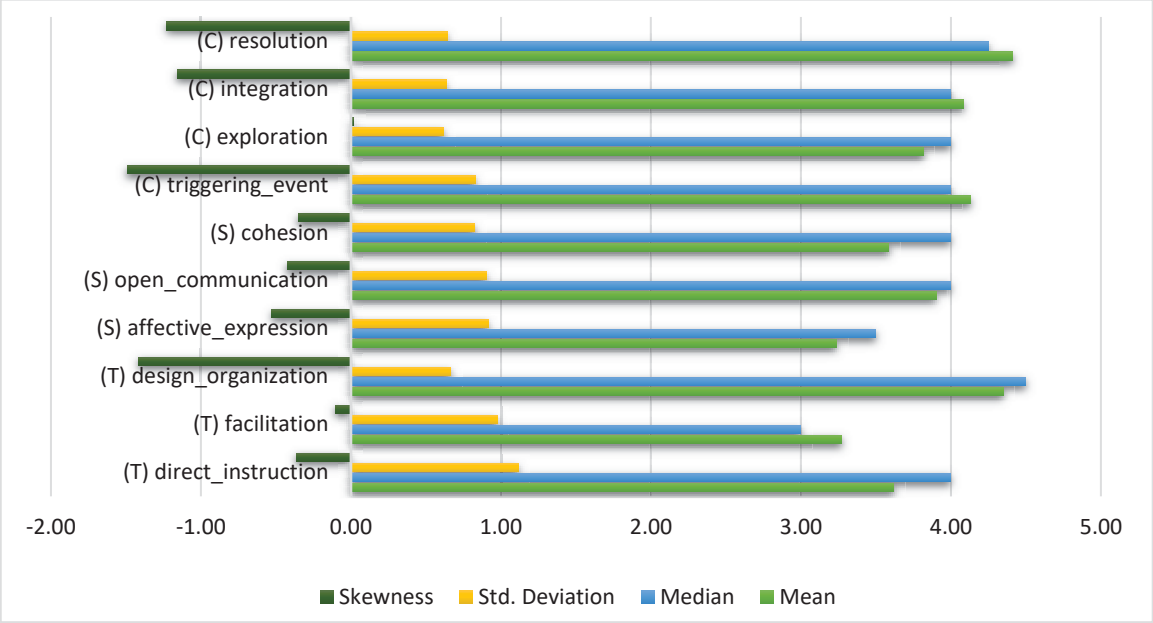

Figure 2: Statistical indicators for categories of cognitive (C), social (S) and teaching (T) presence

The findings related to the categories of cognitive presence (C) indicated that students appreciated the subject matter as being relevant to their professional interests and practice. The cognitive trigger score suggests that the topics raised in the forum most likely sparked curiosity. The cognitive resolution score also seems to highlight an appreciation for developing practical knowledge and skills. The exploration and the integration scores, however, suggest that the participants may have relied on activities other than discussions or brainstorming in the forum to develop this knowledge. While the Practical Inquiry model initially situated the inquiry in the context of online asynchronous conferencing (Garrison, Anderson, and Archer, 1999, 2001), the completion of the inquiry stages may continue beyond the forum, in an alternative activity form (Archer, 2010; Akyol and Garrison, 2011). The exploration may be undertaken during face-to-face dialogue, while the integration may be pursued through individual assignments (Archer, 2010). Notably, the exploration and the integration stages, which according to the Practical Inquiry model take place in the private world of reflection, were perceived as slightly less important than the triggering event and the resolution, both originating in the external world of experience (Garrison, Anderson, and Archer, 2001).

Student perceptions of social presence (S) were distinctly lower than those of the remaining two elements. The distribution of scores for group cohesion, open communication and affective expression suggests that the awareness of the social and the emotional dimensions may have varied considerably among students. The overall picture, however, suggests inadequate affective expression and group cohesion. This could be

translated into the reduced ability of students "to identify with a group, communicate openly in a trusting environment, and develop personal and affective relationships progressively by way of projecting their individual personalities" (Garrison, 2009b cited in Garrison, 2017). While instrumental to the collaborative inquiry, social presence has been shown to correlate with teaching presence tasked with setting a climate to support open communication and designing interactions focused on the shared academic purpose (Akyol and Garrison, 2011; Gutierrez-Santiuste, Rodriguez-Sabiote, and Gallego-Arrufat, 2015; Shea and Bidjerano, 2009). The comparison of findings on teaching and social presence in our study is likely to provide a more detailed indication of how those two aspects were interrelated during the course.

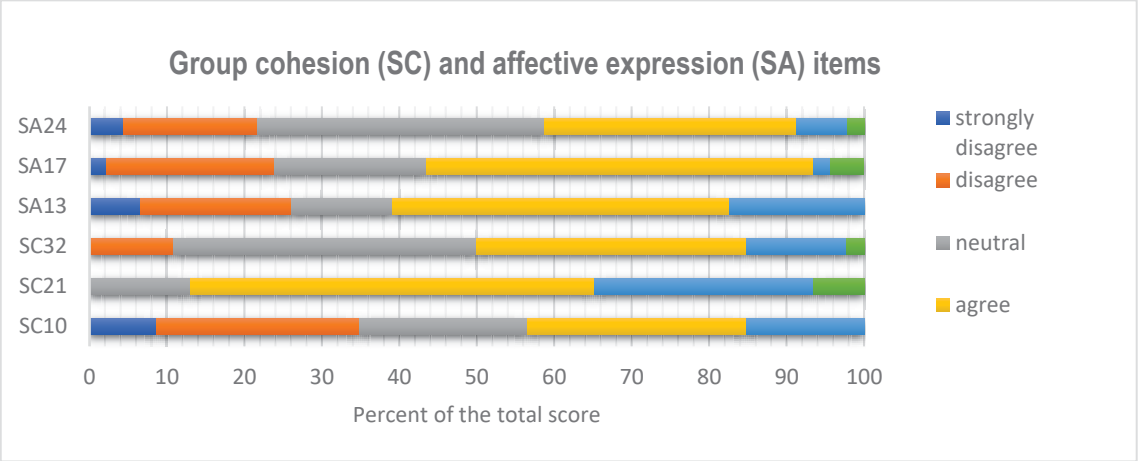

Figure 3: Populated group cohesion (SC) and affective expression variables (SA) with the corresponding survey statements below

SA24 Getting to know other course participants gave me a sense of belonging in the course.
SA17 I was able to form distinct impressions of some course participants.
SA13 Online or web-based communication is an excellent medium for social interaction.
SC32 I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
SC21 I felt that my point of view was acknowledged by other course participants.
SC10 Online discussions help me to develop a sense of collaboration.

The teaching presence results suggest that design and organisation is valued significantly higher than facilitation and direct instruction. Here, “design and organisation” refers to the procedures, the course content and the scheduled events predefined in the LMS. In contrast, facilitation and direct instruction describe the dynamic processes taking place during the course.

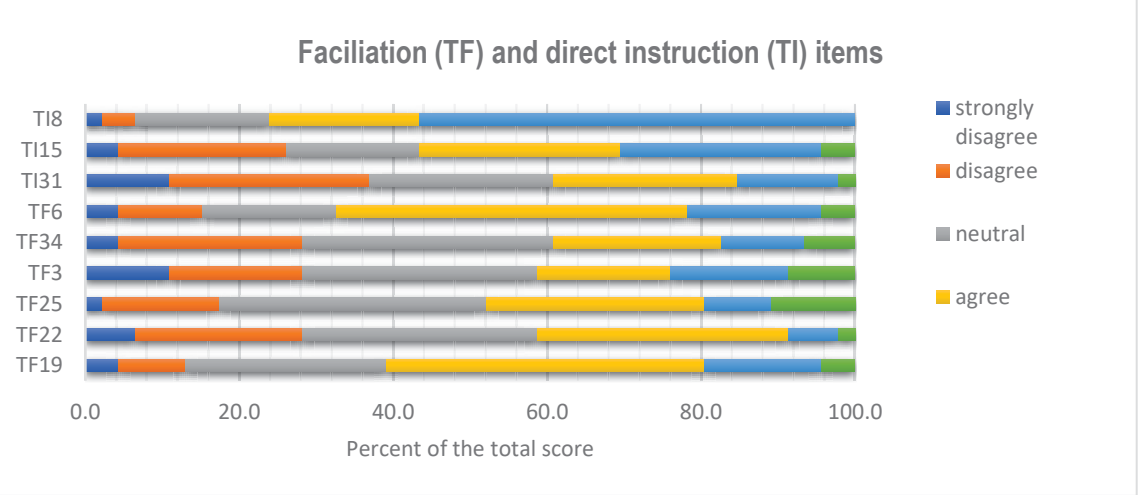

Figure 4: Populated facilitation and direct instruction variables with the corresponding survey statements below

TI8 The instructor provided feedback in a timely fashion.
TI15 The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
TI31 The instructor provided feedback that helped me understand my strengths and weaknesses relative to the course's goals and objectives.
TF6 The instructor encouraged course participants to explore new concepts in this course.
TF34 The instructor helped keep the course participants on task in a way that helped me to learn.
TF3 Instructor actions reinforced the development of a sense of community among course participants.
TF25 The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.
TF22 The instructor helped to keep course participants engaged and participating in productive dialogue.
TF19 The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.

Specifically, the facilitation and direct instruction to support cohesion and collaborative dialogue tend to be seen as insufficient, with a relatively high rate of missing responses. The low perception of formative feedback also indicates inadequacy in this area. The positive evaluation of a structured course design may reflect student preferences for the content-centred organisation of the study. A clear learning path in the LMS, with access to digital resources, provides flexibility yet constrains the interaction "to neglect the process and fixate upon the product" as noted by Dewey (Lipman, 2003 cited in Garrison, 2017, p.24). The facilitation and formative feedback, on the other hand, represent responsibilities related to the study, understood as "the process of actively searching for personal meaning and shared understanding" (Garrison, 2017, p.24), which may have been discounted at the design stage.

4.1 The key themes identified in the qualitative inquiry.

The CoI categories appreciated least were the group cohesion and affective expression, attributes of social presence, followed by the facilitation and direct instruction, associated with teaching presence. These categories became the focus of the interview questions and, subsequently, the key themes for the presentation of findings from interviews.

4.1.1 Affective expression

Preference for video-conferencing
Becoming acquainted with fellow students appears to have taken place mainly through peer assessment and posting commentaries to the discussion forum. Students suggest that video-conferencing could have been used to facilitate introductions and to help establish an online identity. Some informants also indicated their preference for synchronous communication as more expressive and practical, and less demanding: "And this is also challenging... When we are not talking directly but use writing… so we had to learn to be direct when writing, to be more specific. This might be better when you can use chat, where you can see each other, the body language" (Respondent C).

Using asynchronous text exchanges may pose a challenge to inexperienced online learners who need to "project themselves socially and emotionally and, as real people" (Gutierrez-Santiuste, Rodriguez-Sabiote, and Gallego-Arrufat, 2015, p.350). "Written communication lacks a sense of immediacy that builds interpersonal relationships. Immediacy is important to a supportive and learning environment as it reduces personal risk and increases acceptance, particularly during critical discourse that purposefully questions ideas and understanding" (Garrison, 2017, p. 26). The preference for synchronous video-conferencing is likely to address the need to establish social presence, including relationships with other members in the group. Its immediacy can support instant feedback and spontaneous interaction, which can sustain extempore dialogue. In the context of higher-order learning, however, text-based communication seems more appropriate to encourage reflection, explicit expression and revision (Garrison, 2017).

Connectedness
All the informants indicated the need to bond with others for learning. Some course participants had the benefit of studying together with their teacher colleagues from the same school or district. The geographical proximity helped them form a natural partnership practised through regular face-to-face meetings where they "stretched each other to be better." Others, who enrolled on the course alone in their district, may have perceived it as a challenge "not to have someone to discuss things with on a daily basis". "I have been alone in my district. I've communicated with fellow students in connection with peer assessment, and discussions, but

we had no contact via Facebook or Hangout. I have been working alone a lot. I call myself a kitchen table student. I talk to myself in my mind" (Respondent E).

In addition to geographical separation, some course participants experienced a distance in their relationship with the tutor, especially in the initial stage of the course. During the introduction, students were advised to seek peer assistance before approaching the tutor for help. As the course progressed, the facilitator invited students to make contact if they needed additional guidance. Some, however, might have felt too inhibited to take the initiative: "She encouraged us to make contact if we got stuck either concerning mathematical problems or some of the graded assignments related to teaching practice. If we couldn't grasp it either together or on our own, we should not be afraid to make contact with her" (Respondent B).

The existing course design appears to have overlooked the significance of a sense of belonging and the connectedness among the course participants. With no explicit steps to build a community, the design seemed to favour the students who had already formed a professional affinity with the students coming from the same workplace. Moreover, using asynchronous communication may have raised an additional barrier between those course participants who already had a community they could identify with, and those who needed one (Palloff and Pratt, 2007). Another type of distance identified was the perceived hierarchical relationship between the facilitator and the student. To some students, requesting additional explanations from the facilitator may have been the equivalent of admitting one's intellectual incapacity. Both types of distance are likely to be perceived as a communication barrier when trying to establish a climate of trust and respect as a foundation for learning in the Community of Inquiry (Gutierrez-Santiuste, Rodriguez-Sabiote, and Gallego-Arrufat, 2015; Haynes, 2016).

4.1.2 Group cohesion

Individual progression path

In addition to peer assessment, a discussion forum was intended as the main platform for student interaction during the course, however, participation in the forum may have been affected by attending an individual progression path, which involved scheduled graded assignments. Solving problem-based tasks uploaded by the instructor to the forum was an extra activity which was not graded, but had to be completed.

> *And this feeling that after you've completed one assignment, there is a new one waiting, and when you're through with it, so you have to go over to the next one. That's why you wouldn't necessarily go back and throw yourself into a discussion.* (Respondent A).

> *If someone is working with geometry, and I am already working with statistics, it would take me a lot of time to refocus again to engage with the topic* (Respondent D).

Posting messages to the forum tended to depend on each individual student's schedule, which meant that periods of activity varied in the forum. Participation in the discussion was likely to be seen as a lower priority than individual graded assignments with fixed deadlines. The lack of assessment of contributions to the discussion forum may also have undermined cohesion (Rovai, 2003). The considerable amount of workload associated with the individual written assignments may have prompted a casual attitude to engagement in the forum, which could have further eroded group cohesion (Lombardi, 2008).

Presentational style

The course participants were expected to upload to the forum solutions to the problem-based tasks presented by the tutor. By sharing their answers with fellow students, they could gain access to other solutions. The facilitator reportedly encouraged the students to share their strategies and discussed the best answers in the discussion forum.

> *There has been little discussion in which I can disagree with you. It has been more like sharing experiences. (..) Discussion? I am not sure I can call it a discussion. (..) And I have learnt a lot that things can be done in different ways. (..) There's always been such a polite tone that you can hardly call it a discussion. But we have shared experiences.*

> *Were many questions asked to fellow students in the forum?*
> *No, there weren't* (Respondent A).

Reportedly, the interaction on the forum involved presentations of views and solutions, which others would learn about and comment, however, there does not seem to have been further probing or exploration. The overall tone of the forum "would be more on a supportive note" or "very reassuring."

Students indicated that sharing professional experiences was considered the most enriching part of the course, however, the discussion in the forum seems to have been replaced by "serial monologues" backed by reassurance. Becoming aware of the diversity of practice or perspectives is the first stage of critical inquiry. To promote a more in-depth understanding, students need to examine a presented viewpoint against alternative ideas and probing questions which enhance critical evaluation of the subject of an investigation. "This inherent human bias to confirm widely held ideas creates a cognitive straightjacket if we do not engage in critical discourse that considers alternative perspectives. (..) Learners need to be challenged if they are to move out of their intellectual comfort zone" (Garrison, 2017, p.13). Another concern emerging from the interviews was the climate of reassurance and support which seemed to have had a disengaging effect on the discussion participants. The participants seemed to readily agree, and a discussion involving different views seemed implicitly "impolite". This "groupthink represents the negative side of group safety and is a chief inhibitor of inquiry" (Kennedy and Kennedy, 2010, cited in Garrison, 2016, p.73).

4.1.3 Facilitation

Passive instructor

The facilitator's main activity involved publishing and explaining problem-based tasks in the discussion forum. All the respondents observed that the instructor's interventions were rare and may have been prompted by the spread of misconceptions in the discussion of a mathematical problem. "Do you think that the facilitator could have done more to encourage collaboration? (..) if the facilitator had been a model in a way and actively participated in discussions from the very beginning, not just uploaded the solution, but evaluated discussion as it developed" (Respondent D).

Students tended to perceive the facilitator's role as passive. The facilitator appeared to focus on direct instruction in the form of individual guiding or explanatory messages sent to the group. Facilitating discussion in the forum and providing acknowledgement was assumed to be participants` responsibility. This responsibility involves maintaining focus on the progression of the discourse through stages of critical inquiry (Garrison and Cleveland-Innes, 2005; Garrison, Cleveland-Innes, and Fung, 2010; Shea, Sau, and Pickett, 2006). While the student "must accept responsibility for constructing personal meaning (..) control must be commensurate with the abilities of the learner" (Garrison, 2017, p.15). The control, here, concerns the degree of shared metacognition involving the ability to co-monitor and co-regulate the collaborative discourse (Garrison and Akyol, 2015a; 2015b). By relinquishing facilitation to students, who may not have been prepared to exercise this responsibility, the facilitator might have inadvertently inhibited collaborative thinking, which could have further fostered their dependence on direct instruction.

Individual guidance on request

The students were advised to seek help from peers before sending an email to the facilitator. Some respondents felt uncomfortable about taking an initiative to contact the tutor for assistance. Others may have learnt to rely on the tutor's guidance as the course progressed. "I think it took me a while before I began making contact with the teacher, but it has become frequent in recent months. I have discussed the assignments all the way (..) I should have used the tutor much more. Then I would have benefited from the course even more" (Respondent D).

All the respondents emphasised that their facilitator offered individual guidance related to the study topics on many occasions. While this aspect of the facilitator's activity could be categorised as direct instruction, it has been described by the informants as guiding an individual inquiry. "She didn't give me direct answers but would ask a question which made me reflect and continue to work with the assignment, which I could use in practice with my pupils" (Respondent E).

Students reportedly approached the tutor for individual assistance, typically in connection with graded assignments. While one-to-one guidance may have helped students to obtain a passing score or even stimulate reflection, it is likely to have fostered a passive attitude and acceptance of a suggested point of view. To pursue critical understanding requires that students take an active stance "to view problems and questions from a number of perspectives, including perspectives of the other learners involved in the process (Garrison,

2017; Palloff and Pratt, 2007). Students are expected to question the assumptions presented by the instructor and those of the other students, as well as their own assumptions and ideas" (Palloff and Pratt, 2007: Chapter 6). From this perspective, individual guidance, which leads the student to the solution chosen by the tutor, seems to hinder the development of a critical understanding.

Peer and external facilitation

Facilitation could also be provided by fellow students or colleagues in the workplace. Some respondents reported they would often turn to their closest, more experienced, fellow students for explanation and guidance.

> *How important was the facilitator, their role in the course, for your learning?*
> *Not much, I think. Because if I struggled with something I would turn to people in my group, those closest to me in my district. I would take it up on Friday and ask if someone could explain it to me. Then I had four other educators who could show me and explain it to me, my fellow students* (Respondent A).

> *The most significant benefit came from studying, investigating, reading and discussing assignments together. This had the most considerable effect on my learning* (Respondent D).

Turning to fellow students and work colleagues in the search for help to scaffold comprehension suggests insufficient interaction in the discussion forum. Research studies indicate that peer facilitation can engage participants more than facilitation performed by the tutor, who might be associated with authority and assessment (Lim et al., 2011, Mazzolini and Maddison, 2007 cited in deNoyelles, Zydney, and Chen, 2014). The participants` teaching experience in exercising leadership may be both a valuable contribution to collaborative learning as well as the skill they would like to develop (Rourke and Anderson, 2002). On the other hand, there is a concern about insufficient content knowledge, focus or direction in the cognitive presence (Garrison, 2017). As shown by Stein et al. (2013), students who have been coached in facilitation techniques over time are more likely to develop higher-order knowledge than those who did not receive similar coaching.

4.1.4 Feedback

Peer assessment

The informants appear to have relied on peer assessment for their formative feedback. Based on an evaluation of their assignment by two fellow students, they could revise their work before submitting it to the portfolio for the summative assessment. Respondents valued the peer assessment as an opportunity to gain an insight into alternative views which might lead to a revision of their own ideas: "This made me work thoroughly with the problem posed in the assignment. At the same time, I could see how others approached the same problem. This, I think, has been very instructive" (Respondent B).

In the introduction module, the participants were instructed to provide a constructive response when evaluating input from fellow students. Despite the support of rubrics, assessment comments appear to vary considerably in quality: "We were very cautious at the start when we evaluated each other's assignments. I would approach my own work in a more stringent way than others did" (Respondent D).

Feedback by inviting students to "diagnose their misconceptions" is the core of the social constructivist learning experience. Garrison posits that "all presences need to be considered when offering constructive feedback" (Garrison, 2016, p.98). He proposes that feedback, being part of the teaching presence, should be seen as a distributed responsibility for which the participants should be prepared. Similarly, Lynch, McNamara, and Seery (2012) report that peer assessment can be a valuable tool to promote reflection and learning, provided that students have been introduced to the evaluation procedure and the hallmarks of a quality response.

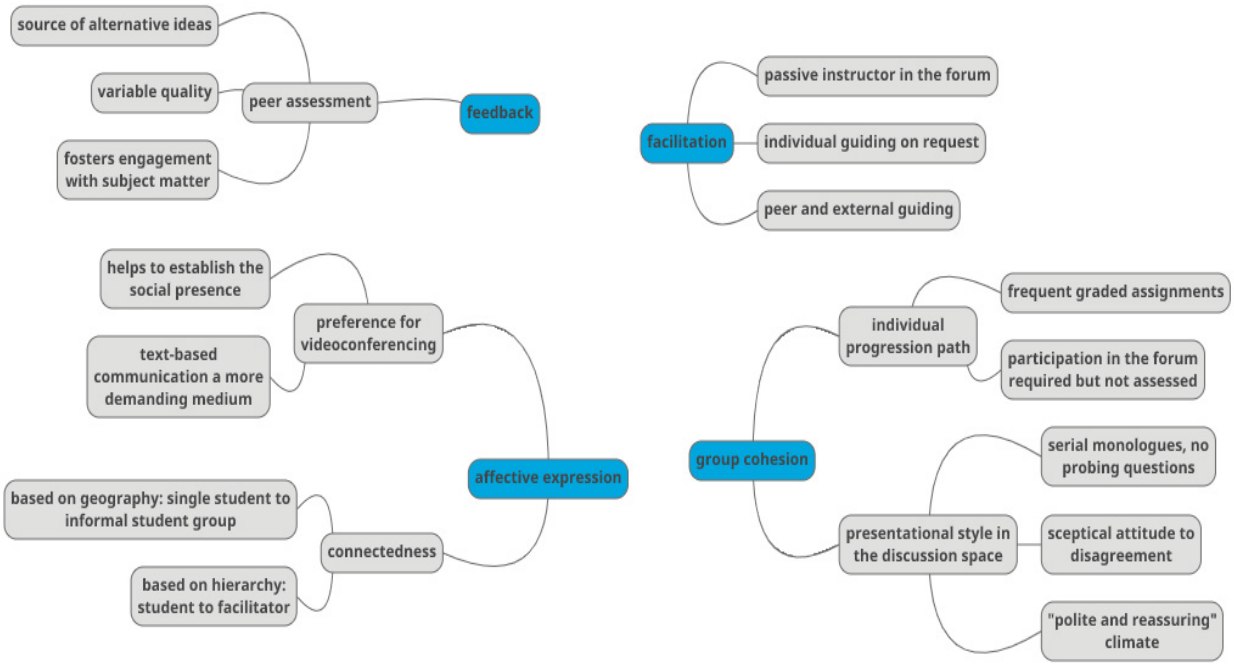

Figure 5: The key themes identified in the qualitative inquiry

The above analysis of the themes emerging from the interviews has highlighted those areas of the learning design which diverge most from the Community of Inquiry model. Based on the CoI design principles, we would like to propose measures to refine those elements to enhance collaborative learning during the course. These recommendations constitute an answer to the third research question.

5. The Community of Inquiry design recommendations

5.1 Plan for the creation of open communication and trust: establish community and cohesion

To improve the existing design, the facilitator should take leadership in establishing inclusiveness and trust by modelling behaviour and discussing engagement rules and expectations with students (Palloff and Pratt, 2007; Vaughan, Garrison, and Cleveland-Innes, 2013). It is essential to provide plentiful opportunities for dialogue and interaction to reduce the perceived distance between the participants, including the facilitator. The real-time communication may be particularly useful for that purpose. However, "we must be careful not to emphasise personal identity (interrelationships) at the expense of group identity (academic purpose)" (Garrison, 2017, p.48). Social presence must be built around the common purpose and the direction of the group interaction. In addition to the icebreaking and cohesive protocols and strategies (McDonald, 2012; Vaughan, Garrison, and Cleveland-Innes, 2013), it seems vital to distinguish between a course discussion forum as the platform for critical inquiry and a Facebook group as an informal arena where the participants can address their social and support needs. Finally, to refocus the course design on higher-order learning, contributions to the discussion forum must be recognised as essential to promoting cognitive presence. Consequently, the course participants should be allowed time for reflection, participation in shared activities, and peer feedback.

5.2 Plan for critical reflection and discourse, establish inquiry dynamics: sustain respect and responsibility; sustain inquiry that moves to resolution

To strengthen the cognitive presence during the course, a dialogic approach, which stimulates reflection, should replace a one-way presentational style of communication in the discussion forum (Swann, 2010). The measures undertaken by the facilitator to encourage collaborative discourse may involve scaffolding a discussion using selected strategies (Darabi et al., 2011; deNoyelles, Zydney, and Chen, 2014) or coaching and feedback (Stein et al., 2013). The CoI model also proposes that facilitation should be dynamically balanced, with the tutor assuming a more active role, especially in the early stages of the course when the cohesion is relatively low. The study by Arend (2009) indicates that effective facilitation is likely to be modest in quantity yet directed to stimulate purposeful student-to-student dialogue. The facilitator's leadership can take the form of implementing explicit discussion protocols or coaching which may help students to co-direct the discourse

(deNoyelles, Zydney, and Chen, 2014; Stein et al., 2013; Zydney, deNoyelles, and Kyeong-Ju Seo, 2012). As the level of group cohesion and metacognition increases with the course progression, facilitation may gradually be exercised by the other participants of the discourse (Garrison, 2017; Palloff and Pratt, 2007;). Given time for reflection, boosted by the formative feedback and facilitation, the discussion in the forum may become a vehicle for the epistemic growth of the group members.

5.3 Ensure assessment is congruent with intended processes and outcomes.

Assessment tends to send a signal to students the type of knowledge they are expected to develop and how they can approach learning. Formative feedback seems indispensable to a critical understanding of the subject. It is instrumental in the development of the metacognitive skills necessary for participation in the online discourse (Garrison, 2017). Palloff and Pratt (2007) recommend the use of rubrics to assess the quality of contributions in the discussion forum and their weight in the total grade for the course. The discussion rubrics proposed by Vaughan, Garrison, and Cleveland-Innes (2013) can be used proactively to shape student metacognition, and as a reference when providing formative feedback.

6. Limitations

This study was based on a modest sample and was conducted while the course was still in progress. The author is a proponent of collaborative learning, and this might have affected the qualitative stage of the inquiry (Creswell, 2012). At the same time, the choice of a mixed-methods design may render a more balanced picture of the student perceptions. Hopefully, the descriptions of research procedures lend transparency to the study.

7. Conclusion

The Matematikk Mooc 1 in its present design has arguably been conceived as cooperative, in opposition to collaborative, learning (Panitz, 1999). Students could interact to some degree by providing and receiving peer assessment, but nonetheless, their efforts were concentrated on submitting the papers necessary to complete the progression path laid out in the LMS. The acquisition of essential content knowledge appears indispensable to teaching practitioners who want to continue their professional development in the field, however, it may reduce a learning experience to "product delivery" if the completion of tasks overrides the process of learning. It seems that professional reflection enhanced by collaborative inquiry offers the preferable path to develop a more profound understanding. "Interpersonal relationships are the greatest influence on our thinking and learning. This is in contrast to the fallacy of the isolated creative thinker. Thinking and learning is not a private experience. It is dependent upon open communication. We don't know what we don't know until we are confronted with conflicting facts and arguments" (Garrison, 2017, p.12). This perspective in the context of online academic endeavour presents affordances which, transcending the benefit of flexible access to content, create conditions for a transformative, transaction-based educational experience. For this to happen, the discussion forum must become a platform for critical discourse where participants, with the facilitator's active support, can scrutinise alternative perspectives through their critical reflection as professional practitioners.
The goal of the present study was to propose the Community of Inquiry model as an instructional approach to improve the learning design of Matematikk Mooc 1. To this end, we have presented the framework from the pragmatic, instructional point of view, and we have applied the survey instrument followed by interviews to gain an insight into collaborative learning during the 2017 edition of the course. Despite the modest evidence, the study identified areas of learning design which could benefit from the Community of Inquiry model.

Specific CoI design principles were called upon to recommend concrete measures to promote collaborative learning within the existing design. Finally, the study hopefully directed attention to the advantages of grounding course learning design in the research-based conceptual model and practice. While no blueprint for online courses in continuing education has yet emerged, the Community of Inquiry framework, with its validated survey instrument, can provide a consistent reference for aligning course design with the socio-constructivist approach.

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Examining Online Cheating in Higher Education Using Traditional Classroom Cheating as a Guide

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Abstract: Academic dishonesty in higher education is a perverse problem affecting institutions of learning in many countries across the globe. More alarmingly, numerous studies have pointed to increasing rates of cheating and plagiarism over the past few decades offering a wide array of explanations and theories for this trend. A relatively new feature of both higher education and the discussion of academic dishonesty involves the growing market for online education. Within the last decade, online education has become a permanent fixture increasing its reach in education markets throughout the world. The trend of online education is seen as bringing with it a new set of opportunities and challenges related to academic dishonesty. With high rates of cheating already a well-documented problem in the traditional (face-to-face) learning environment, it is important to analyze how online education factors into this scenario. The goal of this paper is to provide the reader with a critical analysis of the current literature on academic dishonesty in online education and to propose areas for future research where gaps in the literature exist.

Keywords: academic dishonesty, cheating, online education, distance education, plagiarism

1. Introduction

Academic dishonesty in higher education has been a topic of concern for many decades. An abundance of research has been conducted that considers various forms of cheating, reasons for cheating, and ways to prevent it. It should be noted that academic dishonesty and cheating will be used interchangeably in this paper as is common in the literature (Trenholm, 2006/2007, p. 284). Until recently, most of this research has been conducted from a traditional (face-to-face) classroom perspective. However, in the last part of the twentieth century with the proliferation of the Internet, a new online educational environment has been created for which cheating can be analyzed. Online education, as defined by Allen and Seaman (2015), consists of 80 percent or more of a course's content being delivered online. On the other hand, hybrid or blended learning has 30-79 percent of a course's content being delivered online (Allen and Seaman, 2015).

In the past decade, many issues have been raised regarding the validity and quality of online education and the use of synchronous and asynchronous online learning in higher education. With synchronous online courses, students are typically required to participate in virtual class meetings at specific times. In this case, there is often an opportunity for students to interact with their instructors in real time and to get instant feedback on their progress. Alternatively, students can enroll in fully asynchronous online courses which do not require specific meeting times. In these courses, there are often weekly deadlines, but otherwise students work at their own pace. In addition, with some online education programs, students can participate in blended or hybrid courses where online learning is a component of the course with teachers and students still interacting in a physical classroom.

Many researchers claim that online learning presents a new set of opportunities and challenges for teachers and administrators when it comes to maintaining academic integrity (Kennedy et al., 2000; Rowe, 2004; Shachar and Neumann, 2010). At the extreme, some teachers and academic administrators worry that students can register for courses and then pay someone else to take the courses for them (Kasprzak and Nixon, 2004). For example, Hollis (2018) found that a web search using terms such as "student-for-hire" or "ghost student" revealed an expanding industry offering services dedicated to providing imposter students. Some teachers also assert that a lower student-perceived risk of getting caught makes it almost impossible to prevent student collaboration or the use of unauthorized materials leading to overinflated grades in the online environment.

Rowe (2004) and Bedford, Gregg, and Clinton (2011) have also suggested a variety of new opportunities that students can employ when engaging in academic dishonesty in the online environment such as waiting for another student to take the exam and then obtaining the answers using screenshots and emails, or students

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taking the exams together in pairs or groups. Students can also claim that they received fraudulent error messages to garner extra time to study or to get the answers from another student. In addition, many unauthorized test banks from popular textbook publishers are available online and if given enough time to complete an assessment, students may be able to look up answers or find similar questions to gain an unfair advantage.

Despite these new opportunities and challenges, online learning at the post-secondary level has seen steady growth since 2012, even as overall college enrollments have been declining. Specifically, online education in the United States increased by 5.6 percent from Fall 2015 to Fall 2016 bringing the number of students taking at least one distance course to 6,359,121, representing 31.6 percent of all students (Seaman, Allen, and Seaman, 2018, p.3). As colleges and universities continue to invest time and other resources into developing online courses and education programs, it will become increasingly important to study the prevalence of academic dishonesty in this environment and to continue developing strategies to prevent it (Cronan, Mullins, and Douglas, 2018; Vehviläinen, Löfström, and Nevgi, 2018; Ngo et al., 2018). Ensuring the validity of online courses is a crucial part of an institution's ability to successfully offer online degree programs and to support their continued growth and development. It should be noted that Massive Online Open Online Courses (MOOCs) were left out of this analysis due to the limited number of higher education institutions experimenting with this mode of delivery.

Although the literature that pertains to academic dishonesty in the online setting is still in its infancy, especially compared to the literature that examines traditional classroom cheating, the past two decades have ushered in an abundance of research with an expansive set of noteworthy topics and results. Given the upward trend in online education, it is important to begin examining what researchers are finding in the early stages of its development. The goal of this paper is to provide an overview of the research pertaining to academic dishonesty in the online environment for higher education. The paper is organized around four major themes (also referred to as categories) that emerged while conducting this review. The themes were broadly centered around the following issues: (1) Factors that potentially contribute to online cheating behaviors, (2) Student and faculty perceptions of online cheating behaviors, (3) The prevalence of cheating online compared to cheating in the classroom and (4) How cheating behaviors differ within proctored and unproctored environments.

2. Defining 'cheating' or 'academic dishonesty' in the classroom and online.

Before examining the literature pertaining to academic dishonesty in online education, it is useful to first establish how cheating is defined. It is interesting to note that many generic definitions of cheating seem to be applicable in both the face-to-face and online setting. For example, according to Cizek (2003) academic cheating is "any action that violates the established rules governing the administration of a test or the completion of an assignment; any behavior that gives one student an unfair advantage over other students on a test or assignment; or any action that decreases the accuracy of the intended inferences arising from a student's performance on a test or assignment." Although this author was referring to cheating in the classroom, one could certainly argue that this definition could be applied in an online setting as well. The difference however, lies in the methods or techniques students use to gain an unfair advantage. For example, in the classroom setting during an exam, a dishonest student may look at another student's test or use unauthorized notes hidden from the instructor. Although both behaviors are plausible, the inherent risks of getting caught are usually high enough to prevent most students from attempting these behaviors in the classroom. On the other hand, in the unproctored online setting, there is no way to confirm that the student registered for the course is taking the assessment, and if they are, there is no way to prevent him or her from getting unauthorized assistance. In both cases, the student's actions constitute "a behavior that gives one student an unfair advantage over other students on a test or assignment" but the perceived risks and methods to gain that advantage are different depending on the learning environment.

King, Guyette, and Piotrowski (2009, p.4) provided the following definition of cheating: "a transgression against academic integrity which entails taking an unfair advantage that results in a misrepresentation of a student's ability and grasp of knowledge." The authors then go on to mention that in the online context "this includes obtaining inappropriate assistance either from an online source or adjutant, plagiarism, and false self-representation." In this case, the definition of cheating could once again be applied to both the classroom or online environment. However, in this example, King, Guyette, & Piotrowski (2009) make it a point to specify how the cheating methods may differ or be more pronounced in the online environment.

To better understand how students perceive the concept of cheating, Raines et al. (2011) conducted a qualitative study to examine the definition of cheating in the online environment from a student's perspective. The findings of their study revealed that most students believe that breaking the rules, dishonesty, and not doing the work themselves are behaviors that constitute cheating. The authors also found that students perceived there to be a difference "between the expectations in an online and classroom-based course" and therefore students are "influenced by the boundaries of the learning behaviors established in each course by the faculty." More specifically, students mentioned that in online courses they are often allowed to look at course notes or the textbook when taking assessments, but they are not allowed to look up answers online. Raines et al. (2011) conclude that online instructors need to be very careful and precise when defining the acceptable learning behaviors and expectations regarding assessment practices in their courses.

In summary, cheating occurs when students engage in dishonest behavior. What constitutes dishonest behavior needs to be clearly defined generally by university or college honor codes and defined in specific terms by course instructors. Dishonest behavior in both the face-to-face and online settings results in the student gaining an unfair advantage which misrepresents their true knowledge and abilities. The new opportunities and challenges pertaining to academic dishonesty in the the online environment are due in large part to the absence of physical proctoring of course work. This can lead to student identity issues, the use of unauthorized materials or assistance, and the perception that there is a lower risk of getting caught.

3. Methodology

Given that the definition of cheating remains intact when discussing different learning environments, this study was conducted by first considering cheating behaviors in the classroom and establishing a set of parameters or categories for which these behaviors could be studied in the online environment. Key word searches were conducted using a variety of databases (ProQuest, SpringerLink, Education Information Resources Center (ERIC), JSTOR, and EDUCAUSE Library.) The initial search used ERIC and the words 'cheating,' AND 'academic dishonesty' OR academic integrity.This search provided an extensive list of 242 articles that mainly focused on classroom cheating. Articles that were not from academic peer-reviewed outlets or before 1990 were not examined. While examining the remaining articles, the first category for analyzing cheating in the online environment was established: 'the factors that contribute to cheating behaviors." This category has been well-researched in the literature for the face-to-face learning environment. More specifically, the factors that contribute to classroom cheating have been classified as individual factors (also known as demographic and personality factors), and situational (also referred to as contextual) factors (McCabe and Trevino, 1997; Crown and Spiller, 1998; McCabe, Trevino, and Butterfield, 2001). Once the main factors that contribute to classroom cheating were established, additional key word searches were conducted using the aforementioned databases. These searches focused more specifically on the online environment using thefollowing key words:: 'online education,' OR'distance education,'OR 'online learning,' OR 'online academic integrity' OR 'distance learning,' OR'asynchronous online education,'OR 'synchronous online education,' OR'academic dishonesty in online education,'OR 'cheating online,' OR 'online plagiarism.' In this search, 78 articles from 2000 to 2019 were found. All articles that listed individual factors or situational factors that contribute to online cheating behaviors were analyzed. After excluding articles that only discussed online cheating issues using anecdotal evidence, or for which online cheating was not the main focus of the paper, 63 articles remained and were analyzed.

While examining the above-mentioned academic articles that referenced online cheating factors, the next category to emerge as a prevalent issue in this literature was student and faculty perceptions of online cheating behaviors. This category emerged as relevant because social norms theory, which suggests that an individuals' behavior is influenced by misperceptions of how their peers think and act, has been used to examine student and faculty perceptions of academic misconduct in the classroom. In particular, Hard, Conway, and Moran (2006) used social norms theory to study student and faculty perceptions of academic misconduct and found that students overestimate the frequency of cheating by their peers in the classroom setting. Since students and faculty are found to overestimate the amount of academic misconduct in a face-to-face setting, the perception that it is easier to cheat in the online setting could conceivably enhance these beliefs even further and lead to more cheating online. Examining student and faculty perceptions of online cheating behaviors is thus important from both a theoretical and practical standpoint.

The third category or theme to emerge when conducting this review was the prevalence of cheating online compared to cheating in the classroom. The papers reviewed in this category compared the occurrence of cheating in the classroom to cheating online using self-reported survey methods.

The final issue examined in this paper was the difference in cheating behaviors between proctored and unproctored environments. Because of the new opportunities to cheat and the challenges that instructors face when trying to prevent cheating, it is important to analyze those papers that look directly at how the absence of physical proctoring influences the rate of cheating. These papers were grouped by empirical approach first and then by the authors' results. The remainder of this paper examines each of these four major themes.

In summary, when conducting a systematic review, it is important to clearly define the inclusion and exclusion criteria upon which the review is based. As mentioned above, all articles that referenced one of the four major themes were included in this review. The methodologies used in these papers included: self-reported surveys and randomized or experimental designs. These studies included students who took both asynchronous online classes and those students who took face-to-face classes that had an online component. In addition, both qualitative and quantitative methods were appropriate and therefore included as acceptable research designs when selecting papers for review. Papers that examine online cheating only began to appear in the literature from 2000 onwards and thus the timeframe for this study was predetermined. The exclusion criteria were based upon publication type and relevance to the four major themes. Working papers, conference proceedings, policy briefs, and popular press articles were not included in this analysis. Papers that mentioned online cheating but did not focus on one of the four major themes were excluded. For example, papers that examined the use of online tutorials to prevent cheating or papers that focused on how cheating impacted the effectiveness of online learning were not relevant to this study and thus excluded.

4. The factors that may contribute to cheating behaviors

While there are several factors related to academic dishonesty, most studies that analyze cheating have broadly separated these factors into two types: individual factors (also known as demographic and personality factors), and situational (also referred to as contextual) factors (McCabe and Trevino, 1997; Crown and Spiller, 1998; McCabe, Trevino, and Butterfield, 2001). For comparison purposes, papers that examine the individual and situational factors for both classroom cheating and online cheating are discussed below.

4.1 The individual factors that contribute to cheating behaviors in the face-to-face classroom

Studies that analyze the individual factors contributing to academic dishonesty in the face-to-face classroom are abundant. Variables such as age, gender, intellectual ability, ethnicity, college major, extracurricular participation, employment status, level of schooling and self-esteem have been considered as potentially important factors that may be correlated with cheating behaviors (Iyer and Eastman, 2006). Of these variables, the three that have consistently been shown to have an impact on academic dishonesty in the traditional classroom are age, gender, and intellectual ability. Specifically, both younger students and male students are shown to cheat more often, and in general, students with higher intellectual abilities have been found to engage in less academic misconduct compared to their peers with lower ACT scores, intelligence and grade point averages (GPA's), (Whitley, Nelson, and Jones, 1999; McCabe and Trevino, 1997; Athanasou and Olasehinde, 2002; Underwood and Szabo, 2003; Simon et al., 2004; Lau and Haug, 2011; Kisamore, Stone, and Jawahar, 2007.)

Other studies, such as those that look at individual factors related to personality, have received less attention in the academic dishonesty literature in the face-to-face classroom. However, Simha and Cullen (2012, p.29) found that students are more likely to cheat when they are categorized as 'impulsive, risk taking, attention-seeking, low in responsibility, and tend to be externals on the locus of control measure.'

4.2 The individual factors that contribute to cheating behaviors in the online environment

Research that analyzes the individual factors contributing to academic dishonesty in the online environment is less abundant and the findings are a bit more mixed compared to those of the traditional classroom setting. For example, Lanier (2006) analyzed 1,234 self-reported cheaters in traditional and online courses and found that males are more likely to cheat online and that older students, married students, graduate students and students with a higher GPA are less likely to self-report cheating in their online courses. Similarly, Miller and Young-Jones (2012), Kidwell and Kent (2008), and Peled et al. (2019) found that older students are less likely to cheat but in

contrast to Lanier (2006), these authors observed no significant difference in cheating levels based on gender. In addition, Costley (2017) is the only paper found to exclusively survey online students in order to analyze student characteristics in relation to academic misconduct. The author reported that neither age nor gender are related to cheating behaviors in a Korean online learning environment but that 'students who are in their earlier years of study are more likely to cheat than their senior peers,' (Costley, 2017, p.320).

Interestingly, and in contrast to most studies, Watson and Sottile (2010) surveyed 635 online and face-to-face undergraduate and graduate students and found that more females (37.8 percent) self-report cheating in online courses compared to males (20.8 percent). Finally, Peled et al. (2019) also analyzed the relationship between cheating, personality traits, and motivation and found that conscientiousness, agreeableness, intrinsic and external motivation and emotional stability are all predictors of lower levels of academic dishonesty online. Additionally, the authors noted that "online courses are not a predominant factor in the prediction of misbehavior."

4.3 The situational factors that contribute to cheating in the face-to-face classroom

Over the past several decades, many studies have looked at how students feel about cheating and how those feelings relate to their behavior in a face-to-face classroom. Some studies have revealed a trend in the student culture becoming more accepting of academic misconduct (Brimble and Stevenson-Clarke, 2006). Some students even see cheating as a way to maintain a level of fairness since they believe so many of their peers are engaging in dishonest behavior (Engler, Landau, and Epstein, 2008). On the other hand, some students self-report a lack of time due to time-consuming commitments unrelated to schooling such as work, family, and extracurricular activities as a factor leading to dishonest behavior (Owunwanne, Rustagi, and Dada, 2010). In addition to time pressures, many students feel pressure to achieve high grades. This type of pressure may be self-inflicted or students may feel pressure from their families or employers who offer to pay for their schooling as long as they maintain a certain level of achievement.

Other studies such as and Smyth and Davis (2004) have shown that although approximately 90 percent of students report that cheating is wrong, a large majority of those students (75 percent and 45 percent, respectively) admit to cheating anyway. Many theories have been developed to try and explain this contradictory behavior. For example, Simha and Cullen (2012) suggested that deterrence theory may explain why students continue to cheat even after admitting they know it is wrong. Specifically, deterrence theory demonstrates that unethical behavior can be discouraged by increasing both the perceived probability of being caught and the severity of punishment for the behavior (Buckley, Wiese, Harvey, 1998). Therefore, if students perceive a small chance of getting caught in conjunction with little to no punishment when they do, this may increase their willingness to engage in dishonest behavior. In addition, deterrence theory is applicable when considering student perceptions of peer behavior. For example, researchers have suggested that when students believe their peers are cheating without penalty, they will then be more inclined to engage in that behavior themselves (McCabe, 1992; McCabe, Trevino, and Butterfield, 1999).

Another theory that gained popularity in the 80's and 90's related to academic dishonesty was that of neutralization. Neutralization is defined as 'a process of explaining or legitimizing one's dishonest behavior rendering it neutral or no longer dishonest,' (Wideman, 2008, p.4). This theory predicts that students justify their dishonest behavior by deflecting blame and arguing that special circumstances caused them to cheat which protects them from being held accountable or feeling guilty (McCabe, 1992). According to Meng et al. (2014, p.67), 'blaming others and attributing problems to external sources are prime examples of neutralizing attitudes that enable cheating.'

Recently however, researchers are starting to find that cheating is becoming more of a cultural norm and that many students no longer feel the need to provide justification for their dishonest behavior (McCabe, Butterfield, and Trevino, 2012). For example, Stiles, Wai Wong, and LaBeff (2018) proposed that age cohorts or generations may help to explain this cultural shift. In particular, the authors study academic entitlement, a primary characteristic associated with millennials, as a potential contributing factor to cheating. Academic entitlement is defined as 'preferring to receive more from one's academic experience than one's peers and preferring to get more from one's academic experience than one gives to it' (Miller, 2013, pp.655–656). Using a study of 506 undergraduate students, Stiles, Wai Wong, and LaBeff (2018, p.829) concluded that 'academic entitlement is significantly related to participants' reports of cheating on major exams, weekly quizzes, class assignments (term papers, lab assignments, homework assignments), and helping others to cheat.'

Another recent trend that is receiving attention in the academic dishonesty literature deals with contract cheating. This form of cheating was defined by Clarke and Lancaster (2006) as 'the submission of work by students for academic credit which the students have paid contractors write for them.' Research by Bretag et al. (2018) investigated a variety of outsourcing behaviors in an Australian University and found that the following three variables were significantly correlated with contract cheating: dissatisfaction with the teaching and learning environment, the perception of multiple cheating opportunities and speaking a language other than English at home. It should be noted that the authors did analyze the mode of study as a correlating factor, however, only a small number of online only students were surveyed making generalizations problematic.

4.4 Applying the theories that relate to situational factors in the classroom to the online setting

The situational factors associated with cheating behaviors discussed above have been primarily studied from the standpoint of a face-to-face classroom. However, it is plausible that deterrence theory, neutralization and academic entitlement all play a role in the cheating behaviors of online students as well. To understand how these theories can be applied, it is important to first discuss how the online environment can potentially contribute to academic misconduct. One characteristic of online learning that may correlate with cheating behaviors is the higher degree of anonymity in this environment compared to a face-to-face classroom. Although some students in large traditional classrooms can also maintain some degree of anonymity if they choose, the opportunity to remain anonymous in the online environment is arguably much higher.

Several articles claim that the lack of face-to-face contact between teachers and students creates a psychological barrier that makes students feel as if dishonest behavior is more acceptable (Heberling, 2002; Rowe, 2004; Stuber-McEwen, Wisely, and Hoggatt, 2009; Sande and Xuetao, 2018). Since anonymity can prevent students from developing a connection with their instructor, it may remove some of the guilt students feel about the act of cheating. In addition, the distance creates a perception that it is easier to cheat online because of increased opportunities and a diminished chance of getting caught (Chapman, 2004; McNabb and Olmstead, 2009). Using the same line of reasoning, the perception that it is easier to cheat online may solidify or strengthen the belief that the students' peers are also cheating more often and without consequences (Styron and Styron, 2010; Costley, 2018). Anonymity is thus a potential contributing factor to online cheating that relates to both deterrence theory and neutralization theory.

Another issue associated with anonymity that is shown to increase instances of academic dishonesty is the students' perception that they are receiving a low-quality educational experience (McCabe, Butterfield, and Trevino, 2012). Although there are many papers that address this issue from an offline perspective (Owunwanne, Rustagi, and Dada, 2010; Beasley, 2014), it is possible that the attributes of online learning can intensify this notion due to the feeling of isolation many students encounter in this environment. Accordingly, Costley (2017) found that online students are more likely to engage in dishonest behavior when they are not satisfied with or interested in the course they are taking and student dissatisfaction is often related to poor course design (Costley, 2018; Arnold, 2016; Brent and Atkisson, 2011). Students may consider courses to be poorly designed if the assignments or topics covered are not engaging or relevant to the student's learning goals or because the courses are perceived as being too difficult or time consuming. In addition, online students may turn to academic dishonesty if they feel the instructor has provided insufficient feedback, guidance, or support and if they do not believe the instructor has implemented adequate safeguards against cheating (Owunwanne, Rustagi, and Dada, 2010; Beasley, 2014). In general, if students believe the online environment is to blame for the poorly designed course, this could be a 'special circumstance' that leads to academic dishonesty as predicted by neutralization theory.

Another factor that may contribute to dishonest behavior is the students' lack of knowledge or misunderstanding of their institutions academic integrity policy. Although this can be a problem for all types of dishonest behavior (in both the face-to-face and online environments), it is most often referenced regarding plagiarism (McMurtry, 2001). In particular, many authors have found that 'plagiarism is often misunderstood by students' (Brent and Atkisson, 2011, p.656.) In fact, some students do not know how to appropriately cite sources and therefore the act of plagiarism is inadvertent. In other instances, students develop an attitude of indifference towards plagiarism and therefore it becomes more of a deliberate act (Auer and Krupar, 2001; Stiles, Wai Wong, and LaBeff, 2018). More alarmingly, students may know that they cheated or plagiarized but falsely and intentionally claim they were not given enough information to fully understand what was expected of them (Brimble and Stevenson-Clarke, 2005; Ryan et al., 2009; Beasley, 2014).

When it comes to plagiarism in the online environment, a lack of knowledge or a misunderstanding of academic integrity policies can still be a contributing factor, however, anonymity can potentially lead to additional or enhanced concerns for this type of misconduct. More specifically, research has shown that the lack of a personal relationship between the teacher and student may lead to higher levels of plagiarism online (Ewing, Anast, and Roehling, 2016; Şendağ, Duran, and Fraser, 2012). For example, in a face-to-face course, students often meet with their instructors to discuss an assignment such as a research paper. During these meetings, instructors can ask questions and engage in a dialogue that would make it hard for students to misrepresent someone else's work as their own. When students submit a rough draft in the online environment, using detection software may help to curb plagiarism, however, without face-to-face contact, it becomes harder to establish whether students are submitting their own work or the work of a friend, or engaging in contract cheating. As deterrence theory predicts, the lack of direct contact may increase online cheating behaviors if students perceive an increased opportunity to engage in plagiarism with lower chances of being caught. In addition, although the punishments for plagiarism through contract cheating have been found to be quite severe including suspension and expulsion (see for example, Tennant and Duggan, 2008), students have been found to have a more relaxed attitude when it comes to contract cheating. For example, Newton (2015) found that students expressed the opinion that a more lenient penalty than expulsion is appropriate in cases of contract cheating. These relaxed student attitudes toward contract cheating and how they relate to the idea of academic entitlement in the online environment needs to be further explored in the literature.

Overall, anonymity can be a potential situational factor contributing to dishonest behavior in online learning. The lack of face-to-face contact between the teacher and student can enhance the perception of increased opportunities to cheat and the perceptions of high levels of peer cheating. Deterrence theory, neutralization and academic entitlement all provide explanations for the occurrence of academic dishonesty and all three are applicable in both the face-to-face and online learning environments.

5. How student and faculty perceptions of online cheating prevalence impact cheating behaviors

Ten articles were found that directly compare student perceptions of academic dishonesty in online versus face-to-face courses. Five of these articles concluded that students believe cheating is easier or more prevalent in online courses, three articles revealed mixed results, and two articles revealed evidence that students see no difference in the incidence of cheating between the two modes of delivery. Finally, one article was included in this section that looks at student perceptions of the proctored versus unproctored environment. The articles are discussed in more detail below and are grouped together based on the authors' conclusions.

5.1 Student Perceptions of Online Cheating Behaviors

In a widely cited paper, Kennedy et al. (2000) surveyed behaviors and perceptions of 172 online and face-to-face students at the undergraduate and graduate levels and revealed that 57 percent believe that cheating would be easier in online classes. However, the authors also mention that experience taking an online course reduces that perception. Similarly, King et al. (2009) reported that of the 121 undergraduate business students surveyed, 73.6 percent held the perception that it was easier to cheat online compared to a face-to-face classroom. In this sample, the authors did not find any statistically significant difference in the responses between students who had experience taking online courses and those who did not. Miller, Shoptaugh, and Parkerson (2012) surveyed 639 undergraduate and graduate students from two different universities with varying majors and showed that 57.2 percent agreed that cheating online was easier than cheating in a face-to-face setting.

Watson and Sottile (2010) surveyed 635 online and face-to-face undergraduate and graduate students. The responses indicated that the students believed their peers were five times more likely to cheat in an online class than in a face-to-face class and that they themselves are four times as likely to cheat in an online class. Stuber-McEwen, Wisely, and Hoggatt (2009) surveyed 225 online and face-to-face (upper and lower division) undergraduate students and members from both groups believed more cheating occurs in online courses.

The three articles that reveal mixed results are Charlesworth, Charlesworth, and Vician (2006), Harmon, Lambrinos, and Buffolino (2010) and Watters, Robertson, and Clark, (2011). Charlesworth, Charlesworth, and Vician (2006) surveyed a sample of 175 students in a web-enhanced first year chemistry course and found that although 40 percent of students think online assessments encourage more cheating, another 40 percent think there is no difference. Harmon, Lambrinos, and Buffolino (2010) used a sample of 100 students from both online

and face-to-face introductory economics courses and found that 59 percent of students perceive the frequency of overall cheating to be about the same in online and face-to-face formats. Watters, Robertson, and Clark (2011) used survey responses from 98 undergraduate accounting majors from two universities and reported that 45 percent believe cheating is more prevalent online, 21 percent believe it is not more prevalent, and 34 percent give a response of no opinion. The authors concluded that it is not clear whether most students perceive more cheating to be taking place in the online environment.

Hart and Morgan (2010) and Black, Greaser, and Dawson (2008) report findings that suggest students do not perceive a difference in the levels of cheating based on mode of delivery. Specifically, Hart and Morgan (2010) used survey responses from 44 students in an online cohort and 330 students from a traditional classroom in a registered nurse to baccalaureate in nursing (RN-BSN) program and reported very low levels of cheating from both formats. In addition, there was no significant difference found between the two groups regarding how frequently they think plagiarism on written assignments, inappropriately sharing work in group assignments, or cheating during tests or examinations occurs in their program. The authors also noted that overall, their respondents were mostly white, female, married and planned to continue their education in graduate school which likely influenced the results.

Black, Greaser, and Dawson (2008) surveyed 1,068 undergraduate students primarily aged 18-22 taking an online psychology course. The authors reported that 81 percent of the students believe that cheating is no more prevalent in their online courses than their traditional courses. Although the authors did not provide information specific to the sample, they note that 'reviews of enrollment data have shown that students in these online courses are generally in later academic years and have higher GPA's,' Black, Greaser, and Dawson (2008, p.24).

Finally, Spaulding (2009) looks at the student perception of cheating from the perspective of the proctored versus unproctored environment. Here, the author surveyed a sample of 103 undergraduate students (85 percent of which were female) from two sections of a technology integration course in a teacher education program. The courses only differed by how assignments and tests were delivered. In one section, all assignments and tests were completed in the classroom with a proctor while in the other section all assignments and tests were completed outside of the classroom and without a proctor. The sample contains 76 students from the proctored testing and assignment format and 27 students from the unproctored format. The author observed no significant difference in students' perception of the academic integrity of their own behavior or other students' behavior based on how the assessments were delivered.

5.2 Faculty Perceptions of Online Cheating Behaviors

There are four articles found to analyze faculty perceptions of online versus traditional student cheating behaviors. The earliest article by Kennedy et al. (2000) reported that 64 percent of the 69 faculty members surveyed believe cheating is easier online. However, they also observed that experience teaching an online course reduced that percentage. This is consistent with Yates and Beaudrie (2009) who conducted faculty interviews and reported that faculty members who do not teach online believe academic dishonesty is more likely to occur in an online course. In contrast, they found that faculty who have taught fully online courses perceived there to be no significant differences in test scores between the two environments. Using 76 survey responses of faculty teaching online and in-class courses, McNabb and Olmstead (2009) concluded that those faculty who teach online did not see a discernable difference between instances of cheating in online versus the in-class format. Kelley and Bonner (2005) used a sample of 296 faculty and 131 administrators in their survey of academic dishonesty perceptions. Of their respondents, 52.2 percent either used the web in their courses or had taught online. Of this population, 65.6 percent claimed 'they did not perceive an increase in the amount of academic dishonesty in their courses,' Kelley and Bonner (2005, p.48).

In summary, student and faculty perceptions play an important role in understanding cheating behaviors. Social norms theory says overestimations of problem behaviors in our peers will cause us to increase our own problem behaviors. Hard, Conway, and Moran (2006) found that students overestimate the amount of cheating that occurs in traditional classrooms and five of the ten articles analyzed here showed that students either perceive cheating to be easier or more prevalent online. However, half of the articles revealed mixed results or concluded that student's see no difference in the prevalence of cheating in the two environments. Given the conflicting results from these studies, additional research is needed for generalizability. In addition, although there is only a small sample of articles that focus on faculty perceptions of online versus face-to-face cheating behaviors, the

consensus from these articles revealed that faculty perceptions vary depending on their online teaching experience. More specifically, faculty with online teaching experience in these studies do not believe cheating is more prevalent in the online environment.

6. The prevalence of cheating online compared to traditional cheating in the classroom

There are eight articles reviewed in this paper that employed self-reported survey methods to directly compare the cheating behaviors of students in the online and face-to-face environments. Two of these articles revealed that online cheating is more prevalent, two found that there is no difference, and four concluded that cheating is less prevalent online. The articles are discussed in more detail below.

Lanier (2006) examined survey responses from 1,234 undergraduate and graduate students and observed that students are more likely to cheat online. Specifically, 41.1 percent of students admitted to cheating online while only 4.4 percent reported cheating in a face-to-face course. As mentioned previously, Miller, Shoptaugh, and Parkerson (2012) found that of the 639 students (531 undergraduates and 109 graduates) surveyed, 53.7 percent believed it is easier to cheat online. To test the accuracy of their results, they looked at within-subject comparisons of those students who had experience with both online and face-to-face courses, and between-subject comparisons of those students who had experience with only one mode of delivery. The within subject comparison revealed that more students admitted to cheating in online classes. The between subject comparisons revealed a smaller rate of cheating for students who only took online courses. However, when the authors controlled for age, the difference between the two groups became insignificant.

The two articles that revealed no differences between self-reported cheating behaviors between face-to-face courses and online courses are Grijalva et al. (2006) and Watson and Sottile (2010). Grijalva et al. (2006) used a randomized response method to gather data from 796 undergraduate students who took an online course and estimated a three percent rate of cheating. The authors concluded that this rate of cheating is consistent with the level of cheating in a face-to-face classroom from a single class (Kerkvliet and Sigmund, 1999; Karlins, Michaels, and Podlogar, 1988). Watson and Sottile (2010, p.5) examined self-reported cheating behavior of undergraduate and graduate students and the results of their student survey revealed that '32.1 percent admitted to having cheated in a live class and 32.7 percent admitted to cheating in an on-line class at some point in their higher education coursework.' Thus, the response rates do not reveal a discernable difference in cheating behaviors between the two modes of delivery.

Kidwell and Kent (2008, p.S9) used 248 survey responses from online students and 210 from face-to-face students to compare cheating behaviors of the two groups. Of the face-to-face students, 78 percent admitted to cheating at least once whereas only 35 percent of the online students reported that they ever cheated. The authors noted however, that the average age of the online students was 35.8 compared to 22.4 for face-to-face students. In addition, 78.2 percent of the online students were female compared to 68.4 percent female in the face-to-face group. Because of these differences, the authors controlled for age and gender in their analysis and concluded that 'study mode itself explains differential rates of cheating beyond the influence of age or gender.'

Stuber-McEwen, Wisely, and Hoggatt (2009, p.2) surveyed 225 undergraduate students (87 online and 138 offline) and found that 'students in this sample were more likely to cheat in traditional classroom settings and less likely to cheat in online courses.' The authors also noted that age could be a confounding factor since most of the online classes surveyed are offered through their school's adult program whose participants are on average older.

As mentioned previously, Hart and Morgan (2010) used survey responses from 44 students in a registered nurse to baccalaureate in nursing (RN-BSN) program and 330 students in the same RN-BSN program that was conducted fully online to compare academic dishonesty in the two formats. The results showed the traditional classroom RN-BSN students reporting higher levels of cheating compared with the online students. However, the authors note that the higher levels of reported cheating in the traditional format dealt mostly with collaborative cheating behaviors. Since online students do not interact with each other as much as face-to-face students do, this may explain why they reported less of these types of cheating behaviors.

Peled et al. (2019) used survey responses from 841 U.S. students and 1,634 Israli students in both online and face-to-face courses to assess their personality and willingness to engage in academic misconduct. The findings

indicated that in both countries, dishonest behaviors are greater in face-to-face courses than in online courses. The authors suggested that their results are consistent with the notion that students in online courses may have higher levels of intrinsic motivation to learn or are able to learn independently which reduces their desire to cheat (Zhang, 1998).

7. How cheating behaviors differ within proctored and unproctored environments

There are 15 studies that used an experimental (randomized or observational) design to compare cheating behaviors in an unproctored versus proctored environment. It should be noted that at the time of this study, proctoring software was still in its infancy and many online instructors were still conducting unproctored assessments. As proctoring software becomes more readily available and affordable, future research should focus on how proctoring software impacts student and faculty perceptions of academic dishonesty in the online environment.

The articles are discussed below and grouped first by the type of experimental design and then within each design by the authors' results.

7.1 Randomized experimental designs

There are three articles that employed a randomized experimental design to compare online cheating behaviors in proctored and unproctored testing environments and one study that used a randomized experimental design to compare cheating behaviors in a proctored in-class testing site to an online unproctored testing site.

Hollister and Berenson (2009) examined 217 students enrolled in one of two sections of an introductory computer literacy course. The only difference between the two sections was how the exams were administered. Both sections took their exams online, however, in one randomly assigned section, the exam was given in a classroom with a proctor and in the other section it was taken offsite without a proctor. The results showed that although the unproctored environment had 'significantly more variation in their performance results,' there was no evidence of cheating behaviors in this setting (Hollister and Berenson, 2009, p.290).

Fask, Englander, and Wang (2014) improved upon Hollister and Berenson (2009) by accounting for the confounding effects of taking an online exam. More specifically Fask, Englander, and Wang (2014) used an experimental design and controlled for the increased opportunities to cheat in the online environment as well as the physical and psychological differences between proctored in-class testing and unproctored online testing. The results of their study using 44 students from two sections of an introductory statistics course indicated that students taking the online exam have a greater propensity to exhibit cheating behaviors.It is important to note that the author's approach was not technically a randomized design, but they believed the assignment of students to each type of testing was effectively random.

A related study by Alessio et al. (2018) used a randomized design in six sections of an online medical terminology course to examine students' quiz scores and the time taken to complete them. To investigate the impact of proctoring software on student performance, students were assigned a sequence of four proctored and unproctored online quizzes. For example, one sequence could be proctored, proctored, unproctored, unproctored, while another sequence could be unproctored, unproctored, proctored, proctored. The study controlled for exam difficulty, course design, instructor effects, and student majors. The results indicated that students who were tested without proctoring software took more time to complete the quizzes and scored better on average (7-9 points on a 100 point quiz). The authors concluded that the unproctored students were likely using the extra time to look up answers using prohibited resources.

Hylton (2016) randomly assigned 270 undergraduate students enrolled in the same course at a private university to either a treatment or control group. All students took their exams online from the same pool of questions. The treatment group was monitored via webcam by a Web-based proctor, while the control group was unmonitored. The results showed no statistically significant difference between the two sets of test scores although those students who took the unproctored exam had slightly higher scores. In addition, the unproctored students took significantly longer to complete the exam. The author concluded that one explanation for this result could be that the unmonitored students perceived a greater opportunity to engage in dishonest behavior than those who were monitored.

Overall, when confounding factors are controlled for, the results of the randomized experimental studies point to higher levels of cheating that may be correlated with the unproctored environment.

7.2 Observational Designs

Although there are many observational studies in the literature that reveal higher exam scores of students in unproctored versus proctored environments, not all of these studies attribute their findings to cheating behaviors (Prince et al. (2009); Carstairs and Myors, (2009). In contrast, the 11 studies reviewed in this paper all reference cheating as part of the analysis.

Yates and Beaudrie (2009) studied 850 grades from a variety of distance education mathematics courses and compared 406 students who were evaluated in a proctored testing environment with 444 students who were evaluated fully online with unproctored testing and found no significant difference in grades between the two groups. However, this paper was later critiqued by Englander, Fask, and Wang (2011) for not including a uniform set of techniques to suppress cheating, for not accounting for selection bias and changes in online resources over time, for using an inappropriate outcome measure, and for overstating their conclusions.

Beck (2014) employed a statistical model to predict academic dishonesty using student scores (80 proctored and 19 unproctored) on mid-term and final exams from three sections of an introductory course with the same instructor in the same semester. The model controls for student ability, academic ranking, major, and age. The author concluded that students in online courses with unproctored testing are no more likely to cheat on an examination than proctored students in a hybrid or face-to face-course. In addition, the author also noted that there is no evidence that students with lower GPA's are more likely to enroll in online courses which was suggested by Englander, Fask, and Wang (2011).

Ladyshewsky (2015) used a sample of 250 post-graduate students enrolled in a management and leadership course and observed no increase in the mean test scores overtime for those students who took an unsupervised online multiple-choice test compared to those students who took the multiple-choice test in a supervised classroom. The author concluded that concerns about increased cheating in the online format are not supported. Similarly, Peng (2007) analyzed the multiple-choice test scores of 65 undergraduate students in a corporate finance course and 69 undergraduate students from an investments course. In this study, five quizzes were administered online and a sixth was administered in a proctored classroom. The author found no statistically significant differences in multiple-choice test scores between the in-class and online testing formats and concludes that the online format of quizzes did not make it easier to cheat.

Metz (2008) analyzed quiz performance from two large undergraduate biology courses. Although the courses in this study were taught in a traditional face-to-face lecture format, some quizzes were conducted online. Specifically, 90 students took online quizzes and 98 students took in-class quizzes. The authors looked for evidence of 'information leaks' but show that students who waited until later to take the quizzes scored 10-15 percent lower than those who took the quizzes earlier. The authors also compared the online quiz scores to a previous year's in-class quiz scores and found no significant difference between the average scores in the two formats. The author concluded that as long as preventative measures are taken to discourage cheating, online assessment scores will not be influenced by acts of academic dishonesty.

Harmon and Lambrinos (2008) compared the incidence of cheating between proctored and unproctored exams in an online class using a sample of 60 students in paired sections of a principles of economics course. The only significant difference between the two sections is that in one section the 30 question (multiple choice) final exam was proctored and in the other section it was not. Students did not know prior to enrolling in the course whether their final would be proctored or unproctored. To detect cheating, the authors controlled for the student's cumulative GPA at the beginning of the semester, age, academic major, and college grade level and compared the R-squared statistic for each exam. The authors concluded that cheating is evident because the control variables 'did not explain nearly as much of the variation in test scores in the unproctored format as they did in the proctored format,' Harmon and Lambrinos (2008, p.123).

To improve upon the model used by Harmon and Lambrinos (2008), Fask, Englander, and Wang (2015) employed a latent variable model to analyze the cheating patterns of 52 undergraduate students taking an introductory statistics course. The authors observed that GPA (as mentioned previously) and attendance (mastery variables) are related to cheating. This implies that class attendance and GPA 'become less important predictors of grades

when students can more easily cheat on an online exam than they are when students' cheating opportunities are limited by a proctored exam' (Fask, Englander, and Wang, 2015, p.8). The authors concluded that although 'cheating is the most reasonable interpretation of the latent variable,' (Fask, Englander, and Wang, 2015, p.9) the testing environment itself may also explain a higher level of performance in an unproctored setting.

Arnold (2016) also attempted to improve upon the Harmon and Lambrinos (2008) model by employing an algorithm developed by Jacob and Levitt (2003) to detect 'unexpected fluctuations in test results' Arnold (2016, p.101) using data from 461 students who took proctored exams in mathematics and unproctored online exams in microeconomics, statistics, and accounting. The author revealed that the 'ability of human capital variables to explain the variation in unproctored test grades is slightly lower than their ability to explain proctored test grades' Arnold (2016, p.105). In addition, they also found that cheating is more likely to occur in the unproctored setting than the proctored setting.

Daffin and Jones (2018) analyzed data from 1,694 undergraduate students taking online psychology classes ranging in difficulty level. The authors noted that the typical online student in their study is a working adult in their 30s or 40s with a family coming back to study after being out of school for a period of time. The authors revealed that 'the mean percentage earned on proctored exams was significantly lower than the percentage earned on non-proctored exams' Daffin and Jones (2018, p.138). They also found that students took almost twice as long on unproctored exams as they did on proctored exams. The authors concluded that cheating is one possible explanation for such findings but also suggested the findings could be related to general test anxiety.

Richardson and North (2013) analyzed exam scores from three undergraduate courses and one graduate course. Specifically, they compared 11 proctored exams against 22 identical unproctored exams and found that the class average on the unproctored exam was higher for 19 out of 22 cases. In addition, the difference was statistically significant in 15 of those cases. The authors concluded that this finding is 'a strong indicator of significant cheating' Richardson and North (2013, p.270).

Alessio et al. (2017) used a natural design study of 147 students enrolled in nine sections of the same undergraduate online course to test whether online quiz results were lower when proctored than when unproctored. In the study, instructors from four sections of the course used either a proctoring software called Software Secure or one called Respondus Monitor. The results indicated that students took significantly more time to complete their online quizzes and quiz scores were on average 17 points higher when students were not proctored using video monitoring. The authors concluded that this difference is large enough to suggest that students may resort to academic dishonesty when not being proctored during online assessments.

It should be noted that since observational studies can only establish that associations exist between higher test scores and cheating but cannot establish a cause-and-effect relationship, the results of the observational studies reviewed above should be viewed with caution. In addition, since about half of the studies did not find a significant relationship between test scores and cheating and the other half of the studies did, the ability to generalize the results is limited.

8. Discussion

The strand of literature that considers academic dishonesty from on online perspective is currently in its infancy, especially when you think of it relative to the literature on academic dishonesty in general. There are several papers reviewed here that have made significant contributions and have provided meaningful results. However, there are still many topics and issues that need further investigation. By going back to the four major themes covered in this review, the gaps in the literature can be better defined.

The first major category reviewed was the factors that contribute to cheating behaviors. These factors were broken down into two categories: individual factors and situational factors. Papers that considered individual factors from the face-to-face perspective were examined briefly for comparison purposes. In both the face-to-face and online environments, younger students are found to engage in cheating behaviors more often while those students with higher GPA's are found to cheat less. It should be noted however, that because of the small number of papers that examine individual factors for online students, and given the overall mixed results,

generalizations should be considered with caution. In addition, since only one study focused exclusively on students in online courses, additional research in this area is warranted.

For the situational factors, many issues from the face-to-face environment have been examined such as student culture, time constraints, risk and punishment, as well as academic entitlement. Unfortunately, the literature pertaining to situational factors for online cheating is scarce and limited in scope. For example, there are three papers, Costley (2017), Arnold (2016) and Brent and Atkisson (2011) that suggest student dissatisfaction as a result of poor course design influences online cheating behaviors. However, Arnold (2016) did not test this result directly but instead offered student dissatisfaction as an explanation for poor performance, Costley (2017) only looks at one specific cheating behavior, and Brent and Atkisson (2011) only sampled a single class. In addition, although Bretag et al. (2018) do consider mode of study as a contributing factor to cheating, as the authors point out, the percentage of online students are under-represented in their sample and therefore results should be interpreted with caution. Given the relevance of situational factors for explaining cheating behaviors in the face-to-face classroom, this topic needs to become a priority in the online literature as well. In particular, researchers should consider how situational factors in the online environment can be explained using deterrence theory, neutralization theory, and academic entitlement. By focusing on and exploring these relationships, online instructors could gain insights for improving course design.

The second theme covered in this review are the student and faculty perceptions of online cheating behaviors. Given the mixed results and small number of papers available on these topics, additional research that considers specific cohorts of students and faculty in this area would be beneficial. For example, do student perceptions differ based on age, gender, field of study, college level, experience with online courses, and do faculty perceptions differ based on field of study, years of online teaching experience, types of assignments and assessments used (course design), and so on. Finally, given that many students perceive there to be increased opportunities to cheat in the online environment, it is important that future research focus on how technology can continue to improve student-teacher relationships in this setting to help circumvent these issues.

The third theme reviewed in this paper considered the prevalence of cheating online compared to traditional cheating in the classroom. The results of the self-reported surveys did not provide a definitive conclusion when comparing cheating behaviors in the two environments. However, the studies did reveal that confounding factors such as age, gender and experience taking online courses can influence the results. It should also be noted that various concerns have been raised about the validity of self-reported surveys of student cheating (Baumeister, Vohs, and Funder, (2007); Porter, (2011). For example, social desirability bias predicts that respondents deny socially undesirable behaviors but admit to socially desirable behaviors (Randall and Fernandes, (1991) leading to underreported levels of academic misconduct as suggested by Miller, Shoptaugh, Parkerson (2008). However, given the nature of the topic, self-reported surveys are still an important tool for analyzing cheating behaviors. Once again, additional research on a larger scale comparing online and traditional cheating in the classroom would be beneficial for online instructors.

The last theme discussed in this paper deals with cheating behaviors in proctored versus unproctored environments. This is an especially important topic as proctoring software is becoming more readily available. There are four papers that use a randomized design to examine cheating behaviors. Three out of the four papers find that unproctored students are more likely to engage in dishonest behavior. However, Fask, Englander, and Wang (2014) used a small sample of 44 students and although the results of the paper revealed that "online testing does facilitate student cheating," the authors cautioned that the methodology they used needs to be tested in a large class situation to determine if the results can be replicated. Additional research employing experimental designs will be extremely useful in determining the need and future demand for proctoring software in online courses.

In addition to the experimental designs, there were also 11 papers reviewed that studied the proctored and unproctored environments using observational studies. The results of these studies are also mixed, however, many of these studies should be interpreted with caution as many of them had small sample sizes. More specifically, seven out of 11 had samples of less than 100. Of the remaining four that had larger sample sizes, three of those papers concluded that cheating is more likely in the unproctored setting. When conducting future research using observational designs, studies using larger sample sizes that control for confounding factors will add more depth to the online academic dishonesty literature.

9. Conclusion

Academic dishonesty in higher education has been a topic of concern for many decades. The research analyzing this topic is abundant, covering many aspects of cheating behaviors in the face-to-face classroom. In addition, many researchers claim that online learning provides a new set of opportunities for students to engage in dishonest behavior and therefore creates a new set of challenges for teachers as they design their online courses. Given the growth of online learning in higher education, it is important to understand how cheating behaviors have changed and adapted to this new environment. The goal of this paper was to examine how cheating in the online environment has thus far been addressed in the literature and to make suggestions for future research where gaps in the research are found to exist.

The paper is organized into four major themes. The first theme reviews the individual and situational factors that have been found to contribute to cheating in the online learning environment. The papers that analyzed the relationship between individual factors and academic dishonesty in the online environment revealed mixed results with only age and GPA being mentioned as contributing factors in more than one study. This is in contrast to the face-to-face studies that found age, gender and intellectual ability to affect cheating behaviors more consistently. It was suggested that additional research is needed in this area to better understand the individual factors related to online cheating behaviors.

When considering the situational factors related to academic dishonesty in the online environment, anonymity and student perceptions are found to be important factors influencing dishonest behavior both directly and indirectly. Anonymity can be both a challenge for teachers and an opportunity for students because online learning can prevent a personal connection from forming between the students and teachers. This can lead to feelings of isolation, dissatisfaction with course design, and an increased perception of cheating opportunities. It was suggested that future research on situational factors in the online environment be examined more formally on a larger scale using already accepted theories from the traditional learning environment.

The next section of the paper focuses on the second theme: student and faculty perceptions of online cheating behaviors. The papers reviewed on this topic also revealed mixed results. About half the papers claimed that students believe cheating is more prevalent or easier online. The other papers are either inconclusive or found the opposite to be true. Future research that considers how these perceptions are formed and what factors contribute to these perceptions was suggested. In addition, although the papers looking at faculty perceptions were also inconclusive, they did reveal that experience teaching online courses has an impact on beliefs. Specifically, faculty with experience teaching online observed cheating to be no more pervasive in this environment compared to the face-to-face setting. It is also interesting to note that Hard, Conway, and Moran (2006) argued that the efforts taken to prevent student cheating are related to faculty perceptions about academic misconduct. Specifically, they believe that faculty are more likely to take measures to prevent cheating when they perceive cheating to be more frequent and will be more likely to confront students about the suspected misconduct. Since in general, the faculty who have experience teaching online do not see a significant difference between the levels of cheating in a face-to-face environment versus online, future research should focus on how faculty perceptions of online cheating are related to the various cheating deterrence mechanisms implemented in this environment. Some examples of deterrence mechanisms include: proctoring software, biometrics, honor codes, high penalties for cheating, time limits on assessments, and randomizing examination questions.

The third section of this paper reviews the literature comparing the prevalence of cheating online to cheating in the classroom using eight self-reported surveys. Overall, two articles found that cheating is more prevalent online, two found no difference, and four reported cheating to be less prevalent online. Although self-reported surveys are an important tool for analyzing sensitive subjects such as cheating, they must be evaluated carefully due to an inherent bias that causes students to underreport bad behavior.

The fourth and final section of this paper considers 15 articles that used experimental designs to compare cheating behaviors in proctored versus unproctored environments. Four of these papers used a randomized experimental design and when confounding effects are accounted for, the results revealed that unproctored assessments can lead to higher levels of suspected cheating. The remaining 11 papers are observational studies. The results of the observational studies are mixed but those with larger sample sizes seemed to suggest that cheating is more prevalent in the unproctored environment. Given this result, additional research that studies

online proctoring tools and services would be valuable to instructors specifically, and to colleges and universities in general.

Overall this paper provides a review of the literature that relates the extensively studied topic of academic dishonesty in the classroom to the relatively new issue of online learning in higher education. Although many of the factors that influence student cheating behaviors in the face-to-face environment are also relevant in the online environment, the ways in which these factors are perceived and addressed are often different. In addition, due to the mixed results found in both the perceptions of cheating as well as the actual cheating studies, further empirical research is especially important to better understand cheating in the online environment. In particular, more studies employing randomized experimental designs are needed to gauge the levels of online cheating and to help teachers better understand how they can address academic misconduct in their courses.

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Leveraging Moya^{MA}, WhatsApp and Online Discussion Forum to Support Students at an Open and Distance e-Learning University

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Abstract: This paper reports on a study that integrated two instant messaging applications (Moya Messenger App and WhatsApp) and a myUnisa's online discussion forum (ODF), and utilised them as tools to support student learning at an open and distance e-learning university in South Africa. The participants in this study were 41 undergraduate education students enrolled for an undergraduate English Studies module. Employing a case study research design, the study utilised voluntary sampling to select its participants, and set out to answer three research questions. Data were collected through the three afore-mentioned tools. To this effect, the study made the following observations. First, both the instructor and students were able to engage in asynchronous and synchronous scaffolding using Moya Messenger App. This included engaging in features of scaffolding such as orientation, coaching, conceptual scaffolding and meta-cognitive scaffolding, largely by the instructor. Second, the instructor used Moya Messener App to engage in presence teaching, while students utilised it to engage in presence learning. Third, students utilised WhatsApp to produce short synchronous formal essays based on a compare and contrast essay writing activity. Fourth and last, students used myUnisa's ODF to produce meta-content reflective writing about the module.

Keywords: ODeL, online learning tools, mobile learning tools, Moya Messenger App WhatsApp, myUnisa's ODF

1. Introduction

The use of online and mobile learning tools to support students in an open and distance learning (ODL) context is one of the most vexed issues with which this sector of higher education (HE) continually has to grapple (Barnatt, 2001; Tait, 2014). This is even more so for an open and distance e-learning (ODeL) institution such as the University of South Africa (UNISA) (Baloyi, 2014; Chaka and Nkhobo, 2019a, 2021; Minnaar, 2011). Utilising online learning tools, or using mobile learning tools to support students in a face-to-face HE context is one thing, while employing either type of learning tools for the same purpose in an ODeL context is quite another.. But, what is indisputable across higher education institutions (HEIs) is that the usage of learning tools (online or mobile) is not an exclusive preserve of ODeL institutions alone, notwithstanding the fact that such tools should serve as the bedrock for deploying student support at these institutions (Ferreira and Venter, 2011; Tait, 2014).

Therefore, within the ecosystem of learning tools, integrating online and mobile learning tools for student support purposes in the ODeL arena is not only essential but also indispensable (Tait, 2014; Chaka and Nkhobo, 2021). Doing so is especially relevant in the era in which there is a plethora of learning tools or applications (apps) (Chaka and Nkhobo, 2021). To this effect, the idea of integrating online and mobile learning tools for the purpose of supporting students becomes even more crucial for an ODeL institution such as the University of South Africa (UNISA), which is a mega ODeL institution (Liebenberg, Chetty and Prinsloo, 2012) boasting students with diverse demographics drawn from various geographies. The manner in which these two sets of student support tools can be integrated at an ODeL level varies. Each set with its related tools can be used on its own, or tools from each set can be blended into either set. In addition, most online learning tools are often deployed on walled platforms such as learning management systems (Maboe, 2017; Ng'ambi et al., 2016), while most mobile learning tools are normally delivered from mobile devices as part of a bring your own device (BYOD) approach (Chaka, 2012; 2015a; 2015b; Farley, et al., 2015; Ng'ambi et al., 2016; Lillejord et al., 2018; Mathew and Ebelelloanya, 2016; Sung, Chang and Liu, 2016; Wang, Chen and Khan, 2014).

Which of the two deployment approaches serves ODeL student support better is a moot point, as each of them has its merits and demerits. For example, online student learning support tools offered within an LMS environment or within a virtual learning environment (VLE) are convenient since they are often provided as a fit-for-purpose suite of tools. However, more often than not, they are enclosed in university firewalls. Additionally, they may not be easily accessed from some of the mobile devices owned by students. Most

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crucially, some of the tools proffered in a suite format may not necessarily be the ones preferred by students (Chaka, 2019b; Lillejord et al., 2018; Sung, Chang and Liu, 2016; Tait, 2014). This is likely to lead to low uptake, or to their being under-used by students (Maboe, 2017). Similarly, mobile student learning support tools are convenient for students to use as they are generic and mostly purpose-built for mobile devices. Nonetheless, they are often offered as silos in the form of freemiums, premiums, or few-day trial versions (Ahalt and Fecho, 2015; TeachThought Staff, 2018). Those offered as freemium or trial versions tend not to have all the requisite features and functionalities common in premium versions. By contrast, those available as premium versions tend to be paid for and, thus, are unaffordable to some students. In fact, in a world in which social media technologies together with attendant over-the-top technologies (OTTs) seem to be incrementally colonising students' lifestyles, ODeL institutions will find it difficult to convince their younger students to continue using LMS-driven learning tools. This is particularly so since, as argued by Luskin (2016), OTTs, powered by social media, facilitate online, distance and blended learning a lot more easily and much more seamlessly and conveniently. So, the current study contends that OTTs are better than traditional IT-backed learning tools powered by LMS. Three cases in point are WhatsApp, Twitter and Moya Messenger App (henceforth Moya) which are OTTs with a multi-purpose teaching and learning potential.

Given that no deployment approach to offering student learning support tools is devoid of shortcomings, the current study employs a hybrid approach to student support. This approach integrates two mobile learning tools with an online learning tool deployed on and embedded in UNISA's LMS, myUnisa. The latter is part of UNISA's overall ODeL offerings. The two mobile learning tools are Moya and WhatsApp (see Figure 1), while the online tool in question is a myUnisa's online discussion forum (hereafter myUnisa's ODF)..

2. Statement of the problem

The Department of English Studies at UNISA is housed in the School of Arts and falls under the College of Human Sciences. It is part of UNISA's open and distance e-learning (ODeL) framework. In terms of registered undergraduate student enrolment figures, it is the largest department in this college (faculty). Most of the undergraduate students enrolled in this department are education students registered in an academic programme such as a Bachelor of Education (B. Ed) programme, which is offered by the College of Education. To this effect, the department offers a number of undergraduate modules to these students (Chaka and Nkhobo, 2019a). Over the last three years, the department has been providing face-to-face student support classes to students enrolled in some of their undergraduate modules. Owing to time constraints, the face-to-face student support classes offered to these students is restricted to certain designated days such as Saturdays or particular week days during school holidays. These designated student support classes fall under a special project (the Mathew Goniwe Project) housed in the College of Education (Chaka and Nkhobo, 2021). Outside these designated face-to-face student support days, students can be offered support via myUnisa, which is UNISA's legacy LMS. myUnisa, like many other LMSs (Ahalt and Fecho, 2015; Chaka, 2020; Chaka and Nkhobo, 2021; Mayanja, Tibaingana and Birevu, 2019), has an online discussion forum (ODF) tool embedded in it as part of its online suite of tools. This ODF, like most that are embedded in LMSs, has its own vital affordance that can be tapped into such as asynchronous interaction and responses. These asynchronous interaction and responses play a pivotal role in respect of support offered to students.

In 2018, one of the authors of the current paper offered, as an instructor, face-to-face student support classes to a group of undergraduate education students enrolled in one of the second-level modules. The classes took place on certain designated Saturdays and involved six intensive hours of teaching. Outside the designated Saturdays, students were provided additional support pertaining to some aspects of the module content on the myUnisa-powered ODF. This entailed asynchronous interact and responses on the part of students, and asynchronous scaffolding and feedback on the part of the instructor. Nevertheless, it soon became clear that the asynchonicity of responses, scaffolding and feedback that characterised this ODF, had some drawbacks. Some of these drawbacks were: delayed responses and lack of spontaneous online presence on the part of students; delayed scaffolding and feedback, and lack of spontaneous online presence on the part of the instructor; and the inconvenience associated with accessing myUnisa's ODF on the small screens of students' mobile phones. In order to compensate for these shortcomings, both Moya and WhatsApp were utilised. One the one hand, this was done with a view to enhancing student online response, online interaction and online presence. On the other hand, this was done to enrich instructor online scaffolding, online feedback and online presence. That is, the cardinal aim was to bring an element of spontaneity and near-synchronicity to the student support ecosystem which is often missing on myUnisa's ODF.

3. Theoretical framing

This study situates its debate within an integrated theoretical framework. This framework comprises mobility from the acronym M-COPE (mobile, conditions, outcomes, pedagogy and ethics) (Dennen and Hao, 2014; Lillejord et al., 2018); presence teaching and presence learning (Chaka, 2015a); and connectivism (del Valle García Carreño, 2014; Downes, 2010; Kop and Hill, 2008; Siemens, 2005; Thomas and Gelan, 2018). In brief, as used in this study, this framework refers to learning mediated through mobility, presence teaching, presence learning, and connectivism. This is the learning in which students and lecturers leverage mobile devices and mobile applications (mobility). As pointed out above, the study borrows the concept of mobility from mobile as encapsulated in Dennen and Hao's (2014) acronym, M-COPE. Dennen and Hao (2014) distinguish between learning activities that are mobile by design and necessity, and those that are mobile by circumstance. The former occur on mobile devices, but may as well occur in any other technology; the latter exploit the distinctive qualities and tools related to mobility, location (especially geo-location), and the functionality offered by mobile devices. The main differentiator in all this is the value (affordance) that a mobile device brings to a learning context. Examples of this learning value can be the fact that a given mobile device serves as a cognitive tool or offers new forms of interactions. In this case, some learning activities are mobile-dependent, whereas others are mobile-supported or mobile-enhanced (Dennen and Hao (2014). For the current study, mobility is employed in the sense of facilitating mobile-dependent and mobile-enhancing learning activities. This sense eschews the mobile-dependence and mobile-enhancement binarism.

The framework also uses mobility in the sense espoused by Chaka (2012). This sense of mobility encompasses qualities such as ubiquity, pervasiveness, portability, connectivity and flexibility (Sung, Chang and Liu, 2016) within a consumerisation of information technology (IT) environment. The latter refers to a situation in which personal consumer-grade mobile devices (e.g., mobile phones and tablets) are adopted and used by students for educational purposes to complement the existing educational IT tools such as an LMS. This is also analogous to employees would their adopting and using their own mobile devices for workplace purposes to supplement enterprise IT tools. This approach to using personal mobile devices is also known as bring your own device (BYOD) (Chaka, 2012). In the present study, students' use of their own mobile phones and applications like Moya and WhatsApp as part of learning support represents tapping into mobility within an IT consumerisation environment for educational purposes.

Furthermore, the types of teaching and learning envisaged in this framework are presence teaching and presence learning as theorised by Chaka (2014, 2015a, 2015b). Briefly stated, presence teaching is teaching that enables an instructor's digital presence in a digital tool or application used for teaching purposes. In the same vein, presence learning is learning that allows for a student's digital presence in a digital tool or application used for learning purposes. Three types of online presence are relevant here: social presence, co-presence and tele-presence. The first type of presence is about a symmetrically mutual relationship between participants that requires their co-location (Chaka, 2015a; Oh, Bailenson and Welch, 2018). Roy, 2007). The second type of presence has to do with the mutual awareness participants have of each other online (Chaka, 2015a; Oh, Bailenson and Welch., 2018; Resta and Laferrière, 2007), while tele-presence refers to the degree to which a student feels present in a digitally mediated environment (Chaka, 2015a; Oh, Bailenson and Welch, 2018). In the case of this study, tools that can be used to mediate online presence are Moya and WhatsApp as powered by mobile phones.

The last aspect of this integrated framework is connectivism. Connectivism refers to a digital environment in which virtually dispersed and distributed parts such as machines, mobile devices (e.g., mobile phones), mobile applications (e.g., instant mobile messengers), and people are remotely and seamlessly connected digitally for a given purpose (e.g., communicating, social networking, learning, teaching, etc.) (del Valle García Carreño, 2014; Downes, 2010; Kop and Hill, 2008; Siemens, 2005; Thomas and Gelan, 2018). In the main, it assumes learning is distributed between three pillars: the instructor, the learner, and the network (Crosslin, 2016; Kop and Hill, 2008; Tait, 2014). With regard to this study, the instructor, students, mobile phones, Moya and WhatsApp serve as instances of connectivism.

Given that no deployment approach to offering student learning support tools is devoid of shortcomings, the current study employs a hybrid approach to student support. This approach integrates two mobile learning tools with an online learning tool deployed on and embedded in UNISA's LMS, myUnisa. The latter is part of UNISA's overall ODeL offerings. The two mobile learning tools are Moya and WhatsApp (see Figure 1), while the online

tool in question is a myUnisa's ODF (see Figure 1). The two mobile tools, which are privately owned consumer applications freely available to users.

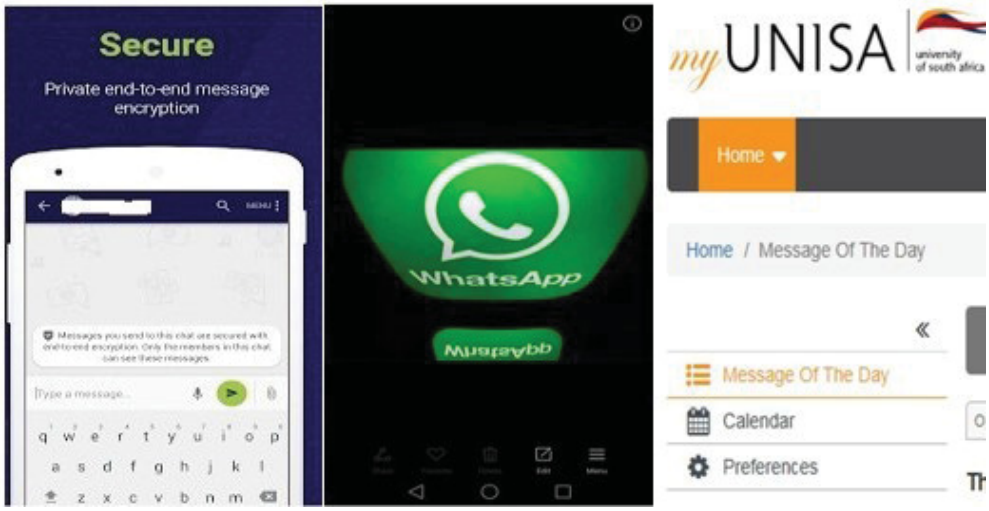

Figure 1: A screenshot of Moya Messenger App, WhatsApp and *my*Unisa.

4. Related literature

This section, which is not a traditional literature review, provides fit-for-purpose aspects of literature that are related to and relevant for the paper. It is structured into two sub-sections: digital shift; and student learning support and scaffolding in an open and distance e-learning context.

4.1 Digital shift

The phrase, digital shift, is used here in its generic sense to refer to use of digital and emerging technologies for student support in open and distance learning (ODL). In this sense, it embodies, especially within the ODL context, a shift from the use of traditional technologies such as telephone and radio which characterised the old form of ODL, to the use and adoption of digital and emerging technologies in the ODL arena. This usage does not foreground the different digital revolutions and historical trajectories often associated with the digital age as such aspects are not the focus of this study (Barnatt, 2001; Chaka, 2019a, 2019b; Tait, 2014). Tait (2014) cites print, text, electricity, transport and radio as examples of technologies that dominated the old form of ODL, which was correspondence or first generation ODL. In its older form, ODL had student support offered by, mediated through and confined to some of these technologies (Ferreira and Venter, 2011; Tait, 2014). Within this old ODL ecosystem, the advent of electronic mail (e-mail) and electronic learning (e-learning) was a momentous event (Chaka, 2010). The latter (e-learning) and LMSs, the paper argues, became disruptive technologies for deploying ODL. Therefore, the observation of this paper is that e-learning remains one of the key teaching and learning deployment tools on which the educational IT infrastructure of UNISA as an ODeL is founded.

The advent of digital technologies in the sense used in this paper has seen ODL enter a new era of student support with digital and emerging technologies become disruptors in the ODL ecosystem in a manner similar to a disruptive and game-changing role played by semio-technologies in digitally mediated literacies. These digital and emerging technologies include but are not restricted to instant messengers (e.g., WhatsApp and Moya), microblogging applications (e.g., Twitter), social networking sites (e.g., Facebook), video sharing tools (e.g., YouTube), (Chaka, 2019b; Resta and Laferrière, 2007), and video-conferencing tools (e.g., Zoom and Microsoft Teams). In the ODL context, and especially for second and third generation ODL (Tait, 2014), digital and emerging technologies, the paper argues, hold the potential to facilitate and mediate student support in a manner that is not possible when traditional and standard technologies such as LMSs and online discussion forums (ODFs) embedded in them are employed alone.

4.2 Student support and scaffolding in an open and distance e-learning context

The expressions student support, learner support and learning support are often used interchangeably in most ODL literature (Brindley, Walti and Zawacki-Richter, 2008; Baloyi, 2014; Minnaar, 2011). However, in this paper student support is a preferred expression as it aptly captures the types of students being investigated here: they are ODeL university students some of whom are working. This is despite the fact that the term learner has a generic usage, and signifies an active and instrumental role that a learner plays in the learning process (Brindley et al., 2008). Thus, it is ODeL student support as situated within the theoretical framing presented above that is foregrounded in this paper. In the ODL context, student support is defined differently. One definition espoused by this paper is that student support entails interactive educational activities and services aimed at supporting and enhancing a learning process. Subsumed in this definition are aspects such as teaching, tutoring, feedback and advising. The other aspects included in this definition are administrative support, counselling, guidance, welfare, and admission and registration (Brindley and Paul, 2008; Brindley et al., 2008; Baloyi, 2014; Ryan, 2008; Simpson, 2002; Thorpe, 2002). Two dimensions of student support are evident from this definition: academic student support and administrative student support (Zawacki-Richter, 2008). While these two dimensions are equally important as they complement each other in the overall student support ecosystem, it is the former dimension of student support that this paper sets out to explore. The focus of this student support is on an undergraduate module offered to a group of undergraduate education students by the Department of English Studies at UNISA. This student support pertains to some of the aspects of the module content in terms of scaffolding and feedback.

There are three cardinal functions served by student support in ODL: cognitive, affective and systemic functions. The first function is about fostering learning by mediating it through course materials and learning resources; the second one entails providing an environment that supports and enhances learner self-esteem; and the third function relates to implementing administrative and information management systems that are transparent. efficient and student-centred (Brindley and Paul, 2008). It is the first function that forms part of the focus of this paper.

The second area of focus in this section of the paper is scaffolding within an ODeL context. Like student support, the term scaffolding is defined multiply not only within ODL, but across the teaching and learning spectrum (Puntambekar and Hübscher, 2005; Resta and Laferrière, 2007). In educational circles, scaffolding is credited to Wood, Bruner and Ross (1976) even though it is also linked to Vygotsky's (1978) metaphorical concept of the zone of proximal development (McLoughlin, 2002). The latter is part of Vygotsky's (1978) social development theory, which refers to the space in which a student can learn on their own (self-learning) and in which they can learn through the assistance of a teacher (Chaiklin, 2003; Ludwig-Hardman and Dunlap, 2003; Wertsch, 1984). In this paper, scaffolding is used to refer to the support offered to a student with regard to a learning activity with a view to helping the student to successfully engage with the learning activity. Such a support involves interactions between an instructor and a student, instructor-led discussions, peer interactions, and hints and prompts provided on technologies intended to offer support student learning (Puntambekar and Hübscher, 2005; Resta and Laferrière, 2007;Wood, Bruner and Ross, 1976). This is an evolved and modified version of the scaffolding construct that resonates with fifth generation ODL (Ferreira and Venter, 2011) as one of the salient features of the latter is digital and emerging technologies.

McLoughlin (2002) identifies several dimensions applicable to different teaching and learning settings within ODL. These are as follows:

- Orientation (communication of expectation) – Providing students with a clear explanation of what they are expected to achieve
- Coaching – Offering students support through software applications to facilitate task performance
- Eliciting articulation – Encouraging articulation so as to help students express existing understanding and reflection (e.g., peer communication posted on a ODF)
- Task support – Creating support structures that enable students to perform a task (e.g., resources that enable engagement with task or activity)
- Expert regulation – Provision of support based on instructor or mentor expertise
- Conceptual scaffolding – Support offered when the task or activity is presented so as to help focus students on the problem at hand in the midst of multiple interpretations
- Meta-cognitive scaffolding – Type of scaffolding given by a cognitive tool (e.g., an electronic device) to enable students to express their thinking while engaging with the task

- Procedural scaffolding – Type of scaffolding intended to support in using available resources and tools (e.g., online resource sharing or online collaborative learning)
- Strategic scaffolding – Type of scaffolding provided to signal alternative learning pathways or courses of action related to the task at hand (e.g., multiple perspectives or multiple scenarios to the task) (Puntambekar and Hübscher, 2005; Zawacki-Richter, 2008).

In contrast, Puntambekar and Hübscher (2005) identifies four features of scaffolding. These features, as modified for the purpose of this paper, are as follows:

- Scaffolder – Assistance or expertise offered to the student by an instructor or a peer, or through technology (mobile or online resources and tools)
- Shared understanding – Providing shared common knowledge about authentic tasks embodied in a learning environment
- Ongoing diagnosis and calibrated support – Ongoing diagnosis by an instructor, a peer or a tool, including blanket scaffolding to all students or a differentiated scaffolding to individual students
- Fading – Support can be withdrawn, or can be permanent and stable

The current study intends exploring the dimensions and features of scaffolding mentioned above in varying degrees. A crucial point to note here is that the notion of scaffolding has been contested and problematised by certain scholars, especially in its simplistic and blanket application. One such scholar is Palinscar (1998) who raised the point that applying scaffolding atheoretically is problematic. To this end, she called on scholars to re-situate scaffolding within its theoretical framework, consider instances in which activities and circumstances scaffold learning, and investigate the link between scaffolding and teaching (Puntambekar and Hübscher, 2005). The current study aligns itself with this observation. To this end, it situates its investigation of scaffolding within the integrated theoretical framework it outlined earlier.

Mobile learning tools such as the two tools mentioned above, can be construed as push technologies as they enable servers to channel and direct information updates to web clients (Bassendowski and Petrucka, 2013; Spacey, 2017). In this sense, they allow students to be primed, taught and supported directly on their own mobile devices (Armatas, Holt and Rice, 2005) through a BYOD approach. Conversely, within the ODeL system as is the case with the rest of the HE ecosystem, LMSs such as myUnisa (together with its online discussion forum tool) operate as pull technologies intended to pull students to these online platforms through requests made by web clients to servers in a traditional client/server architecture (Bassendowski and Petrucka, 2013; Spacey, 2017). As pointed out above, this study integrates two push technologies (e.g., Moya and WhatsApp) with one pull technology (e.g., myUnisa's ODF) as part of its hybrid tools to support students enrolled for an English Studies module at UNISA. To this end, the study is informed by the following research questions (RQs):

RQ1 – What are the benefits of integrating Moya Messenger App and WhatsApp as push technologies with *my*Unisa's ODF (an online discussion forum) as a pull technology to support students enrolled for an English Studies module?

- RQ2 – How do these three learning support tools facilitate student support in this module?
- RQ3 – Which of these tools are readily embraced as a learning support tool by students?

5. Research methodology

This study is grounded in an interpretivist research paradigm. Research based on this paradigm often yields copious, contextual, but substantially unregulated, unpredictable data (Mason, 2002; Ponelis 2015). As a corollary, a case study research design was deemed to be an appropriate research design for the current study. A case study research design is intended to examine contemporary phenomena as embedded in real-life contexts, especially when boundaries between such phenomena and their contexts are not clearly manifest (Yin, 2014). It is also a research design requiring multiple sources of data and a resultant triangulation of datasets. This research design may encompass a single case or multiple cases, and may include qualitative and quantitative data (Harrison et al., 2017). Moreover, a case study research design draws strengths from prior theoretical propositions for data collection and data analysis. To this end, it is not merely a data collection technique or a design plan, but an all-encompassing research strategy. There are certain purposes that case studies serve. These are to: (a) explore situations in which interventions being evaluated have single clear-cut outcomes; (b) describe interventions in real-life contexts in which such interventions occur, or the sequence in which they occur; (c) illustrate particular topics in a given evaluation by employing a descriptive mode; (d) explain

correlations in real-life interventions; (e) meta-evaluate other evaluation studies (Yin, 2014; Griffee, 2012; Stake, 2005; Thomas and Myers, 2015). In this instance, it can enhance theory testing and theory building (Yin, 2014).

5.1 Participants and sampling techniques

Participants for this case study comprised 41 undergraduate students enrolled for a second-level English Studies module at UNISA. This module is a semester module, one of the outcomes of which is to analyse and interpret the structure of language as reflected in selected texts drawn from different genres. All of the participants had registered for a Bachelor of Education (B.Ed.) degree: Foundation Phase, and were from diverse language backgrounds and from different geographic locations across South Africa. Forty of these participants were females and one was a male. Collectively, their average age, based on their module registration data, was 38 years (SD = 2.2). All of these students were allocated to the instructor by the Mathew Goniwe project which was responsible for a special learning support programme that run on designated Saturdays in the second semester of 2018. Besides, most of the participants enrolled in this module were prospective educators for early childhood education which traditionally attracts more female educators than male educators. This is one of the factors that accounted for one male student who had registered for this module.

A sampling technique employed to sample these participants was volunteer sampling. Briefly stated, this technique entails self-selection – participants selecting themselves; or volunteer participation – participants volunteering to be part of a given study project. Often participants are requested to volunteer to partake in a study, or an announcement is advertised inviting volunteer participants (Omair, 2015; Sharma, 2017). Three benefits of volunteer sampling are: it is less time consuming and inexpensive; it allows a collecting of a lot of data with minimum personal effort (Alvi, 2016); and it enables easy access to appropriate units (cases) (Sharma, 2017). However, some of its drawbacks include the following: its findings are often not generalisable to other cases; it lacks representativeness and is prone to systematic errors (Omair, 2015; Rezigalla, 2020; Setia, 2016); and it is susceptible to bias (Sharma, 2017; Arinto, 2016; Benoot, Hannes and Bilsen, 2016; Etikan, Musa and Alkassim, 2015).

In the current study, 61 participants were requested to volunteer to take part in the research project through an email announcement that was sent to them before the onset of the project (Wood, Bruner and Ross, 1976). In the final analysis, 41 of them volunteered to participate in the study. This, then, is the manner in which participants for this study were sampled. But before all this took place, participants were informed about the study; their consent was sought; and ethical clearance was secured. The ethical clearance used was the one granted to a special project (the Mathew Goniwe Project) overseeing designated Saturday student support classes as mentioned earlier. It was granted by the College of Education's Research Ethics Review Committee at UNISA (Chaka and Nkhobo, 2019a).

5.2 Data collection process: Instruments, materials and procedure

There were three sets of data that were collected for the purpose of this study. All the data were collected over six days, from 26 October 2018 to 31 October 2018, as part of the participants' revision for their end-of-semester examination in the module in question. Students' participation in this exercise was optional, and the revision itself was meant to establish the manner in which the three tools employed for revision helped mediate learning support to those students who were willing to participate in this revision exercise. Therefore, the three datasets were garnered through three tools: Moya, WhatsApp and myUnisa's ODF. The first dataset consisted of the teacher's scaffolding and participants' synchronous responses to the scaffolding; the second dataset comprised samples of three-paragraph essays; and the third dataset was made up of participants' reflective comments.

As pointed out above, three learning support tools, Moya, WhatsApp and myUnisa's ODF were utilised as a combination of mobile push technologies and an online pull technology to collect data from participants. Firstly, participants were given a topic, "Compare and contrast the way that the writers use register, style and linguistic features to convey intention and reveal the genre of the texts" (see Figure 2), and two texts (Text B and Text C) on Moya (see Figure 4) on 26 October 2018. After that, the teacher engaged participants in real-time scaffolding about what they needed to know about and what they had to do in writing the essay task (see Figures 5 and 6). Secondly, a day later, participants were requested to write a three-paragraph "compare and contrast" essay on WhatsApp. Each of the three paragraphs had to be dedicated to an introduction, a body and a conclusion, respectively (see Figure 6). The essay's instructions and its other related aspects had been posted (real-time) on Moya a day before the due date. Thirdly, participants were asked to comment about and reflect on their

experiences of having partaken in a Moya scaffolding and of having written the essay on WhatsApp. They did this on *my*Unisa's ODF.

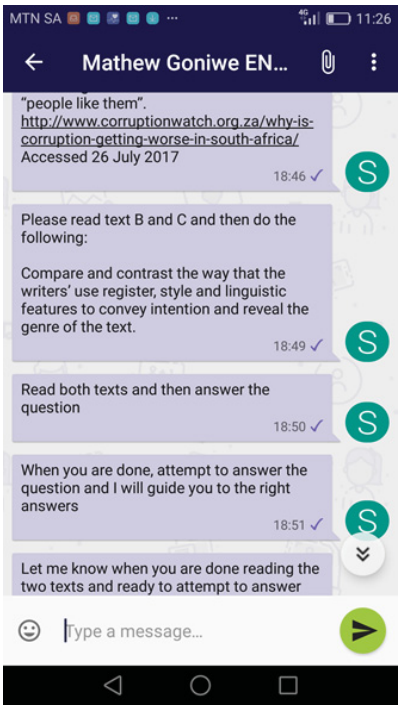

Figure 2: A screenshot of a topic given to participants on Moya

5.3 Data analysis

An analytic method used for analysing the data for this study was thematic analysis. This analytic method entails searching for themes emerging from and embedded in, especially though not exclusively, narrative data of phenomena investigated. It essentially involves identifying themes by carefully extracting them from the data, thereby making it a pattern recognition process in which themes emerging from the data become categories subjected to analysis (Fereday and Muir-Cochrane, 2006; Attride-Stirling, 2001). It may either be inductive or deductive depending on the choice made by the researcher. The data coding system follows specified steps. Codes are intended to capture the richness of themes embedded in the data. To this end, a theme is seen as a pattern in the data which, on the one hand, helps describe and organise the possible aspects of a phenomenon, and which, on the other hand, helps interpret crucial aspects of the phenomenon (Fereday and Muir-Cochrane, 2006; Attride-Stirling, 2001).

In the present study, thematic analysis was both inductive and deductive, and iterative and reflective. Inductive thematic analysis followed a step-by-step coding procedure, which even though entailed linearity as depicted in Figure 3, but was nonetheless iterative and reflective in its execution. This form of analysis was data-driven. Deductive thematic analysis was mounted as a priori approach responding to the aspects of the theoretical framework mentioned in the first section of this study. This dual approach was employed to ensure that the analysis was both data-driven and theory-responsive. The stages of the data coding system for inductive thematic analysis were as illustrated in Figure 4 below.

As shown in this figure, the data coding procedure used in this study consisted of 4 steps with their related sub-steps as outlined in this figure. These themes, together with the related theoretical constructs displayed under step 4, were created iteratively and revised constantly. Three raters coded the data using Cohen's kappa (κ). Cohen's κ is a common co-efficient used to measure inter-coder reliability (Cohen, 1960; Sun, 2011; Chaka, 2019a; Chaka, Lephalala and Ngesi, 2017). The three raters' coding reliability was .80, which according to Cohen's κ value weightings (.00 to .1) is excellent (Cohen, 1960; Chaka, 2019a; Chaka et al., 2017).

Step 1: Developing a Coding Framework/Code Manual

(a) Coding of data (e.g., instructor's scaffolding and participants' synchronous responses; samples of three paragraph essays; and participants' reflective comments)
(b) Calculating the reliability of codes (e.g., three raters coded the data, and their coding consistency and agreement was calculating using Cohen's kappa (κ) (Cohen, 1960)
(c) Dissecting (textual) data into segments using the coding framework

Step 2: Identification of Initial Themes

(a) Extract/Abstracting basic themes from coded data segments (e.g., compare and contrast)
(b) Refining themes as needed (e.g., exchanges; announcements; instructions; responses; introduction; body; conclusion; sentences; and paragraphs)

Step 3: Identification of Final Themes

(a) Building final themes from initial themes (e.g., announcement tool; affordances; mobility; and interactions)

Step 4: Establishing theoretical constructs

(a) Building theoretical constructs from final categories (e.g., asynchronicity/synchronicity; asynchronous/synchronous mobility; asynchronous/synchronous scaffolding; multiple digital interactions; synchronous feedback; presence teaching; presence learning; asynchronous/synchronous paragraph writing; and online meta-content reflection)
(b) Linking theoretical constructs to the study's theoretical framework

Figure 3: A diagrammatic representation of the stages of the data coding system (Adapted and modified from Attride-Stirling, 2001, p. 391 and Fereday and Muir-Cochrane, 2006, p. 5)

6. Findings

The findings presented in this section are informed by the three sources of data mentioned in the preceding section. In addition, these findings are in response to the research questions cited earlier and, as such, they are divided into sub-sections based on these research questions.

6.1 Moya

With reference to employing Moya as a learning support tool, a *compare* and *contrast* activity that participants had to do was announced on this instant messaging tool. This included two texts that were to be compared and contrasted (see Figure 4). The two texts were part of the May/June 2018 examination question paper for the module under study (again see Figure 4), and had been sourced from two Internet websites, a web address of one of which is shown in the right-hand side screenshot of this figure.

In respect of what was expected of the participants pertaining to this activity, Figure 5displays the interaction in which one of the researchers (henceforth the teacher unless otherwise stated) had with some of the participants. This interaction was a follow-up to the announcement of the activity that the teacher made to participants (see Figure 2). As illustrated in these two figures, the activity required students to compare and contrast two texts (Text B and Text C) using the Moya, mobile platform. Figure 2 under the previous section displays a screenshot of the step-by-step instructions of the activity as posted on Moya by the teacher. These consist of the main instruction and its associated sub-instructions. The associated sub-instructions are explanatory in nature, with one of them guiding participants as to how they should respond, and with the other one informing participants to signal once they are ready with their responses.

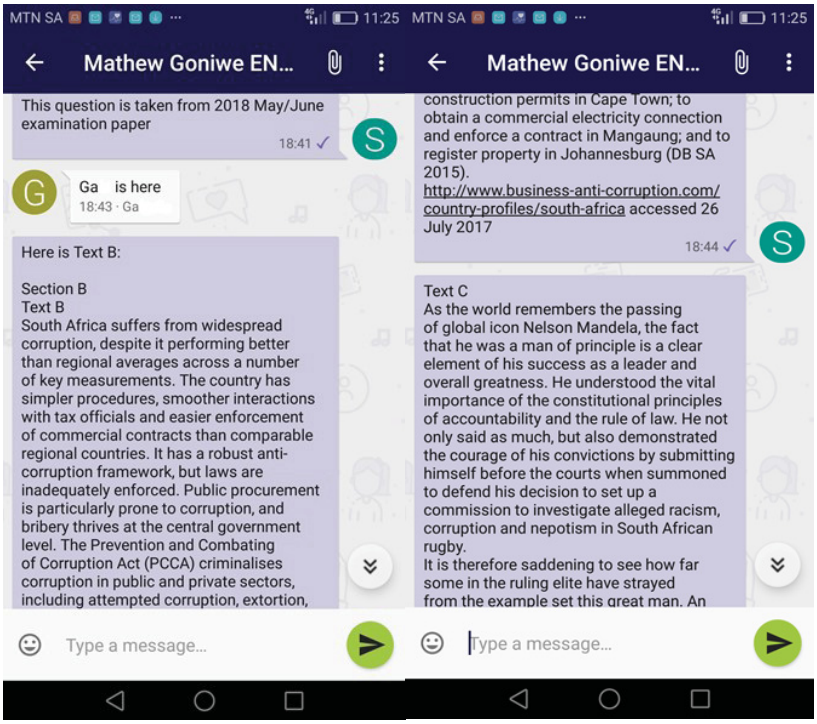

Figure 4: Portions of both Text B and Text C as part of a *compare* and *contrast* activity

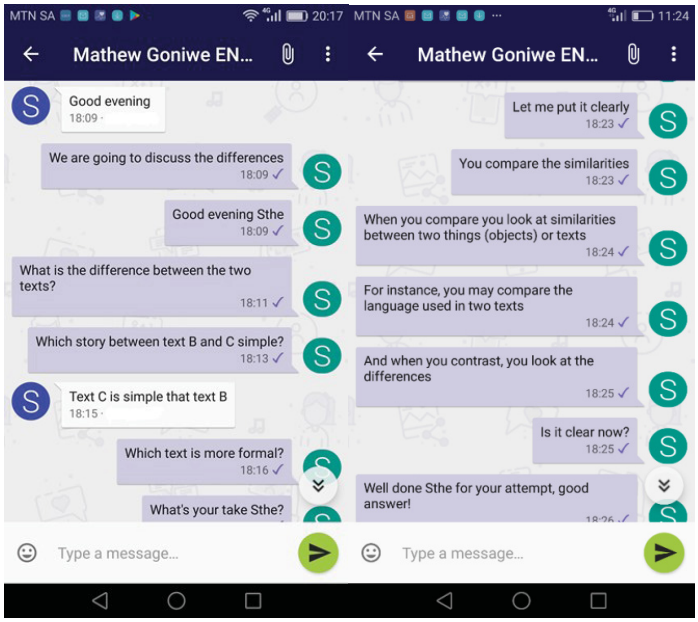

Figure 5: Greetings and prompts related to a *compare* and *contrast* activity on Moya

On this score, the left-hand part of Figure 5 depicts one of the participants greeting the teacher, to which the teacher duly reciprocates. The exchange immediately switches to the teacher's introducing of the focus of the chat: the discussion of the differences between the Text B and Text C. The points he presents are framed as prompts in the form of leading questions) which are, in one instance, interposed by the participant's response. The right-hand side screenshot of this figure features further prompts in the form of clarification of the activity by the teacher to the participant.

Similarly, Figure 6 provides a further clarification of the Moya *compare* and *contrast* activity. In fact, most of the information captured in the top part of the left-hand side of this figure is a rehash of the main instruction represented in Figure 2. So, while the main instruction in Figure 2 is framed in generic terms without any length specification, in Figure 5 (the left-hand part of this figure) the self-same main instruction has both a length specification ("three paragraphs of 5 lines each") and the mode in which the activity should be presented (a

written essay). It also has three more prompts phrased as statements that serve to elaborate on the main instruction. The last prompt re-emphasises the expected length again. In this part of the figure, two participants engage in the exchange by a one-word response each. The right-hand part of this figure offers even more specific details about the activity. It furnishes (in parentheses) what aspect of an essay each paragraph needs to have and has to focus on.

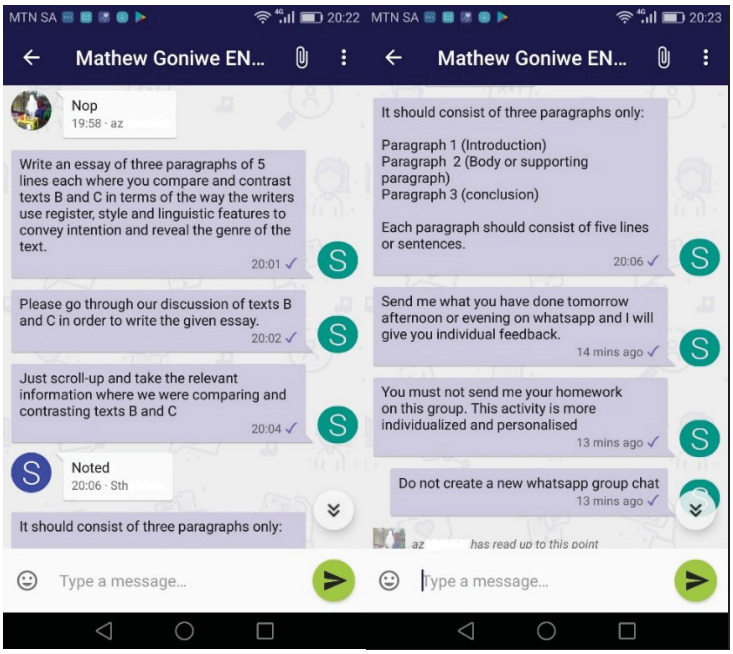

Figure 6: Further clarification of the Moya activity

Additionally, it re-states the number of lines or sentences each should have. This again, it does by not only rehashing a point mentioned in the main instruction showcased in the left-hand side screenshot of Figure 6, but also by providing an equivalent of lines: sentences. Moreover, the day at which and the period during which the activity has to be submitted are both supplied. To this end, the mobile platform (WhatsApp) on which the activity should be submitted is mentioned. At this point, participants are told that the activity is "individualized" and "personalised". So, they are cautioned not to "create a new whatsapp group chat".

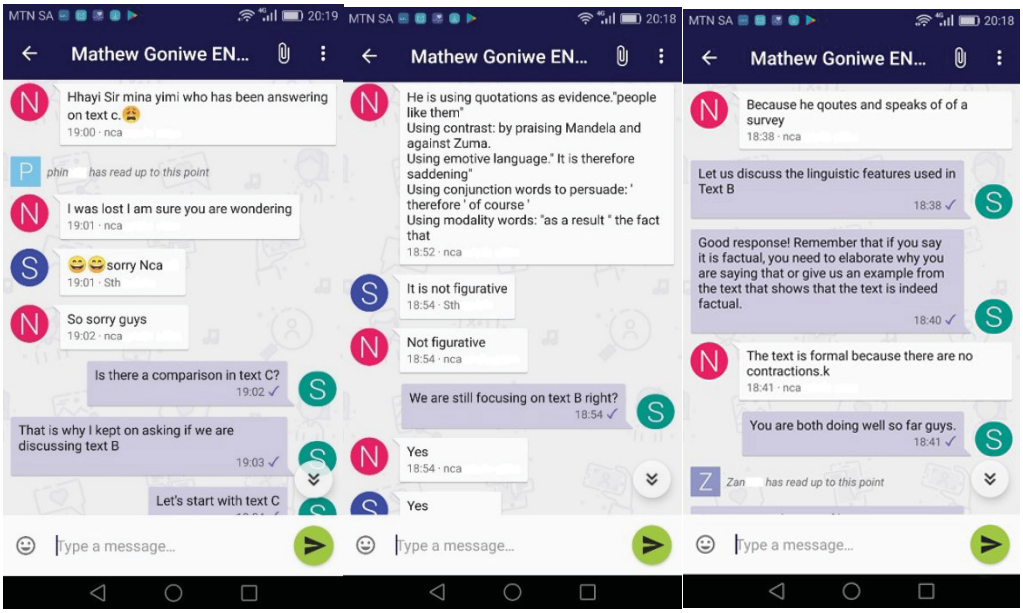

Figure 7: An interaction between the lecturer and some of the participants with regard to the *compare* and *contrast* activity on Moya

In response to the teacher's instructions for the *compare* and *contrast* activity that participants had to carry out on Moya as captured in Figures 2 and 5, part of the interaction which developed between the teacher and some

of the participants is as exemplified in Figure 7. This interaction starts off with one of the participants making everyone aware of the fact that she is the one who had been responding to Text C (on Moya), but that initially she "was lost" (see the left-hand side screenshot of this figure). One of the participants feels "sorry" for her, whereupon she apologises to the group ("So sorry guys"). The same screenshot indicates how far one of the participants "has read" this text: "phin… has read up to this point". The middle screenshot displays how another participant engages in-depth with this text as per the instructions provided in Figures 2 and 56. She is joined in her response by another participant and by the teacher. But, much of the exchange on this screenshot is between her and the other participant.

In the right-hand side screenshot, the exchange is between the same participant who provided an in-depth response to Text C and the teacher. In this exchange, the former offers a motivation for her response, while the latter provides further prompts and commends both participants. Additionally, in the same screenshot, one participant's (Zan) point at which she has read Text B is reported.

6.2 WhatsApp

Pertaining to the actual *compare* and *contrast* essay itself, which was supposed to be submitted on WhatsApp (see the right-hand side screenshot of Figure 6), samples of this essay are depicted in Figures 8, 9, 10 and 11. For example, all these four figures depict sample essays which follow the stipulated essay structure: introduction, body and conclusion.

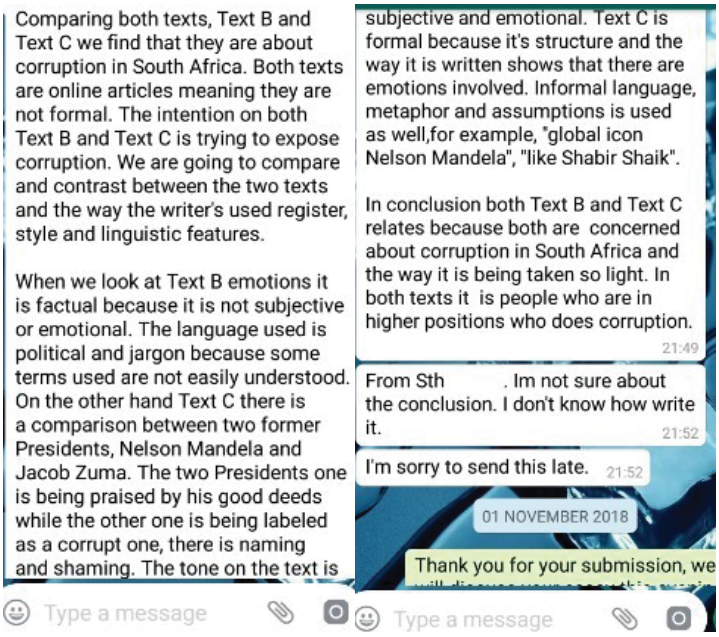

Figure 8: Sample essay 1

Each of these three sections of the essay had to constitute a paragraph consisting of five lines/sentences (see Figure 6). In this regard, each of these sample essays, as shown in Figures 8, 9, 10 and 11, had the following number of sentences in each of the three categories, respectively: Figure 8 = 3 paragraphs (4+7+2 = 13 sentences); Figure 9 = 4 paragraphs (2+4+5+1 = 12 sentences); Figure 10 = 3 paragraphs (6+7+2 = 15 sentences); and Figure 11 = 4 paragraphs (5+6+4+2 = 17 sentences). The total number of sentences for each paragraph and for each sample essay are in parentheses, and must be seen against the backdrop of 5 sentences each paragraph was supposed to have according to the essay instruction. These sample essays have a total word count of 229, 135, 240, and 333 words apiece, and a grand word count of 937 words collectively.

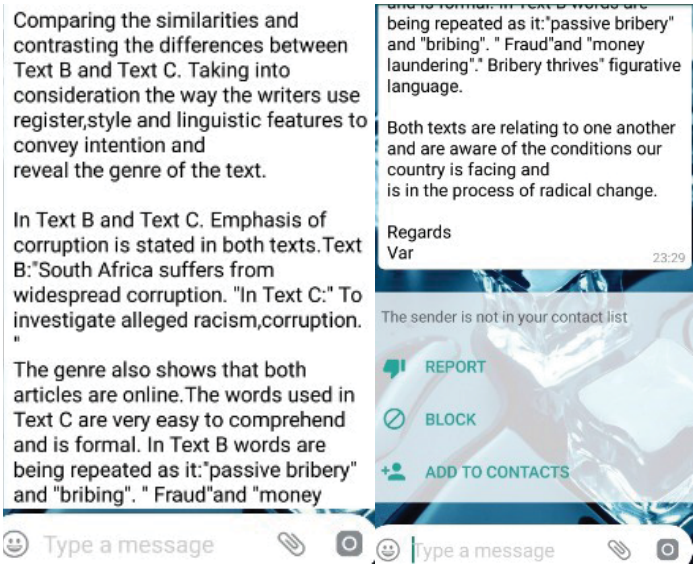

Figure 9: Sample essay 2

In terms of the core instruction, "compare and contrast the way that the writers use register, style and linguistic features to convey meaning and reveal the genre of the text" (see Figures 2 and 6), sample essay 1 in Figure 8 tends to provide largely a descriptive analysis of the two texts. Nonetheless, it has elements of comparing and contrasting. By contrast, sample essay 2 (see Figure 9) restates the exact wording used in the main instruction of the question in its introduction. However, it falls short of elaborating on each of the key words contained in the main instruction of the question in its two subsequent paragraphs, save that it provides words repeated in Text B in the third paragraph.

Two sample essays that attempt, to some extent, to respond to the "compare and contrast essay task according to its core instruction are sample essays 3 and 4 (see Figures 10 and 11). Both sample essays begin with introductory paragraphs that foreground some of the requirements of the core instruction in varying degrees. For instance, on the one hand, sample essay 3 prefaces its discussion by drawing the reader's attention to "how language is used in context" and how writers "use specific discourse for different texts" when communicating a given purpose. On the other hand, sample essay 4 flags the common issue addressed by the two texts (Text B and Text C): "corruption in South Africa". Subsequent paragraphs in each sample essay endeavor to respond to the question, particularly, by trying to demonstrate – again in varying degrees - how register and linguistic features have been used in each text to convey meaning.

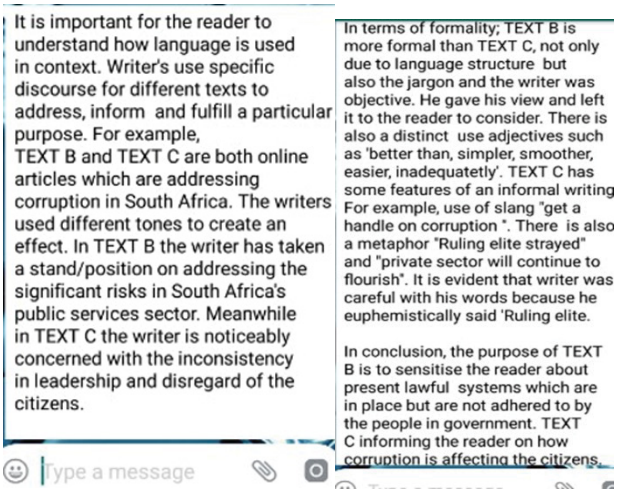

Figure 10: Sample essay 3

Both texts deal with the level of corruption in South Africa. Text B shows that even thought the laws of the country are in place to combat corruption, the officials who are supposed to be enforcing these laws are the ones who are having problems enforcing them. On the other hand Text C shows that former president Nelson Mandela has set a good example (practicing what he was preaching). He was even prepared to stand in front of a commission that was investigating the alleged racism and corruption in rugby to show how opposed to corruption he was. But one of his successors, Jacob Zuma was notorious of his corrupt practices and corrupt associations with questionable individuals.

As Text B shows, though the system is put in place, which is a good thing, it has to do something with the law enforcers. They are the ones who do corruption by accepting bribes. It is using more of an informal communication. On the other hand Text C is more formal and factual as it also quotes the stats. For instance, it mentions a certain survey that shows that in 2012 there was a "10.8 % decrease in citizens' confidence in national government" because of what the law enforces do. It also says "there has also been a 13% increase in the proportion of citizens who feel that the government does not care about them."

The jargon used in Text B is more technical and political mentioning like "Public procurement", and some other institutions, PCCA and ICS. Text C is simpler and easy to follow. It does not use a difficult jargon that may make it difficult for the lay reader to follow. Text B shows the writer's opinion, whereas Text C shows facts by naming and shaming specific individuals, for example.

It is clear from both texts that something needs to be done about corruption. This is particularly because it takes place in the higher ranks, negatively affecting those on the ground.

Figure 11: Sample essay 4

6.3 *my*Unisa's ODF

As pointed out earlier, in respect of *my*Unisa's ODF as a pull learning support tool, participants were asked to post on this tool their comments about their experiences of engaging with the essay task on Moyaand of writing this task on WhatsApp.

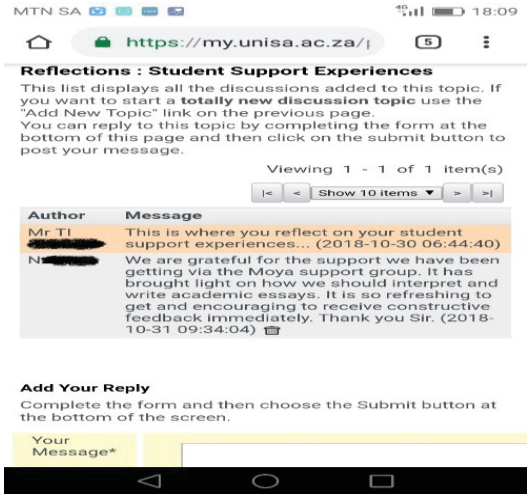

Figure 12: Sample discussion forum message

All participants were happy about the learning support provided to them. One such comment posted on *my*Unisa's ODF is displayed by Figure 12. Here one participant expresses her gratitude about such a support. She particularly singles out the Moyalearning support group, mentions how it has shed light to them about interpreting and writing an academic essay. To this end, the participant is of the view that it is "encouraging to receive constructive feedback immediately."

7. Discussion of findings

This section discusses the findings of the current study. The discussion is grounded on the findings as presented in the preceding section. In addition, this section is divided into the affordances each learning support tool offers. These affordances are discussed under a learning support tool through which they were both realised and

mediated. Moreover, the discussion of the findings is framed – together with the attendant affordances of the three learning support tools - in response to the three research questions (RQ1, RQ2 and RQ3) of the study.

7.1 Moya[MA] and its affordances as a learning support tool

As described in the findings presented in the preceding section, there are a number of affordances (inherent utilitarian uses) that are offered by Moya as a student learning support tool. One of these affordances is an announcement tool. As illustrated by Figures 4, 5, 6 and 7 and as described in the preceding section, Moya was employed in this study as a mobile announcement tool. This affordance is mobile-enhancing in its asynchronous form and mobile-dependent in its synchronous from (Dennen and Hao, 2014). The second affordance which is functionally linked to the first one is mobility. As a tool, Moya enabled the teacher to tap into asynchronous mobility (see Figure 2). In this case, the instructor (S) posted the essay activity announcement live on Moya when all participants were offline, thereby leveraging the asynchronous mobility of this platform. But no sooner had he posted this announcement than one participant (G) logged onto Moya live (see Figure 4) to announce her presence online. This demonstrates that Moya also facilitated synchronous mobility not only between the instructor and this participant, but between him and other participants as well (see Figures 5 and 6). In this instance, this dual affordance underscores its mobile-enhancing and mobile-dependent functionality. This means that Moya also afforded the instructor and participants both asynchronous and synchronous mobility (Dennen and Hao, 2014; North-Samardzic, et al., 2014). To this end, North-Samardzic, et al. (2014) emphasise the complementarity of asynchronicity and synchronicity in virtual learning environments. The same argument holds for the ODeL environment as exemplified by Moya in the current study. Moreover, in this case, Moya tends to lends itself well as a digital and emerging technology that can used for both BYOD and IT consumerisation purposes (Chaka, 2012) within a student learning support context.

Another affordance offered by Moya is scaffolding. The type of scaffolding mediated to participants through Moya and how participants were scaffolded using this instant mobile messenger application is shown by Figures 5, 6 and 7. For instance, the scaffolding displayed in these figures is enacted through multiple digital interactions. In Figures 5 and 6, for example, the scaffolding is initiated through a student/instructor interaction, even though it is more instructor-dominated. This, then, becomes an instructor-led discussion (Puntambekar and Hübscher, 2005; Resta and Laferrière, 2007) in which the instructor provides: orientation; coaching; eliciting articulation; expert regulation; conceptual scaffoliding; cognitive scaffolding; and meta-cognitive scaffolding (McLoughlin, 2002). Three more scaffolding features based on Puntambekar and Hübscher (2005) are evident from the scaffolding interactions as depicted in these aforesaid figures. These are a scaffolder exemplified by the instructor; a shared understanding related to the essay writing activity offered mainly by the instructor, and to some extent by students, especially student N; and an ongoing diagnosis provided largely by the instructor.

Similarly, the scaffolding in Figure 7 is mediated through a student/instructor interaction that is more student-dominated, resulting in a student-led discussion (Puntambekar and Hübscher, 2005; Wood, Bruner and Ross, 1976). In this interaction (which is largely dominated by N), N provides responses to the instructor's scaffolding as well as responding to student S (colour blue). The latter case exemplifies peer interaction which is often regarded as a necessary component of student learning support that helps reveal students' level of content matter understanding (Aghaee and Keller, 2016; Bond et al., 2020; Lai et al., 2019). So, here, student N, unlike prescholars who often rely on the instructor's prompts and hints (Wood, Bruner and Ross, 1976), is able to lead a scaffolding discussion by responding to some aspects of the scaffolding and by engaging another student.

In addition, the scaffolding as exemplified in this figure is mediated through four more types of interaction: student/student interaction; student/content interaction; instructor/student interaction; and instructor/content interaction. This underlines notion idea of multiple digital interactions embedded in this scaffolding. Emphasising the pivotal role played by scaffolding in computer-mediated learning, Laru (2012) contends that besides enhancing learning, the practice of scaffolding is increasingly becoming an indispensable ingredient in technology-rich environments. The current usage of Moya for scaffolding learning seems no different.

All of this scaffolding together with its concomitant types of interaction was mediated by Moya as an instant mobile messenger application. Therefore, in this case, Moya enabled the teacher and participants to engage in mobile scaffolding pertaining to the essay writing activity. This mobile scaffolding happened mainly synchronously (see Figures 5, 6 and 7), even though it was initiated asynchronously by the teacher. The value of synchronous interaction - and analogously of synchronous scaffolding – is highlighted by North-Samardzic et al.

(2014) who maintain that such synchronicity offers immediate feedback. With reference to this study, Moya afforded the teacher the opportunity to render instant scaffolding to participants. Most importantly, this instant scaffolding on itself own served as a virtual forum in which the teacher and participants engaged in meta-content issues related to one aspect of the module being studied, the *compare* and *contrast* essay writing. All of this underlines two elements of mobility - mobile-enhancement and mobile-dependence (Dennen and Hao, 2014; Sung, Chang and Liu, 2016) – that Moya adds to scaffolding as part of this BYOD and IT consumerisation student support environment.

A further affordance facilitated by Moya is presence teaching (Chaka, 2014, 2015a, 2015b). Figures 4, 5, 6 and 7 exemplify instances of presence teaching. For example, Figures 5 and 6 display instances of presence teaching in which the teacher has more digital presence than participants have. This is due to a scaffolding-cum-teaching that is teacher-dominated. Of course, it becomes a scaffolding-cum-learning for participants as they learn through reading and responding to what the teacher posts on Moya. Presence learning becomes even more profound in Figure 7 which portrays a scaffolding that is student-dominant. This presence teaching-presence co-occurrence facilitates and enables social presence, co-presence and tele-presence (Chaka, 2015a; Oh, Bailenson and Welch, 2018; Resta and Laferrière, 2007) between the instructor and students, on the one hand, and between students themselves, on the other hand. A key feature allied to both presence teaching and presence learning in connection with Moya is on-screen presence announcement and on-screen presence reading action tracking. An instance of on-screen presence announcement is "Ga … is here" (see Figure 4), while examples of on-screen presence reading action tracking are messages, "az … has read up to this point" and "Zan … has read up to this point", as depicted in Figures 6 and 7, respectively. Both presence announcement and presence reading action tracking are application-generated: they are programmatically generated by Moya. In this respect, Moya was employed as a platform to mediate presence teaching and presence learning, and to provide on-screen presence announcement and on-screen presence reading action tracking.

Intrinsically allied to presence teaching and presence learning is connectivism (del Valle García Carreño, 2014; Downes, 2010; Kop and Hill, 2008; Siemens, 2005; Thomas and Gelan, 2018). Through this connectivism, the teacher and participants were able to tap into mobility, scaffolding, presence teaching and presence learning (see Figures 2, 4, 5, 6 and 7) by utilising Moya. In a connectivist learning environment, power is dispersed within triple locations comprising instructors, learners and digital networks. Such power should oscillate between instructor-centredness and learner-centredness (Crosslin, 2016). In the present study, connectivist interactions are instructor-led; yet, there are others that are student-led.

Another intrinsic affordance provided by Moyais that it is both a push and an over-the-top (OTT) technology. As delineated earlier, this type of technology harvests information updates through servers and channels them directly to web clients (Bassendowski and Petrucka, 2013; Spacey, 2017). One instance of the push factor of Moya is demonstrated by the rapidity with which participant G's digital presence is announced in Figure 4 within 2 seconds of the teacher's being online. In all, these affordances are some of the benefits Moya as a push technology provided to support participants in this study.

The foregoing discussion demonstrates how in this study, the mobile tool, Moya, can be employed as a mobile platform to offer asynchronous affordances (e.g., announcements and scaffolding) in the same way as an LMS such as *my*Unisa (see Figure 1) and other LMSs can be employed (Chaka, 2015a; 2015b). However, as a push and OTT technology, Moya brings other benefits or value-adds to the ecosystem of affordances needed for supporting students. These are synchronicity, mobility, presence learning and connectivism as discussed above. All of these tend to compensate for the asynchronicity, and for the lack of mobility, presence learning and connectivism characterising an LMS such as *my*Unisa. These composite benefits, which are inherent in Moya as a push and OTT technology, are flagged up in this section as one part of the response to both RQ1 and RQ2 of this study.

7.2 WhatsApp as an instant mobile platform for essay writing

As is evident from sample essays presented in the findings section, participants were able to digitally and instantly produce *compare* and *contrast* essays of varying lengths and of differing word counts, sentences and paragraphs on WhatsApp. All of these differing aspects of sample essays ought to be seen against the backdrop of the essay instruction (3 paragraphs - a paragraph each on the introduction, on the body and on the conclusion - each of which was to consist of 5 lines/sentences) (see Figure 6). They also need to be viewed against the instant scaffolding that was provided on Moya prior to the essay writing activity. Of these sample essays, the

shortest had 135 words, 12 sentences and 4 paragraphs. In contrast, the longest had 333 words, 17 sentences and 4 paragraphs. Based on this, it becomes clear that in this study WhatsApp – as a social networking application - was utilised by participants as an instant mobile platform for essay writing. In particular, it lent itself well to being used as a mobile platform for synchronous essay writing. Elsewhere, Chaka (2014) reported the same observation that the now defunct South African-invented instant messenger, MXit, yielded with respect to synchronous paragraph writing (Chaka, 2015b).

Another aspect emerging from sample essays as presented in the findings section is that, in writing their essays on WhatsApp, participants used conventional sentences and followed conventional paragraphs (Chaka, 2015c; Thubakgale and Chaka, 2016) in keeping with both the essay instruction and the scaffolding (see Figures 8, 9, 10 and 11). To this effect, their sentences and paragraphs did not contain textisms (Chaka, 2015c; Thubakgale and Chaka, 2016) as would have been expected in an instant mobile messaging environment. This means that WhatsApp as a mobile social networking application – and as a push and OTT technology – enabled participants to write synchronous formal essays consisting of conventional sentences and conventional paragraphs that were textism-free.

A further feature observable from sample essays is that each essay contained an introduction, a body and a conclusion in line with both the essay instruction and the scaffolding provided. With reference to participants' responses to the core instruction of the essay task as captured in Figures 2 and 6, their sample essays were at polar opposites. For example, two of them did not respond according to the instruction (one provided a descriptive analysis, and the other restated the instruction, especially in its introduction, and failed to elaborate on key instruction words). The other two sample essays responded appropriately to the core instruction in varying degrees. This means that some participants were able to produce relevant essay responses through WhatsApp, while others were not. This is consistent with real-world, face-to-face teaching and learning scenarios in which some students may provide relevant responses, whereas others may not (Chaka, 2014, 2015c)It is also consonant with other online scenarios such as ODFs in which the two contrasting student responses may occur. Most importantly, the dual use of two instant messengers, Moya and WhatsApp, for engaging with students, tend to have provided the teacher and participants with the opportunity for not only a synchronous engagement with each other and with meta-content issues, but also for a dual synchronous interaction with each other and with meta-content aspects of the module under study.

Thus, all the points discussed above show that as a push and OTT technology (Bassendowski and Petrucka, 2013; Spacey, 2017), WhatsApp, especially as used in the current study, had a value-add of being an instant mobile platform for essay writing for the participants involved. In particular, this means it brings instantaneity and almost *real-timeness* to the type of writing in which participants engaged. These two value-adds are, in addition to mobility and connectivism, two key benefits that WhatsApp brings to the ecosystem of affordances which compensate for the affordances an LMS such as *my*Unisa's ODF tends to lack. Again, these composite benefits serve as another part of the response to both RQ1 and RQ2 of this study.

7.3 *my*Unisa's ODF as an online meta-content reflection forum

Participants used *my*Unisa's ODF – as requested by the instructor - to reflect on the scaffolding they received on Moya and on the essays they wrote on WhatsApp. Participants indicated that they liked the fact that they used these two instant messengers to write their essays. For them, Moya stood out as the tool that supported them well in writing the essay by means of the scaffolding that was provided on it. This is not entirely surprising as the scaffolding participants received on Moya was not only focused and intensive (see for example, Figure 6), but also synchronously interactive and engaging (see for instance, Figure 7). That is, it had synchronous interactivity and engagement for both the instructor and participants (Chaka, 2014, 2015b). The synchronicity and the interactivity and engagement of this scaffolding is underscored by the view expressed in Figure 12 that it was "encouraging to receive constructive feedback immediately." Thus, *my*Unisa's ODF, as an asynchronous discussion forum, afforded participants the opportunity to comment (post the essay writing activity itself) on the essay they wrote about some of the aspects of the module, especially the *compare* and *contrast* aspect of essay writing of the module. In this sense, in this study, *my*Unisa's ODF served as an online asynchronous space in which participants reflected on some of the meta-content issues related to the module. The significance of asynchronous discussion forums in facilitating student reflexivity in online courses is highlighted by Chadha (2017) and Hew, Cheung and Ng (2010). Against this background, these are some of the benefits *my*Unisa's ODF as a push technology proffered to support participants in this study. Given student comments on *my*Unisa's ODF as discussed above, it appears that Moya is learning support tool that participants liked the most.

8. Limitations and recommendations

As mentioned earlier on, this study employed a case study research design. In this instance, it had 41 undergraduate students as its participants. These participants had been requested to select themselves through volunteer sampling as all the students enrolled for this module were on the verge of writing their 2018 end-of-year examination. On this basis, the sample used in this study is small for findings sourced from it to be universal and representative. However, the findings of a study such as this one are more beneficial for their contextual transferability and applicability than for their universal replicability and generalisability (Chaka, 2015b; Chaka and Nkhobo, 2019a).

Lastly, the current study was conducted over a short period of time. Future research needs to be conducted over an extended period of time. Most importantly, such future research requires to compare two groups of students using the same learning support tools for comparative purposes.

9. Conclusions

The three tools, Moya, WhatsApp and *my*Unisa's ODF, were used in this study as tools to support a group of students enrolled for an undergraduate module in their *compare* and *contrast* essay writing activity for different purposes in an ODeL context. In the course of their being used in this study, these three learning support tools provided various affordances to both the instructor and participants. For instance, Moya offered certain interrelated affordances. Firstly, it was employed as a mobile platform for announcing information pertaining to the *compare* and *contrast* essay writing activity in the same way as such an announcement can be made on a LMS like *my*Unisa. Secondly, this tool enabled both the instructor and participants to l tap into asynchronous and synchronous mobility, what the study has also referred to as mobile-enhancing and mobile-dependent capacity of this tool. Thirdly, it served as a mobile platform for the instructor and participants to engage in an instant and synchronous scaffolding related to the *compare* and *contrast* essay writing activity. All of this entailed scaffolding features such as orientation, coaching, eliciting articulation, expert regulation, conceptual scaffolding, cognitive scaffolding, and meta-cognitive scaffolding which often characterise face-to-face teaching and learning encounters. Fourthly, as a mobile instant application, Moya facilitated presence teaching and presence learning in respect of the instructor and participants. To this end, this application offered on-screen presence announcement and on-screen presence reading action tracking of participants. Fifthly, Moya mediated connectivism between the instructor, participants, and their respective mobile phones. Allied to this affordance is the fact that Moya^{MA}, as a push and over-the-top (OTT) technology, harvested information updates about the *compare* and *contrast* essay writing activity (e.g., participants' digital presence) and pushed them to participants' mobile phones.

With reference to WhatsApp as an instant application, it was used in this study as an instant mobile platform for the *compare* and *contrast* essay writing activity. In this instance, it enabled participants to write synchronous formal essays consisting of conventional sentences and conventional paragraphs that were textism-free. When used in tandem with Moya^{MA}, WhatsApp afforded the instructor and participants the opportunity to have a dual synchronous interaction with each other and with meta-content aspects of the module investigated in this study.

In conclusion, *my*Unisa's ODF was employed in this study as an online meta-content reflection forum on which participants were asked to reflect on the scaffolding they received on Moya^{MA} and on the essays they wrote on WhatsApp. Overall, in this study, the three aforesaid learning tools were integrated for the purpose of supporting participants to engage in synchronous essay writing scaffolding and in instant essay writing. So, when taken together, these three learning support tools were utilised in this study to harness their affordances in a complementary and hybrid way.

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Does Flipped Learning Promote Positive Emotions in Science Education? A Comparison between Traditional and Flipped Classroom Approaches

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Abstract: Flipped learning has become a popular approach for supporting higher education, but less is known about its link with the learners' emotions, which are known to play an important role in science education. The main purpose of this study is to analyse the effects of the flipped learning approach on students' learning emotions. This research utilised a quasi-experimental design with two data collection time points (pre- and post-study). The sample involved 65 students from the science track in one Saudi university. The participants were distributed into two groups, taught by the traditional and the flipped learning methods respectively. Data collection took place over a period of 4 study weeks. The results show that the flipped mode group had obtained higher learning emotions mean score compared to its traditional counterpart, and they showed improvement in learning emotions mean score over the period of the study. The findings indicate that further study is needed both to validate the current study in a different context , and also to determine how the flipped learning environment can better support students' interactions and their emotions.

Keywords: Emotions and learning, flipped learning, university, science education

1. Introduction

Science education primarily aims to develop a specific degree of scientific understanding among individuals to support formal education in schools (Wang and Schmidt, 2001). Higher education reforms have underlined the increasing concerns of the science educational model's capability of arming university students with the required skills to develop their future careers. In fact, several attempts have been made in the science field to tackle the issues that students face including disengagement and negative attitudes towards science education (Howard, 2017), with the approach to which such education is delivered falling short of meeting time demands (Cagande and Jugar, 2018). In this regard, Thornburg (2009) presented five main challenges faced by science students that require addressing by educators to meet societal expectations; 1) lack of qualified teachers, 2) learning science not only as a subject but a dynamic human activity, 3) lack of hands-on sciences learning, 4) learning science as an inquiry and actual process and 5) relating science to other subjects. Other studies such as Jeong, et al., (2019) revealed that traditional teaching methods in science are not effective in instructing students and this increasing concern on the science education quality necessitates a shift from the traditional didactic teaching approach (Weiman, 2008a) for the preparation of students' future career development. Presently, there are different learning methods that have been introduced to keep abreast with the dynamic ongoing societal changes and scientific and technological developments (Sojayapan and Khlaisang, 2018). Undoubtedly, science education is among the top disciplines that could be easily learned through the use of technologies (Cagande and Jugar, 2018). However, Mc Laughlin, et al. (2016) stated that one of the more popular learning methods resulting from the developments in technology and pedagogy is flipped learning. Such learning is based on the principle of active learning and in higher education, literature has, time and again, highlighted the value of the flipped classroom method and its positive effect on the learning outcomes of students (e.g., Kwon and Woo, 2018; Jdaitawi, 2019). In fact, Jdaitawi (2019) claimed that flipped classroom is one approach that could minimize classroom time spent on lectures that are teacher-centered, while at the same time relaying sufficient learning content. Flipped classroom, also known as inverted classroom, is an instructional model, whereby the lecture material that is delivered in the classroom to the students is delivered online instead, before class begins, in order for the students to review, practice and apply knowledge (Sojayapan and Khlaisang, 2018). Other studies like Chen, et al. (2014) and Lai and Hwang (2016) revealed that flipped classroom is an alternative to in-class lectures, equipped with collaborative practical activities and it requires students to revise the course material on their own. Similarly, flipped classroom was described by Burke and Fedorek (2017) and Bergmann and Sams (2012) as an approach whereby the instructor would enable students' display of more in-depth understanding of the material, compared to the traditional approach. It is noteworthy that learning strategies play a key role in

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the outcomes of learning (Yousefzadeh and Salimi, 2015), while relating with the learning emotions of students (Abar and Loken, 2010). Additionally, increasing evidence revealed that non-traditional approaches are more capable of promoting students' positive attitudes and emotions (Roach, 2014). In relation to this, active learning has been often linked with higher degrees of motivation, confidence and critical thinking skills of students, as well as their learning abilities, particularly in science (Machemer and Crawford, 2007; Jeong, et al., 2019). In the same vein, researchers such as (Borrachero, et al., 2014; Fared, Jdaitawi and Sheta, 2018) have connected the learning and teaching process and academic success with the cognitive and affective dimensions. Initially, the constructive theory highlighted the important role of emotional dimensions in teaching and learning environments (Ross, 2012). Literature also indicated that emotions play a crucial role in the learning and teaching process, particularly in science (Pintrich, Marx and Boyle, 1993; Mellado, et al., 2014). Therefore, there is a need to consider emotions in the teaching and learning strategies of a certain course, in a way that controls and regulates affective dimensions which promote positive emotions (e.g., enjoyment and learning pride) (Vazquez and Manassero, 2007; Aydogan, Bozkurt and Coskun, 2015; Brigido, et al. (2010) and Jeong, et al. (2019). Bradford (2005), states that people produced different emotional responses in their daily interaction.

Against this background, flipped learning is able to promote students' positive learning emotions, which could increase their active learning, enjoyment, and accomplishment of their goals. Some other studies highlighted the under-reporting and under-examination of flipped classroom in science studies (e.g., Jeong, Canada and David, 2018; Love, et al., 2013) and the majority of studies in the topic of the flipped classroom examined the performance of students depending on the traditional approach (Patterson, et a., 2015); on different subjects at different study levels (Blair, Maharaj and Primus, 2018), but only a few focused on university students' learning emotions. Hence, in the present study, the effects of flipped learning among first-year university students are investigated by answering the following research questions;

1. Does the use of the flipped learning approach with science students promote positive learning emotions?
2. Do science students, who are taught by the flipped learning approach, obtain better mean scores of positive learning emotions compared to students, who are taught using the traditional approach?

2. Literature Review

2.1 Flipped Learning

A flipped learning approach was described by Sojayapan and Khlaisang (2018) as an instructional strategy that advocates a reversed version of the traditional learning environment wherein, instructional content is delivered online outside of the classroom. It is a learning strategy that brings about learning with the help of technology, particularly with the help of online video media that assist in listening lecturing time and maximizing students' activity time, which can be used in learning cooperatively and practically (De-Lozier and Rhodes, 2017). Moreover, a flipped classroom model is a combination of traditional and online education systems, where in- and out-of-class time is used to facilitate effective learning opportunities and perspectives (Munir, et al., 2018). Furthermore, this approach has been evidenced to bring about self-regulation, engagement, sense of responsibility for work, teamwork and participation in classroom activities among students (Yilmaz, 2017; Panich, 2013).

2.2 Learning-Related Emotions

Academic emotions, based on the control-value theory of academic emotions by Pekrun et al. (2002), stem from value appraisals that the student relates to learning and outcomes of learning well as those relating to learning tasks control. According to Perkun et al. (2002), academic emotions refer to a set of emotions that the students go through when taking part in academic activities (e.g., studying, learning and following instructions). In the learning process, emotional detection is a must (D'Mello, Jackson and Craig, 2008), with positive emotions relating to positive outcomes, high achievement level, high motivation level, informed decision making and skillful problem solving skills (Trigwell, Ellis and Han, 2012; Hannula, 2012; Lewis, et al., 2011; Linnenbrink, et al., 2011). In contrast, negative emotions negatively affect learning (Goetz, et al., 2014).In relation to the above, studies in literature highlighted different emotions that learners experience (Kort, Reilly and Picard, 2001) and these included boredom, confusion, anxiety, appreciation, engagement, motivation, happiness, pride and shame (e.g., Altrabsheh, Cocea and Fallahkhair, 2015). Also, D'Mello, Jackson and Craig, (2008) revealed that positive emotions may lead to increased learning interest, increased engagement in the class and increased motivation among students; and happy students are more motivated to achieve their learning targets. Along a similar line of study, Velayutham and Aldridge (2013) stated that a positive learning environment is a top element of

students' learning motivation, while Pekrun, et al. (2002) revealed that positive emotions are considered to be the core of achieving learning and education goals. Furthermore, flipped learning mode assists in the enhancement of students' performance, reinforces their interest in the course, and promotes their self-efficacy through active learning strategies that can be included as a result of maximized time in the classrooms.

2.3 Role of Flipped Learning in Promoting Positive Emotions Related to Learning

Towards the end of the 20th century, colleges and universities began adopting inverted classroom approach to improve the learning outcomes of students. However, it was not until recently that inverted instruction methods, like flipped learning, have begun to garner attention in higher education, particularly in science courses (Jeong, et al., 2019). It is considered to provide a more suitable learning environment that achieves a significant level of learning in light of affective domains and performance of students (Blair, Maharaj and Primus, 2016; Roach, 2014). The flipped mode assumes that students' participation and engagement in their classroom activities as well as their learning may be enhanced (Jeong, Canada and David, 2018). Added to this, flipped classrooms are able to provide engagement, and in turn, satisfaction and retention of students (Burke and Fedorek, 2017). Generally speaking, the instructional method adopted affects the emotional learning of students (Joeng, et al., 2019). Moreover, the adopted instruction method and its delivery of content may directly impact students' academic emotional experiences (Goetz, et al., 2013). In the case of science courses, Pintrich, Marx and Boyle (1993) found that positive emotions do have a key role in fostering learning. Stated clearly, positive emotional conditions improve students' learning and development of science, whereas negative emotional conditions hinder them (Aydogan, Bozkurt and Coskun, 2015). Hence, a suitable instruction method should be adopted to enhance positive emotions in order that the learning process of students is positively affected (Jeong, et al., 2019). In their study, Jeong, Gonzalez-Gomez and Canada, (2016) demonstrated that university students have positive perception and positive emotions to a flipped classroom setting. The study also suggested confirming its result by conducting another study focusing on the learning-teaching environment. Hao (2016) also surveyed 84 undergraduate students and the statistical result showed that students' felt positive toward flipped learning by agreeing that flipped classroom met their learning needs. Wilson (2013) also found that undergraduate students' attitudes have been statistically positively changed after having a flipped classroom learning experience. However, he suggested examining the effect of flipped classroom on students from different milieus and various classrooms. Although some studies (Jeong, et al., 2016) claim that students taught in flipped classroom may score higher positive emotions than students exposed to traditional methods of teaching, other studies indicate that students' response and attitude towards flipped classroom are not comprehensively positive (Wilson, 2013; Missildine, et al., 2013). Thus, the current study seeks to better understand the flipped classroom method, by investigating the science track students' emotions towards learning of the flipped classroom.

3. Methods

3.1 Design

The research follows a quasi-experimental design with two groups of first year university students. The study involved a quasi-experimental design due to the fact that the design allows the students to be randomly selected from the population and does not require the random assignment of individual cases to the comparison groups (Muthomi and Mbugua, 2014). In addition, the students were assigned by the researcher since they worked with existing streams and students (Nachmias and Nachmias, 2004). The study focused on science track classes with the syllabus including topics and content relating to the subject. As the study's independent variable, is a learning mode with two levels: one group that interacted with a flipped learning mode and another group interacted with the traditional learning mode. The study dependent variable was the learning related emotions, which has two dimensions: 1) emotions related to study and 2) emotions related to test. Flipped and traditional groups were exposed to 4 weeks of learning, given a M1 prior to the study and M2 after completing the study. Both measures were performed through the Statistical Package for the Social Science (SPSS) software.

3.2 Participants

The participants involved in this study were in classes studying a compulsory general course from the Science track. The study subjects comprised two groups of 65 science students of Imam Abdulrahman Bin Faisal University, located in Dammam city in Saudi Arabia. The sample was selected through purposive sampling from two groups of students, as there was a sufficient number of students available for the experiment, along with the suitability of the school's technological equipment in the form of internet and infrastructure. They were randomly divided into flipped (33 students) and traditional classrooms (32 students).

3.3 Procedures

This study was conducted in compliance with the ethical research standards of Imam Abdulrahman Bin Faisal University, as permission was sought from the university's college. Accordingly, prior to participation, the researcher obtained the voluntary participants' permission and they were informed about the goals of the research and its duration. Students were assured that all of their answers would remain confidential and used for this research purpose only. Two groups from the Science track were randomly chosen to participate in this study. Flipped and control groups were exposed to 4 weeks of flipped classroom and traditional learning mode, given a M1 prior to the study and M2 after completing the four weeks of the study. Before the start of the study, students were invited to participate in the study by explaining the study's benefits in terms of desire learning emotions, situation that resulted in student's acceptance. At the of the first meeting, the students completed the learning related emotions M1 data collection. Once the instructor received the M1 data, the instructor started giving students roles in every single session in order to save the session time. The units of instruction used in this study were limited to four topics and sessions (2 hours every session) of the self-communication course syllabus. The communication course topics were taught to students and were discussed and evaluated as well as students work together to correct each other. Furthermore, students were given time to present a practical activity to prove that they mastered the skills. These tasks were worked on out-of class schedules and available to students on the Blackboard platform. Students in the traditional group were taught by lecturing method. After completion the tasks, students were given the learning related emotions scale M2 and feedback was provided.

3.4 Data Collection

To determine students Learning Related Emotions (LRE), a LRE scale was employed twice, at the beginning (M1) of the study and another one at the end (LRE scale M2). The instrument used for collecting data was adopted from Pekrun, Goetz and Perry's (2005). The scale allows identifying emotions experienced by students in their class and during tests through 15 items, distributed in two components, namely: class emotions and tests emotions. Class emotions refers to emotions experienced during classroom instruction such as enjoyment and anger (I enjoy being in class; I am confident when I go to class). Tests emotions refers to emotions occurs after taking tests and exams (I am proud of how well I mastered the exam; I feel panicky when writing an exam).

Learning related emotions scale is a self-report questionnaire with a Likert scales ranged from 1 (strongly disagree to 5 strongly agree. The instrument's content validity was confirmed by five experts. Cronbach's alpha value was also obtained to confirm reliability, which was at 0.91.

4. Data Analysis

This study used SPSS to analyze data, specifically using descriptive statistics, t-test and ANOVA test by conducting a comparison of difference in means. The sensitivity of statistical analysis to non-normality necessitated conducting the skewness and kurtosis normality tests (Tabachnick and Fidell, 2001). Skewness and kurtosis acceptable values lie between ±3.00, 7.00 respectively. The skewness and kurtosis values of the original data set with the original respondents' number (65) are presented in Table 1. It is evident from the tables that the kurtosis and skewness values are acceptable.

Table 1: Results of Normality Measurments

Main Variables	Skewness	Kurtosis
Learning Related Emotion M1	-.591	-.230
Learning Related Emotion M2	-.788	.278

On the basis of the table, data based on the measurements indicated normality as skewness and kurtosis values lie within acceptable range (+1.96, -1.96). In Table 2, values of mean and standard deviation of the M1 and M2 scores are displayed. From the table, the study participants' mean scores revealed an increasing trend over the period of study in terms of learning related emotions. More specifically, M1 prior to the experiment the learning related emotions of the whole sample obtained a mean score of (M=51.27, SD= 12.37), and M2 following the experiment, learning related emotions of the same sample obtained a mean score of (M=60.33, SD= 6.56). For the flipped mode group, the M1 of the learning related emotions scores obtained were (M=50.80, SD=12.39), which were lower compared to its traditional counterpart (M=51.70, SD=12.51). But for the M2 scores, the flipped mode group obtained higher mean scores (M=64.35, SD=4.91) compared to its traditional counterpart (M=56.67, SD=5.70), and they showed improvement in learning emotions mean score over the period of study.

Table 2: Summary Statistics for Learning Related Emotions Scores (N=65)

Variable		Experimental Group	Control Group	Total Sample
Learning Related Emotions	M1 Mean	50.80	51.70	51.27
	SD	12.39	12.51	12.37
	M2 Mean	64.35	56.67	60.33
	SD	4.91	5.70	6.56

The initial analysis was conducted to determine the changes over the study period in terms of learning related emotions, according to 0.05 significance levels. In addition, the paired sample test was conducted to provide the significant difference between the M1 and M2 based on the results the mean scores of learning related emotions of M1 (M=51.27, SD= 12.37) increased to (M=60.33, SD= 6.56) in M2. Based on the paired sample test, the mean difference obtained between M1 and M2, is (M= -9.061, t=-5.537, sig=.000< 0.05) and thus, overall mean scores among science students' learning related emotions improved during the study as shown in Table 3. .

Table 3: Results of Paired Sample Test for Learning Related Emotions

Variable	Mean Diff	t	df	Sig
PretestM1 LREs-M2 LREs	-9.061	-5.537	64	.000

In the second analysis, the differences between flipped mode and traditional mode groups were ascertained in terms of their learning related emotions M2 based on the significance level of 0.05. Based on the independent sample t-test results (refer to Table 4), significant difference was found between the two groups in terms of learning related emotions M2 4, sig=.000< 0.05). Also, ANOVA results (refer to Table 5) supported the significant differences between the groups in terms of learning related emotions M2 scores. Additional investigations into the groups indicated mean and standard deviation values of the flipped learning group scores surpassed those of the traditional learning group.

Table 4: Results of Independent Sample T-test for Learning Related Emotions

Variable		F	Sig	T	Sig.2 tailed
Learning Related Emotions	Equal variance Assumed	2.084	.154	5.784	.000
	Equal Variance not assumed		5.824	62.80	.000

Table 5: Results of ANOVA for between-Subjects Effects of the Learning Related Emotions

	Sum of Squares	Mean Square	F	Sig
Between Group	956.016	956.016	33.451	.000
Within Group	1800.538	28.580		
Total	2756.554			

** P < .05

5. Discussion and Conclusion

The results of this study revealed a significant difference between M1 and M2 scores of students based on their learning emotions. Furthermore, upon examining the M2 scores of the whole sample, it was evident that the learning emotions of the students towards learning were higher compared to the M1 scores. This may be attributed to the opportunities for interaction among students' themselves as well as interaction between students and their instructor in the flipped classroom mode, in addition to the preparation of course content at the students' convenience. Students were enabled to work individually and in groups and this may have assisted their familiarity and clarification of the subject, making it interesting to them and triggering their productivity and motivation via a competitive environment.

In recent times, students are inclined towards technology use in their day-to-day lives and their education as observed by instructors and hence, technological integration into flipped classroom can support their learning and promote their positive emotions towards it. Therefore, it can be stated that students' positive emotional level towards learning comes about through a flipped learning model application. In other words, the flipped learning mode allows students' participation in class activities as evidenced by prior studies. For instance, Hung (2015) indicated that flipped classroom mode promoted class engagements. Also, Jeong, et al. (2019) revealed that it assisted in achieving the students' learning goals and confidently accomplishing in-class activities and also promoting positive emotions. Mattis (2015) indicated that it promotes the students positive experience, while Tune, Sturke and Basile (2013) showed that it increases the motivation among students. Hence, the results

obtained by the present study supports those reported by prior literature on flipped classroom mode's effective promotion of positive emotions towards the learning environment.

The result of this study was consistent with Baepler, Walker and Driessen (2014) study, which compared the effectiveness of the traditional classroom, with two active learning groups (flipped/blended) courses among 340 US university students, on students' satisfaction and their learning outcomes. The result showed statistically significant positive results for students who were taught in both active learning courses compared to their counterparts in the traditional group. Along the same lines, Strayer (2012)'s study compared two groups with different teaching methods. The first group consisted of 23 students having flipped classroom learning, and the second group consisted of 26 students having traditional classroom learning. The result showed statistically that students in the inverted classroom were more cooperative with both their preferred learning environment and their actual classroom experience than students in the traditional group. Smallhorn (2017) also compared students' engagement and their learning outcomes after replacing lectures with flipped classroom method activities. The results of the study showed students' engagement increased statistically with a positive attitude towards the learning method. Therefore, flipped classroom method may explain the increase in students' emotions mean scores from M1 to M2.

From the comparison results, it is evident that a significant difference exists in students' emotions towards learning between a flipped mode group and a traditional mode group. Specifically, students in the former group obtained higher scores in emotional engagement with learning compared to their traditional counterpart. In fact, the highest mean scores were obtained by the flipped learning mode group and thus, flipped learning mode is thus suitable to promote positive emotions of science students towards learning. Along a similar line of study, Aydogan, Bozkurt and Coskun (2015) reported that learning of science is fostered by positive emotional conditions, which leads to the commitment of students as active learners. Moreover, instruction methodology and the way the content is delivered may directly affect the academic emotional experience of the students (Goetz et al., 2013). In other words, flipped learning mode does enhance the positive emotions of students towards learning.

In conclusion, researchers have not yet agreed on the feasibility of the flipped classroom approach and the effectiveness of technology in the learning environment (Hao, 2016). Furthermore, previous studies have highlighted the important role of emotions in the learning process. Pintrich, Marx and Boyle (1993) pointed out that emotions play a key role in achieving significant learning in science courses. In other words, a positive emotional state fosters the learning of science and increases students' commitment in the active learning process; while negative emotions limit the learning ability (Vazquez and Manassero, 2007; Aydogan, Bozkurt and Coskun, 2015). Thus, in order to maximize the benefits of the flipped classroom, the study needs to know students' emotions towards flipped classroom learning experience. Therefore, this study contributed to the literature and confirmed that flipped learning mode is an effective approach to trigger and maintain positive emotions among science students. Students in the flipped learning group indicated higher learning emotions compared to those in the traditional learning group.

6. Recommendations and Limitations

This study experimented with two sample student groups numbering a total of 65 science course students. Because of the small sample size as well as the students were not randomly assigned to the two different learning modes, the generalizability of the findings with the general population should be done with caution. Other studies may reference the study in science education and in other courses and levels. Future works are recommended to increase the number of samples, and select them from various courses and levels for greater generalizability strength. This study was conducted in a short period of time owing to limitations in time, and as such, future studies can conduct a long-term study for accuracy and reliability of findings. Lastly, the study adopted a quantitative method, but future studies can adopt other data collection methods, like the mixed method to obtain the students' opinions and perceptions concerning the flipped classroom learning method.

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Students' Creativity in Virtual vs. Classroom Courses on the Basis of Their Personality Traits: A Prediction Study

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Abstract: The present study aims to compare the creativity of students in virtual and classroom courses at University of Isfahan and study its prediction based on the personality traits of these students. The statistical population of the study consisted of all faculty members and students at University of Isfahan in academic year 2017-2018. Among them, 150 subjects were selected using Morgan Table and random sampling method. The data collection was done through Abedi's Creativity Questionnaire (1993) and Costa and McCrae Personality Questionnaire (1992). Data were analyzed by T-test for independent groups, Pearson correlation coefficient and multiple regression analysis. Results show that there is a significant difference in creativity scores of students attending virtual courses and those attending classroom courses, as well as between female and male students. However, the relationship between personality traits and creativity was significantly stronger among classroom students than the virtual students, and these traits were better predictors of creativity in classroom students than in virtual students. Based on findings, it can be concluded that more usage of the information and communication technologies such as internet, wireless networks, cell phone, etc.(ICTs) by virtual students not only increases their creativity, but also, as an important environmental and intrapersonal factor, affects the relationship between personality traits and creativity among these students and weakens it. This finding shows the great role of acquisitive-digital factors in students' creativity.

Keyword: creativity, personality traits, students, virtual courses, gender differences

1. Introduction

Creativity or creative thinking is among the most important cognitive skills that practitioners in the field of education around the world are interested in examining its nature and its cultivation. The importance of creativity can be emphasized at individual, social, economic, environmental, and educational levels. From the viewpoint of education, the importance of creativity lies in its power to find solutions and solve problems that are in line with life and the changing world. In this regard, Ocon (2006, quoted by Best et al.,2007) believes that innovation and creativity are the only way to survive in a world subject to rapid change, where its security is subject to ever-increasing dangers.

Many years ago, it was thought that creativity was a separate ability specially gifted people, who were able to utilizes this skill and be distinguished in different fields. Lately, psychologists (Craft, 2011, quoted by Nikolopoulou, 2018) argue that creativity is not a special skill or ability of a few individuals, but rather is the result of specific education and learning. Creativity can be regarding as not only a quality finds in exceptional individuals but also as an essential life skill through which people can develop their potential to use their imagination, to express themselves, and to make original and valued choices in their lives. There are many definitions for creativity and innovation that can be examined from different cognitive, behavioral, and cognitive-social perspectives. A first attempt to define the concept was made by Guilford (1986). He believed that creativity covers the most typical capabilities of creative individuals that determine the probability for a person to express a creative behavior, which manifests itself via invention, synthesis, and planning. This behavior seems to be linked with certain personality characteristics, which have speculated whether and how this behavior will be expressed. Getzels and Jackson (1962, quoted by Gunwanan et al., 2018) define creativity as the combination of those elements which are considered original and different. Recently, Santrock (2004) defines creativity as the ability to think about things in new and unusual ways and to reach unique solutions for problems. Some psychologists (torrance,1979, quoted by Pavon and Pavon, 2017) distinguished the qualitative elements of creativity as the flexibility of thinking, the originality of ideas, the ability to think differently, and the ability to solve problems. Torrance test of creativity consists of four subscales: fluidness, expansion, innovation, and flexibility, and now it is one of the most valid tools for measuring creativity.

Regardless of the many varied definitions and perspectives on the nature and dimensions of creativity, one of the key questions in the area of creativity is related to the factors influencing creativity and its development. Hence, over the last few decades, specialists in the fields of education, psychology, and in particular educational

psychology have been interested in looking at the personality traits of the people who are creative, and they have witnessed a new wave of research in this field (Stein, 1974; Torrance, 1998; Batteson, Tormy and Ritchi, 2014; Karwowski, et al., 2013; Latifian, 2014; Pasha Sharifi, 2014; Lotfi, 2016).

There is a long history for the research on the personality traits of creative people and it is not a thing of the recent decades. So far as Stein (1974, as cited in Seif, 2017) has studied the conducted research on personality traits of creative people, he has found the following features: high achievement motivation, high curiosity, discipline orientation and order in the works, the power of self-expression and self-sufficiency, unconventional and ambitious personality, perseverance and discipline in the works, independence, intuition, and the power to influence others. However, Travers (1977) has said that these traits, although suggest the creative person has a lovely and interesting personality, these people are not necessarily the loved ones by their colleagues and associates. In fact, the opposite story is correct. Defining the personality traits for creative people and how it affects their creativity, Torrance (1988) also maintained that personality can both make creativity easier and to be a stoppage for it. This theorist believes that features such as readiness to risk, curiosity, independence in thinking, perseverance and consistency, courage, and engagement in affairs are among the easiest ways to creativity, and features such as dominancy, negativity, resistance, fear, faultfinding, critique of others, compromising, surrender to power, and low self-esteem are the obstacles against creativity. In the same vein, Sternberg (2006) is one of the new theorists who in his theory, entitled " Personality Investment Theory", suggests that creativity consists of six distinct but interlinked sources: the mental abilities, knowledge, styles of thinking, motivation, environment, and personality. From his point of view, personality traits such as the tendency to remove obstacles and to embrace risks and challenges, the tendency to tolerate uncertainty and ambiguity and high self-efficacy with creative performance are related. For example, the results of the research by Karwowski et al. (2013) indicated a positive and significant relationship between the three factors of the big five personality factors: extraversion, openness to experience, and conscientiousness with creative self-efficacy and creative personal identity in students. In sum, these theories and researches can be concluded that these researchers and theorists believe that creativity is something internal and innate and emphasize on the role of innate and internal in creativity, so that instead of creative people, they speak about creative characters. However, creativity is not only influenced by internal factors, and the role of external factors in formation and development is very important.

While the research conducted by neurology experts has shown that all babies and children are born with a kind of innate ability (Zaidel and Struzic, 2014), but it has been observed that, parallel to one's growth, some of these children develop their innate creativity and keep it active, and others do not grow their innate talent. Identifying and understanding the underlying cause of this issue is very easy, and it relates to the role of environmental and educational factors that surround these children. Therefore, one can say that the creativity of an adult is the result of the interactions between the internal and external factors of an individual. External factors affecting creativity have a wide range, the most important of which are institutions such as the family, formal and informal education systems, information and communication technologies (ICTs) and mass media, culture, customs, etc. It can be said that among these factors, in the present era, mass media, the existing ICTs and the structure of educational systems of a society are among the most important factors affecting the creativity of individuals. It is because today, each person spends almost half their lifetime in institutions such as schools and universities, but technology has a very strong presence in all aspects of their life. In fact, in today's world, technologies have been integrated with all aspects of human life, and most importantly, their presence become more important every day. So that schools, high schools and universities are no exception to this and have become a hot spot for the presence and growth of technology. In this regard, theorists and researchers in the fields of psychology and educational technology emphasize on the role of the technologies in developing the creativity of students (Kim, et al., 2018; Coursey, et al., 2018). For example, they believe blogging and digital storytelling tools cultivate creative thinking skills in children and adolescents. On the other hand, according to the social dimension of creativity, researchers in this field believe that the virtual world can act as an inspirational source for fostering creative ideas in the field of art, design, architecture, management, etc., and it can facilitate learning, developing knowledge, and getting feedbacks, critiques and criticism from others. It will lead to the formation of learning groups and make it possible to have access to more advanced tools and utilize them (Elmansy, 2019). In fact, membership in various social networks and channels and virtual groups provide individuals with a huge amount of information, stimuli, ideas, methods, approaches, and styles that all facilitate divergent thinking (Mauroner and Breitenborn, 2014; Perry-Smith and Mannucci, 2015; Rizza, 2017 quoted by Kim, et al., 2018; Mayorer, 2016). Researchers in the field of creativity believe that the impact of information and communication technology on creativity can be beneficial, depending on the extent and type of user's use and their personality

traits (e.g. Kim, et al., 2018; Zhou et al., 2009). In addition, people who possess the motivation and skills to use this technological resources are more creative, competitive, adaptable and employable on the job markets (Pavon and Pavon, 2015) therefore, it can be concluded that research on the relationship between creativity and personality traits with emphasis on the role of ICTs is of particular importance and it has remarkable applications for those who involved in education systems at different level of education. In fact, helping students to think creatively is one of the key goals in higher education. Yet, current criticism on universities around the world suggest that students are not prepared for a world where they are expected to solve messy and unstructured problems that don't have easy answers.

Given the fact that we are currently witnessing the emergence and growth of faculties and virtual and e-learning courses in most universities, both domestic and foreign universities and schools, and as annually, a large number of students are trained through such university courses and are graduated, such students have more technological knowledge in comparison with those who attend classroom courses, and this technological knowledge is an important factor in innovation and creativity (Esjholm, 2019). Also, due to the nature of such colleges and courses, the rate of usage, communication and interaction of virtual course students with ICTs (including the Internet and virtual social networks) is more than students of classroom courses, in the present research, therefore, it is assumed that the degree of creativity of students in virtual courses is more than classroom students. The important point to note here is that the characteristics of the formal-public education system in Iran are such that it not only does not encourage creativity but also suppresses it. due to the large volume of textbooks, the lack of time and a large number of students in the classrooms, teachers only focus on textbooks, and don't consider other books and supplementary activities. They often use lectures method to teach students and do not have access to new educational technologies. Group discussion and question-answers methods are rarely used in the classrooms. The evaluation methods used by the teachers are such that they only measures students' rote memory in classroom assessments conducted by teachers, students' analytical, critical, and creative skills are not emphasized and if a student has a new and creative, but strange idea, it will not be encouraged by teacher and even ridiculed by classmates. Of course, the story does not end here, and all of these problems intensify during high school period. Because, in addition to the cases mentioned above, on the one hand, universities' entrance exams(tests) are only focused on memorizing textbooks content and parents, on the other hand, forced their children to spend all their time on memorizing the textbooks content so that they can enter the university. In this way, the students' creativity body becomes half-dead. This vicious cycle is repeated when these students enter universities and attend to university classes. This is where the half-dead body of students' creativity dies. Now let's see what happens to the creativity of virtual university students. Can e-learning and virtual courses revitalize the half-dead bodies of these students' creativity? In fact, the main question is whether virtual learning can moderate the relationship between personality and creativity in these students as an external moderator variable? And how? Hence the other goal of the present study is to investigate the relationship between students' personality traits and their creativity. Therefore, it is assumed that the relationship between personality traits and creativity in virtual students is weaker than students in classroom courses. In other words, the higher level of creativity in virtual students can be attributed to external factors, such as the higher use of ICTs and better and more diverse quality of virtual education in their universities rather than to their personality and internal factors such as their personality traits.

On the other hand, the results of research on the existence of gender differences in creativity are very heterogeneous, in a way that some of these studies do not show any significant difference in the level of creativity of girls and boys (for example, Chan, 2005; Donell, 2005; He and Wong, 2011). Others have reported girls' scores in creativity tests above boys (for example, Misra, 2003, McCrae et al., 2003; quoted by Baer and Kaufman, 2008), and some others found boys' scores in some of the sub-scales of creativity tests higher than the girls, and in some of them, they are lower than girls (e.g. Fichnova, 2002; Kaufman, under press). In this vein, another objective of this study is to compare the creativity in male and female students.

2. Methodology

Considering the fact that the present study aims to determine the relationship between personality traits and creativity in students, its research design is non-experimental and descriptive-correlational. The statistical population is all students of the classroom and virtual courses at University of Isfahan, Iran, in the academic year 2017-2018. Using the Morgan table and random sampling, 150 of these students were selected as sample groups, of which 75 were in the classroom courses and 75 of them were in virtual classes. From the total, 150 graduate students were selected as sample groups, 77 were female and 73 were male students. Due to the fact

that students of virtual courses at the University of Isfahan can only study in one of the fields of business management, information sciences, women studies, English language studies, law, and Persian language and literature, hence the classroom students were matched with them and selected from the same fields.

3. Research instruments

The tools used in this study include Abedi's Creativity Test and NEO Personality Inventory Test.

1. Abedi Creativity Test. This test was made by Abedi (1993) based on the theory of Torrance creativity and consists of 60 three-choice questions. Choice 1 is scored 1 and the creativity marker is low, the second option is scored 2, indicating moderate creativity, and the third option is scored 3, indicating high creativity. The test has four subscales: fluidness, expansion, innovation, and flexibility. The total score of the subject is obtained from his scores in these four subscales. The overall range of scores in this test is between 60 and 180. Abedi (1993) calculated the validity of the four subscales of this test through the test-retest method and the coefficients of 0.85, 0.84, 0.82, and 0.80 for its four subscales. Also, the internal consistency of this test was calculated by Azmandi, Villa and Abedi (1996, quoted by Rahnama and Abdolmaleki, 2009) by calculating the Cronbach alpha coefficient and its value for the four subscales of this test, the value of which is equal to 0.75, 0.66, 0.61, and 0.61, respectively.
2. NEO Personality Inventory Test (NEO-FFI-R). This test was prepared by Costa and McCrae (1992) and was standardized in Iran by Anbari (2003) in the form of a thesis for Master of Science in Psychology for studying the pre-university students. There are 60 items (questions), all scoring on a five-point Likert scale (strongly agree=5 and strongly disagree=1). The test has five sub-scales that measure five personality traits such as neuroticism, extraversion, conscientiousness, agreeableness, and openness to experience. Anbari (2003) reported the overall reliability of this test by calculating the Cronbach's alpha coefficient as 0.93 and the coefficients of the five factor's reliability are 0.75, 0.82, 0.89, 0.84, and 0.82, respectively. This researcher verified the construct validity of the test using an exploratory factor analysis method, so that the five factors were able to explain 72% of the total variance of the test.

It should be noted that classroom students' questionnaires were distributed in the classrooms and with the prior permission of the deputy of the faculty and the faculty members, and these questionnaires were completed by these students, and the questionnaires related to the students of virtual courses were distributed among them online, along with an accurate and complete instruction, wherein the purpose of investigation and the confidentiality of information, and the manner in which questionnaires were completed and sent were explained. Data analysis was conducted using Pearson correlation coefficient, multiple regression analysis and independent t-test.

4. Research findings

In this section, first descriptive statistics and then research findings are presented.

Table 1: Mean, standard deviation, and minimum and maximum student ages

Age	Number	Mean	SD	Minimum	Maximum
Virtual students	75	29.98	3.56	25	37
Classroom students	75	27.24	3.01	24	31

As shown in Table 1, the age mean for the virtual students is almost 2 years higher than the classroom students.

Table 2: Mean, Standard Deviation, Minimum and Maximum Student Score in Creativity Test

Creativity	Quantity	Mean	SD	Minimum	Maximum
Virtual Students	75	99.59	13.43	90	145
Classroom students	75	80.85	10.15	75	120

As you can see, the mean score of creativity in virtual students, about 19 points is higher than the average score of creativity in classroom students.

Table 3: Mean, standard deviation, minimum and maximum scores related to the NEO-FFI-R in classroom students

Personality Traits	Mean	SD	Minimum	Maximum
neuroticism	20.05	6.86	5	42
Extraversion	28.86	6.32	15	44
Openness to experience	27.45	4.78	17	39
Agreeableness	31.90	5	17	43
Conscientiousness	32.01	6.80	18	48

As shown in Table 3, the average score of students in personality traits in neuroticism is 20.05in extraversion is 28.86, in Openness to experience is 27.45in Agreeableness is 31.90 and in conscientiousness is 32.01.

Table 4: Mean, standard deviation, minimum and maximum scores related to the NEO-FFI-R in virtual students

Personality Traits	Mean	SD	Minimum	Maximum
neuroticism	20.09	7.48	6	46
Extraversion	20.54	3.45	11	34
Openness to experience	30.23	6.88	20	50
Agreeableness	29.02	4.49	16	41
Conscientiousness	34.99	5.78	17	46

As shown in Table 4, the mean score of virtual students in personality trait in neuroticism is 20.09, in extraversion is 20.54, in openness to experience is 30.23, in agreeableness, 29.02, and in conscientiousness is 34.39. Comparison of the results of Table 3 and Table 4 shows that the mean scores for extraversion, agreeableness, are respectively about 8 and 3 scores higher than virtual students, while the mean scores of virtual students in openness to personality traits, experience and conscientiousness are about 3 scores higher than classroom students. In other words, classroom students are more introvert and more consistent than virtual students, while virtual students are more conscient and open to experience than classroom students.

Since one of the objectives of the present study is to compare the creativity of students in virtual and classroom courses, to test this goal, the T test for independent samples was used, the results of which are shown in Table 6. It is necessary to explain that in order to examine the presumption of the normal distribution of the sample, the Kolmogorov-Smirnov test was used, the results of which are given in Table 5.

Table 5: Skewness, kurtosis and normality of the distribution of research variables

Groups	Skewness	standard error of Skewness	kurtosis	standard error of kurtosis	KS	P
Creativity	0.207	0.221	-0.071	0.438	0.537	0.936
neuroticism	0.125	0.221	0.215	0.438	0.701	0.710
Extraversion	0.005	0.221	-0.610	0.438	0.773	0.588
Openness to experience	0.174	0.221	-0.267	0.438	0.683	0.739
Agreeableness	-0.300	0.221	0.165	0.438	1	0.270
Conscientiousness	-0.187	0.221	-0.339	0.438	0.778	0.580

The findings of Table 5 indicate the meeting of the necessary assumptions for conducting relevant statistical analyses. So that the distribution of data in all variables is normal and the data in terms of skewness and kurtosis is in good condition.

Table 6: Independent T-test results to compare the difference between the virtual and classroom students' scores in the creativity test

Creativity	Quantity	Mean	SD	T	P
Classroom	75	80.88	11.15	3.008	0.001
Virtual	75	99.59	13.43		

As can be seen, there is a significant difference between the level of creativity of virtual students and the classroom students ($P \leq 0.001$) and virtual students' score of creativity is higher than that of the classroom

students. In the following, the results of multiple regression analysis are presented to predict students' creativity based on their personality traits.

It is necessary to explain that in order to examine the presumption of the normal distribution of the sample, the Kolmogorov-Smirnov test was used, the results of which previously reported in the table 5.al so, The Durbin-Watson test was used to illustrate the independence of the regression model's residuals(errors). the results of the test showed a lack of autocorrelation between model's errors (because of, the obtained value for Durbin-Watson statistics was 1.713, and it is between 1.5 to 2.5, it is an acceptable value).

Table 7: Pearson correlation coefficients between creativity and NEO-FFI-R in classroom students

Criterion variable	Prediction variable	R	N	Significance Level
	Neuroticism	0.07	75	0.445
	Extraversion	0.29*	75	0.021
	Openness to Experience	0.21*	75	0.001
	Agreeableness	0.24*	75	0.001
	Conscientiousness	0.17	75	0.061

Based on the findings of Table 7, the relationship between the three personality traits of Extraversion, Openness to experience, and Agreeableness with creativity is positive and significant in classroom students. This means that with increasing scores of extraversions, openness to experience and agreeableness, creativity scores also increase in these students.

Table 8: Pearson correlation coefficients between creativity and NEO-FFI-R in virtual students

Criterion variable	Prediction variable	R	N	Significance Level
	Neuroticism	- 0.09	75	0.489
	Extraversion	0.18	75	0.069
	Openness to Experience	0.19	75	0.051
	Agreeableness	0.16	75	0.074
	Conscientiousness	0.17	75	0.061

Based on the findings of Table 8, although the relation between the four personality traits of extraversion, openness to experience, agreeableness, and conscientiousness with creativity is relatively good in virtual students (the range of these correlations varies from 0.16 to 0.19), but none of these relationships is significant. Multiple regression analysis was used to more accurately determine these relationships, as well as to determine the share of each of the predictor variables (personality traits) in explaining the criterion variable (creativity), in the students of classroom and virtual courses, that are reported in the following tables.

Table 9: Multiple correlation coefficient (regression coefficient) to predict creativity in students of classroom courses

	R	**R^2**	**Adjusted R^2**	**Standard error of the mean**
Model	0.385	0.148	0.111	15.59

The results of Table 9 show that the reported values for R, R^2, and adjusted R^2 are at the acceptable level and indicate the fit of the regression model. Also, considering the significance of F in analysis of variance of personality scores and creativity (P<.01 and F = 3.96), the effect of predictive variable on the criterion variable can be statistically accepted. Since the value of the regression coefficient is significant, the standardized and non-standardized regression coefficients table can be used to determine the significance of the predictor variable in determining the criterion variable.

Table 10: Standardized and non-standardized regression coefficients

	Non-Standardized coefficient		Standardized coefficient		
Variables	B	standard deviation	Beta	T	Significance Level
(constant)	107.917	17.896	-	6.142	0.000
Neuroticism	0.029	0. 249	0.019	0.106	0.949
Extraversion	0.722	0.292	0.276	2.473	0.015
Openness	0.897	0.397	0.328	3.454	0.021
Agreeableness	0.738	0.361	0.223	2.046	0.043
Conscientiousness	0.032	0.274	0.013	0.117	0.907

With regard to the significant levels reported in Table 10, three dimensions of the five dimensions of personality can predict the level of creativity in the classroom students. Regarding the reported values for beta coefficients, the change in the size of a standard deviation in the personality traits of extraversion, openness to experience, and agreeableness, respectively, resulted in,0.276, 0.328, and 0.223 of the standard deviation of the change in creativity of these students. According to the above table, the regression equation is as follows.

(0.738 × agreeableness) + (0.897× openness to experience) + (0.722× extraversion) + 107.917 = Creativity of classroom students

In the above equation, the number 107.917 is constant and the regression coefficient for extraversion is 0.722, for openness to experience is 0.897 and for agreeableness, it is 0.738.

It should be noted that multiple regression analysis was used to predict the creativity of virtual students. The following table gives the results.

Table 11: Multiple correlation coefficient (regression coefficient) for the prediction of creativity in virtual students

	R	**R^2**	**Adjusted R^2**	**Standard error of the mean**
Model	0.342	0.117	0.102	14.99

The reported values for R, R^2, and adjusted R^2, in Table 11 are at an acceptable level and indicate the fit of the regression model. Also, with regard to the significance of F in variance analysis test of personality and creativity scores, the effect of predictive variable on the criterion variable can be accepted statistically ($P < 0.05$, $F = 3.13$).

Table 12: Standardized and non-standardized regression coefficients

	Non-Standardized coefficient		Standardized coefficient		
Variables	B	standard deviation	Beta	T	Significance Level
(Constant)	103.256	16.820-	-	5.103	0.000
Neuroticism	0.027	0. 265	0.002	0.012	0.179
Extraversion	0.123	0.292	0.076	0.473	0.129
Openness	0.072	0.310	0.001	0.022	0.144
Agreeableness	0.039	0.261	0.223	0.046	0.806
Conscientiousness	0.687	0.274	0.213	2.236	0.037

With regard to the significant levels reported in Table 12, conscientiousness is only among the five dimensions of personality able to predict the level of creativity in virtual students. Regarding the reported values for beta coefficients, a change in the magnitude of a standard deviation in conscientiousness personality leads to a change in the standard deviation of students' creativity by 0.213. According to the above table, the regression equation is as follows.

(Conscientiousness × 0.687) + 103.256 = Virtual Students' Creativity
In the above equation, the number 103.256 is the constant in the regression and the regression coefficient for conscientiousness is 0.687.

In order to examine the difference between creativity of female and male students, the independent t-test was used.it should be mentioned that the assumptions of independency and homogeneity of the variances were checked in groups. Levine's test was used to check the homogeneity of the variances. The results of the test showed the homogeneity of the variances (F= 0.317, P≤. 0.598).

Table 13: The results of independent t-test for examining the difference between general creativity and quadruple subscales of creativity in male and female students

Creativity	Group	Quantity	Mean	Standard Deviation	T	Significance Level
Innovation	Girls	77	20.96	3.78	4.05*	0.003
	Boys	73	25.89	4.95		
Fluidness	Girls	77	28.51	4.42	8.52*	0.001
Fluidness	Boys	73	22.42	3.20		
Flexibility	Girls	77	26.54	5.77	4.96*	0.011
Flexibility	Boys	73	21.22	3.51		
Expansion	Girls	77	23.28	4.66	9.11*	0.001
Expansion	Boys	73	29.34	5.56		
Total Score	Girls	77	99.29	4.66	1.12	0.234
Total Score	Boys	73	98.87	4.31		

Findings of Table 13 show that although the total score of girls and boys in the creativity test is not significantly different, female students have significantly higher scores in fluidness subscales (P ≤ 0.01) and Flexibility (P≤0.05), while male students received significantly higher scores in innovation subscales (P ≤0.05) and expansion (P≤0.01) in comparison with female students.

5. Discussion and Conclusion

The purpose of this study was to compare the creativity of virtual and classroom students at the University of Isfahan and study its prediction based on the students' personality traits. The findings of the research showed that students of virtual courses have significantly higher creativity than classroom students. These findings are in line with the findings of Nachmias and Shany (2002). By studying 110 students from the eighth and ninth grades who enrolled and participated in an online classroom, they found that among these students, there is a positive and significant relationship between the Liberal Learning Style (from the six learning styles that Sternberg suggests in his theory of Mental Self Government) and creativity. It should be noted that people with a tendency to a liberal learning style have elements of inner motivation. The researchers conclude that the conceptual technological knowledge is small and it constrains the students' abilities in innovation, geniality, and creativity, and vice versa. Therefore, it can be concluded that the virtual students in this study were equipped with more technological knowledge and this has made them more creative. The other possible reason for the greater creativity of the virtual students is related to the better quality of virtual courses. Because the professor of the virtual universities compare to their counterparts in face-to-face universities does not have any limitations in terms of time and space, so, they provide the students with a variety of educational contents in terms of content and format. For example, e-books, articles, educational videos, slides, pictures etc. The students also have no time and space limitations. they can deal with these contents according to their personal learning styles. They can access these contents quickly and whenever they want. Virtual university professors also use a variety of methods to evaluate their students. Their evaluations are usually done with the aim of assessing the high level of the Bloom's cognitive goals such as analytical, critical and creative skills, and all of these increase the creative potential of the students. The findings of the European commission's survey (2014-2015) supports these points, so that 80% of teachers and students considered as important the ICT tools: computers, educational software, videos, online collaborative learning tools, virtual learning environments, interactive whiteboards, online free material, and online courses. In this regard, Loveless (2007) investigated the characteristics of the digital technologies that allow learners to be creative: interactivity, multiple types/forms of information, range, speed, and automatic functions, characteristics that allows users to do things that could not be done as effectively, or at all, by using other tools. For example, ICT tools enables users to make changes, to try out alternatives, and to keep the traces of the development of their ideas. Interactivity engages the learners-users at different levels, from playing games (which provide feedback to users' decisions) to monitoring-recording the results of an experiment (which again provide immediate and dynamic feedback). Additionally, the speed and automatic

functions allows the ICT operations of storage, transformation, and display of information, so that students can engages in higher cognitive levels (e.g., interpretation, analysis, and synthesis of information). The recognition of the specific characteristics of the digital technologies (ICT tools) allows learners and teachers to decide when and how to use them. One of the key affordances of the digital technologies is that content or knowledge can be created, shared, and discovered much more quickly and easily (Henriksen, Mishra and Fisser, 2016, quoted by Nikolopoulou, 2018). The new technologies have much to offer to the world of creative sharing: for example, new applications for content development/creation, sharing videos/ audio/images across global contexts, and websites that allows the diverse creators to share content (such as YouTube).

The findings showed that the classroom students are more extrovert and have more agreeability than the virtual students, while the virtual students are more open to experience and have more Conscientiousness than the classroom students. These findings are consistent with Cohen and Baruth's research findings (2017), Denphaisarry (2014, quoted by Kim, et al., 2018), Ramirez-Corea, et al. (2016) and Kim, et al. (2018). By studying virtual students, the researchers found that the three personality traits of openness to experience, conscientiousness and agreeableness were the best predictors for making these students satisfied with the virtual courses. The results of the Denphaisarry's research suggests a strong, meaningful and positive relationship between the conscientiousness personality trait and attitudes toward technologies, and a strong, meaningful negative relationship between the extraversion personality trait and attitudes toward technologies in students. Ramirez-Corea, et al. (2019) also, indicate that the personality type plays an essential role as a moderator of the technology acceptance at work. Kim, et al. (2018) in their article entitled 'Social Networks and Individual Creativity: The Role of Individual Differences' have pointed out that the extent to which individuals take advantage of their social ties may vary depending on individual characteristics, based on the componential model and the investment theory of the creativity. Building on an interactional approach, they explored the role of individual differences in the relationship between social networks and individual creativity and have proposed that weak ties enhances the creativity when information recipients are highly open to experience, have more domain knowledge, have an innovative style, and are intrinsically motivated.

Probably, one of the reasons for turning these students into virtual universities is their being introvert, which makes them more interested in communicating with the cold world than connecting with the warm and human world and attending classrooms. It can also be said that virtual students are likely to have more self-regulatory and self-controlling skills; therefore, they are more responsible (Conscientiousness) and task-oriented than the classroom students and have more time management skills. Thus, without direct supervision and control of the professors and other monitoring systems are able to carry out their study assignments and tasks.

The Findings also showed that the relationship between personality traits and creativity was stronger among classroom students than virtual students, so that the three personality traits of extraversion, openness to experience and agreeableness were able to significantly predict creativity in these students. While the only significant predictor of the creativity in the virtual students was the conscientiousness personality trait. These findings suggest that, in today's digital age, learners' cognitive abilities and creativity are more influenced by the factors that are in the outside world than they are influenced by their personal and internal factors, such as the educational systems and the cultural tools that these systems possess. These tools include digital technologies such as the internet, social networks, virtual worlds, etc., which not only enhance the technological knowledge of the learners, but also facilitates their creativity and innovation with their capacities (Esjholm, 2019). These findings are in line with the research results and theories of the educational technology field, including Mauroner and Breitenborn, 2014; Perry-Smith and Mannucci, 2015; Rizza, 2017, quoted by Kim, et al., 2018; Mauroner, 2016. According to the present study findings, it is suggested that the professors of the face- to-face universities also, use blended /combined learning methods. The methods such as synchronous and asynchronous e-learning. In synchronous learning, the learners and the teachers are online and interact at the same time from different locations. They deliver and receive the learning resources via mobile, video conference, internet or chat. In this type of learning the participants can share their ideas during the session and interact with each other and they get detailed queries and solutions. In asynchronous e-learning, the learner and the teacher cannot be online at the same time. Asynchronous e-learning may use the technologies such as email, blogs, discussion forums, eBook's CD, DVD, etc. Learners may learn at any time, download documents, and chat with teachers and also with co-learners.

Findings of the present study showed that male and female students have a significant difference in terms of the dimensions of creativity. Girls have lower scores in innovation and expansion, and boys have lower scores in flexibility and fluidity. However, the difference of their overall score in creativity is not significant. These findings

are consistent with the findings of Fichnova, 2002, Abraham,2015; Matud, Rodriguez, and Grande, 2007; He and Wong, 2011; and Kufman (under publication). Such differences can be attributed to the role of internal or genetic factors, especially to the different brain functions and structures of girls and boys, as well as to the socialization and acquired cultural-social factors.

Regarding gender differences in the brain functions or structures, it can be said that some studies have taken gender differences in to account as a covariate or interactional factor in interpreting the relation between creativity and brain structure and function (e.g., Takeuchi, et al., 2015). To date, only two EEG studies (Fink and Neubauer, 2006; Razumnikova,2004), one structural neuroimaging study (Ryman et.al.,2014), and one functional neuroimaging study (Abraham, 2014) have been published which specifically addressed the question of the gender-based brain-related differences in creativity (Abraham, 2015). Fink and Neubauer (2006) found that although no behavioral differences emerged between the sexes on a measure of originality, males and females of different verbal ability significantly differed with respect to task-related synchronization of EEG alpha activity in their anterior region of the cortex. Females in the high ability group demonstrated stronger synchronization with originality than those of average verbal intelligence, whereas the opposite pattern was seen among males. Razumnikova (2004), in contrast suggested that gender differences are instantiated in terms of the hemispheric organization of the brain activity during creative thinking. Ryman's et al. (2014) findings also shows gender differences in the pattern of the white matter connectivity between brain regions, particularly within the default mode and cognitive control networks, as a function of creative ability.

Abraham (2015) believes that sociocultural explanations have been more widely discussed in the context of accounting for gender differences in behavioral performance, particularly in the context of creativity. Societal, cultural and socialization factors have been put forward to explain why men and women demonstrates different levels of creative achievements. Societal constraints include different standards of success for men and women, women not being allowed to participate to the same degree as men in different spheres of life, and active discrimination which negatively impacts access to the resources that are essential for achievement in the certain fields (Simonton, 1992, quoted by Pagnani, 2011).

Cultural factors also have an enormous impact on creativity as cultures differ considerably with regard to gender-based rules, roles and assumptions. Not only are cross-culture differences reflected in the pattern of the gender-related creative achievement, but even transformations within a culture also accompany changes in gender-related differences in creative achievement (Simonton, 1992, quoted by Pagnani, 2011).

Socialization differences have also been put forward to explain gender differences in creativity (Piirto, 1991, quoted by Matud, Rodriguez and Grande, 2007). These include gender labeling, different perceptions and expectations for daughters compared to sons, variation in schooling and other important resources.

One of the research constraints is the selection of a sample group from among the undergraduate students of the University of Isfahan, which makes it impossible to extend the results to other students and other universities and institutes of higher education. Due to the fact that researches have shown that there is significant relationship between education level, field of study and students' creativity (e.g., Matud, Rodriguez and Grande, 2007) therefore, the findings of the present study should be generalized to other students with caution. For example, Matud, Rodriguez and Grande (2007) examine the relevance of sociodemographic factors on gender differences in creative thinking. They assessed their subject's creativity thinking with the figural and verbal Torrance test of creative thinking (TTCT) and found statically significant interaction between gender and educational levels on figural fluency, figural originality, resistance to premature closure, figural creativity index, and verbal TTCT scores of fluency, originality, and average standard scores. The women with a university education level scored higher than those with secondary educational levels on all measures. It is recommended that the next researchers select its sample group from other education levels and other universities. In addition, the majority of the classroom students at the University of Isfahan are natives and come from small towns and villages around the Isfahan. Many of these students have limited access to information and communication technologies (ICTs) and digital devices such as laptops, iPads, smartphones, and high-speed Internet. Therefore, caution should be exercised when generalizing the results of the present study to the students of the universities in the large cities and the capital. Given the impact of technology on the creativity of learners, researchers who are interested in the field of creativity, using experimental designs that are conducted under fully controlled conditions, study the impact of the technologies such as virtual social networks on the learners' creativity.

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EFL Learners' Perspectives on the use of Smartphones in Higher Education Settings in Slovakia

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Abstract: MALL (Mobile assisted language learning) affords new opportunities for EFL (English as a foreign language) learners and teachers. Research on MALL is still in its infancy in Slovakia, and this paper attempts to fill in this gap by examining students' perception and attitudes towards the use of smartphones for the purposes of learning and practicing English. The target population of this study constituted of the Slovak university EFL learners whose major was Teacher Training of English Language and Literature (n = 77) at a Slovak university. The research method employed to achieve the objectives of this study was a 5-point Likert scale questionnaire, comprising of two sets of statements: general and out-of-the-classroom statements with a total of 29 items. The research results for both sets of statements imply that the participants display moderately positive attitudes towards smartphones in the context of EFL learning. However, the findings also reveal some issues surrounding the perception and potential use of smartphones such as the inability to plan students' language learning appropriately and effectively, general underuse of smartphone apps, or problems related to practicing speaking skills. The results further suggest the immediate need to develop and enhance the awareness of smartphones and their potential in the process of teaching and learning English so that the EFL learners can utilize considerable opportunities these smart devices offer. Finally, the limitations of this study are recognized, and it is emphasized that conducting further research in this area is urgently needed.

Keywords: EFL learner, mobile learning, smartphone and language learning, attitudes and perceptions, process of learning English

1. Introduction

Modern technologies have caused changes in every sphere of human activity and it is also education which has served as a focus of technological intervention for some time (Straková and Cimermanová, 2018). "Educational practices are constantly adjusting to technological advances, in order to improve their effectiveness in delivering knowledge and preparing students for the challenges of modern digital society" (Rovithis, et al., 2019, p.144), which offers a possibility of enhancing educational practices and approaches.

The modern-day English language is linked with advancements in many fields (e.g. tourism, trade, science, etc.) including innovations in technology (Kandasamy and Habil, 2018; Namaziandost, Shatalebi and Nasri, 2019). Mobile devices, which occupy a powerful role with regard to the implementation of technology into the teaching and learning process (Klímová, 2018), have become indispensable for modern society as contemporary issues call for effective communication in foreign languages (Nikolajová-Kupferschmidtová, Štubňa and Kučmová-Lenzi, 2018; Štubňa, 2019), including English.

However, it should be also noted that in order to recognize and obtain the benefits of implementing technology into the teaching and learning process, teachers ought to be able to use technology appropriately and effectively within their practice. The increasing trend in the shift from the use of computers to the use of smartphones merits attention of instructors and researchers, and numerous aspects concerning the implementation of mobile devices into teaching and learning English (extent, manner, frequency, etc.) ought to be investigated and elucidated. This paper attempts to contribute the attitudes of Slovak EFL learners towards smartphones to the research agenda on smartphones in the context of English language learning.

2. Research background

The smartphone is regarded as a handy and multipurpose mobile device that assists people to perform their daily and professional activities and duties (Almunawar, et al.,2015; Anshari, et. al., 2019). However, finding a satisfactory definition of the word smartphone in the literature is a formidable task. "Despite the lack of a standard definition, the term *smartphone* generally refers to a mobile phone offering some computer-like functionalities, including Internet access" (Kim, Chun and Lee, 2014). These smart devices include sophisticated hardware along with the clearly identifiable operating system (e.g. Android, Blackberry, Apple's iOS, Windows Phone, etc).

The operating system allows the installation of the third-party applications (apps) from application markets such as Android Market, BlackBerry App World, or App Store (Theoharidou, Mylonas and Gritzalis, 2012). This is also the reason why smartphones are technologically superior to standard mobile phones (Barrs, 2011); EFL learners are able to install a high number of English language learning apps (based on their personal preference), and use them whenever and wherever they want. This can be regarded as a considerable benefit which regular mobile phones were not able to provide.

Smartphones are built on an operating system, and they have more advanced connectivity and computing capability when compared to standard phones, which means that they can be regarded as mini computers that are regular cell phones at the same time (Yaman, Şenel and Yeşilel, 2015). Thus, smartphone users have plenty of opportunity to perform a high number of tasks of various types using these smart devices.

The number of people owning a smartphone has increased significantly in recent years. There are over three billion smartphone users in the world today, and the number is forecast to further grow by several hundred million in years to come (Statista, 2019). Therefore, smartphones are likely to influence the teaching and learning process in the future to an even greater degree (they are already exerting a powerful impact on educational practices worldwide), and the question arises as to how smartphones can be used within the educational process, and what the attitudes of EFL learners towards these smart devices are.

Smartphones, which demonstrate tremendous potential for becoming a useful gadget in EFL classes, may help students become more autonomous, also by offering independent access to various materials via the Internet (Yaman, Şenel and Yeşilel, 2015). The importance of smartphones is also acknowledged by Alzubi and Singh (2017), who indicate that more control over the learning process can be achieved by learners, and they are able to connect to other learners. “Today, the smartphone is the latest invention in mobile technology which has gained popularity and attention of academia” (Abdullah, Tajuddin and Soon, 2019, p. 61). The significance of smartphones is undeniable, but one must take both advantages and disadvantages into account.

One of the key advantages of smartphones is that its users can be connected to the Internet anytime and anywhere, hence the possibility for working outside offices, studying outside schools, cooperating on home assignments, projects, or seminar papers at students’ home.

Another considerable benefit results from the advantages English language learning apps offer (a substantial number of applications can be installed into smartphones). According to Rosell-Aguliar (2014), the likelihood that one application will offer all the solutions students need regarding language learning is rather low. This can be, however, solved by installing further apps for various learning purposes such as developing vocabulary, honing listening skills, or practicing reading subskills. “This is the best thing that apps can bring: a portable solution to every learning style which can suit different language learning skill requirements: grammar, vocabulary, reading, listening, writing or speaking” (Rosell-Aguilar, 2014). EFL learners can actually practice all the language systems and skills by choosing the appropriate application. Hossain (2018) mentions the following benefits students can experience with English language learning apps:

- practice any item of the language anytime anywhere;
- the smartphones and the apps are portable;
- the learners don’t have to carry books, pen and paper;
- they can take tests on the different skills of the target language;
- they can share their proficiency with their friends through the same device;
- they can practice the four skills of the target language on the same device;
- on the apps, they can have lessons and tips on the different skills;
- they can have knowledge and fun together;
- they can be technologically advanced and linguistically benefited simultaneously;
- they can get the apps for free;
- apps can accompany them 24/7 like an expert teacher on the target language.

Therefore, EFL learners have a possibility to choose when, where, how they can work on their language systems and skills according to their personal needs and weaknesses they suffer from concerning particular aspects of the English language. Furthermore, they can do this without books, pen or paper, with a chance of sharing their success with their peers, possibly having fun and acquiring knowledge at the same time.

On the other hand, there are also some drawbacks that need to be overcome by both EFL teachers and learners. Since the app developers are working 24/7, the number of applications on the market is enormous, and one might experience difficulties in choosing the appropriate ones. Therefore, finding the proper apps within the vast number of applications requires time. Moreover, the functionality of some apps may be questionable at times; some of them may have bugs that need to be eventually eliminated by the developers.

3. Literature review

Attitudes and perceptions of EFL learners towards smartphones in the EFL classroom have been explored in numerous studies with interesting outcomes as illustrated in the following paragraphs.

Abdullah, Tajuddin and Soon (2019) explored how Mandarin students perceive smartphone applications as well as its usability, effectiveness, and satisfaction. The findings revealed that learning Mandarin by means of smartphone applications influenced their language performance, task accomplishment, and personal study in a positive way. Moreover, learners were engaging, satisfied, and willing to proceed with using smartphones in their study.

Another study by Tayan (2017) attempted to examine thoughts, reflections, attitudes, and perceptions of mobile device/smartphone adoption in order to facilitate and support the contemporary classroom approach to EFL learning. The findings of the study, based on the student questionnaire and teacher interviews, generally highlight positive attitudes and receptiveness towards the implementation of mobile learning. Moreover, the results revealed that learners' autonomy was facilitated, and the students could collaborate to a greater extent within a richer learning environment.

The research results of the study carried out by Sarhandi, Bajnaid and Elyas (2017) demonstrate that students indicated a significant difference in their emotional attitudes towards smartphone activities when compared to the paper-based ones, demonstrating a considerably higher level of task engagement. On the other hand, White and Mills (2014) found out that although learners are increasingly adopting smartphones when it comes to personal usage, they appear to be unwilling to utilise smartphones for the purposes of education, based on the current application use. However, attitudes towards employing smartphones for learning have become more positive within the twelve-month period during which the attitudes towards the use of technology were examined.

Some scholars attempted to examine the notions of motivation and anxiety in relation to learning a foreign language. Several studies (Baluha, Marques and Martins, 2015; Tayan, 2017; Teodorescu, 2015) revealed that learners who use mobile phones or smartphones and their apps seem to be more motivated to learn in the classroom as well as outside the classroom, experiencing a lower level of anxiety (Luo, et. al., 2015). It should be mentioned that anxiety represents one of the key matters within language learning, and several scholars explored anxiety from different standpoints (see, for example, Woods and Scott, 2016 or Machmud, 2018).

In their study Ansarin, et. al, (2017) attempted to investigate the students' attitudes towards smartphones and tablets. The findings revealed that both tablets and smartphones were evaluated positively – increasing students' motivation to study and being a means to develop reading comprehension, spelling, and vocabulary. Nonetheless, the learners' expectations regarding the impact of these devices on students' reading speed, test and quiz preparation as well as comfort and enjoyment were not reached.

Several studies, offering different outcomes, also concentrated on the perception of mobile devices/smartphones by teachers. The research results in the study conducted by Abugohar, Yunus and Rashid (2019) show that most of the participants (teachers) reflect high, inspiring, and positive perceptions of using smartphone apps in teaching speaking. It was also Alzubi (2019) who examined attitudes of EFL teachers to smartphones in the Kingdom of Saudi Arabia. The findings revealed that most of the participants supported the notion of integrating smartphones in the EFL context. Another study conducted by Ozdamli and Uzunboylu (2015) compared teachers' and students' perceptions and abilities regarding m-learning. The authors concluded that both teachers and students are in favour of using m-learning in education; their perceptions are positive, but their adequacy levels concerning m-learning do not seem to be sufficient. Kafyulilo's study (2014) showed that students, pre-service teachers, and college instructors supported the notion of using mobile phones for the purposes of learning, but most of the in-service teachers were against it.

The above-mentioned studies reveal that apart from positive perceptions of smartphones, there seem to exist some doubts and hindrances concerning their use in the EFL settings. Various issues can be raised when mobile technology platforms are adopted for the purposes of learning such as the price of the device, physical properties (e.g. small screen, small keyboard, limited data storage, limited battery life, etc.), reluctance to use smartphones for learning, learners' distraction, or teachers' willingness and readiness to employ these devices as educational tools (Aljaloud, et. al., 2019; Ismail, et. al., 2013; Metruk, 2019; Metruk, 2020). These are definitely issues that warrant attention of teachers and researchers worldwide and which need to be dealt with and resolved soon.

Margaryan, Littlejohn and Vojt, (2011) explored the extent and nature of university students' use of digital technologies regarding socializing and learning. This study did not produce evidence which would support general assertions that young people adopt radically different learning styles. The attitudes of the students towards learning seem to be influenced by lecturers' teaching approaches. The learners appear to adhere to traditional pedagogies, with minor use of tools that deliver content. "The outcomes suggest that although the calls for transformations in education may be legitimate it would be misleading to ground the arguments for such change in students' shifting patterns of learning and technology use" (Ibid.). Therefore, not all young people necessarily cultivate markedly different learning styles, teaching approaches exerting noticeable impact on learning.

Kim, et. al. (2013) explain that although numerous teachers and instructors already use technology in their classes, they ought to consider modifying existing activities so as to make them more meaningful and practical for language learning when mobile technologies are employed. This demonstrates the importance of using technologies appropriately and effectively – to tailor them for learning purposes, making the tasks and exercises meaningful.

Kukulska-Hulme (2009) draws attention to another related issue. Mobile technology often takes learning outside the classroom, frequently beyond the teacher's reach. This can be viewed as a certain type of threat, and the challenge lies in developing designs that would clearly identify what is best learnt in the classroom, what is best learnt outside, and the ways by which the connections between the two settings would be made. It seems that some harmony needs to be achieved between learning inside and outside the classroom as these two notions are clearly linked.

Ebadi and Bashiri (2018) examined the EFL learners' viewpoints on their experiences with vocabulary learning using a smartphone application. The research results suggest that the learners displayed positive attitudes towards the smartphone app since it influenced their learning in a positive way and provided them with form and meaning-focused instruction. However, the participants were not satisfied with the app's levels and authenticity, which represents one of the issues connected with smartphone applications (this has been discussed earlier).

The research performed by Şad and Göktaş (2014) explored how pre-service teachers perceived m-phones and laptops as mobile learning tools in education. The results suggested that the pre-service teachers' perception of laptops was potentially stronger than that of m-phones. Generally, the attitudes towards the use of laptops were not extremely positive, but significantly more positive than those of m-phones. The research results further indicate that there exists an urgent need to develop and increase the awareness of the m-learning (especially m-learning through m-phones) concept among the participants. Thus, this study also suggests that m-learning is not always perceived positively, and that the positive attitudes need to be somehow developed, also by raising awareness of m-learning.

In the light of the literature review and due to the fact that such research is absent in the Slovak context, this study attempts to verify the previous findings regarding the perception of smartphones in relation to their use in the process of teaching and learning English. Moreover, it is hoped that the outcomes of this paper will provide suggestions and recommendations for further exploration in this field.

4. Research methodology

4.1 Research design

The objective of this study is to investigate the attitudes of Slovak university EFL students towards employing smartphones in the EFL settings. The study was conducted in Slovakia using convenience sampling. The subjects were given two sets of statements via the research method questionnaire, which was distributed electronically using the Google Forms survey administration application, and they were asked to choose one of the five options: strongly agree, agree, neutral, disagree, strongly disagree (a Likert scale of 1 [strongly disagree]) to 5 [strongly agree] was adopted). The two sets of statements were comprised of the general statements (10 statements) and outside-the-classroom statements (19 statements). After the data were obtained, they were analysed, interpreted, and conclusions were drawn. The following research questions were formulated:

1. What are the university EFL students' general perceptions and attitudes towards the use of smartphones for the purposes of learning English?
2. What are the university EFL students' perceptions and attitudes towards the use of smartphones for the purposes of learning English outside the EFL classes?

4.2 Sampling

The target population was formed by B.A. and M.A. students of the study program Teacher Training of English Language and Literature at a Slovak university – convenience sampling. The total research sample (n = 77) comprised of 60 females (77.9%) and 17 males (22.1%). They were approximately 22 years of age on average, all of them having Slovak nationality, residing in Slovakia. The year they were studying in at the time of this research is shown in Figure 1.

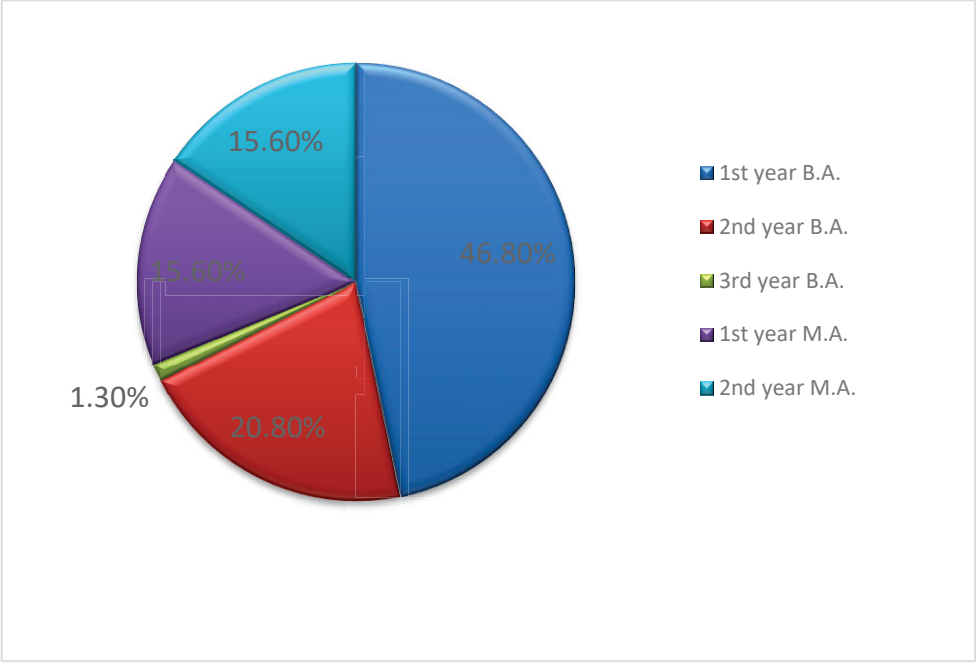

Figure 1: Subjects' year of study

In order to gather more information on the participants, they were asked to reveal which brand of smartphones they use. Figure 2 illustrates their smartphone ownership. Apple, Huawei, and Samsung earned most of the mentions (respectively), followed by Honor, Lenovo, Motorola, Nokia, and LG. Other brands (8) included OnePlus, Allview, Microsoft, Sony, Acer, Bluboo, Gigabyte, and Asus.

Apple, Samsung, and Huawei were prevalent among the research participants, which shows that there are differences not only between the smartphone operating systems, but also within the applications used as apps are developed differently for the two operating systems. The knowledge of smartphone brand enables teachers and researchers to achieve a deeper understanding of attitudes of EFL learners to smartphones in the context of English language learning.

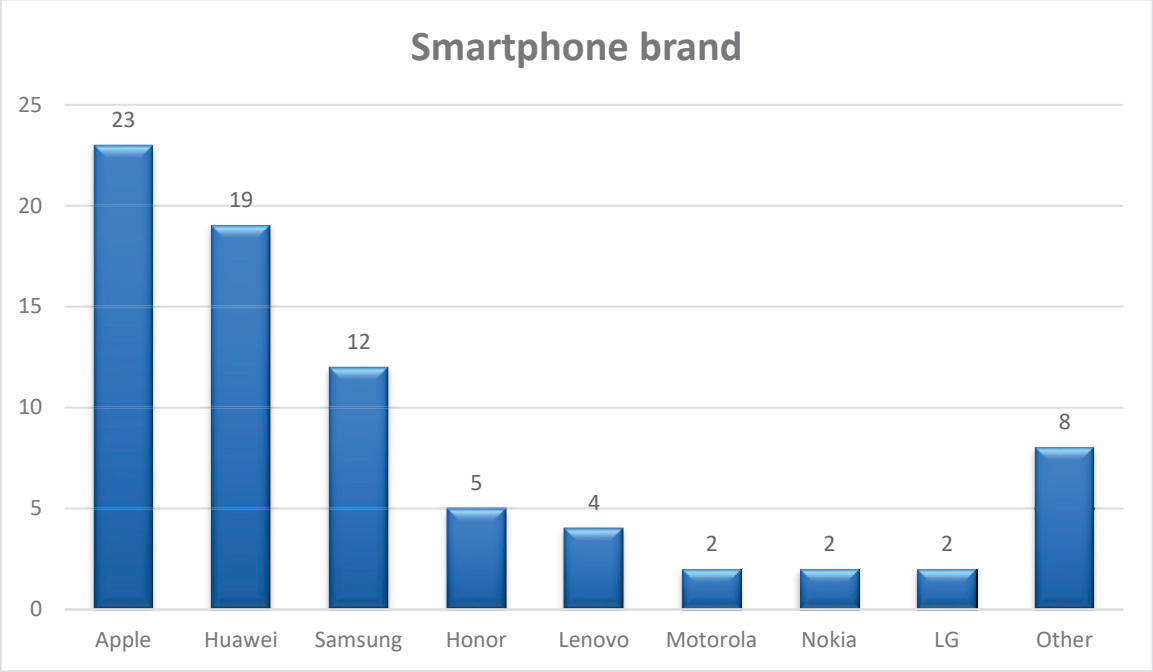

Figure 2: Subjects' Smartphone brand

4.3 Instrument and data collection procedure

The data were obtained through a questionnaire that concentrated on the attitudes of Slovak university EFL learners towards smartphones within teaching and learning English as a foreign language. The questionnaire was modified and revised twice employing help of the author's colleagues. The final version of the questionnaire, which was administered through Google Forms, comprised of two sets of statements (the statements were carefully chosen in order to answer the research questions) on the following: general statements (10 items) and outside-the-classroom statements (19 items). In total, there were 29 statements, and the quantitative data were gleaned using a Likert scale of 1 to 5, where 1 corresponds to a strong disagreement and 5 corresponds to a strong agreement. The participants were informed that their names and places would remain omitted to ensure anonymity. Descriptive statistics of the Likert-based questions were conducted.

5. Results and discussion

The findings of this study will offer some new insights regarding the EFL students' perceptions and attitudes towards the use of smartphones for the purposes of learning English.

5.1 General statements

The first research question was aimed at analysing the participants' general attitudes towards smartphones. Table 1 shows the students' responses to the general statements. The majority of subjects agree with the statements 1, 3, 4, 8, 9, and 10, but their level of agreement is lower within the statements 2, 5, 6, and 7.

Overall, it can be concluded most of the students assent to the following. The introduction of smartphones contributes to their language learning process. Learning English using a smartphone represents an innovative and effective way of learning a foreign language, and smartphones, which open up great opportunities for language learners, enable them to practice and enhance their language skills whenever and wherever they want – their learning is independent of time and place, which can be regarded as an asset to the foreign language learning. It should be also noted that the majority of subjects agree that employing smartphones makes them more autonomous and less teacher-dependent, and that these smart devices will form an inseparable part of their language learning process in the future, which emphasizes the significance of smartphones in years to come. These findings support the notions expressed by Alzubi and Singh (2017) or Yaman, Şenel and Yeşilel (2015) who maintain that smartphones hold considerable potential for enhancing the learning process and for making learners less dependent, which allows them to become more autonomous.

Moreover, they can practice their language systems and skills in an innovative and possibly effective way, which could lead to the enhancement of their language learning process.

Although the overall calculated mean was 3.52, which indicates that the students displayed a reasonably positive attitude towards smartphones in terms of learning English as a foreign language, there still exist issues that need to be addressed and discussed. The research results reveal that the students do not seem to be competent enough to plan their language learning via smartphones carefully and well enough. This appears to correspond with the paper written by Kukulska-Hulme (2009) who touches on the issue of identifying what is best learnt in the classroom and what is best learnt outside the classroom. With the help of their teachers, the learners ought to find a way how to manage and plan their language learning effectively, possibly seeking some harmony between learning inside the classroom and outside the classroom. Therefore, involving instructors in implementing smartphones into the teaching and learning process and guiding learners towards the effective and appropriate use of their smart devices for English language learning is necessary.

Next, the research findings imply that the participants still tend to use their computers or laptops for practicing and enhancing language skills to a greater degree than the smart devices, and they do not think that their language learning is dependent on their smartphones. This finding reveals that laptops and computers are still more prevalent among EFL learners when compared to using smartphones for developing their English language proficiency.

Finally, 44.2% of participants claim that they cannot imagine learning English without their smartphones, which suggests that although the learners might consider smartphones important, most of them do not seem to think that the smartphone occupies a crucial and decisive role concerning their language learning.

Table 1: General statements

Statement	SA	A	N	D	SD	Mean
1. The advent of smartphones has greatly contributed to my language learning process.	18.2%	55.8%	23.4%	2.6%	0%	3.90
2. I cannot imagine learning English without my smartphone anymore.	9.1%	35.1%	26%	28.6%	1.3%	3.22
3. Learning English through my smartphone represents an innovative and effective way of learning a language.	20.8%	54.5%	18.2%	6.5%	0%	3.90
4. My smartphone enables me to practice and improve my English whenever and wherever I want.	40.3%	53.2%	5.2%	1.3%	0%	4.32
5. I know how to plan my language learning through my smartphone.	3.9%	44.2%	42.8%	9.1%	0%	3.43
6. I prefer using my smartphone to using a computer or a laptop when it comes to practicing and improving my English.	9.1%	26%	24.6%	31.2%	9.1%	2.95
7. My language learning success is dependent on my smartphone.	3.9%	6.5%	24.6%	49.4%	15.6%	2.34
8. Using my smartphone for the purposes of practicing and improving my language learning skills makes me a more autonomous learner.	6.5%	50.6%	33.8%	9.1%	0%	3.55
9. Smartphones create great opportunities for practicing and improving my English.	24.7%	55.8%	18.2%	1.3%	0%	4.04
10. In the future, smartphones will form an inseparable part of language learning process, both in the classroom as well as outside the classroom.	13%	46.7%	27.3%	13%	0%	3.60
	Overall mean					**3.52**

5.2 Out-of-the-classroom statements

Table 2 shows the students' responses to the out-of-the-classroom statements on smartphones. The subjects agree with most of the statements (16 out of 19), and their level of agreement is lower within the statements 7, 13, and 18.

Overall, the participants assent to the following. They use smartphones for the purposes of learning English outside their English classes, and using the smartphones makes them more autonomous, saves their time, is convenient for them, helps them do their home assignments, and enables them to effectively share and exchange the course-related material with their peers. Nearly eight out of ten participants use smartphones for practicing English outside the classroom, which demonstrates that smartphones are commonly employed outside school, and that they seem to have assumed considerable importance within the learning process of EFL learners. Moreover, these smart devices are timesaving, helpful, and convenient for students. It should be also emphasized that smartphones create plenty of opportunity to share and exchange various files and materials among learners, which enables them to work on assignments and projects in pairs or groups, and they can consult and compare their answers and solutions to tasks and assignments.

Furthermore, 91% of the participants use smartphones outside the classroom to check and find out the meaning of unknown words, correct pronunciation (83% of the participants), and appropriate grammatical structures (70% of the participants). Employing smartphones outside their classes also helps learners develop reading (87% of the participants), listening (70% of the participants), and writing skills (68% of the participants) and the systems of grammar (66% of the participants), vocabulary (94% of the participants), and pronunciation (65% of the participants). The subjects have a dictionary app installed on their smartphones, and they use this application on a regular basis.

Therefore, the attitudes of students towards the use of smartphones with regard to the development of English language systems vary. Most subjects (94%) think that the use of smartphones outside the classroom aids learners with improving their vocabulary, while approximately two thirds of participants believe that smartphones help them develop their grammar and pronunciation. Learning and enhancing EFL vocabulary (lexis being one of the most verified language system in relation to smartphones in the context of EFL learning) has been examined in numerous studies with promising results in which smartphones demonstrated potential for the development of lexical system of EFL learners (see, for example, Ebadi and Bashiri, 2018; Wu, 2014 or Lei, 2018).

In a similar way, the results reveal that the smartphone has a potential for practicing almost all the language skills, but to varying degrees. The students believe that, for example, the smartphone enables them to practice reading skills to a greater extent than listening skills. Further, the participants maintain that the language skills of reading, listening, and writing can be enhanced with the use of smartphones. However, they do not share this opinion when it comes to practicing speaking skills as only 36.4% of the students think that using their smartphones outside the classroom helps them improve their oral skills. This is an interesting piece of finding as the skill of speaking is often regarded as the primary language skill, which is often at the centre of attention for EFL learners (Mishan and Timmis, 2015; Ur, 2012). Increasing the awareness of practicing speaking skills through the smartphone (for example using a video chat with other peers) among the EFL learners would possibly stimulate their interest in developing speaking via smartphones. Although several papers attempted to investigate the development of speaking skills using smartphones (see, for example, Abugohar, Yunus and Rashid, 2019; Darmi and Albion, 2017; Sherine, Sastry and Seshagiri, 2020), exploring the enhancement of oral skills and subskills using smartphones is a matter that requires attention of teachers and researchers in the future studies.

Using a dictionary, EFL learners become more autonomous and take on some responsibility for their own learning. The smartphone makes this usage even easier as the students carry their smartphones with them all the time. They can check the vocabulary and other language aspects in their dictionary whenever and wherever they want. Thus, EFL learners are offered a considerable advantage when compared to computers or laptops, for example, as far as dictionary or other apps are concerned.

The overall mean was calculated at 3.86, which indicates that their attitudes to employing smartphones out of the classroom for the purposes of language learning are reasonably positive. However, approximately half of the subjects prefer using smartphones to using a computer for reading emails outside the classroom, while the other half is either neutral or disagrees with this statement.

It has been already mentioned that EFL learners can experience a number of benefits with the English language apps and it is, therefore, surprising that less than a half of the participants use various applications on their smartphones with regard to practicing their English outside the classroom. The reason for this possibly

lies in the limited awareness of smartphone apps among Slovak EFL learners. The research findings demonstrate that despite the fact that most of the students agreed with the majority of statements, which demonstrates reasonably positive attitudes towards smartphones in the process of learning English, it should be noted that there are still some issues with smartphones in connection with EFL teaching and learning such as the limited use of apps for practicing English systems and skills or practicing speaking skills. These issues need to be the focus of researchers' attention in further studies.

Table 2: Outside-the-classroom statements

Statement	SA	A	N	D	SD	Mean
I use my smartphone for the purposes of learning English outside the English classroom.	20.8%	58.4%	14.3%	6.5%	0%	3.94
Using smartphones for the purposes of learning English outside the English classroom makes my language learning process more autonomous.	15.6%	51.9%	32.5%	0%	0%	3.83
Practicing my English via smartphone outside the English classroom saves my time.	18.2%	45.4%	32.5%	3.9%	0%	3.78
Practicing my English through my smartphone outside the English classroom is convenient for me.	19.5%	53.2%	24.7%	2.6%	0%	3.90
My smartphone helps me in doing my home assignments outside the English classroom.	23.4%	49.3%	14.3%	11.7%	1.3%	3.82
Using my smartphone, I can easily and effectively share and exchange the course-related material with my peers.	36.4%	53.2%	7.8%	2.6%	0%	4.23
I prefer using my smartphone to a computer or a laptop for the purposes of reading and writing emails outside the classroom.	22%	27.3%	22.1%	22.1%	6.5%	3.36
I use my smartphone outside the classroom in order to find out/check the meaning of unknown words.	63.6%	27.3%	5.2%	2.6%	1.3%	4.49
I use my smartphone outside the classroom in order to find out/check the correct pronunciation of words.	44.1%	39%	9.1%	6.5%	1.3%	4.18
I use my smartphone outside the English classroom in order to find out/check the appropriate grammatical structures.	28.6%	41.5%	20.8%	7.8%	1.3%	3.88
Using my smartphone outside the English classroom helps me develop my listening skills.	26%	44.1%	20.8%	6.5%	2.6%	3.84
Using my smartphone outside the English classroom helps me develop my reading skills.	29.9%	57.1%	7.8%	5.2%	0%	4.12
Using my smartphone outside the English classroom helps me develop my speaking skills.	9.1%	27.3%	41.5%	16.9%	5.2%	3.18
Using my smartphone outside the English classroom helps me develop my writing skills.	14.3%	53.2%	22.1%	7.8%	2.6%	3.69
Using my smartphone outside the English classroom helps me develop my grammar.	13%	53.2%	23.4%	9.1%	1.3%	3.68
Using my smartphone outside the English classroom helps me develop my vocabulary.	44.1%	49.4%	6.5%	0%	0%	4.38
Using my smartphone outside the English classroom helps me develop my pronunciation.	13%	51.9%	27.3%	6.5%	1.3%	3.69
I use various applications on my smartphone with regard to practicing my English outside the English classroom.	9.1%	39%	32.4%	15.6%	3.9%	3.34
I have a dictionary application installed on my smartphone and I use this application regularly	48%	29.9%	5.2%	13%	3.9%	4.05
	Overall mean					3.86

6. Conclusion and recommendations

In today's world, people are attaching increasing importance to smartphones, and apart from their widespread use for communication or socializing, they offer huge potential for enhancing the language learning process. Within this context and in order to fill the research gap in the Slovak area of learning English, the present study aimed to examine attitudes of Slovak EFL learners towards the use of smartphones within their English language learning.

Based on the first research question, which concerned general statements on the use of smartphones, it was established that the Slovak university EFL learners display moderately positive attitudes towards smartphones in the context of learning English as a foreign language. The participants of the study believe that smartphones allow them to practice their English language skills whenever and wherever they want (this enables them to liberate their language learning from the constraints of time and place), possibly in an innovative and effective way, contributing substantially to their learning process, and that they will form an inseparable part of their language learning process in the future. Furthermore, the findings indicate that learners may become more autonomous when they use their smartphones for the purposes of practicing and learning English. This can be considered a rather significant finding as students' autonomy is an important characteristic of a successful language learner, and EFL learners can take a certain amount of responsibility for their own learning.

However, there are also some difficulties EFL learners are confronted with. For instance, students believe that they face some issues within planning their language learning through smartphones, and they still do not think that their language learning is dependent on their smart devices. Involving teachers in the managerial and planning process, the learners ought to develop a design which would clearly set what is best learnt in the classroom, what outside the classroom, and how to make connections between the two concepts so that the learning process is effective and ultimately improved. Moreover, building awareness of the smartphone potential could also lead to the increase in their usage, making their language learning more dependent on their smart devices. It should be emphasized that it is also the EFL teachers who need to be concerned with developing the awareness of the implementation of smartphones into the teaching and learning process as they can guide their students towards the effective and appropriate use of these smart devices.

The second research question aimed to examine the attitudes of EFL learners towards the use of smartphones outside their English classrooms as plenty of foreign language acquisition takes place outside the school. In a similar way, the responses to these statements reveal that there exists a moderately positive attitude of the Slovak EFL learners towards smartphones. Apart from using them for practicing language skills and systems, EFL learners believe that they can also experience other considerable benefits; smartphones save their time, help them do their tasks and home assignments, they are useful for exchanging course-related materials with other peers, and they make them more autonomous and less teacher-dependent. These findings support the notion that employing smartphones both inside and outside the classroom may facilitate their language learning process and increase their success in learning English, which is conditioned by the proper use of smartphones and smartphone apps.

However, there are also some drawbacks that need to be overcome. Interestingly, less than 50% of the subjects uses various applications on their smartphone with regard to practicing their English outside the English classroom. Smartphone apps have numerous advantages EFL learners can benefit from, and it appears that the awareness of smartphone apps ought to be increased among the learners as well as teachers, highlighting the benefits English language students can enjoy. They have a vast number of smartphone apps at their disposal, but they ought to be able to carefully choose those apps and use them wisely, which might result in enhanced language learning. Conducting studies on the usage of English language learning apps by EFL students is of considerable importance and more studies are needed in this regard.

Another issue is that the participants do not think that using smartphones outside their classrooms helps them improve their speaking, a skill which is by many considered as the primary language skill. EFL learners need to understand that speaking can be practiced by means of smartphones in a number of ways, for example by using various chat protocols and video calls with their friends and classmates or by recording oneself, which is then followed by the speech analysis conducted by learners themselves or by their peers. Again, the awareness must be raised, and both students and teachers need to understand that speaking skills and subskills can be practiced and enhanced through smartphones and smartphone apps.

The limitations of this study include some aspects of the chosen research sample. The study was carried out at only one of the universities in Slovakia which prepares prospective teachers of English. Thus, the findings report the current state of only one university, employing convenience sampling, which means that the results cannot be used to generalize the entire population. Including more universities with the same study programmes along with a larger research sample could prove useful and increase the validity of research. Moreover, employing more research methods such as the interview, observation, or testing would possibly reinforce the findings.

Exploring the attitudes of EFL learners to smartphones as well as the implementation of smartphones into the teaching and learning process seems promising, but there are several issues that demand attention of researchers and which need to be resolved. It is expected that his paper can serve as a guide to future studies in this field; the abovementioned findings could provide necessary impetus for further investigation into this area, especially in Slovakia where such examination is absent, and the research on this matter is still in its infancy. Exploring attitudes in more detail with the employment of other research methods, and investigating the effects of using smartphone in the context of EFL settings on particular language systems and skills would prove useful and help fill in the gap in the Slovak EFL teaching and learning by means of modern technologies. Moreover, comparing learners' attitudes to computers with the perceptions of smartphones or the efficiency between learning via smartphones and learning through computers and laptops would also prove important along with conducting studies in relation to smartphone applications and how they are used by EFL learners. Therefore, it is vital that further studies on using smartphones for the purposes of English language learning are performed.

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Investigating Students' Attitudes, Motives, Participation and Performance Regarding Out-of-Class Communication (OCC) in a Flipped Classroom

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Abstract: In a flipped classroom, students engage in active learning during class time and have individual information-transmission outside class time. University students need to complete the pre/post-class activities to fully benefit from flipped classroom. It is important that teachers adopt practical methods including teacher-student out-of-classroom communication (OCC) to help students manage their time effectively and stay on task. This research examines the practice of OOC in a flipped first-year postgraduate Business Law course at an Australian university that comprises a large overseas student cohort. By means of a questionnaire, the researcher collected data about student perceptions of OCC, their motives for engaging in OCC, and the change of the motives in a flipped classroom. Student demographics, online participation, and academic performance data were exported from the university database. The student answers, participation, and performance were measured and compared with t-tests. The preliminary results show that in a flipped classroom, students were more motivated to engage in OCC. Moreover, the short-term online participation improved for the students who were communicated by the teacher outside classroom. However, an analysis of the data indicated no statistically significant difference in students' academic performance. In the concluding sections of this paper, the limitations of this study are acknowledged, followed by several recommendations for future research.

Keywords: Out-of-classroom communication (OCC), flipped classroom, motivation, intervention

1. Introduction

The "flipped classroom" is loosely defined as a method of instruction whereby individualised, direct instruction occurs outside the classroom, often assisted by information technology, while interactive learning activities occur inside the classroom (McNally, et al., 2017). The popularity of this concept has grown rapidly in recent years (Abeysekera and Dawson, 2015).

The approach, however, does have its drawbacks, particularly if the demands placed on students by the self-directed part of a course are too extensive or onerous (Zainuddin and Halili, 2016). Therefore, careful consideration has to be given to the design of flipped units to ensure successful implementation. Various methods for improving unit designs, such as gamification and productive failure approaches, have been explored by educators, (Huang and Hew, 2018; Song and Kapur, 2017). However, there are very few studies on the use of Out-of-Class Communication (OCC) in conjunction with the flipped classroom in higher education.

Instructional design researchers have paid closer attention to concepts like OCC in recent years (Sung, 2018) as, increasingly, it has been recognised that much of a student's learning takes place outside of timetabled hours. In tertiary education, the value of OCC has been well-acknowledged in terms of increased student retention, persistence, and motivation (Brooks and Young, 2016). The application of OCC combined with a flipped classroom approach can influence the successful design and teaching of a unit. However, the application of OCC in a flipped classroom environment in higher education has not been closely observed and analysed. Thus, the aim of our research is to address this gap by examining the practice of OOC in a flipped first-year postgraduate Business Law course at an Australian university with a large cohort of overseas students.

Australian universities have enjoyed a boom in enrolments in the last decade (Australian Department of Education and Training, 2018). Increased student numbers have also brought challenges, particularly for teachers since it can be difficult to engage all learners and to monitor students' learning progress (Saunders and Gale, 2012). Compromises also need to be made regarding "personalised" communication, during both in-classroom and out-of-classroom teaching periods.

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The spike in enrolments is mainly due to the success of Australian universities in recruiting international students. According to the Australian Department of Education and Training (2017), about half of these overseas students are from Confucian Heritage Culture (CHC) countries that include but are not limited to China, Vietnam, Japan, South Korea. However, a closer examination of individual units within specific universities, such as Law and Business Decisions at Monash University (Caulfield Campus), reveals a far greater percentage of international enrolments. For example, in the second semester of 2018, of a total of 138 enrolments, 97% were international students. Although Monash has a diverse international student population, of that 97%, approximately 78% (104) were from mainland China, or 75% of the entire cohort. Much has been written about the challenges faced by international students in the UK and the US (Heng, 2017; Kraal, 2017; Heng, 2018). The challenges faced by our cohort in Australia are similar. For example, there is the very real challenge of having to support themselves and study in a new country (Heng 2017; Kraal 2017; Heng 2018). However, the greatest challenge is the language barrier experienced by English as Second Language (ESL) students. Whilst the English language entry requirement is 6.5 (IELTS), the faculty concluded from observations of their students in class that many students were experiencing serious challenges with verbal and/or written communication - a concern expressed by many of the students themselves at the beginning of each semester.

The next challenge, which exacerbated the problems caused by the language barrier, is the nature of law units. Law is a language-intensive discipline with nuances of usage that challenge native speakers, and contain concepts such as "reasonable" that are value-laden and culturally relative. Law units involve solving problems that are laden with varying degrees of uncertainty. Many domestic students from a STEM or accounting background struggle with this problem since their disciplines demand an unequivocal right or wrong answer, whereas in law there is no right or wrong answer- just a better argument. Thus, answering a legal problem-style question requires not only knowledge of concepts, but also finely-tuned language skills.

Finally, for cultural reasons, many students from these backgrounds tend to avoid communication if they feel their language skills are deficient, for fear of "losing face" (Teo and Arkoudis, 2019). Moreover, several researchers have found that some overseas students are surprised that they do not feel more welcome during their studies abroad. This gives rise to other communication complications when students become frustrated by the lack of curiosity about them and their culture, unlike the way that foreigners are treated back in their home countries (Leask and Carroll, 2011). Also, for many students from CHC backgrounds, the fact that they are not familiar with the new education system and culture makes it more difficult for them to participate in interactive learning and communication activities with their classmates and teachers. This is because the learning models with which they are familiar in their native cultures are more didactic-based, authority-centred, and with less interaction between teachers and learners (Hodkinson and Poropat, 2014).

To answer the challenges posed by the increasing student numbers in the class and the large proportion of international students in the flipped (law) unit, personalised emails were sent to a large number of students throughout the semester-. Using the Student Relationship Engagement System (SRES; www.sres.io), the teacher was able to sort students into different groups according to data such as workshop attendance, online participation in the Learning Management System (LMS) and assessment outcomes. Emails were sent in bulk, albeit with personalised information. In these personalised emails, the teacher often encouraged the learners to communicate with them. The efforts from the teacher initiated and promoted OCC in this class.

2. Literature review

The flipped classroom has been defined by Abeysekera and Dawson (2015) as a set of pedagogical approaches that:

- move most information-transmission teaching out of class
- use class time for learning activities that are active and social
- require students to complete pre- and/or post-class activities to fully benefit from in-class work.

The flipped classroom approach promotes active learning strategies by using classroom time to engage students in activities related to the higher levels of Bloom's taxonomy (Nouri 2016). Some researchers have claimed that it can bring positive outcomes for university student learning in terms of increased learning, more effective learning, and improved student outcomes as it enables students to learn at their own pace by watching lecture videos. Also, students benefit from not only the more practical and interactive classroom learning coordinated by the teacher, but also from the more scaffolded learning processes supported by the teacher and the

classmates both in the classroom and in the online learning space (Nouri, 2016; Thai, De Wever, and Valcke, 2017).

Scholarly studies related to the flipped classroom often adopt the self-determination theory (SDT), to investigate its relationship to student motivation to learn (Abeysekera and Dawson, 2015). The SDT defines the three basic cognitive needs as the needs for competence, autonomy, and relatedness (Ryan and Deci, 2000). People feel competent regarding know-how mastery, feel in control of their own study pace, and feel related when working in a group (Ryan and Deci, 2000). Thus, the flipped classroom approach might improve student motivations, both intrinsic and extrinsic, as it creates such scenarios for students. And if the students are more motivated, they might be willing to complete a significant amount of learning activities both inside and outside the classroom. Some researchers claim that the flipped classroom motivated students to learn during the lessons themselves (Clark, Kaw, and Besterfield-Sacre, 2016) as well as in their subsequent learning activities (McLaughlin et al., 2013).

Furthermore, various other beneficial effects of the flipped classroom method of teaching and learning have been found by previous researchers. Studies have strongly argued that students have engaged readily in flipped classrooms, possibly because they were more prepared and more confident during active learning in the classroom as they had watched pre-class lecture videos (Zainuddin and Halili, 2016; Lo and Hew, 2019; He et al., 2019). Furthermore, when Hung (2015) investigated the student interactions in a flipped classroom, 64% of the participants reported having increased their interaction with the teacher and their classmates. With its positive impacts on students' motivation, engagement, and interaction, it is unsurprising that the flipped classroom design has been identified in some journal articles as a more effective means of improving students' performance in various subjects (Zainuddin and Halili, 2016). Study results also suggest that, compared with the traditional mode of delivering courses, students could improve their academic performance in a flipped classroom if they use the out-of-class learning materials prior to classes (Huang and Hew, 2018).

Despite the reported benefits of adopting a flipped classroom, researchers also noted that there are challenges (Huang and Hew, 2018). Many students claimed that they found it difficult to adjust to the new and unfamiliar flipped classroom approach and the pre- and post-class materials were too much for them to finish on time. At the same time, student engagement with the pre-class preparation learning resources and activities had a direct, positive effect on the success of the flipped class (O'Flaherty and Phillips, 2015). However, simply preparing well-designed pre-class and post-class materials and tasks does not necessarily guarantee that the learners are going to complete them. Furthermore, students not completing the pre-class learning before the face-to-face sessions might compromise the intended outcomes of the flipped design.

To answer the challenges in flipped classrooms, course designers try to ensure that the pre- and post-class learning materials are aligned with and complement the in-class activities so that the students find the materials meaningful and useful. Moreover, lecture videos can be presented in innovative and interactive formats to attract and engage students. Some educators (Huang and Hew, 2018) have even begun to explore the application of gamification in the design of flipped classrooms to inspire learners to acquire knowledge via the out-of-class learning activities. Researchers have also explored effective change management strategies to minimise the risks associated with flipped classroom pedagogy (Hutchings and Quinney, 2015). However, to date, the role of out-of-classroom communication (OCC) and its influence on the success or otherwise of a flipped classroom has not been studied in depth.

OCC, defined as "student-faculty communication in the instructor's office, informally on campus, or before and after class" (Jaasma and Koper, 2002, p. 119), can occur via different modes (online, phone call, social media, text message, face-to-face, LMS forum), can be initiated by either student or teacher, can vary in content (course-related, personal problems, small talks, intellectual ideas), and can vary in duration (no durative/back-and-forth conversation, a brief exchange, some lengthy conversations). However, in higher education, students might not engage in discussions with their teachers other than during the scheduled teaching hours. As Brooks and Young (2016) found in their research, college students do not think that they communicate with teachers often outside classroom. And even when they did, they were least likely to have lengthy conversations with their teachers.

Literature in the communication and education fields claims that that whether or not the students initiate or participate in OCC is influenced by the class dynamics, the teacher's method of teaching, and the teacher's

personality (Leach and Wang, 2015). Students are more likely to initiate or participate in OCC with more attractive, credible, immediate, accessible teachers who have a sense of humour and are prepared to self-disclose and use affinity-seeking strategies. Conversely, students are less likely to engage in OCC with a teacher who is verbally aggressive and strongly assertive, or when they have difficulty in securing OOC, fail to see the value of it, or have other more appropriate and convenient alternatives (Leach and Wang, 2015). Instructional communication researchers suggest that by using OCC, teachers can bring about positive education outcomes (Nadler and Nadler, 2001). Those positive outcomes have been observed in increased student higher education aspirations, affirmation, confidence, academic and cognitive development, persistence, and university retention (Faranda, 2015). The findings from those research studies consolidate the belief that many educators have: the productive casual talks between teachers and learners outside class time have a profound and beneficial effect and are positively related to the university students' educational experience (Myers, Martin, and Knapp, 2005).

Hence, the investigation of student motives to engage in communication with their teachers has become a focus of communication and education research. Researchers have described the students' motives for communication as deriving from "the needs students desire to have fulfilled through communication with their instructors" (Myers, et al., 2007, p. 496). University students have been asked why they would communicate with their teachers. The researchers identified five underlying reasons or motives: relational (desire to establish a personal relationship), functional (requiring information), excuse (wanting to justify faults), participation (wanting to appear engaged with learning), and sycophancy (wanting to flatter or charm) (Martin, Myers, and Mottet, 1999). Of these five reasons, researchers suggest that students might benefit more from the relational and participation motives as the students with those reasons are more motivated, satisfied, and associated, showing more participation, less challenging behaviour, and greater cognitive learning (Goodboy and Myers, 2008). In other studies which focus on the OCC via emails, the motives for students to engage in OCC with the teachers was measured using the instrument developed by Waldeck, Kearney, and Plax (2001). In those studies, the researchers found that students engage in the communication for the purposes of clarification, efficiency, and personal or social motives; they suggested that students are more likely to participate in OCC because they need clarification regarding some aspect of the course (Waldeck, Kearney, and Plax, 2001; Young, Kelsey, and Lancaster, 2011). Similarly, research has also been done on university students' motives for pursuing out-of-classroom communication with the faculty academic advisor (Leach and Wang, 2015).

Similar to a traditional classroom environment, OOC in a flipped class can take place in a formal consultation, phone conversation, text messages, online forum, emails, or informal campus locations. Compared to the lecture and tutorial teaching format, a flipped classroom course might reduce the number of weekly in-class face-to-face sessions between students and teachers. However, it is also supposed to promote more interactive and problem-based learning during the face-to-face interaction, which might lead to more teacher-student in-classroom communication (Abeysekera and Dawson, 2015). In those classes, the teachers coordinate the activities and provide immediate feedback instead of simply lecturing in front of the classroom. In university classes, the online learning spaces in the LMS also provide a convenient communication channel for teacher and students during the pre-class and post-class learning (Furse, Ziegenfuss, and Froehlich, 2018). The addition of the online learning platforms in the flipped classroom might influence the pattern of OCC between teachers and students. This study aims to acquire a better understanding of OCC in higher education and investigate OCC as a factor that has the potential to improve the design of courses for a flipped classroom.

Furthermore, educators and scholars have analysed the gender differences in terms of OCC (Jaasma and Koper, 2002). Some of the studies (Bennett, 1982; Nadler and Nadler, 2001), examining the frequency with which male and female students engaged in OCC with their teachers, have reported conflicting results. Bennett's study (1982) found that while there was no difference in OCC patterns in terms of student gender, the teacher's gender played a role in OCC as the female teachers received more OOC than did the male teachers. In another research, no major difference was found for teacher gender, but female students reported a lower frequency of OCC compared to the male students (Nadler and Nadler, 2001). This current study will also explore this OCC issue by addressing student perceptions of OCC frequency and motives in a flipped classroom environment.

In summary, the flipped classroom approach has positive impacts on students' motives, interactions, and performance in terms of active learning but it also has challenges when it comes to students being asked to complete pre- or post-class study activities designed to produce satisfying learning outcomes. OCC offers various benefits to students' learning experience, and it can be a useful addition to the course design in a flipped classroom approach. Such designs and applications in the emerging flipped classroom teaching strategy in higher

education are still to be fully explored. To address this gap, the researchers examine the role of OCC in a flipped course.

2.1 Research questions:

1. What are the reasons for students engaging in OCC in a flipped classroom?
2. What are the influences of flipped classrooms on the students' motives to engage in OCC compared to the traditional pedagogical practices?
3. Does a personalised OCC initiated by the teacher have an impact on students' online participation in pre-class and post-class learning activities in LMS in a flipped classroom?
4. Does a personalised OCC initiated by the teacher improve student performance in the flipped unit?

3. Methodology

In this study, quantitative data was collected from student surveys, learning management system logs, and the student database. Descriptive statistics, one-sample and independent t-tests, and paired t-tests were applied to analyse the data to investigate OCC in this business law class.

During the semester, the teacher communicated 15 times with the whole class via the LMS and tried to establish personalised OCC with individual students as well. Via the Student Relationship Engagement System (SRES; www.sres.io), the teacher filtered students based on their record for online learning activities and assessment results, then emailed them with personalised greeting and messages in bulk, in a total of four rounds:

1. 19 emails before the 1St assessment,
2. 23 emails after the 1st assessment,
3. 17 emails before the 2nd assessment,
4. 38 emails after the 2nd assessment.

Via emails, the teacher reminded students about overdue online learning activities, congratulated some students on their assessment scores, or encouraged the students to meet for consultations. In total, 74 students received personalised emails from the teacher at least once during the semester.

In summary, the researchers presented a flipped unit with plenty of student-teacher OCC. At the end of the semester, a post-course survey was conducted to determine students' OCC mode, motives for communicating, and the influence of the flipped classroom on students' motives for engaging in OCC.

3.1 Participants

In 2018, 133 international students (female: 95, male: 38) and 4 domestic students (female:2, male: 2) were enrolled in the first-year postgraduate business law unit in a large university in a metropolitan city in Australia. Of these students, 38 (27.7%), comprising 31 females and 7 males, returned the questionnaire successfully. They were overseas students from five countries: 32 students (84.2%) from China, 3 students (7.9%) from Vietnam, 1 student (2.6%) from India, 1 student (2.6%) from Thailand, and 1 student (2.6%) from Turkey. The students ranged in age from 22 to 37 (M = 25.24, SD = 2.94%).

3.2 Instruments

3.2.1 Out-of-Classroom Communication:

The items in the survey questionnaire were intended to give us a better understanding of the participants' OCC with the teachers. The five-item measure in the research on teachers' email frequency conducted by Young, Kelsey, and Lancaster (2011) was modified to measure the OCC frequency. A modified version of the Brooks and Young (2016) measure of OCC type, location, and duration was also adopted.

3.2.2 Motives/reasons to communicate:

The motives for students to engage in the OCC with the teacher were measured using a modified 5-point Likert-type version of the students' reasons for emailing their teacher (Waldeck, Kearney, and Plax, 2001; Young, Kelsey, and Lancaster, 2011). Two new questions were included to replace the not-needed efficiency motives; these new items were intended to measure the students' motives for replying to or engaging in a communication initiated by the teacher, which was not measured by the original instrument. The 15 possible motives were categorised under three factors in this multidimensional measurement: personal and social motives for engaging in OCC (e.g., to let the teacher know I'm interested in the course), clarification and procedural motives (e.g. to

ask the teacher questions about the course content), and responsive motives (e.g. to reply to a personal message/conversation to me started by my teacher).

3.2.3 Flipped classroom's influence on motives to communicate:

Unlike the more commonly-used university lecture and tutorial approach, a flipped classroom moves most information-transmission teaching out of class and uses class time for active and social learning activities (Abeysekera and Dawson, 2015). Often it provides more opportunities for teachers and students to work interactively within the classroom.

To investigate the influence of the flipped classroom on the students' motives for engaging in OCC, compared to the traditional lecture and tutorial teaching method, participants were also asked to indicate whether their motives changed in this flipped class.

3.2.4 LMS records:

In this flipped unit, the teacher created weekly online pre-class and post-class learning activities, including lessons and quizzes for 13 weeks in the LMS. Students' online activities and assessment grades were collected from their LMS records.

4. Results and discussion

Students reported how their teacher communicated with the whole class (M = 3.87, SD = 1.19) and individually with the student (M = 3.39, SD = 1.31) outside classroom time, on a Likert-type scale ranging from 'hardly ever' (1) to 'numerous times' (5) in Table 1. An independent-samples t-test shows that there is a significant difference between how male students and female students reported on the frequency of teacher's OCC with the whole class ($p =<0.05$) but not the frequency of individual OCC ($p = 0.306$). Male students tend to consider 15 LMS announcements per semester a quite high number.

Table 1: Frequency of OCC for the whole class and individual students

	Sex	N	Mean	Std. deviation	Std. error mean
Class	**Male**	7	4.57	.787	.297
	Female	31	3.71	1.216	.218
Individual	**Male**	7	3.86	1.464	.553
	Female	31	3.29	1.270	.228

Most students reported their primary OCC mode with their teacher is email (n=30, 78.9%), followed by face-to-face (n=5, 13.2%), and the Moodle discussion forum (n=3, 7.9%). The significant role that email played in OCC shows that online written communication was more popular than face-to-face or voice communication. However, the result also brought to our attention that the flipped unit was not effective in engaging the student in online discussion forums, which should demonstrate active students' discussions with the teacher and their classmates. Furthermore, the duration of students' communication with their teacher was reported as: some lengthy conversation (e.g., more than 15 minutes of vocal talk or multiple text-based exchanges over an extended period of time) (n=14, 36.8%), a brief exchange (n=14, 36.8%), and no durative/back-and-forth conversation (n=10, 26.4%). Students tended to communicate with their teacher via email rather than face-to-face.

Although the male and female students did not report any significant difference between the frequency of the teacher's OCC with the students individually, there was a significant difference between the reported frequency of the teacher's OCC addressing the whole class between male and female students. The male students were more likely than females to consider that 15 LMS announcements were "numerous times". Whether this attitude might make them more likely to ignore the teacher's message in the LMS needs further investigation.

4.1 What are the reasons for students engaging in OCC in a flipped classroom?

As displayed in Figure 1, the participants agreed that all the factors were important (mean score > 3) for them to engage in OCC communication with their teacher, except one factor: to escape or divert from other tasks (M=2.87). Moreover, there was no statistically significant difference between the answers of male and female students.

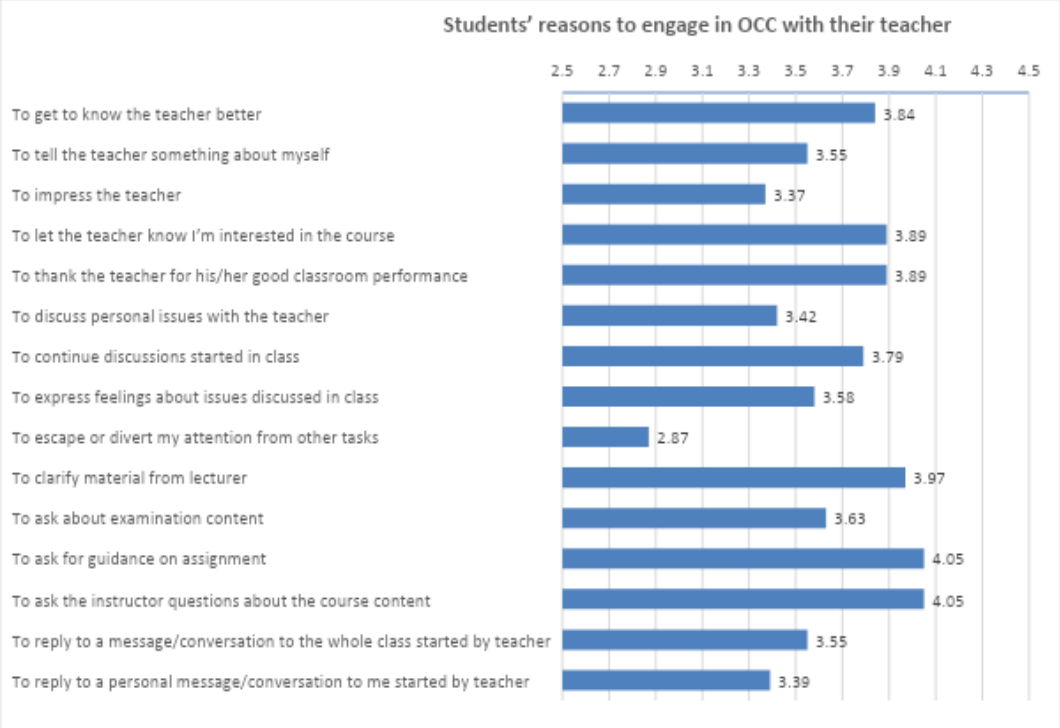

Figure 1: Students' reasons for engaging in OCC with their teacher

The students in this flipped class identified their three most important motives for communicating with their teacher outside the class time as:

- to ask guidance on assignment (M=4.05)
- to ask the teacher about the course content (M=4.05)
- to clarify material from the teacher (M=3.97)

In a survey of 289 undergraduate students in the US regarding their motives for engaging in OCC, Waldeck, Kearney, and Plax (2001) found "that students reported a greater reliance on using e-mail to contact their teacher for procedural or clarification reasons" (p. 63). These findings were supported by those of this study which found that in an Australian university, postgraduates engaged in OCC with their teacher to seek clarification or for procedural reasons. Our results show that although detailed instructions for assignments in this flipped classroom were included in the LMS together with learning resources such as lecture videos, online lessons, and reading materials, students still felt strongly about receiving personalised advice from the teacher on assignments, and clarification about the course contents. Perhaps, no matter what the pedagogical or technological solution is proposed, a central tension will remain between presenting larger-scale lectures, and students' expectations of personalised contact with the teacher. Hence, the change of course design in the flipped classroom does not alter students' main motive for communicating with their teacher.

The participants also indicated their three less important reasons:

- to escape or divert from other tasks (M=2.87)
- to impress the teacher (M=3.37)
- to reply to a personal message/conversation to me started by my teacher (M=3.39)

The results show that personal and social motives are less important reasons for students wanting to engage in OCC, which is similar to the findings of Waldeck, Kearney, and Plax (2001). Even if the teacher initiated personal OCC with individual students, the motive to respond to this communication is still less important to the students than are their other motives (M=3.39).

4.2 What are the influences of flipped classrooms on the students' motives to engage in OCC compared to the traditional pedagogical practices?

As shown in Figure 2, students reported an increase in all the motives when learning in a flipped classroom, compared to the traditional setting.

The students in this flipped class identified their three most increased motives for communicating with their teacher outside the class time compared to a traditional lecture and tutorial approach:

- to ask guidance on assignment (M=4.18)
- to ask the teacher about the course content (M=4.11)
- to thank the teacher for his/her good classroom performance (M=4.03)

A closer analysis using the one sample t-test showed that the mean scores for the motive changes are significantly different from the middle-value 3 at significant level except for the motive to 'escape or divert my attention' (p=0.277) and 'to reply to a personal message/conversation to me started by my teacher' (p=0.077). There was no statistically significant difference between the answers of male and female students.

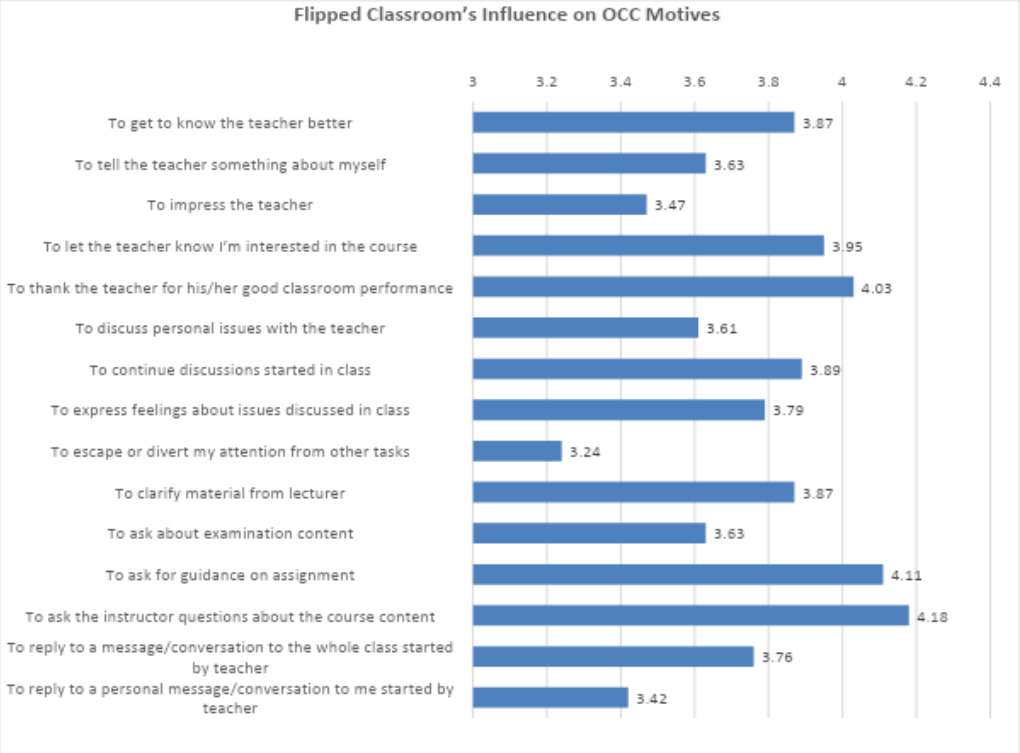

Figure 2: Influence of flipped classroom on OCC motives

Because no actual lecture time is allocated in the flipped unit, students might be unsure of the assignment requirements or course contents if they are not actively engaged with the online learning resources and activities. This may account for the increase in motives to ask for guidance on assignments and clarification about the course content. And in the flipped unit, student could become more actively engaged in the higher order thinking according to Bloom's taxonomy (Anderson, et al., 2001). Therefore, they tried to learn deeper into the subject by asking the teacher for more information. Further research is needed to find out the cause of those changes. The motive to thank the teacher for his/her good classroom performance also was reported to increase significantly. It would be interesting to find out whether that was a result of a more engaging, interactive, and student-centred course design in a flipped classroom approach.

4.3 Does a personalised OCC initiated by the teacher have an impact on students' online participation in pre-class and post-class learning activities in LMS in a flipped classroom?

The teacher sent emails to the 19 of the 137 enrolled students who had not completed more than four of the set activities. Such communication was designed to encourage them to learn more actively online and improve their academic performance, especially for the first assessment task in week 5.

An independent samples t-test was conducted to compare the number of newly-completed activities and percentage of newly completed activities between students who had missed more than four activities (received email) and students who had missed fewer than four activities (no email received). Results are presented in

Table 2. The students who received the teacher's email had completed more of the overdue learning activities before the next assessment.

Table 2: Newly completed activities number and percentage

	Received email	No email received	t	p-value	df
Newly-completed activities	M=2.79	M=0.78	7.24	<0.001	91
	SD=1.84	SD=0.78			
Newly-completed percentage	M=52%	M=42%	1.13	0.268	32.1
	SD=0.35	SD=0.41			

4.4 Does a personalised OCC initiated by the teacher improve student performance in the flipped unit?

In total, the teacher sent 19 individual emails to students to remind that they had completed only few of the online learning activities, and to encourage them to finish more or seek consultation to prepare for the coming assessment. Within the week between the email communication and the first test, 11 students (Group A) had finished only less than half of the overdue online learning activities, while eight students (Group B) had completed 50% or more.

When comparing the results of the 1st assessment (week 5), 2nd assessment (week 9), and the final marks obtained by Groups A and B (Table 3) in this flipped unit, there is no statistically significant difference in their performance.

Table 3: Comparison of assessment results and final end-of-semester results

	Test 1 Result (15 marks)		Test 2 Result (20 marks)		Semester Result (100 marks)	
	Group A	**Group B**	**Group A**	**Group B**	**Group A**	**Group B**
N	11	8	11	8	10	8
Mean	10.09	10.13	11.53	12.78	55.70	57.13
Std. deviation	2.77	1.55	2.11	1.64	4.87	8.32
t-test	0.31		1.38		0.46	
p-value	0.97		1.67		0.68	

5. Conclusions

In this research, the students agreed that all of the reasons for engaging in OCC were important except one: to escape or divert from other tasks. They also agreed that the procedural and clarification reasons were more important than the personal and social motives. Our results are consistent with the findings obtained in the previous research of undergraduate students (Waldeck, Kearney, and Plax, 2001). The data show that even if the teacher initiated personal OCC with individual students and observed an increase of students coming to consultations, the motive to respond to this communication is still relatively lower (M=3.39). This could discourage teachers from initiating OCC with their students and in the hope of receiving a response. The analysis did not find any significant difference between the responses of male and female students.

The investigation results show that the participants considered their motive to engage in OCC increased in a flipped classroom approach compared to the traditional university lecture and tutorial approach except for two motives: 1. to escape or divert my attention, and 2. to reply to a personal message/conversation initiated by my teacher. Findings showed a substantial increase in the number of students using OCC to thank the teacher for their good classroom performance. In this project, the teacher did convert the face-to-face class into a more interactive, problem-based, and student-focused sessions so that the learners could engage in higher order learning according to Bloom's taxonomy (Anderson et al., 2001), which is not possible in traditional teacher-centred sessions. The teacher's changing role from lecturer to facilitator of learning might be well received by the students. And that could explain the increase in students using OCC to thank the teacher. On another note,

students in the flipped classroom also thought they were increasingly motivated to engage in OCC in order to clarify course contents and assignment tasks. Considering the previous research findings that sometimes students had difficulties in completing self-learning tasks outside classroom time (Zainuddin and Halili, 2016), such students would be more likely to communicate with the teacher for clarification reasons because they are unsure of what the self-learning tasks require.

The most significant increase was in the students' motivation to ask for guidance on assignment tasks and to ask the teacher about the course content. This could be the result of the student being unfamiliar with the assignment requirements or course content, and there being no lecture time allocated to the flipped unit. Another possible reason may be that students tried to seek more information regarding the course contents from the teacher as they were more actively engaged in higher order learning in the flipped classroom. Further research is needed to determine the cause of such changes. As students reported using email as their primary method to communicate with the teacher out-of-classroom, it would also be interesting to discover whether those international students whose first language is not English, used written communication such as email to replace the more challenging face-to-face interaction with the teacher. Also, researchers could investigate the different influence of OCC delivery modes and formats as a flipped classroom integrated with extensive e-learning context offers a variety of modalities to communicate with students.

The study results of the LMS data of the student online participation show that even though there was no statistically (percentage) significant difference in the newly completed activity out of the total overdue activities between the students who received the teacher's reminder email (<= 50% of the activities by week 4) and those who did not (>50% activities by week 4), the students who received the email had completed a significantly greater number of online learning activities in the following week before the first major assessment. Considering that all students who received the email had a record of missing the scheduled learning activities, it is evident that the communication from the teacher had encouraged the students to participate in the online learning more actively in the short-term (a week). Our research results are not consistent with those of previous research which investigated the whole-semester participation (Sullivan, 2016). Further investigation might be needed to understand the short-term and long-term effects, on student participation, of teachers' OCC.

In this research, results indicated that there was no significant difference in student performance outcomes regardless of whether or not they engaged in online learning activities after receiving personalised communication from their teacher. The researchers feel that the current unit design limited the research design options. It would be ideal if future research could employ a control group for an experimental study with large student numbers to test whether there is any correlation between students' OCC and their academic performance in a flipped classroom.

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The Level of ICT Infrastructure as a Factor of ICT Integration in Greek High School Science Teaching

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Abstract: This paper examines the extent to which the level of technological equipment affects the integration of the Information and Communication Technologies (ICT) in Greek high school science teaching. The limited ICT infrastructure environment, with only one computer-projector system available and access to the internet ("PC-VP" environment), is compared to the high level ICT environment ("1:1" environment) where, in addition to the computer-projector system, each student has access to a computer and the internet. It is a study relying on a relatively small dataset derived from student answers to a questionnaire aiming to determine the degree to which some of the "expected" ICT benefits reach the students. The level of ICT integration is judged by the degree to which the ICT benefits reach the students. That is, the more the ICT benefits reach the students, the better – or the greater - the ICT integration is. The participants were eighty-nine, 14-year-old students who belonged in four different classes and the teacher who taught Physics in those classes. The SPSS non-parametric "Man-Whitney U Test" test was used to compare the statistical distributions of student answers. The results show that, when the applied teaching approach is used, the ICT integration is equally successful in both environments. This questions the idea of investing in "1:1" environments in the Greek public schools where less student centered and inquiry oriented teaching approaches are the norm. It also highlights the importance of the specific teaching approach as an ICT integration tool in "PC-VP" environments that still exist in most Greek schools.

Keywords: ICT integration, ICT infrastructure, high school science teaching

1. Introduction

The Information and Communication Technologies (ICT) have dramatically changed the way we live and have opened new horizons in nearly every sector of our society. However, despite their great potential, the ICT integration in the daily teaching practice is not an easy task (Osborne & Hennessy, 2003; Penuel, 2006; Unal and Ozturk HI, 2012; Platinakis, 2011; Tzifopoulos, 2010; Flores, Santero and Gordillo, 2017). As far as it concerns the secondary education public schools of Greece, even today, the most important obstacle to the ICT integration is the lack of basic technological infrastructure in the classroom. In February 2020, the mapping of the existing ICT infrastructure by the Regional Directorate of Education of Western Macedonia – which is a region in the north-western part of Greece - showed that, the majority of classrooms in the secondary education schools lacked the basic ICT equipment for any ICT integration. That is, in most classrooms, a computer-video projector system was not present. Since the infrastructure of the Greek schools is mainly provided through nationwide programs by the Ministry of Education, the same situation is expected to be the case for the other twelve (12) Regional Directorates (educational districts) of the country. This means that even today the lack of ICT infrastructure is a significant obstacle to ICT integration for most of the Greek public high school teachers. The Greek Ministry of Education (ΥΠΑΙΘ) has been trying to upgrade the technological infrastructure of Greek schools through European Union programs (European Commission, 2019) and so far has managed to supply several school classrooms with video-projectors and to connect schools to the internet via broadband lines.. However, taking into account the current financial situation, the installation of a computer-video projector system in every school classroom is probably the best thing we can expect to happen, in the next couple years.

Hew and Brush (2007) in a summary of previous empirical studies showed that in descending order of relative frequency, the most frequently reported category of barriers to ICT integration is "Resources" at 40% frequency, followed by "Knowledge / Skills" at 23% frequency. The "Resources" category mainly includes the available ICT infrastructure (e.g. access to computers, video projectors, printers, etc.). Experimental studies conducted in Greece (Platinakis,, 2011) show that the obstacles reported by Greek teachers in the Greek High School are similar to those reported in the international literature. Several more studies suggest that the ICT infrastructure available in the classroom has always been essential to effectively embed ICT in teaching and learning (Bariu, 2020; Hyunjin,Taejung and Jongwon, 2020; Lu,Tsai and Wu, 2015; Voogt et al., 2013). However, those studies do not examine the degree to which specific levels of "Resources" may affect ICT integration. Furthermore, there seems to be an absence of studies concerning the benefits of ICT integration

in environments of limited ICT infrastructure such as the “PC-VP” environment as described in the next paragraph. In this context, this paper comes to explore the extent to which two different levels of technological infrastructure (“PC-VP” and “1:1”) as described here, can affect the level of ICT integration. Here, the level of ICT integration is judged by the degree to which the expected ICT benefits reach the students.

Obviously, in order to use technology (ICT) in the classroom, some elementary level of ICT infrastructure is required; otherwise there can be no use of any digital material. We consider this elementary level to be a computer - video projector system with access to the internet. This system is the only ICT infrastructure available in the classroom and is mainly used for presentation purposes mainly by the teacher and occasionally by the students. From now on, this environment will be called "PC-VP" environment. On the opposite side, there is the “high level” of infrastructure where each student has direct and continuous access to a computer and to the internet and where a computer - video projector system is also available for the teacher or the students to use. This environment will henceforth be called the "1:1" environment. The main question this paper aims to answer is: “How does the level of ICT integration compares in these two ICT infrastructure environments (PC-VP and 1:1)?”

The way teachers use technology in the classroom is one of the most important factors for the success of the ICT integration. Norris and Elliot (2010) reported that this was the main factor or reason for the failure of several 1:1 programs in USA schools. In this light, "the way the ICT was used" (the teaching approach or practice) by the teacher who participated in this study, is an important factor which can affect the attempted ICT integration and for this reason it is described in a separate section. The integration of ICT in both environments (PC-VP and 1:1) was implemented through the same teaching approach.

The answer to "how much or what technological equipment is necessary for the ICT benefits to reach the students” is of great value to those who provide or decide for the infrastructure of public schools (State, School Committees, Parents' associations, etc.). It goes without saying that providing for "1:1" environment infrastructure, besides the cost of the equipment, also requires continuous computer maintenance, technical support, familiarization of students with software and computer operation and management of computer storage and security. In other words, it requires significantly more resources than just implementing "PC-VP" environment infrastructure and this should be taken into account.

1.1 The ICT benefits for Science teaching

The potential contribution of technology use – or ICT integration - to science teaching and learning has been reported in previous studies (Osborne & Hennessy, 2003; Hennessy, Deaney and Ruthven, 2004; Drayton et al., 2010) and can be summarized in the following eight (8) benefits:

1. They can improve student motivation and engagement.
2. By providing access to experiences not otherwise feasible and by linking school science teaching to real life phenomena and to contemporary science, they can make teaching more interesting to students.
3. By providing visualization and multiple representations of physical processes and phenomena, they can enhance understanding.
4. By providing parametric simulations and by facilitating the calculation of data, they provide more opportunities for student participation in inquiry activities.
5. They can facilitate exploration and experimentation by providing immediate visual feedback.
6. They can foster collaborative learning by providing more opportunities for collaboration.
7. They can make student work possible in conditions or environments that are not possible in the actual school laboratory, such as environments without gravity or friction.
8. They can make student work more productive by saving teaching time from time-consuming manual processes such as data management and graph construction to the benefit of reflection, discussion and interpretation.

This paper explores the extent to which these benefits reach students in the two different ICT infrastructure environments when the teaching practice - as described below - is applied.
We should realize that those are potential benefits and that infrastructure alone is insufficient for effective ICT integration into the classroom (Flores, Santero and Gordillo, 2017). In other words, putting computers in classrooms is not always beneficial for teaching and learning and that the resulting benefit depends mainly on what teachers do in classrooms (Cuban, 2006; Norris & Elliot, 2010; Flores, Santero and Gordillo, 2017). There

are studies showing that the use of computers in the classroom has a positive effect on student learning (Bebell, 2005; Penuel, 2006; Zucker & McGhee, 2005; Gulek & Demirtas, 2005; Dunleavy & Heinecke, 2007) however there are also studies showing that the benefit may not be such as to justify the required time and money investment (Osborne & Hennessy, 2003; Cuban, 2006; Hu, 2007; Stanbury, 2010; Norris & Elliot, 2010; Sauers & Scott, 2012).

1.2 The applied teaching practice

The same teaching approach was applied throughout the school year, in both environments (PC-VP and 1:1) and in both cases, Digital Work Sheets (DWS) were used. In "1:1" environment, students read them, scroll through them and type their answers to the DWS questions in their computer. In "PC-VP" environment, the DWS are displayed in a large screen (on the board) and students write their answers in their notebook. In both environments the same worksheets were used. Students were organized in 2-member teams (one team per student desk) and collaborated for the completion of each activity contained in the DWS.

The DWS are MS-Word files (.docx files) and therefore have the "capabilities" of the "MS-Word" application by which they were created. That is, in addition to text, through their hyperlinks they can "contain" any form and amount of digital content, such as videos, simulations, virtual labs, quizzes or any other digital content available on the Internet. In this sense they can be "interactive". In the "1:1" environment, the students themselves can access the material of the hyperlinks at will, while in the "PC-VP" environment, this material is accessed by the teacher. The specific DWS are characterized by limited text for the benefit of other forms of teaching material such as images, videos, simulations and virtual labs. This makes DWSs more attractive and increases student participation. Also, hyperlinks are mainly placed in images - not in text. This urges students to “click” on them in order to see what comes after the "click".

The implemented teaching approach adopts inquiry practices as well as elements of the constructivist approach. By “inquiry practices” we refer to practices students use when they get involved in student-centered, hands-on activities with discovery (Smallhorn et al., 2015). The teacher acts mainly as a facilitator providing guidance during a learning activity and promoting student discussion – mainly a whole class discussion in our case. These practices are described as “Practices for K-12 Science classrooms” by the (United States) National Research Council (2012) and include: 1. Asking questions, 2. Developing and using models, 3. Planning and carrying out investigations, 4. Analyzing and interpreting data, 5. Using mathematics and computational thinking, 6. Constructing explanations, 7. Engaging in argument from evidence, 8. Obtaining, evaluating, and communicating information. These practices are implemented either through the work of students in teams, or through whole class discussion. The work of the students is usually guided by the DWS. That is, the teaching in most cases takes the form of guided-inquiry based learning. However, when the inquiry takes place in whole class discussion, which is directed by the teacher, it may also take the form of open -inquiry based learning. “Elements of the constructivist approach” means that students themselves construct their knowledge through a process that involves change (Olsen, 1999). Communication, negotiation, cooperation, reflection, and discussion reciprocity are qualities of Constructivist approach (Karal, Bahçekapılı and Reisoglu, 2009). Constructivist activities empower the learners to gain access to their experiences and beliefs that reshape their prior knowledge in the light of the applied course content (Nuket and Cigdem, 2014). The new knowledge has to come through experience of new authentic situations provided by the student activities in class and builds on students’ prior knowledge, “connects” with it and possibly reorganizes it. For this, students must have an active role in teaching. Inquiry-based learning provides suitable ground for student to construct their knowledge i.e. for constuctivistic didactic approaches. Eliciting prior knowledge, creating cognitive dissonance, application of new knowledge with feedback, and reflection on learning, are essential features of constructivism (Baviskar, Hartle, and Whitney, 2009). These features were taken into account in our teaching approach.

Usually, in the beginning of a student activity, students are asked to make predictions or formulate explanations-interpretations of phenomena or processes that are related to their experiences. This way, the student ideas-preconceptions are recorded (a characteristic of a constructive approach). Students are then given the opportunity to explore the validity of their predictions and explanations through a variety of exploratory activities. These may include performing real or virtual experiments, using information from the Internet and discussing and arguing with each other in their teams. The DWS activities require exploration practices such as formulating questions, designing experiments, studying texts, collecting and managing experimental data, using arguments, interpreting results, and presenting findings-conclusions. Where possible,

at the end of the activity students are asked to compare their initial views with the conclusions they have reached (also characteristic of a constructive approach). At the end of each activity there is an open whole class discussion where - with the guidance of the teacher - the conclusions of the teams are discussed and the class ends up with commonly accepted conclusions. Because the whole class discussion is a key element of the applied teaching approach, most student activities are short in time in order to allow for more such discussions during a class session.

To better understand the teaching approach applied, a student activity in Physics of the 3rd Grade or C Class (age 14) in Lower Secondary School (Gymnasium) is described. The subject is “Sound waves”:

First, the teacher asks the class “why many animals hear sounds that we cannot hear”. In an open discussion all possible student explanations are heard and recorded. This is followed by individual student work which includes a) a visit to the Wikipedia website (https://el.wikipedia.org/wiki/Ακοή) to study the text of the paragraph "The way we hear" and b) watching a video showing the effect of frequency on the oscillation of a membrane. In the video, there is a ruler that plays the role of the ear drum membrane that oscillates at different frequencies when a sound wave reaches it. After their individual work, students work together in their team in order to answer the original question. At this stage, they formulate and evaluate opinions and use arguments in order to come to a common conclusion. After their collaboration, the teams present their conclusions in a whole class discussion which is coordinated by the teacher. Through this discussion, the final and commonly accepted conclusions emerge. At the end of the activity, the final conclusions are compared with the initial student views-explanations.

2. Method

2.1 Data collection methodology

The study draws data from four 3rd Grade classes (C classes) of the 3rd Gymnasium of the City of Kozani, and extends into two consecutive school years, 2011-12 and 2012-13. The School is a typical public school in the city of Kozani and during this research it had 12 classes distributed in three grades (A, B and C Classes). That is, there were 3 classes per grade, with 20-25 students in each class.

In the following text as well as in the tables and pictures of this article, there are references to specific classes. The expression "class-school-year" is used for their coding. For example, the symbolism "C-3gym-2012" means the "Class C of the 3rd Gymnasium, in the year 2012".

The participants are eighty-nine (89) students from the four (4) different participating classes and the teacher who taught in those classes. Two of those classes were C Classes during the school year 2011-12 (C-3gym-2012) while the other two were C Classes during the next school year 2012-13 (C-3gym-2013). The subject taught in all classes was Physics. The teacher who taught the classes had 20 years of teaching experience in secondary education and was a certified teacher in the "B level" training program which concerns the use of ICT in teaching practice.

The DWS were used in "PC-VP" and "1:1" environments. The "1:1" environment was possible in the Greek public high school because the Greek Ministry of Education, through the "Digital Classroom" program - a program funded by the European Union - provided all first grade Greek students with laptops - the so-called "student netbooks". This happened in October 2009 and enabled the creation of "1:1" teaching environments for grades A, B and C of high schools during the school years 2009-10, 2010-11 and 2011-12 respectively. Class "C-3gym-2012" from which data for the "1:1" environment are drawn, is such a class. The following year (2013), "1:1" environment was not possible for the C class and for this reason this class the “C-3gym-2013” class was taught in a "PC-VP" environment. The data for the "PC-VP" environment come from class C-3gym-2013.

The data presented in this paper come from the students' answers to a questionnaire given to them at the end of each school year. This insured students had enough time to form an opinion about the benefits of the ICT integration in class. The questionnaire was the only possible way of collecting data by the teacher. For this, there was no need for any approval since the students were asked to answer questions concerning the quality of a new teaching method with the purpose of improving it. The effect of the different level of maturity of the

compared classes was examined and the results showed that age affects the effectiveness of the ICT integration. However this is beyond the scope of this study and for this reason is not presented here.

For the answers, a Likert scale was used with five possible options. The questionnaire was answered anonymously. Before completing the questionnaire, students were asked to compare the teaching with DWS with the teaching in other subjects where there wasn't any ICT integration.

In order to investigate the effect of the ICT infrastructure on the ICT integration, the data obtained from the two "C-3gym-2013" classes which were taught in the 1:1 environment, are compared with the data obtained from the two "C-3gym-2012" classes, which were taught in the PC-VP environment. For the compared C-3gym-2013 and C-3gym-2012 classes, the parameters "teacher", "school", "science subject" and "student age" that could also affect the ICT integration are the same. The only parameter (variable) that is different between those classes and that could affect the ICT integration is the "ICT environment" which is the focus of this study.

The questionnaire was self-developed and contained eight (8) questions which were created based on the eight (8) ICT benefits to Science teaching, which were mentioned in the previous section. For each benefit, one or two questions were created asking students to say whether they were recipients of this specific benefit. Thus, eight (8) questions were created which correspond to the first seven (7) ICT benefits. For the eighth (last) benefit questions were not created because it was considered that this benefit could not be perceived by the students. The reasoning was that the more the ICT benefits reach the students, the better – or the greater - the ICT integration is.

The eight questions students were asked to answer were:

1. Q.13: To what extent do you agree with the sentence "Now I understand the lesson better"?
2. Q.31: To what extent did the lesson become more interesting because it contains multimedia material (videos, simulations and virtual experiments)?
3. Q.33: To what extent did the use of ICT increase your engagement/participation in class?
4. Q.34: To what extent do you think the use of ICT linked Physics to real life?
5. Q.35: To what extent did the use of ICT provide more opportunities for inquiry and reflection?
6. Q.36: To what extent do you think the use of ICT provided more opportunities for collaboration in class?
7. Q.44: To what extent do you think the use of ICT provided more opportunities to check the effect of variables when working with multivariable experiments?
8. Q.45: To what extent do you think the use of ICT provided more opportunities to perform experiments in conditions not possible in the school laboratory?

"Table 1" shows the benefit to which each question corresponds. In Table 1, the questions are not numbered consecutively, but rather as Q13/31/33/34/35/36/44/45. To avoid any confusion, we need to say that these questions were part of a larger question database which also included questions investigating other matters such as the operational state of the notebooks in the 1:1 environment or some of the difficulties the students could have faced while working in such an environment.

Table1: Matching the questions with the ICT benefits

Question	Benefit
Q.33	**1.** They can improve student motivation and engagement.
Q.31 and Q.34	**2.** By providing access to experiences not otherwise feasible and by linking school science teaching to real life phenomena and to contemporary science, they can make teaching more interesting to students.
Q.13	**3.** By providing visualization and multiple representations of physical processes and phenomena, they can enhance understanding.
Q.44	**4.** By providing parametric simulations and by facilitating the calculation of data, they provide more opportunities for student participation in inquiry activities.
Q.35	**5.** They can facilitate exploration and experimentation by providing immediate visual feedback.
Q.36	**6.** They can foster collaborative learning by providing more opportunities for collaboration.
Q.45	**7.** They can make student work possible in conditions or environments that are not possible in the actual school laboratory, such as environments without gravity or friction.

The results came from the students' answers to the eight questions shown in Table 1. Forty-eight (48) students who were taught in a "PC-VP" environment and forty-one (41) students who were taught in a "1:1" environment answered those questions. When students answer "Significantly", "A lot" or "Very much" to a specific question, then the specific corresponding benefit is considered to have reached the students at a satisfactory degree. This criterion was used to assess the degree to which the ICT benefits reached the students through these two ICT environments (PC-VP and 1:1).

The following should be taken into consideration:
More data comparing ICT integration in PC-VP and 1:1 environments could not be collected in the following years (since 2013) because 1:1 environments did not exist in the schools where the participant Teacher was teaching. Up to this day, no considerable further improvement in the ICT infrastructure of the daily secondary Greek school classrooms has taken place since the year 2013. The publishing of this research has been delayed in the hope of getting more data. Due to the limited amount of data we consider it to be a preliminary study.

As already mentioned earlier (in Introduction), even today (Feb. 2020), the majority of the secondary education public school classrooms lack the basic ICT equipment for any ICT integration which is a computer-video projector system. For this reason, teachers who are lucky to teach in PC-VP classrooms and want to use ICT in their teaching should plan their instruction for this environment (PC-VP). This was another reason to publish this overdue - since the data collection - study. The financial situation in Greece is more or less the same compared to what it was in 2011-13 and the same challenges concerning educational investment are still in place. The coronavirus pandemic has made things even worse in the current year. However, there are European Union programs running, though which there is a good prospect of improving the public school ICT infrastructure.

2.2 Data analysis methodology

The SPSS application (v. 19) was used for the statistical analysis of data. The non-parametric "Man-Whitney U Test" test was used to compare the statistical distributions of student answers. This test was chosen because students' possible choices (answers) were very limited (only 5). With the same software, the statistical measures (Mean and Standard Deviation) were calculated. The "Man-Whitney U Test" test was used to compare the statistical distributions that do not exhibit normal distribution. This is the case either when the amount of data is a limited or when the values the parameter in question can take are limited or when both of these conditions happen simultaneously. In our case, both, the compared samples are small (N=62 and N=48 for A and C classes) and the possible values for the compared parameter (the answer to a specific ICT benefit) are only five (from 1 to 5). Had the compared distributions exhibited normal distribution, the “T-test” would have been used because it produces relatively more reliable results.

To estimate the degree to which a) the lower Secondary school students (ages 12-14) can meaningfully form an opinion about the “enjoyment” and the “understandability” of teaching (lesson) and b) the questions used could detect any differences in student answers caused by a change of some factor which might affect the student answers, we compared the answers of two student groups of different age. If the age factor actually affects student answers and the comparison of student answers to those two questions shows considerable difference, then it is most likely that a) the students can meaningfully form an opinion about what they are asked by the questions, and b) the questions are a proper tool to detect differences in student answers. In a way, this comparison could play the role of a pilot test in this study. The two student groups compared for this purpose were the A Class (N=62) and C Class (N=48) students, ages 12 and 14 respectively who were taught in PC-VP environment, the same subject, by the same teacher. The only factor left to affect student answers was the age factor. For the comparison of the statistical distributions of the student answers the Mann-Whitney Test was used. The results are shown in Table 2.

Table 2: Statistic comparisons & measures of student answers for A & C Classes in "PC-VP" environment

Question	**Compairing**: A Class & C Class **Z / Sig**	**Means:** A Class / C Class	**St. Deviations** A Class / C Class
To what extent did the lesson become more interesting?	3,876 / **0,000**	4,60 / 3,85	0,664 / 1,185
To what extent do you agree with the sentence "Now I understand the lesson better"?	2,346 / **0,019**	4,47 / 4,00	0,671 / 1,031

Judging from the Sig values (<< 0.05) in Table 2, we can say that at "95% confidence level" (p> 0.05), for both questions, there is statistically significant difference in the student answers for the "A" and "C" Classes. This suggests the questionnaire used in this study can "detect" factors affecting the ICT integration and thus it can be used as a tool for this purpose.

3. Results

The student answers are presented in the form of diagrams (Figures 1 and 2). "Figure 1" presents the statistical distribution of the answers of the student who were taught in a "PC-VP" environment, while "Figure 2" presents the answers of the students who were taught in "1:1"environment. The answers to each question are shown with a specific color – there are 8 different colors for the 8 questions.

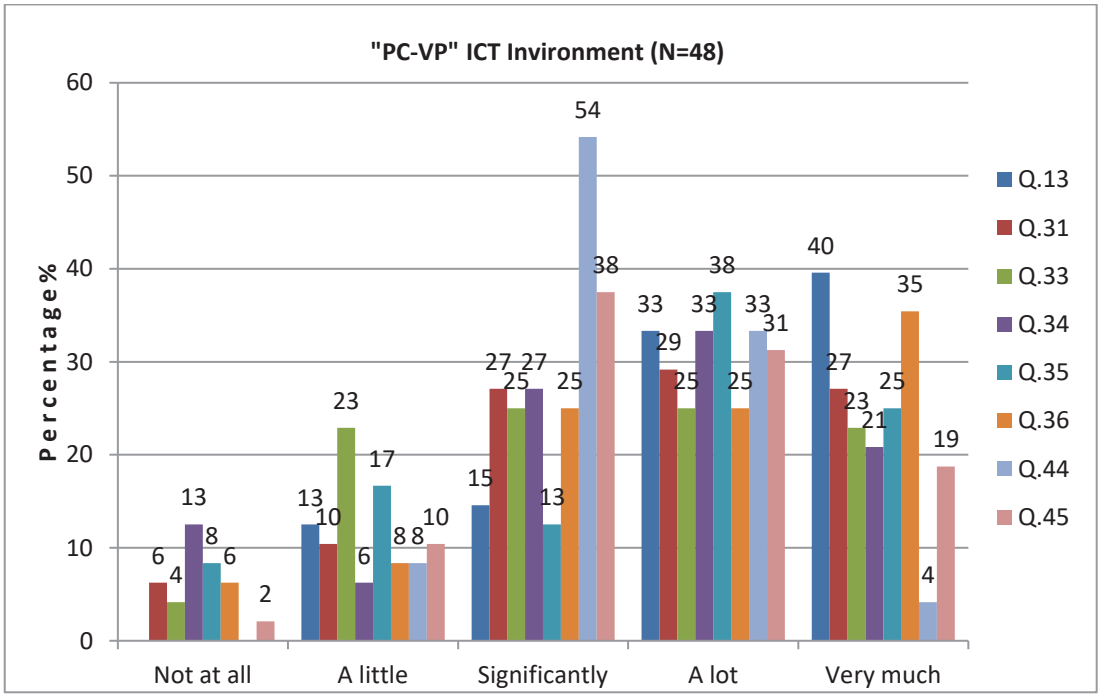

Figure 1: Results from «PC-VP» environment

"Figure 1" shows that, in a "PC-VP" environment, all the benefits concerning the specific eight questions, reached the students to a great extent (Significantly, A lot, and Very much). If the answers to "Significantly", "A lot" and "Very much" are added together, then the percentage of students who - at a great extent - receive a specific ICT benefit, in the "PC-VP" environment, are as follows:

- 88% of students said that the ICT integration contributed significantly to a better understanding of the lesson (Q.13)
- 83% of students said that the ICT integration contributed significantly to making the lesson more interesting because it now contains multimedia material (videos, simulations and virtual experiments) (Q.31)
- 73% of the students said that the ICT integration contributed significantly to the increase of their participation (Q.33)

- 81% of the students said that the ICT integration significantly increased the connection of the course (Physics) with real life (Q.34)
- 76% of students said that the ICT integration significantly increased the opportunities for inquiry (Q.35)
- 85% of students said that the ICT integration significantly increased the opportunities for student collaboration (Q.36)
- 91% of students said that the ICT integration significantly increased the opportunities for participating in "variable control" practices when working with experiments (Q.44)
- 88% of students said that the ICT integration provided more opportunities for doing experiments in ideal conditions, not possible in the school laboratory (Q.45)

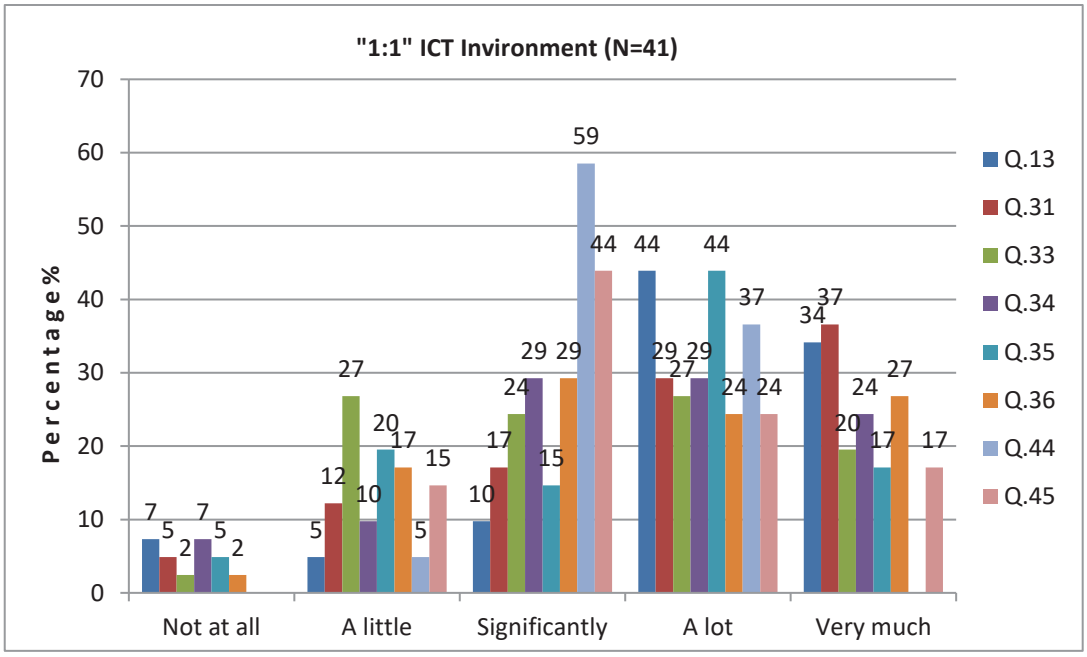

Figure 2: Results from "1:1" environment

"Figure 2" shows that, in a "1:1" environment, all the benefits concerning the specific eight questions, reached the students to a great extent (Significantly, A lot, and Very much). If the answers to "Significantly", "A lot" and "Very much" are added together, then the percentage of students who - at a great extent - receive a specific ICT benefit, in the "1:1" environment, are as follows:

- 88% of students said that the ICT integration contributed significantly to a better understanding of the lesson (Q.13)
- 83% of students said that the ICT integration contributed significantly to making the lesson more interesting because it now contains multimedia material (videos, simulations and virtual experiments) (Q.31)
- 71% of the students said that the ICT integration contributed significantly to the increase of their participation (Q.33)
- 82% of the students said that the ICT integration significantly increased the connection of the course (Physics) with real life (Q.34)
- 76% of students said that the ICT integration significantly increased the opportunities for inquiry (Q.35)
- 80% of students said that the ICT integration significantly increased the opportunities for student collaboration (Q.36)
- 96% of students said that the ICT integration significantly increased the opportunities for participating in "variable control" practices when working with experiments (Q.44)
- 85% of students said that the ICT integration provided more opportunities for doing experiments in ideal conditions, not possible in the school laboratory (Q.45)

What follows is the comparison of the statistical distributions of student answers for the two different ICT infrastructure environments ("PC-VP" and "1:1") with the non-parametric test "Man-Whitney U Test ". That is, a comparison between the answers of classes C-3gym-2013 and C-3gym-2012 that were taught respectively in

those two environments. The answers for each specific question are separately compared. The results of those comparisons are shown in "Table 3".

Table 3: Statistic comparisons & measures of student answers for "PC-VP" and "1:1" environments

Question	**Compairing**: «Η/Υ-ΒΠ» & «1:1» **Z / Sig**	**Means:** C-3gym-2013 / C-3gym-2012	**St. Deviations** C-3gym-2013 / C-3gym-2012
Q.13: To what extent do you agree with the sentence "Now I understand the lesson better"?	0,201 / **0,841**	4,00 / 3,93	1,031 / 1,149
Q.31: To what extent did the lesson become more interesting because it contains multimedia material (videos, simulations and virtual experiments)?	0,908 / **0,364**	3,60 / 3,80	1,180 / 1,209
Q.33: To what extent did the use of ICT increase your engagement/participation in class?	0,250 / **0,803**	3,40 / 3,34	1,198 / 1,153
Q.34: To what extent do you think the use of ICT linked Physics to real life?	0,264 / **0,792**	3,44 / 3,54	1,253 / 1,185
Q.35: To what extent did the use of ICT provide more opportunities for inquiry and reflection?	0,396 / **0,692**	3,54 / 3,49	1,271 / 1,143
Q.36: To what extent do you think the use of ICT provided more opportunities for collaboration in class?	0,912 / **0,362**	3,75 / 3,56	1,212 / 1,141
Q.44: To what extent do you think the use of ICT provided more opportunities to check the effect of variables when working with multivariable experiments?	0,019 / **0,362**	3,33 / 3,32	0,694 / 0,567
Q.45: To what extent do you think the use of ICT provided more opportunities to perform experiments in conditions not possible in the school laboratory?	-0,636 / **0,525**	3,54 / 3,44	0,988 / 0,950

Judging from the Sig values (>> 0.05) in Table 3, we can say that at "95% confidence level" (p> 0.05), for all eight questions, there is no statistically significant difference in the student answers for the two ICT infrastructure environments ("PC-VP" and "1:1").

4. Discussion

The results shown in the diagrams (Figures 1 and 2) show that, in both ICT environments under consideration ("PC-VP" and "1:1") the majority of students said that they received all the ICT benefits which correspond to the eight (8) questions asked. More specifically, in a "PC-VP" environment, the percentage of students who said they received the ICT benefits range from 71 to 93% depending on the benefit, while in the "1:1" environment the range is from 71 to 95%. However, these benefits are the seven of the eight benefits that the ICT can offer to Science teaching. Therefore, the first conclusion that emerges is that the ICT integration - in the way it was done - was largely effective in both ICT environments under consideration ("PC-VP" and "1:1") and what remains to be seen is whether the level of ICT infrastructure available in the classroom affects the degree to which these benefits reach the students.

The answer to that question comes from the comparison of the statistical distributions of student answers in the two different ICT infrastructure environments ("PC-VP" and "1:1"). As shown in Table 3, there is no statistically significant difference in student answers for the two ICT environments under consideration ("PC-VP" and "1:1") for any of the questions. In other words, the degree to which students receive the ICT benefits is the same for those two environments. This means that the ICT integration is equally effective and beneficial regardless of the number of the computers in the classroom. However, we should have in mind that this happens when the specific teaching approach (or practice) is used and that different use of technology might produce different results. The results are consistent with the reports of Cuban (2006) and Hu (2007), according to which the introduction of 1:1 environments in US schools did not result in measurable benefits compared to PC-VP environments. Similarly, several other studies show that for teachers, the ICT infrastructure is not an

important criterion for ICT integration in their teaching practice (Flores, Santero and Gordillo, 2017; Totter, Stütz and Grote, 2006).

The finding, that the teaching approach implemented was largely effective for ICT integration into both ICT environments, is particularly important for those looking for ways to integrate ICT into elementary ICT infrastructure environments such as the "PC-VP" environment. This approach could be applied today in all classrooms equipped with a computer-video projector system. This equipment is already available in several classrooms in the secondary education Greek public schools and it is reasonable to expect that all classrooms will be supplied with this basic infrastructure in the near future. In contrast, providing computers for every student in the classroom is a project which requires more funds and - as far as it concerns the Greek schools - it is unlikely to be implemented in the next few years. The importance of this approach is that in Greece, several teachers can use it today in the existing PC-VP classrooms and in the years to come all teachers will be able to use it either in PC-VP or in 1:1 classrooms. It is worth mentioning that the teacher who participated in this survey and who has been lucky enough to teach in PC-VP classrooms since then, has continuously been using the same teaching approach since then (since 2013). She insists she is “very happy with it” and also “feels” her teaching integrates ICT effectively.

The finding, that the level of ICT infrastructure does not significantly affect the benefits of the ICT integration, contradicts our initial prediction - according to which - having many computers would result in more benefits for the students. We would for example expect that more computers would make the lesson more interesting and enjoyable and would increase student participation. In other words, we would expect students to “vote” more for the 1:1 environment and say the lesson was “better” when they had their own computers in class. However, this is not what our results show and the question is “why didn’t they”. A possible explanation is that while the ICT integration doesn’t make a difference when the specific teaching approach is used it might make a difference when different teaching approaches will be used. For example, if the lesson is designed on a more student-centered basis, where every student was expected to work autonomously on his computer and create his own work, then the 1:1 environment will be a necessity and students will probably “vote” for it. Similarly, when the teaching scenario requires the use of the web on a personal or team basis - a scenario possible only in 1:1 environment - students may find this environment more “attractive”. In other words, different teaching planning could make better use of what the ICT can offer to students. Some other factors that could explain the students’ responses may be the inconvenience of bringing and carrying their computers to school every day, or the technical computer (software or hardware) problems that often occurred during class, causing frequent lesson interruptions. These interruptions often broke the normal flow of teaching because the teacher, in the absence of technical support, had to take care of such problems. Finally, the school or student culture might be a factor affecting student answers (the results). That is, the way students used to learn in the particular school or in the educational system of Greece, might be such a factor. From our experience, the traditional teacher-centered teaching seems to be the norm in the Greek schools. If students are used to this kind of teaching, they may feel more comfortable and see more favorably a PC-VP environment in comparison to a 1:1 environment. Despite the above possible explanations and the limitations on the drawn conclusions, the results still show equal benefits for the two ICT environments examined.

An important question that arises is which investment is preferable on a “value for money” basis. Investing in “PC-VP” or “1:1” ICT environments? For those countries or school districts which can easily afford the “1:1” ICT environment, this environment is probably a better choice since it can be considered an investment for the future as it can be used by teachers who can benefit further from the additional possibilities the 1:1 environment can offer. It allows for more autonomous student work and might be more effective when different teaching approaches are used. For those with limited budgets, as is the case for Greece, it might be better to go step by step and first equip all classrooms with a computer-video projector system leaving the 1:1 environments for the future. In any case, given that today most Greek schools lack the basic ICT infrastructure (PC-VP) and no ICT integration can happen in those schools, it is imperative to install PC-VP infrastructure in all classrooms without any delay. The results of this study are an additional argument for making that choice.

We need to keep in mind that the only source of data is the student answers. More data and more data sources would further support the conclusions drawn. When 1:1 environments appear in some public schools or some classrooms, more data could be produced from bigger samples and from different age classes. This is expected to happen in the next couple of years through the European Union programs expected to run in the

next few year. A survey of the teachers' opinions on the matter would be another source of data. Again, in the coming years, when 1:1 environments exist in several schools, then teachers' opinions can be studied.

5. Conclusions

In the present study, the degree to which the level of technological infrastructure can affect the ICT benefits in the daily science teaching was investigated. The ICT integration was attempted through a specific teaching approach which uses digital work sheets with specific characteristics.

The results show that, when the specific teaching approach is used, the benefits the ICT can offer to sciences teaching reach students at the same degree in a teaching environment where there is only a PC and a video projector and in a teaching environment where every student has his own computer.

Based on the results of the research and taking into account the current economic situation of Greece, it is important to ask ourselves if at the present time it is preferable to invest in 1:1 or in PC-VP infrastructure for public school classrooms. The results show that unless different teaching approaches are used, investing in 1:1 environments does not secure additional benefits. We should also have in mind that "different teaching approaches" require teachers able to effectively implement them. Different approaches might benefit further from the additional possibilities the 1:1 environment can offer. For example, more student-centered approaches requiring more autonomous student or team work might make the difference in this environment. In addition, if the 1:1 infrastructure is chosen, besides the computers cost, we should also take into account the cost of maintenance, technical support and storage of the computers. Other ideas for solving the infrastructure problem, like the "BYOD" initiative, cannot be adopted in Greece because – according to the current legislation – no personal student portable devices are allowed in the classroom. However, this might be a solution for countries where such legislation is not in effect. On the other hand, it will not be reasonable to support the idea of not advancing the ICT infrastructure beyond the PC-VP level. Advances in ICT, the use of portable devices (smartphones etc.) in the classroom, and the development of new powerful science applications which can promote inquiry-based learning and communication will lead to classrooms where everybody will have to have his own "computer", and this is going to be the future for the Greek public schools classrooms.

The specific teaching approach used in this study, achieved satisfactory ICT integration in both ICT environments considered here. This means that the secondary education teachers who teach science in public high school PC-VP classrooms can use it without waiting for any major coming improvements in the ICT infrastructure. It also makes sense for school administrators and teachers to ask for PC-VP infrastructure to be installed in every classroom if any ICT integration in teaching is to happen. It will be a wise move, will not cost much and may immediately bring considerable benefits to teaching and learning. . Beyond this, we wish and hope the Greek Ministry of Education will be able - in the Greek school classrooms - to upgrade the ICT infrastructure to 1:1 level or even further so that teachers and student will be able to benefit in all possible ways ICT can benefit teaching and learning.

In this study, the "samples" used for statistical analysis were relatively small (N1 = 48, for PC-VP and N2 = 41 for 1:1 environment). More research is needed to draw safer conclusions. More research could be done using larger samples (more student participants), on other science subjects or based on teachers' views. It would be interesting to apply the same approach with students of different age (grade). More data and more queries can further support the results.

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Understanding e-Learning Acceptance Among Teachers: A Grounded-in-Theory Approach

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Abstract: The ramification of understanding why technology is accepted and used for e-Learning in school education has significant implications for administrators, practitioners and researchers. A key consideration regarding technology acceptance for e-learning is the extent to which usage decisions are informed by affective and cognitive factors. This conceptual paper sets out the process we used to develop a theoretical model based on the technology acceptance model (TAM). The 'attitude' construct of TAM was explored to understand 'why' practicing teachers chose to use technology for e-Learning. The paper presents a conceptual review of selected technology acceptance and social cognitive theories/models. The development of the theoretical model employed a cross-sectional 'grounded-in-theory' methodological approach using TAM as the anchor theory. The adapted TAM (figure 3) offers that the attitude construct is well suited to be moderated by self-efficacy, motivation, benefits and value propositions. The adapted TAM is not arbitrarily suggesting replacing existing and successful approaches to research that use single or multiple theories/models. It seeks to augment researcher's perspectives on research foci of theory testing, confirmation, generation and modification and as such is suitable for studies located in focused contexts.

Keywords: e-Learning, Grounded-in-theory, TAM, Attitude, Self-efficacy, Value

1. Introduction

This paper extends on our conference paper: 'When Tam just won't do' (Sadeck and Cronjé, 2018, pp.383). We motivate for including different moderating constructs and making explicit existing ones to enhance the contextual usability of TAM in focused studies. Our approach was to examine various theories/models on technology adoption and those focused on cognitive and affective constructs to understand why teachers use technology for e-Learning.

"The adoption of an educational innovation is a complex process involving a multitude of variables" (Hall, Dossett and Wallace, 1973, pp.3). Our critique of researchers is that they often attempt to apply theories as is which contradict the contextual nature of their study. Research contextual imperatives and focussed research questions often provide possibilities for adapting theory. Existing technology adoption theories do not explicitly progress beyond the point to 'actual use'. Concomitantly, existing research does not sufficiently describe or indicate patterns of use and practice.

According to Oye, Iahad, and Ab-Rahim (2012) there is little value to be gained unless technology is actually used. We wanted to understand why teachers choose to use technology for educational purposes. To understand what contributes to practitioner's attitudes and eventual use of technology, we looked to what Chigona and Chigona (2010, pp.212) state as "teachers' readiness, confidence, knowledge and ability to evaluate the role of ICT in teaching and learning". The constant revisions to TAM appear to suggest an instability of the core constructs to explain acceptance and usage behaviours. Given our need to understand the relationship between intent and action, the phenomenon of actual use is approached via the attitude construct through relational aspects in the cognitive and affective domains. The grounded in theory approach used in this paper represents our argument for seeking out focused moderating constructs that mediate attitudes-intention-use through rational reasoning.

We focused on, and examined: self-efficacy; motivation; beliefs; attitudes and value, as key foundational beliefs as moderating constructs, drawn from social cognitive and motivational theories alongside technology adoption theories. Our decisions to hone in on two separate sets of theories are based on the following: "If adoption is not present, then it is unlikely that one would see any application or integration" (Sadeck and Cronjé, 2017, pp. 401).

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Our rational for using a grounded-in-theory methodological approach is aligned with, Bagozzi (2007) and Glasser and Strauss (1967): Glasser and Strauss (1967, pp.4) note that some research methodologies advocate "… the opportunistic use of theories that have dubious fit and working capacity." We regard this as clarifying the "de-emphasis on the prior steps of discovering" regarding what constructs, concepts and hypotheses are significant for the research area (Glasser and Strauss, 1967, pp.1). Bagozzi (2007) states that "the problems are…that little theoretical insight is provided into the mechanism, or "the why", behind proposed interaction effects..." He further maintains that "consideration of moderating variables is one way of deepening any model, but introductions of these should be grounded in theory…" (Bagozzi, 2007, pp.244).

2. Context, Problem statement, Rationale, Aims and Methodological approach

2.1 Context

Our conceptualisation of the context comprises dualism, i.e. the research paradigm of ICTs in education and of the implementation of ICTs for e-learning in the Western Cape Province, South Africa (SA).

2.1.1. Research paradigm of ICTs in education:

Implementation of ICTs in SA is embedded in a systemically different context to that in many developed countries. The situation is problematised by the vast divergence between implementation and integration in developed and developing countries (Thomas and Cronjé, 2007, pp.765). Technology related initiatives in SA have primarily focused on technology deployment, models of implementation and emerging technology testing previously undertaken in other countries.

Much of the research is on peculiarities of technology attributes (confirming or proving the use of a new innovation) and why technology is not used. More recently studies focus on: professional development, models of implementation and hybrid models of e-Learning, etc. Research using theories/models generally evolve around theory testing and theory confirmation. There are additionally few studies that focus on the human element in these studies. According to Thomas and Cronjé (2007) research focuses on: "implementation (generally associated with simplicity)". However, what is needed is a focus on "integration (generally associated with complexity)", as this process is what points to actual use of technologies (Thomas and Cronjé, 2007, pp. 765).

2.1.2 Implementation of ICTs for e-learning in the Western Cape, South Africa:

This context is partially underpinned by Abuhmaid (2011, pp.195) who notes that complexities regarding integration of ICTs into education include those associated with the "human side of the integration…and the technological side of it". More appropriately the environmentally contextual realities of the teachers in schools in the Western Cape and SA in general are, at best, described as unequal. This refers to their access to technology; resources; connectivity; technologically sound professional development and technical support.

2.2 Problem statement

We problematise our paper as responding to:

- Diminished attention to attitudes for understanding 'why' technology is used.
- The technologically deterministic nature of technology adoption theories/models that neglect the human element.
- The indiscriminate use of theories/models.

The theories/models employed in research into ICTs in education appear to be used commonly and partially. Researchers tend to take only some constructs from theories/models and sometimes selectively use preferred theories/models (Venkatesh et al., 2003, pp.426). We believe that while the strategies and approaches used, however logical and easy to implement, are not enough to critically engage with understanding why something is happening or not happening. There are, according to Samaradiwakara and Gunawardena (2014), "substantial differences between groups in how they perceive items on technology acceptance" (Samaradiwakara and Gunawardena, 2014, pp.32). This statement, which implies a human element, suggests significant implications for usage predictions, both theoretically and practically. This we believe warns against the danger of exclusive selection of a theory or approach.

We elected to begin with the technology acceptance model (TAM) as an extensively tried and tested model that assist to predict and describe acceptance and use of technology. The TAM model has been the subject of

contention owing to the fact that it is regarded as being technology focused and that a range of moderating constructs are not explicit. According to Bagozzi (2007, pp.244) "Parsimony has also been an Achilles' heel for TAM……It is unreasonable to expect that one model, and one so simple, would explain decisions and behaviour fully across a wide range of technologies, adoption situations, and differences in decision making and decision makers". Cheng-Min (2019, pp.2) summarised disadvantages of TAM based as: " not providing adequate insight into individuals' perspectives of novel systems; neglecting its indicators and directly investigating the external variables of perceived ease of use (PEOU) and perceived usefulness (PU); and ignoring the relationship between usage attitude and usage intention".

We disagree with suggestion of a direct link from perceived usefulness to behavioural intent that bypasses attitude. Furthermore, subsequent iterations of TAM, have completely left out the attitude construct. Our critique is that attitude is a decision making process and as such cannot be bypassed or left out.

2.3 Rational and aims

The aim this paper is to understand how a grounded-in-theory approach using existing adoption and social theories could bring meaning and understanding to why individuals adopt and actually use technology for educational purposes. The rationale for this was to understand why any individual chooses to adopt and use any particular technology. As such our focus was on the attitude construct of TAM. The purpose of this paper is not to produce an account of adoption of any particular theory/model, but rather to explore adoption theories, and describe the process of developing a theoretical model.

2.4 Methodological Approach:

Our methodological approach is premised on a conceptual interpretation of a grounded approach, i.e. to generate and modify inductively from existing theories/models. This is based on the seminal work on grounded theory (GT) of Glasser and Strauss (1967, pp.2-3). They state that the aim of grounded theory is: "to generate or discover a theory" and further defined GT as: "discovery of theory from data systematically obtained from social research."

We used an inductive approach through an exploration of secondary sources to produce a substantive model for a contextually specific area of study (teaching using technology). Our approach was to examine the suitability of moderating constructs from a range of theories to augment attitudes in TAM. We then propose a lean model, that is implementable and methodologically grounded-in-theory, that can be used in research focused on understanding why people actually use technology.

3. Literature Review: background

3.1 Technology adoption

Adoption refers to the acceptance, implementation and taking on of a new product or innovation. Innovation refers to something new, or more accurately "an idea, practice or object that is perceived as new by an individual" (Rogers, 1995, pp.11). Technology in the context of this paper is taken as a broad term for all "physical hardware/technology, systems, services and products" (Sadeck, 2016, pp.21).

Adoption theories focus on predicting individuals' choices to accept or reject innovations. Adoption is not a one-time event, but rather a process (Hall, 1974, pp.5-6), which Straub (2009, pp.628) explains as "beliefs and attitudes… over time…may influence decisions". The adoption trajectory of people will be shaped by their take on the innovation's perceived benefits, motivations and personal beliefs of being able to implement the innovations.

3.2 Innovation Diffusion Theory (IDT): Adoption - Diffusion

Innovation diffusion theory (IDT) (Rogers, 1995) has been the foundation of many studies on innovations. Rogers (1995, pp.208) proposed five rate of diffusion attributes: relative advantage; compatibility; complexity; trialability and observability. Being inherently innovations focused, they are insufficient as a basis for understanding underlying affective processes. In the adoption decision-making process, attitude formation is a mental activity which is in the affective domain. Adoption, as a personal and internal process is not an issue of the attributes of a technologies, but about the human element and change. Change we believe is the stimulus that activates both physiological and psychological responses in a teacher.

Change brings about a reaction in the form of concerns which, in turn, triggers two control mechanisms: one that mobilises (to carry out an action) and the other that immobilises (not to carry out the action). The concerns-based adoption model (CBAM – Hord et al., 1987) was developed "to describe changes people undergo as they adopt a new program" (Loucks, 1983, pp.1). It provides a "developmental perspective on how an individual's concerns influence integration (and use) of an innovation" (Straub, 2009, pp.632). The strength of the CBAM lies in the application of affective and cognitive concerns. One limitation of the CBAM is that it contextually presupposes that adoption is present.

3.3 Technology acceptance model (TAM)

TAM (figure 1) posits that, behavioural intentionality (BI) to use, serves as a mediator of actual use. It proposes that attitudes determine BI with perceived usefulness (PU) seen as impacting directly on intention. Perceived ease of use (PEOU) is said to have a direct impact on PU. Cognitive beliefs, PEOU, and PU are said to jointly impact on behavioural attitude (Davis, Bagozzi and Warshaw, 1989, pp.985).

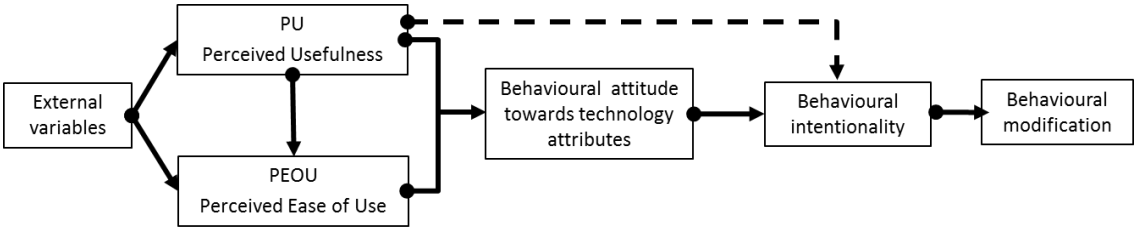

Figure 1: Technology Acceptance Model (TAM) Adapted from Davis, Bagozzi and Warshaw, 1989

The Technology Acceptance Model (TAM) introduced in 1986 by Davis, originated in the Theory of Reasoned Action (TRA) of Ajzen and Fishbein (1980). According to Bagozzi (2007) a key asset of TAM is that it links intention as an influencer for usage.

TRA postulates that a person's behaviour is informed by behavioural intent (BI) and this gives meaning to attitudes toward the behaviour. It contends that people would use technology if they perceive positive benefits associated with its use. Intentions according to Ajzen (1991, pp.181), "are assumed to capture the motivational factors that influence behaviour". Bandura (2001, pp.6) further states that intentionality is "a representation of a future course of action to be performed". A further strength of TRA is that it suggests that an intention (mental process) transforms a thought into a physical action. However it must be noted that intention does not mean that an action will be performed.

The theory of planned behaviour (TPB) was proposed by Ajzen (1985) and is a derivative of TRA. TPB adds a third concept, i.e. perceived behavioural control (PCB). TPB holds that attitudes, subjective norms, and PBC are direct determinants of intentions, which in turn influence behaviour. PBC according to Ajzen (1991, pp.183) refers to people's perception of the ease, difficulty, or capability to perform behaviours. PBC shows a natural relational link to Bandura's (1982) self-efficacy concept. Intentions to use, in TAM, are strengthened by two cognitive influencing factors, i.e. PEOU and PU, via attitude. These attributes of TAM have contributed significantly to its usefulness in explaining user acceptance.

However, TAM, TRA and TPB do not adequately explaining factors that could influence or mediating adoption and use. The original TAM (Davis, Bagozzi and Warshaw, 1989, pp.985) shows a direct link from PU to BI – this however does not consider that, by bypassing attitude, which is a decision making process, the model is rendered flawed. Furthermore, according to Lee, Cheung and Chen (2005, pp.1102), PEOU does not have any considerable direct effect on the attitude construct. Park (2009, pp.159) further concludes that "neither perceived usefulness nor perceived ease of use had a significant direct effect on behavioural intention…"

Park's (2009) study has shown, as have others (Venkatesh and Davis, 1996; Grandon, Alshare and Kwan, 2005; Ndubisi, 2006), that "some TAM concepts had a direct and indirect effect" (Park, 2009, pp.159). The need for adaptations and extensions to TAM (Bagozzi, 2007, pp.244), have not gone unnoticed and subsequent iterations resulted in TAM 2, TAM 3 and UTAUT.

Conspicuous by its absence in TAM 2, TAM 3 and UTAUT is the attitude construct This resulted from studies which maintained that attitude only 'partly' mediates PU. We argue that attitude is a mental attribute that

informs decision-making and as such cannot be left out of any adoption model even if it is considered to 'partially' mediate.

What was a relatively simple model (original TAM) to follow and use is now rendered complex in both application and theoretical rigour. Venkatesh and Bala (2008, pp.274), believe that TAM 2 lacks "actionable guidance [for] practitioners". The anchor and adjustment determinants in TAM 3 are equally scant in guiding users specifically because of the absence of the attitude construct.

The UTAUT model (Venkatesh et al., 2003) explains substantial variance in BI and usage behaviour. Dwivedi et al. (2019, pp.721) believe that in UTAUT, "there may not be any variation in the moderator for the adoption and use context". We find the suggestion of UTAUT that facilitating conditions leads directly to use as hugely problematic. We believe that use is predicated on intention and this we note are absent in the association between BI and assistive environments. The various iterations of TAM contain a range of independent variables for predicting intentions but fewer for explicitly explaining behaviours. This we maintain is limiting as behaviour is influenced by attitudes which are based on beliefs.

3.4 Theoretical underpinning

3.4.1 Beliefs and Attitudes

In the debate on the implementation and integration ICTs into schools, "beliefs and attitudes of teachers towards ICT in teaching and learning have always been regarded as a central criteria" (Eickelmann and Vennermann, 2017, pp.733). Furthermore school workplace behaviours are driven by attitudes and beliefs and these ultimately effect change processes (Pajares, 1992; Richardson, 1994-b). Both attitudes and beliefs, we believed, exist differently in the psychological-self.

Beliefs are considered to be formed by affective, evaluative and social elements and as such, they are not believed to be "founded on rationality but on feelings and experiences…making them consistent and long lasting" (cited in Solis, 2015, pp.248). Drawing on the work of Pajares (1992), Solis (2015, pp.248) states that beliefs "…have an influence on a person, mainly on the generation of thought, opinions, aptitudes and attitudes." The attitude outcomes of beliefs are categorised by Ajzen and Fishbein (2005, pp.7) as: "general attitudes toward physical objects" and "attitudes toward performing specific behaviors". This suggests that, decisions about 'if' and 'how' to use technology, is influenced by one's beliefs. We hypothesise that beliefs become evident in what a person says and, in their actions/behaviour.

We believe that attitudes and beliefs are not mutually exclusive. Prestridg (2012, pp.450) maintains that even though "beliefs are not easily changed, it does not mean that they cannot be changed". The question we considered is: how does the attitude construct in TAM moderate the intent-to-action continuum? There is a general argumentative base that deals with known contradictions between intentions and action.

Ajzen and Fishbein (2005, pp.20-21) offer that it is the "qualities of the attitude itself…that may moderate the strength of the attitude-[intent]-behaviour relation". Attitude formation plays out differently, i.e. people who hold the same general attitude can act out differently. Thus we believe that the attitude construct of TAM lacks direct moderators in the cognitive and affective domains.

Richardson (1996) notes that "beliefs are thought to drive actions; however, experiences and reflection on actions, may lead to changes in, and/or additions to beliefs." Ajzen and Fishbein (2005, pp.21) based on the work of Fazio and Zanna (1981), state that "attitudes based on direct experience are more predictive of subsequent behaviour than are attitudes based on second-hand information". These beliefs, according to Straub (2009, pp.641), are uniquely constructed by individuals, and that these beliefs are malleable. This leads us to argue that attitudes and beliefs can vary over time and that there is a reciprocal push-pull of a range of cognitive and affective moderators.

Our exploration of the attitude construct in TAM does not sufficiently justify its direct resulting in BI without understanding the factors that shape attitudes. We felt it necessary to explore the expectancy-value relationship. This was to understand the cognitive and affective processes that determine and shape decisions to act or not to act.

At this point we paused to recount the process thus far. We started with TAM and found that it did not explicitly advance our understand of why individuals adopt and use technology. To understand this we engaged with attitudes and beliefs to validate its role in decision making. We began to engaged in an exploration of social cognitive theory (SCT) and motivational theory (MM) to understand how beliefs and attitudes are shaped.

3.4.2 Social Cognitive Theory (SCT)

According to Bandura (1989), "In social cognitive theory, people are neither driven by inner forces nor automatically shaped and controlled by the environment…they function as contributors to their own motivation, behaviour, and development within a network of reciprocally interacting influences (Bandura, 1989, pp.8). Behaviour is determined by the influence of various factors that shape the inner self of a person - such influences include situational factors, societal norms, personality and cognitive factors. In this section we limit our discussions to self-efficacy, motivation, expectancy and value through the PU and PEOU constructs of TAM. Perceived usefulness (PU) directly simplifies usability value and could be explored through a benefit-expectancy-value relationship. Perceived ease of use (PEOU) attempts to simplify competency and could be explored through a competency-belief-motivation relationship.

Holden and Karsh (2010) maintain that the use of ICTs must have a value proposition associated with it, i.e. it "must be perceived as useful". Their study highlights sharply "that, regardless of how useful and easy to use…steps will need to be taken to ensure that end users feel confident in their ability to use it (self-efficacy)" (Holden and Karsh, 2010, pp.166).

3.4.3 Self-efficacy

Bandura (1996, pp.5516) defines self-efficacy as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives". These beliefs are known to exert an influence on what people decide to do and the effort they are prepared to put into it. Self-efficacy beliefs are associated with the affective domain and determine how people feel, think and motivate themselves.

Both self-efficacy and perceived behavioural control (PBC) are focused on beliefs: self-efficacy as an internal trait and PBC as external. Self-efficacy as a control belief exerts influence over internal factors (peoples' beliefs of their ability to carry out the action) and situational factors such as PCB (peoples' beliefs of being able to control time, resources, etc.). However, PBC is a belief, and should not be confused with actual control, i.e. where people are actually able to exert influence on situational factors, i.e. under their volitional control (controllability).

Perceived behavioural control (PCB) and actual control are more predictors of actual behaviour than self-efficacy is. If people believe they have the ability to perform the action and are in control of the situational factors, then the probability of the action being performed is high.

3.4.4 Motivational Model (MM)

The range of motivation theories underpin many studies (with adaptations) for specific contexts such as, to understand new technology adaption and use. Motivational factors orientate us in understanding mediating variables of attitudes and beliefs.

The two core constructs are: extrinsic and intrinsic motivation. Intrinsic motivation is "the desire to do or achieve something because one truly wants to and takes pleasure or sees value in doing so" (Usher and Kobe, 2012, pp.3). Extrinsic motivation is this same desire, however not for itself but for the purpose of a result, external reason or instrumental value (Pintrich, 2003, pp.673). We believe that these two subtly different motivators ultimately determine specifically valued behaviours.

According to Usher and Kobe (2012, pp.3), in the "self-efficacy theory [of Bandura], PEOU influences intrinsic motivation". We believe that this reasonably suggest that self-efficacy beliefs have a reciprocating moderating effect on motivation. It is then very likely that positively motivated persons could to develop a robust sense of self-efficacy and PCB beliefs and vice versa. This iteratively suggests that motivation could also serve to alter beliefs and attitudes – equally to motivate or demotivate over time.

We asked ourselves how else could attitudes and intentions be moderated to tell us why people actually use technology. There are contradictions and variations in correlating what people believe and say and what they intend and actually do. We were particularly interested in understanding why in spite of variances people

actually do use technology. This prompted us to look deeper into the processes of motivation. We did this through an exploration of the valence, instrumentality, expectancy theory (VIE).

3.4.5 Valence, Instrumentality, Expectancy theory (VIE)

One of the process theories of motivation is Vroom's (1964) Valence, Instrumentality, Expectancy theory (VIE) (Van Eerde and Thierry, 1996, pp.575; Parijat and Bagga, 2014, pp.3). Valence, encompasses intrinsic value which is the sense of personal accomplishment and satisfaction, i.e. "possible affective orientations toward outcomes, and it is interpreted as the importance, attractiveness, desirability, or anticipated satisfaction with outcomes" (Van Eerde and Thierry, 1996, pp.576). It concerns emotional orientations which people hold when considering what to do, based on how valuable or meaningful the desired outcome is.

Instrumentality refers to the perceived link between expectancy and the eventual outcome (second-order outcome). Will an action be followed by an outcome (first-order outcome) and will this outcome in turn provide the desired outcome (second-order outcome) (Van Eerde and Thierry, 1996, pp.576). Expectancy is reported by Van Eerde and Thierry (1996, pp.576) as "a subjective probability of an action or effort leading to an outcome or performance".

The valence construct can be linked to expectancy–benefits–value relationships and personal concerns of the CBAM. A person's behaviour is influenced by beliefs that their actions will produce a result, and that this is actually achievable (Parijat and Bagga, 2014, pp.2). The expectancy construct can be linked to self-efficacy, PBC, and to external concerns of impact.

Two assumptions associated with the VIE theory are thus critical to this paper:

1. Conscious decision: "An individual's behaviour is a result of conscious choice" [cognitive and affective decisions] (Lunenburg, 2011, pp.1-2), meaning that people are at free to decide what to do based on their inner beliefs.
2. Value proposition: "People will choose among alternatives so as to optimise outcomes for them personally" (Lunenburg, 2011, pp.1-2). This means that people will decide on actions if it gives them the gratification they wish for.

We could hypothesise that if valence is positive and, expectancy and instrumentality are high, then there could be motivation to carry out the action. The discussion on expectancy by Gellerstedt, Babaheidari and Svensson (2018, pp.14) notes that if teachers perceive gains, they will be likely users and those who do not are less likely to be users of technology. This is aligned with our belief that it is unlikely that a teacher will willingly or mandatorily use a technology if there is nothing in it for him/her, i.e. no benefit or value proposition.

4. Discussions:

The attitude construct appears to be underplayed in many theories relating to adoption and use. Bagozzi (2007, pp.245) identified a gap when he stated that there is an "absence of a sound theory and method for identifying the determinants of PU and PEOU". The implications of social cognitive and adoption theories suggest, according to Bandura (1986, cited in Straub, 2009, pp.642), that "just as the context can influence the beliefs and emotional response, emotions may influence beliefs, context, and culture".

The relationship between attitude and behaviour is indicated by the intentions that individuals make to action behaviours that they perceive positively. There has been considerable debate about the 'attitude' constructs as a predictor of behaviour. The base assumption has been that the intention to do the action will be positively aligned if, people assume a positive outcome for their behaviour, their attitudes will be equally positive. We agree that this concept is true, but equally offer that attitudes could determine a negative intent irrespective of the positivity of the outcome. We maintain, given the findings in a vast body of literature on psychological attributes, that attitudes are significant as an affective component that shapes decisions [intent]. We thus believe that the attitude construct must be retained and mediated as a construct that precedes intention-use.

Noticeably absent from the theories are any explicit construct on value propositions and benefits. Our contention is that benefits and value propositions have a very direct influence of intention and subsequent use. This is based on the fact that if the value proposed is good or not good, then the intention is accordingly moderated by this feeling.

We expect that limitations will be ever-present in any theory. These limitations will pose low-to-significant risk in any research involving the human element. Two of the limitations noted by Samaradiwakara and Gunawardena (2014, pp.28) that are particularly relevant in our context are:

- Confusion about beliefs and attitudes. They both have a reciprocal relationship and influence one another in varying degrees of intensity.
- Assumptions that an intention to perform a behaviour will inevitably result in the behaviour being performed. However actual use (intention enactment) will only materialise if the individual is free to perform the action.

We find that TAM in its native iteration was not perfectly suited for the context of this paper. We conceptualised a theoretical model which is an adapted TAM. The theoretical model suggested, focuses on moderators for the attitude construct, towards understanding the cognitive and affective influences on intention based on attitudes.

5. Development of the theoretical framework

5.1 Stage 1:

The main moderating constructs from the range of theories used were mapped onto a matrix (see table 1). We commenced with listing relevant individual personal factors as we deemed these to be suggestive of the affective-self. Thereafter the correlating and reciprocal concepts from the various theories were mapped and highlighted against the individual personal factors.

Table 1: Matrix of constructs and moderators - theories and models

Individual Factors	IDT	TAM	TRA	TPB	CBAM	VIE/MM	SCT
Beliefs	Seeking information	Perceived usefulness	Attitudes	Attitudes	Concerns: self/task/impacts	Motivation: extrinsic/ intrinsic	Beliefs
Norms: personal/subjective	Forming an attitude	Perceived ease of use	Norms: Subjective	Norms: Subjective	Domains: personal/external	Valence	Attitudes
Motivation	Choices	Variables: external	Behavioural intent	Perceived behavioural control	Seeking information	Expectancy	Motivation: extrinsic/ intrinsic
Perceptions	Use	Attitudes	Behaviour	Actual behavioural control	Outcome: expectancy	Instrumentality	Self-efficacy
Expectancy	Reinforcement	Behavioural intent		Self-efficacy	Behavioural intent	Behavioural intent	Perceptions
Self-efficacy	Relative advantage	Behaviour		Behavioural intent	Behaviour	Behaviour	Various (social) learning
Locus of control	Compatibility			Behaviour		Outcome: value laden	Outcome: value laden
Attitudes	Complexity					Effort	Verbal persuasion
Confidence	Observability					Self-efficacy	Emotional state
Needs						Outcome: expectancy	Hierarchy of needs

5.2 Stage 2:

A schematic outline (figure 2) was developed from the matrix (table 1) to show the relational links and dependencies among the moderating constructs. We prefaced the schematic with the adoption process (Rogers, 1995). We selected this as is accurately resembles what people naturally do when making decisions, especially when encountering something new.

We engaged in backward mapping from the assumption that technology is actually used. We offer that an action will not materialise without a conscious decision (intent). Any decisions taken by an individual is based on an attitude towards that action. Attitudes are primarily informed by beliefs.

The next process was to draw out, from the matrix, the aspects that could have contributed to the beliefs and attitudes. For this we used the PU and PEOU constructs of TAM and the motivation and self-efficacy constructs from SCT; MM; VIE; CBAM. Each construct was then further decomposed and then linked based on the following reasoning:

- Usability indicates the simplicity or relatively ease it would be to operate or use the technology – although a technology is considered simple to use, the user's feeling about his/her capability to do this is based on the person's self-efficacy beliefs and confidence – if these beliefs are positive, it could in turn be a motivating factor to consider using it. This represents a usability-self efficacy-motivation-belief-attitude relationship.

- Usefulness of a technology is based on what it can do (its intended function). However this may or may not be what an individual needs from it. As such an individual searches for the offer of usefulness of the technology against his/her needs and desires. Should the offer be substantial for the individual, for his/her job and/or his/her learners, then the probability exists that the individual will be motivated by the offer. This is not a guarantee as noted in the literature review in this paper. We believe that should the offer carry a value proposition that substantially satisfies an individual's desire to be efficient, effective, acknowledged, then the individual's beliefs of usefulness of the technology becomes positive. The probability now exists that the individual will be further motivated by the offer.
- Motivation could be either intrinsic or extrinsic and in effect is the expectancy of an individual of the results of his/her decision to act. Motivation is linked to all those aspects that lead an individual to believe that there is something good or valuable to gain from engaging in an action. Individuals are motivated by their beliefs (based on knowledge and or experience) of what they can do, and can accomplish, as well as by the attractiveness and value from engaging in an action.
- Self-efficacy is a belief based on ones feelings that are informed by knowledge and experience. Should individuals believe that they are capable, and there are no distractors to them carrying out an action, then the person is more likely to have positive beliefs about his/her abilities to do something. High self-efficacy beliefs additionally serve as motivating factors.

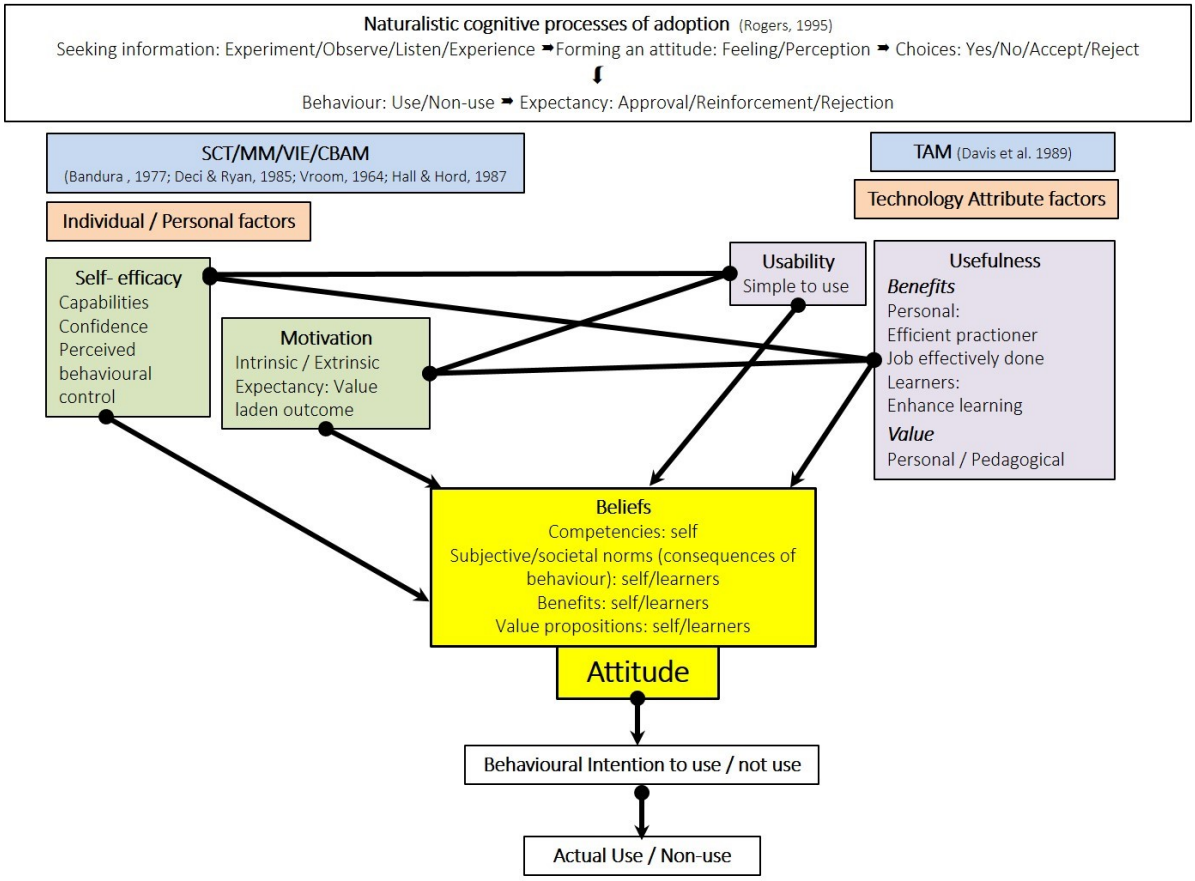

Figure 2: Schematic of moderating constructs

5.3 Stage 3:

In the final stage of the process, the core constructs were set out from the anchor theory (TAM). From the schematic the suggested new moderating constructs were mapped to the relational TAM constructs aligned to the rationale discussed in stage 2 of the process. The resulting outcome was an adapted TAM appropriate as a theoretical model. See figure 3.

6. Adapted TAM

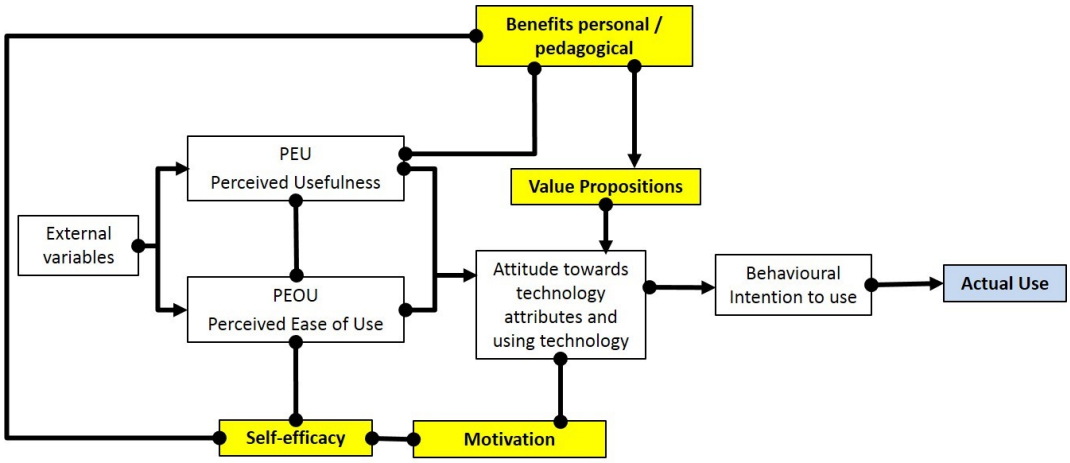

Figure 3: Adapted TAM

According to Lee, Cheung and Chen (2005, pp.1097), "the decision to use technology is determined partly on a rational calculation of the benefits". They state that behaviour is motivated by "perceived values and benefits derived" from the utility value and affordances of a technology (Lee, Cheung and Chen, 2005, pp.1097). The affective and cognitive domains within people, work in tandem in decision making. Attitudes are effectively shaped by motivation and attitudes themselves could have an influence on a person's motivation iteratively. One can carry out an action because of a belief that it is valuable and, when the action is completed, it could result in internal satisfaction or external praise. This in turn can further stimulate motivation to sustain such actions.

Attitude is the degree to which a person has a favourable or unfavourable disposition towards adopting or rejecting an innovation (Ajzen, 1991, pp.188). As a mental process it incorporates the cognitive (assumes the use of existing knowledge to understand and make decisions), and affective (based on feelings and not on using knowledge to evoke feelings to make decisions) domains. In developing attitudes, people mentally contemplate options of how it can be applied before deciding whether to try it out. This constitutes the formulation of a behavioural intent (BI) that could lead to actual use. Technologies in themselves have an instrumental value of usefulness (Sadeck 2016, pp.213). It is when an individual interprets this attribute as having benefits for their context (in our case a teaching/learning context), then this technical attributes begin to transform into pedagogical usefulness, which in turn emerge as possible benefits for the user. These benefits are informed by attitudes towards the usefulness of the technology and the possible pedagogical benefits it offers.

We further analysed the literature to explicate how benefits could result in a positive intention to use. We linked our decisions to the literature search and the work of Holden and Karsh (2010, pp.166) who maintain that "…the use of ICTs...must have a value proposition associated with it". The general acceptance that a favourable attitude results in action is challenged by a favourable attitude and external factors that counter the freedom of an individual to perform an action. Furthermore, a favourable attitude must be based on something tangible, such as, there must be something about usefulness that is compelling. Benefit to be gained from the usefulness of a technology and the concomitant value proposition is potentially the connection between intention and use (Lee, Cheung and Chen. 2005, pp.1097). The attributes of innovations may be attractive, the resources could be available, the skill set could be present, but it is ultimately a person's wants, feelings, beliefs, motivation, attitudes and needs that ultimately prompt decisions to act (intent) and possible action. The decision about an intention to use or not use is informed by attitude and beliefs that are moderated by self-efficacy beliefs, motivation, perceived benefits and value propositions offered by the technology to the individual.

7. Conclusions

Existing theories, have over time alluded to the moderating constructs we highlighted in this paper. There are numerous seminal papers, additional research papers and adaptations to theories/models, regarding technology adoption, that have been produced since the 1980s. While this adds to the richness in the field, the relative complexity that has emerged leaves some researchers perplexed. As such we argue that a grounded-in theory approach is well suited as a means of understanding the research need in a systematic way.

We submit that we have made explicit the self-efficacy and motivation constructs. We clarified the benefits construct and we added value propositions as an additional construct for a contextual understanding of actual use. The adapted TAM proposed in this paper offers:

- Self-efficacy beliefs impact confidence through feelings that can be a motivating factor.
- Benefits from technology affordances (usefulness) could influence a person's motivation. The utility value and benefits to be gained from the use of the technology could further provide value propositions as additional motivation.
- Value propositions are based on the notion that a person will be motivated to act if he/she believes that there will result in a good output (expectancy), and this output will earn him/her the desired rewards (instrumentality), and that the value of the rewards is highly positive (valence). An individual is thus likely to use a technology based on the value he/she attaches to the outcome of the use of a technology.

Theories, models and frameworks are not mutually exclusive. Exploring related theories symbiotically promotes insight into the phenomenon and further deepens the rigour in research undertakings. The dynamic nature of technologies and peoples' adoption trajectories argues for mechanisms that promote valid exploration of adoption and use of technologies.

The focus of this study was on why people adopted and used technologies. Having examined TAM and its overlaps with other theories, an adaptation to TAM was conceptualised through the inclusion of moderating constructs, i.e. value propositions; motivation; benefits and self-efficacy. We offer that the adapted TAM proposed in this paper hedges the changes of success for technology acceptance and use research studies in appropriate contexts. We further maintain that it will be useful for researchers seeking to understand the 'why' question in research.

8. Contributions:

Our contributions are framed primarily by our grounded-in-theory approach which argues that it is unlikely that any single theory is the panacea to researching complex issues. We argue that people's actual use of technology follows intentions reasonably informed by their beliefs and attitudes. There are implications for both practice and research using the adapted TAM: Research – guidance on the process of a grounded-in-theory approach, and Practice – application of the adapted TAM to understand why technology is used. We believe that researchers could test the adapted TAM in both qualitative and quantitative studies to further refine its practical and theoretical value.

Our grounded-in-theory approach is explorative in a specific context, suggesting that it should not be interpreted as confirmative proof as an alternative to existing theories/models. According to Taylor and Todd (1995) models should be appraised in terms of the number of predictors and how they contribute to understanding a phenomena. We believe that a limitation of the suggested adapted TAM is its conception in a school e-learning educational context. It has not been tested in context outside of education

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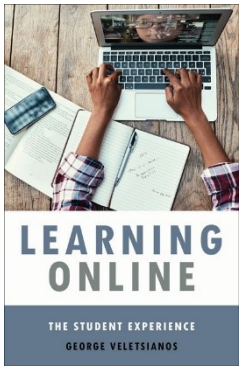

Book Review: George Veletsianos's 'Learning Online: The Student Experience'

A review by Ken Currie (1st September 2020)
DOI: 10.34190/JEL.18.6.010

Author: George Veletsianos
Publisher: Johns Hopkins University Press
Year of publication: 2020

This is a book from a highly respected author that draws on many of his past journal publications and other writings. He is also an author steeped in the recent history of distance and online education in North America. If online distance education is really going to be accepted and integrated into the culture of our universities and other educational establishments, then there has to be an holistic understanding of how its development should be approached, how it should be targeted and how it can be delivered to be as effective as more traditional study modes.

The author offers a distillation of his experiences and observations via a series of short narratives about particular students and the circumstances of their studies.

1. The audience

Probably the first thing to ask of a book is "who will read this?". I struggled to think who this book was being aimed at.

There is more than a hint in the Introduction, which suggests that the many institutional players involved in online education (instructors, researchers, instructional designers, policymakers, technology developers amongst others) need to better understand the requirements and experience of students opting for this mode of study. Perhaps I am naïve in thinking that this is something that institutions should already be well aware of, but the massive uptake of online learning and development should be seen as a welcome opportunity to being a bit more serious about doing this in a much more principled manner?

However, back to the question. If a prospective student were to read this book, then it might put him/her off. There are very many viewpoints (do I really need all these skills and literacies, the passion and motivation, and the staying power?), no single strong message, and it doesn't really paint a coherent picture of what they might be getting themselves into.

Perhaps it is really is aimed at the strategic planners and developers in a university? Well, it certainly presents student viewpoints (some of which I can agree with) but it doesn't offer much suggestion about how to proceed and succeed with online learning. I was reminded of Bob Hope in *Son of Paleface* as he is about to get involved in a gun fight. He receives so much information that it confuses him (a bit like the advice I've been given at golf). If I were a strategist I might be interested in online learning to open up new, and lucrative, income streams and/or to internationalise. I would also certainly be thinking about new markets, not merely offering alternative support to existing markets, but I would need to have a clear set of goals and indicators of success. This book would offer no help in that respect.

I did find the chapter titles to be interesting as listed in the index, but much of this interest did not come through in the chapters themselves and they did not address some of the issues I would have liked to have seen covered in such a text. For example, I would really have wanted to hear the views of students who have been studying distance and online for many years at, say, the UK Open University. The OU's 50 year history was not even acknowledged, though it has been a global leader in many aspects of today's non-traditional study. The University of London has an even longer history so their students' views would have been of interest. The experience of these institutions would have provided a foundation for the more contemporary technology-led institutions to build on. I do find it interesting that the Courseras and FutureLearns (an OU spin-out) of this world have embarked on, and are beginning to shape, online learning despite lacking the pedagogical experience learning the lessons that the OU has been through over many decades. This was a glaring omission for me as this would have been my opening chapter on which to judge all other student views.

So, back to the question of who should read this book? Prospective online students? They might be put off as the reality is simpler. Teachers who lack the digital skills and proficiency to develop for online learning? Few, if any, would act on their own to improve their position but this book did not offer guidance on how to do so. Universities and colleges providing online learning? They don't act strategically enough to react to this, plus they suffer from a general apathy towards change.

Perhaps it should be influencers such as Governments and funders? Despite the funding, the research and the self-praise from institutions about how good they are at online learning, all were caught napping when Covid-19 struck. They exhibited a general ability to respond to disruption and most paid little attention to quality. Perhaps future funding should be targeted better at more visionary sets of goals capable of transformational and measurable change?

2. Insight and advice

Another general lack of comment was in the area of relevance. Yes, the book talks about the student who studied to get promotion but there was no comment about how well aligned courses and programmes on offer are to real needs, e.g. competency frameworks, industry skills, etc. If there is one thing that online learning should herald, it is the opportunity to address the failings of traditional learning, i.e. to make learning relevant, timeous, competency-based, etc.

Many, if not most of the chapters, could be skimmed as the bullet-point summaries at the end said just as much as the narrative. This would have made it quicker for me to find out if the book addressed some of the questions I would have asked as a student, for example: "why does X university charge just as much for online learning as on-campus?" or "what makes for a good course?". With regards the latter, I always advise students to look for an online course that has a fully operational demonstrator course so that you can see the quality, the presentation and the range of features that will be on offer. Do not sign up to a (paid) course with only a general description.
I felt that reading the book was akin to participating in a MOOC – you start with enthusiasm but end up just reading the summaries to get it over with. There were highlights. Sentences such as "… MOOCs is their potential to act as vehicles for digital neocolonialism, propagating western ideologies, ways of thought, and morals to diverse populations globally" made me think (though I am still thinking about what this means). Curiously, the chapter on Social Networking touched on 'alternative' learning environments acting as more than simple content repositories but the references were all quite old (10+ years), which reinforced my thinking that many of the views expressed were rather dated.

I can see what the book was trying to do in presenting a wide range of views, but it really didn't pull anything together for me. There are a huge number of online courses out there today, but this book would not have helped me separate the wheat from the (abundant) chaff which, as a student, is probably the key factor I would take into account when embarking on such a course. On a personal note, I am always disappointed when *quality* is not seriously addressed. Are students not interested in what makes for a course of acceptable, or exceptional, quality? This takes us right back to fundamentals such as content. If we start with dumb content, we end up with dumb courses and no amount of AI, or other wizardry, will improve on this and learning analytics will be trivial in nature. There is much to learn about in online learning so everyone has to start by building lasting foundations for improvement.

3. Conclusion

There is no harm in reading this book but I suspect you could save time by just looking at the bullet points at the end of each chapter. Treat is as a MOOC or a bit of an 'airport read'. For me it was a bit like watching the movie 'Love Actually', as opposed to 'The Searchers'. A *4 out of 10* offering and not one I would dip back into.

Editorial for EJEL Volume 18 Issue 6

Dear readers of the EJEL,

with the end of the year 2020 coming up, things are moving at a rapid pace: we had just introduced you to Volume 18 Issue 5, and Issue 6 follows already. The e-learning topics covered by the articles of this issue again demonstrate the wide range of perspectives to which e-learning is subject. The topics discussed in this issue include community of inquiry, flipped classroom, online cheating, communication, personality traits, mobile learning, digital environments in the classroom and technology acceptance models. Reflecting on these articles, it has become evident to us that all the articles in this issue are inspiring in their own way, so motivation for designing own e-learning activities is the overarching theme of this issue. In the following, we present a summary of these ten articles, so that the interested reader may follow-up by choosing to read the ones that are of most interest to them.

This issue starts with a Norwegian-Greek collaboration: Krystyna Krzyszkowska (UiT The Arctic University of Norway) and Maria Mavrommati (Aristotle University of Thessaloniki) investigated to what extent a Community of Inquiry (CoI)-based model may be used to improve the instructional design of an online course in continuing education for Norwegian teachers. Their approach was based on a mixed method comprising a validated CoI questionnaire and interviews. The findings from their study lead to three clear design recommendations, which have gained even more relevance during the COVID pandemic.

The second article by Kerry Adzima from the Pennsylvania State University of Erie (USA) looks at academic dishonesty, and in particular cheating, in a context of higher education. Based on the assumption that e-learning increases or at least enables the opportunities for cheating, a literature review was conducted. The results are grouped in four categories and altogether constitute a meaningful overview of a topic with which everyone who teaches is confronted.

The third article authored by Chaka Chaka, Tlatso Nkhobo and Mirriam Lephalala from the University of South Africa (South Africa) delves into the world of instant messaging apps. Using Moya and WhatsApp as well as the online discussion forum myUnisa as examples, the article explores how these communication tools are integrated into formal learning contexts in South Africa. The results show a broad spectrum of uses on the part of both teachers and learners.

Likewise, communication in formal learning contexts is investigated in the seventh article by Tristan Cui (Monash University) and Andrew Coleman (Swinburne University of Technology), based in Melbourne, Australia Their article examines communication via LMS-enabled text messaging between teachers and learners in an online course for an international audience, which uses flipped classroom approach. The authors surveyed the attitudes, motivations, participation and performance of the students involved in so-called out-of-class communication (OOC) during the course. They have found an increased participation of students in the course who are using text-messages but could not establish a significant relationship between OCC and academic performance. The article concludes with guidelines and suggestions for refining the research design.

The didactic approach of flipped classroom, which benefits often from the capabilities of e-learning, is thematised in the fourth article by Malek Jdaitawi from the Imam Abdulrahman Bin Faisal University (Saudi Arabia). The author investigated to what extent the emotions of students in a flipped classroom approach differ from those in a traditional teaching setting. Based on a quasi-experimental study, it was found that the flipped classroom approach led to more positive emotions. It was also noted by the author that the results must be reproduced in the future and, in order to allow a constructive use, the factors of the flipped classroom approach that lead to positive emotions will need to be identified.

The fifth article establishes a link between personality traits and creativity. Yasemin Abedini from the University of Isfahan (Iran) uses validated questionnaires assessing personality traits and creativity and compares the results between online and face-to-face courses. It is found that personality traits may be used for predicting creativity and that students attending online courses exhibit higher creativity scores.

The sixth article explores mobile learning in higher education in the specific context of English as a foreign language (EFL) learners in Slovakia. Ratislav Metruk from the University of Žilina (Slovakia) used data from a questionnaire to show that there is a moderate positive attitude towards learning with the help of smartphones. However, various challenges were also highlighted, such as the difficult planning of learning, the low use of smartphone apps and the low degree of support for training of speaking skills.

I lThe eighth article provides an insight into the practice of digitalised school teaching. Charalampos Apostolou, teacher at the 3rd Gymnasium of Kozani (Greece), has collected student feedback over several years in different classes by means of a questionnaire. The aim was to compare different ICT equipment environments available in the classroom: On the one hand was a 1:1 environment, in which each student has his or her own notebook, and on the other hand, a so-called PC-VP environment, which consisted of an Internet-capable PC with attached projector. Interestingly, students rated both approaches as similarly successful. But the teaching approach was highlighted as a more important factor for successful learning. Although the data collection took place several years ago, the article contributes to the discussion about the level of digitalisation in schools.

Decisions about adopting digital learning tools depend on many factors, including the willingness of teachers to use the tools. In the ninth article, Osman Sadeck, Agnes Chigona and Johannes Cronje from the Cape Peninsula of Technology, Cape Town (South Africa) use a theoretical approach in developing a model that describes the acceptance of digital learning tools by teachers. The model is based on technology acceptance models (TAMs), which have been extended by elements of social cognitive models. The resulting model is not meant to be a substitute for all previous models, but rather an instrument for sharpening the perspective on digital learning tools.

The tenth and last article in this issue is, after a long time, another book review. Our highly appreciated and experienced associate editor Ken Currie took the opportunity to take a closer look at the book "Learning Online - The Student Experience" by George Veletsianos, published by John Hopkins University Press. The result is a critical but to-the-point review that is certainly worth reading. With this review, Ken Currie retires from his work for the EJEL. We thank him sincerely for his tireless commitment, his sound assessment and support of articles that have contributed to the success of the EJEL. We will not forget, but will miss, his refreshing, on-target comments that have always brightened up our work.

This was a brief description of the ten articles included in this issue. We hope that these articles inspire you to design your own creative learning activities using digital tools. If you have not yet found adequate inspiration, or if you are already eager for further inspiration, we would like to draw your attention to the upcoming Volume 19 Issue 1, which is the first special issue of the EJEL reporting on the challenges of e-learning in the light of the – unfortunately still continuing – COVID pandemic.

Editors: Heinrich Söbke and Marija Cubric