



An Exploration of the Alignment of Learning Theories with eTools at the University of the Western Cape (UWC)

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Authors' contributions

This work was carried out in collaboration between all authors. Author JS designed the study. Authors JS, AS and VvdH designed the questionnaire and authors AS and VvdH distributed it to students and collated the findings. Authors JS and AS conducted the literature review. All authors wrote and edited all drafts. Author AS prepared the manuscript for submission. All authors read and approved the final manuscript.

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ABSTRACT

The impact of emerging technologies on authentic learning in higher education remains a core concern in the South African context. Learning Management Systems (LMSs) must include emerging technologies to support innovative teaching and learning practices, given their importance in expanding student access to learning materials, and the facilitation of student development. At the University of the Western Cape (UWC), the Centre for Innovative Education and Communication Technologies (CIECT) has championed the adoption of innovative eLearning practices for over 10 years. This study explores the infusion of learning theories aligned to eTools in service of national higher education imperatives. The authors discuss the value of learning theories in the eLearning field, and deliberate on the development of the main learning theories.

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The study also discusses the application of learning theories in online environments, and this issue is explored by way of six cases, providing examples of how various learning theories can be aligned to eTools. These were gathered from CIECT's marketing blog, which constitutes a research repository of practitioner experiences and reflections of the institutional LMS and innovative teaching and learning practices. The aim is to explore and emphasize the importance of grounding emerging eTools use in theory and pedagogy to promote student development, as well as the application of learning theories, specifically when designing learning environments to support traditional teaching and learning practices. The qualitative study is primarily exploratory and descriptive. It also includes a brief discussion of the results of a student questionnaire (179 respondents from across faculties and departments) exploring how and why students use eTools at UWC. This exploration of broader student eTools use will help create the foundation for a follow-up study to explore the use of learning theories in promoting more focused eTools adoption.

Keywords: Learning theories; student development; eTools; eLearning; learning management system; student access; designing learning environments.

1. INTRODUCTION

At the University of the Western Cape (UWC), the Centre for Innovative Education and Communication Technologies (CIECT) is responsible and accountable for the delivery and infusion of emerging technologies across campus. This accountability includes exploring the impact of learning technologies and interventions (on staff and students) and providing evidence thereof, which is instrumental to promoting the iKamva (Sakai) Learning Management System (LMS), and which facilitated the migration to iKamva from KEWL, a home-grown LMS [1]. This exploration of impact is also in line with UWC's Institutional Operating Plan White Paper (2016-2020), which emphasizes this provision of evidence, especially in relation to teaching and learning. It is necessary to continuously review the impact of authentic online activities undertaken for student development across disciplines. As Elliot argues, the introduction of new learning environments necessitates a continuous revision of the methods of teaching and learning [2]. To this end, this study explores how various learning theories are used by CIECT in designing eTools at UWC.

The authors present examples of the impact of authentic teaching and learning online activities for student development, across faculties and disciplines, thus highlighting the importance of the meaningful impact of trustful relationships and networks of support over time. These qualitative examples are drawn from CIECT's marketing blog, which constitutes a research database recording evidence of various interventions (including training), and novel use of eTools. In addition to exploring the impact of

learning theories on the design of eTools, this paper includes a brief exploration of what eTools students make most use of, and for what purpose, at UWC. This will help guide future thinking towards better aligning learning theories to eTools. This is in line with Engelbrecht, who argues that eLearning constitutes more than mere "delivery of traditional learning content via the Internet" [3].

The results support the view that "new technology – as an educational tool, [is not] entirely separate from pedagogy" [2]. Transforming lecturers' mindsets regarding the importance of sound ePedagogy and student development requires CIECT team members to be more than mere trainers, and to remain at the forefront of theory and the broader professional development project. Effective eLearning implementation requires pedagogical and didactic proficiency [4]. This view is also reflected nationally through the White Paper on e-Education, which positions the challenge in relation to the alignment of learning activities and objectives [5]. Additionally, the White Paper for Post-School Education and Training highlights that Information and Communications Technology (ICT) integration must be determined by pedagogical strength [6]. For this reason, the researchers explore the use of learning theories in the application of eLearning practices, and their value. Hence, the authentic examples (deliberated in Section 3.4) expand on this in relation to the engagement within online teaching and learning interventions, such as: contribution to group tutorials; discussion forums and related articles; self-directed assessment tasks; journal writing; active problem-based case studies; and assessment activities addressing lower and higher cognitive skills.

The researchers aim to explore examples of online teaching and learning practices within a complex higher education environment. Furthermore, the study explores how important learning theories are when selecting eTools. There is still a need within higher education to explore the application of learning theories to enhance design and development processes and how well-designed, interactive teaching and learning environments promote student engagement. The researchers argue for the consideration of learning theories in the effective use of institutional LMSs to promote pedagogical benefits.

The researchers explain the need for a higher education institution to explore the use of educational technologies aligned to global trends. This is also pertinent for UWC, a member of the Sakai consortium, which includes other South African and global institutions, such as the University of South Africa (Unisa), North-West University (NWU), University of Cape Town (UCT) and University of the Witwatersrand (WITS). Lecturers and students still want to see contextualized examples of good practices, whilst thinking of adoption. Hence, the researchers have illustrated cases from the marketing blog, which promotes a continuous awareness of innovative technologies to support traditional teaching and learning practices. The following section presents a brief word on methodology.

2. METHODOLOGY

This study is a combination of exploratory and descriptive qualitative research. In the discussion of the employment of learning theories in practice, it also makes use of various short cases collected from the marketing blog, which serves the purpose, as Neuman argues, of “connect[ing] the micro level, of the actions of individual people, to the macro level” [7]. This act of connecting learning *theory* with learning *practice* is important in ensuring that CIECT’s mission to infuse emerging technologies into its higher education setting continues to serve and promote student development and staff needs.

An online survey was also designed and shared with students to explore broader eTools use. This will help create the foundation for a follow-up study to explore the use of learning theories in promoting more focused eTools adoption. It was distributed via various channels, eliciting a total of 179 responses. A purposive sampling method,

and a mix of open and closed questions was used. While learning theories and sound pedagogy are vital, the aim here was to establish how and why students use eTools, allowing CIECT to better focus its efforts to support student development, and identify further opportunities to infuse learning theories in the design of learning environments. This creates the foundation for the follow-up study, which will develop this further.

3. INTERRELATED LEARNING THEORIES UNDERPIN ELEARNING

This section briefly outlines the value of learning theories for teaching and learning purposes, the development of the main learning theories, and their application within online learning environments. This review is of value because these learning theories are used on a daily basis within the operations of CIECT. It can also remind other eLearning professionals of the value of learning theories and to prompt them to consider how they use eTools within their teaching and learning, and to enhance their effect.

3.1 The Value of Learning Theories

Learning theories provide a structure for teaching and learning practices, and influence learning processes and student development. More importantly, the principles and associated pedagogies which arise from various learning perspectives have a profound impact on practical applications [8]. This impact extends to eTools and eLearning interventions as well. Theory should underpin curriculum design and pedagogy. It enables critical program examination to reveal “structuring principles and to develop insights into the knowledge and practices that enable effective courses” [9].

As Subject-Matter Experts and Academic Developers, it is valuable for us to investigate learning theories, as they enable us to engage more effectively with lecturers across disciplines. As Quinn argues, these make “explicit the underlying principles” of conceptualization and structure, as well as enabling analysis of curricula and pedagogy [9]. Furthermore, the understanding of learning theories provides a structure for “organizing thinking and making sense” [8].

This investigation of learning theories will enable the researchers to highlight the application and

implications of the adoption of emerging technologies to support teaching and learning. First however, a brief discussion of the development of the main learning theories will be presented.

3.2 The Development of Learning Theories

Learning theories stem from multiple disciplines including education, psychology, pedagogic studies, sociology and neuroscience [8]. The application of each theory led to necessary constructive criticism around learning processes, and the development of later theories. For example, initial behaviorist principles, focusing on “learning as observable changes in behavior”, were criticized as being too teacher-centered, ignoring the discourse around thinking and understanding [8].

This constructive criticism gave rise to cognitivist and constructivist theories (while not completely rejecting behaviorism), which reflected a “more holistic view of behavior and the mind”. These perspectives influenced the main discourse contrasting passive learners with more active learners who are involved in the “primary construction of knowledge”. However, further criticism of these perspectives focused on the underlying assumption that all students are able to engage successfully in “unguided methods of instruction”, and called for more “structured learning activities” [8].

This gave rise to social and situated learning perspectives, as social psychologists and sociologists emphasized the “effects and influences of social and cultural interaction” on individual learning [8]. Hence, (i) social constructivism emphasizes the importance of the educator who develops the potential of the learner and provides “scaffolding support” interventions; (ii) social learning theory emphasizes that learning occurs through observation and imitation; (iii) situated learning emphasizes that learning also occurs in informal settings, is contextually situated and success thereof is determined by individual situational competence. These too were critiqued, in relation to how much influence social interactions have on behavior, and for assumptions of communities of practice being stable environments that students easily adapt to.

Recently, the focus has been on socio-constructivism, also referred to as ‘communal

constructivism’. This learning theory emphasizes a process whereby people construct their own knowledge (constructivism) as a result of social learning (social constructivism), and actively contribute their learning to the creation of a communal knowledge base for other learners [10]. Importantly, ICTs present tools whereby a social constructivist environment can realize its goals, and “online learning affords individuals the linked community, the knowledge bases, the knowledge-creation tools and the facility to provide their learning to others” [11,12].

The recognition of ever-changing environments has given rise to self-theories and humanistic perspectives, focusing on experiential learning, personal growth and the importance of self-perceptions in determining learning processes. However, these theories have been criticized as too ‘optimistic’, and for ignoring that many students will not be able to make positive choices on their own [8]. Being knowledgeable regarding these learning theories is important, and the researchers will reflect on the value of learning theories for an impactful teaching and learning agenda in the next section. Cases providing examples of how various learning theories can be aligned to eTools were gathered from CIECT’s reporting and marketing blog, which is briefly introduced next, after which these cases are explored in more detail.

3.3 Application of Learning Theories in Online Environments

As a result of an ongoing non-coercive approach to eLearning since November 2008, CIECT employs a marketing strategy via campus-wide email, further linked to a blog (<https://ciect.wordpress.com/>), which constitutes a valuable research repository of practitioner experiences [13]. Over the longer term, email is not the “ideal medium” for storing and sharing “snippets, or information nuggets”, however, blogs “make an ideal tool for this kind of information management”, especially for an online community [14]. This marketing strategy is a crucial facet of fostering a community of practice around eLearning, as it provides a platform for “enculturation”, in relation to the sharing of experiences, especially for newcomers [15]. Observations by the CIECT team over time have shown that lecturers across disciplines who read these blogs have contacted CIECT for the creation of interactive online environments and training sessions for both the lecturers and their students.

The blogs convey each initiative in an impactful way, including the particulars of the lecturer, the eTools used for their pedagogical value in structured activities or assessment tasks, and ultimately the impact on student development [13]. The blogs entail substantive theoretical engagement aligned to practice, since it is best to assist teachers in improving their teaching by making use of theory to reflect on their practices [16]. This strategy has contributed to the “ever-growing recognition of eLearning as an important role-player in the effective delivery and decision-making of teaching-and-learning at UWC” [13]. The next section presents the discussion of examples of how various learning theories have been aligned to eTools.

3.4 Notable Examples of Learning Theories in Practice (In the Use of eTools)

This section highlights underlying learning theories of CIECT's emerging technologies. Six examples from the blog are used to explore and emphasize the importance of grounding emerging eTools use in theory and pedagogy to promote student development.

First, it is possible to showcase behaviorist perspectives in the growth of emerging technology adoption and effective eTools use. The CIECT team assisted a lecturer in creating a video for an online chemistry course, which demonstrated the use of a specific apparatus in a laboratory setting, allowing students repeated attempts to practice and reinforce their learning.

Second, the design of an online environment can also showcase a cognitivist and constructivist perspective. A discussion forum, with an attached reading, can encourage students to engage with the topic prior to a face-to-face tutorial. A lecturer from the English Department set up an interactive online environment for a large class of 600 first-year Law students, who accessed their online term test, and which they completed during vacation (regardless of location). This resulted in student engagement and reflection on the subject by allowing unlimited attempts, with the highest mark being recorded. Also, students learning in an ‘academic way’ used this opportunity to attend the lecture better equipped, forming a “keystone for a particular arch of knowledge”, aligned to a deep learning approach (Marton and Saljo in [16]).

Third, a lecturer is not in control of all factors that impact students' development, such as a surface

approach to learning, and mere note collation for assessment. A more active problem-based teaching method can bridge this gap considerably [16]. The CIECT team assisted a lecturer from the Interdisciplinary Teaching and Learning Unit (ITLU) to create a structured, interactive online environment, aligned to Salmon [17], who emphasizes the creation of spaces entailing guiding roles and a skills approach. These first steps of “familiarisation and socialisation” to eTools and environments contribute to the critical stages of achieving effective online communication and knowledge creation. To this end, a Facebook group (‘Inter-Professional World Café’) was created to supplement the online course, enabling the students to post comments related to their group case-studies, and to share related media, to which the lecturer was able to comment in real-time. Thus, meaning was not imposed by the lecturer, but created by the students' learning activities, allowing them to structure the information and make sense of it – referred to as conceptual change [16]. This environment enabled students with a surface approach to learning, to “question, speculate, generate solutions, and use higher-order cognitive skills” [16].

Fourth, the design of an online environment can showcase social and situated learning perspectives. A collaborative online course was created (UWC/University of Missouri), organizing students in groups related to specific topics. A debate initiated by the lecturer took cognizance of different cultures, and a guest speaker (champion) was invited. Furthermore, a ‘Multi-disciplinary University Traditional Health Initiative (MUTHI) Clinical Trials’ online course was designed and developed by the CIECT team and shared among eight universities in Africa and Europe. Students could navigate the structured course that consisted of manageable units of work which contained various interactive media and assessment activities. This becomes a community of practice, whereby clinical trial investigators in the herbal science and medicine field, registered in the course, can join.

Fifth, the design of an online environment can also showcase the influences of humanistic and self-theories. The delivery of a digital inclusion course for eCentre Managers from rural and urban areas demonstrated the importance of mindsets in the achievement of eSkills. The CIECT team designed a scaffolded learning pathway, engaging with the learners through self-

directed activities and instructional material. Surprisingly, deep-rural learners with fewer resources successfully completed both the face-to-face and online phases, whilst some well-resourced urban learners did not receive their Certificates of Competence. CIECT's monitoring and tracking throughout the phases revealed a high work ethic and positive mindset of some learners, despite their challenges.

Finally, lecturers in Physics used emerging LMS-integrated eTools, namely Doctopus and Goobric, in a project aligned to socio-constructivism. The co-designers (lecturers and CIECT Instructional Designer) customized an eAssessment environment to manage large classes. This entailed the co-creation of a scientific report template which was shared (Doctopus) with students to build and strengthen their own. The template was aligned to an online rubric (Goobric), enabling students to meet specific assessment criteria. This assisted lecturers with assessment and provided constructive feedback online. These assessment processes enabled the lecturer to identify bottlenecks within the module. Students could monitor and track their progress online, through the rubric. Socio-constructivist principles are evident here, but "[a]lthough a resource may be both appropriate and useful, students may require some guidance or scaffolding in the procedures and uses of the resource" [18].

These qualitative examples presented the adoption and implementation of eTools for teaching and learning, underpinned by, and aligned with, theory. The following section will provide an exploration of broader student eTools use via an online survey. This will help create the foundation for a follow-up study to explore the use of learning theories in promoting more focused eTools adoption.

4. STUDENT USE OF ETOOLS

As part of CIECT's delivery and infusion of emerging technologies across campus, it is important not only to ensure the proper alignment of learning theories and ePedagogy with eTools, but to explore and review *how* and *why* students are using various eTools. In this way, it becomes possible to ensure that attention is given to those tools and functions that are most useful for students. In this section, we briefly explore what eTools students are making use of, how, and for what purpose. The ultimate aim is to reflect on where learning theories can be better aligned,

and to help focus future efforts and identify new learning theories. This is linked to follow-up research, but serves the purpose of providing at least a cursory overview of student eTools use at UWC.

In June/July of 2015 an online student survey was conducted to explore precisely this issue of student eTools use (see Appendix). It was distributed via various channels, including CIECT training workshops, student visits to the Centre, and email, resulting in a total of 179 responses, despite coinciding with student examinations and vacation. A purposive sampling method, based on the "judgment of an expert in selecting cases", was deemed appropriate given the direct contact between students and CIECT's SMEs [7]. A mix of open and closed questions was used.

All respondents indicated that they and their friends make use of the iKamva LMS to access learning material. It was then explored how many modules students were accessing via iKamva, and results reflected access to multiple modules. A majority of responses indicated 11 modules (20.1%, n=36), three modules (16.2%, n=29), and eight modules (10.6%, n=19). The responses overall ranged from one to 15 modules, but were concentrated between three and 11 modules (84.9%, n=152). Students are able to access previous years' modules for revision purposes or as part of a scaffolded structure.

Further results, related to engagement with emerging eTools embedded within iKamva, reflected that 64.2% (n=115) used iKamva only to download class or learning material. Apart from retrieval of learning material, 35.8% of students used additional functions, including assessment activities: (i) Assignments 71.6%, n=63; (ii) Tests and Quizzes 86.4%, n=76; (iii) Discussion Forums, 30.7%, n=27; (iv) and Other 21.6%, n=19 (Personal Learning Environments including videos, digital stories, blogs, Google Applications – used as stand-alone interventions or embedded in iKamva). This reflects that lecturers are recognizing the underlying pedagogical value of eTools, and use them to encourage social learning. This concurs with Garrison and Anderson in [2], who emphasize the need to rethink pedagogy in order to overcome passive-information-transfer approaches.

Student iKamva access responses revealed that the majority of students have access via laptops

(60.9%, n=109), followed closely by campus computer labs (58.1%, n=104). Another major avenue is via smartphones (49.7%, n=89) and the final response indicated that some students use tablets (23.5%, n=42). Importantly, 92.7% (n=166) believed that the eTools they used served to develop their overall eSkills.

The final, optional, open-ended question strived to explore LMS improvement. Feedback indicated five general groups of responses. Fourteen responses were received providing only positive feedback. Five requested email notification updates. Three requested an app to access iKamva on their smartphones. Two requested the creation of assignment groups and related communication. Finally, four had a diverse range of requests (for online textbooks, Wi-Fi accessibility, educational videos, and video chats).

Some of these requests made by students regarding specific features are already embedded and available in the iKamva LMS. Lecturers are making use of the announcement feature, which is directly linked to student Gmail, group assignments, and related discussions. Additionally, lecturers across disciplines are creating and retrieving educational videos. Regarding the request for eBooks, the CIECT team has to collaborate with faculty members and the Library, especially with regards to copyright issues. Regarding the Wi-Fi request, UWC has since expanded its information infrastructure on campus. Additionally, the CIECT team has successfully launched its mobile 'Student Toolkit Application', which includes a link to iKamva and other student services. Thus, these requests are afforded full consideration to help improve the student experience at UWC.

A follow-up study, to capture the student voice with regards to the use of the LMS for student development, can provide a valuable insight into changing patterns of use by students. A special focus on whether learning theories and their use can promote the adoption of wider eTools use beyond retrieval of learning material from the LMS will be especially insightful.

5. CONCLUSION

This study explored some of the ways in which CIECT aligns the design of learning environments and eTools with learning theories in order to promote student development and

contribute to UWC's graduate attributes. The research used a framework of learning theories to explore impactful eLearning application. The value, development, and application of learning theories in online environments were discussed. Six cases were drawn from the marketing blog, which constitutes a research repository of practitioner experiences. The authors argue that these cases showcase good practices, and prompt other eLearning professionals to enter into a debate on how eTools may better serve student development in light of the insights presented by various learning theories. The authors also contend that blogs are excellent tools for other practitioners to adopt, since our blog reflects the collaborative efforts of the CIECT team and the lecturers within the broader teaching and learning milieu, representing "evidence-based learning" and the "learning organisation" culture (UWC) [19]. The efforts demonstrated in this research are also aligned to the National e-Skills Plan of Action, which calls for an "appropriate 'enabling environment' for e-skills development" [20]. Ultimately, this environment aims to make UWC students more successful future workers and citizens.

Learning theories thus remain critical in the design of learning environments. This is equally true for online learning environments supporting both traditional and innovative teaching and learning practices. CIECT's grounded research, going back more than a decade, has also demonstrated the continuing need for familiarization and socialization, linked to the effective use of eTools aligned to learning theories. Students will also continue to demand access to online modules. The creation of online modules takes place via a collaborative partnership between the CIECT Instructional Designers and the lecturers. Furthermore, by reflecting on how and why students use eTools, both in the institutional LMS and in PLEs, the CIECT team is prompted to continue efforts, and to recognize the fundamental importance of learning theories in (e)learning practice.

CONSENT

Consent was obtained from all participants in the online survey. See Appendix for full consent information.

ETHICAL APPROVAL

All authors hereby declare that this study and the student survey have been examined and

approved by the UWC Humanities and Social Sciences Ethics Committee.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Student Survey (2015)

You are kindly invited to participate in a research study, which focuses on the impact of eTools, You are kindly invited to participate in a research study by the Centre for Innovative Education and Communication Technologies (CIECT), which focuses on the impact of the use of eTools, specifically iKamva, on student development. Completing the questionnaire should take no more than 10 minutes. Participation is voluntary and you may withdraw at any time.

This research is being conducted by Dr Juliet Stoltenkamp, Mr Andre Siebrits and Mr Valentino van de Heyde of CIECT. We believe there are no known risks associated with this research study, which means you should not experience it as any more troubling than your normal daily life. If you have any questions or concerns, please direct them to the researchers at 021-959-3068, or via email to asiebrits@uwc.ac.za or vvandeheyde@uwc.ac.za. Every effort will be made by the researchers to keep your responses confidential and all data will be stored in a password protected electronic format.

By completing the questionnaire, you agree that:

- Participation in this study is entirely voluntary.
- You will not be penalised if you refuse to participate.
- The researcher(s) may quote your responses for the purposes of the study.
- The findings of this research project may be published.
- Your identity and that of all other participants will be protected.

By clicking on the "Submit" button, you agree that you have read and understood the above information, that you voluntarily agree to participate, and that you are at least 18 years old.

1. Do you use the iKamva platform to access your class notes/material? If you answered NO, what are the reasons for this?
2. Are your friends/fellow students making use of iKamva?
3. How many modules do you have in iKamva?
4. Do you only use iKamva to download class/learning material? If you answered NO, please explain how else you use it?
5. How do you access iKamva?
6. Do you think the eTools used on iKamva have developed your eSkills?
7. If there is anything else that you would want to do or see in iKamva, please add it here.

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