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The Transformative Landscape of eLearning Center for Innovative Education and Communication Technologies: Institutionalizing eLearning

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Abstract

In May 2005 the University of the Western Cape (UWC) established an eLearning Division (ED) that over the past 18 years has accelerated into the institutionalization of the efficient center for Innovative Education and Communication Technologies (CIECT). The initial objective of the ED was to align itself with emerging technologies as a result of the digital transformation that has impacted Higher Education Institutions (HEIs) globally. In this paper, we present how UWCs eLearning Division (established May 2005) evolved first into the eLearning Development and Support Unit (EDUS) and then into the Centre for Innovative Education and Communication Technologies (CIECT). CIECT was strategically separated from the Department of Information and Communication Services (ICS) in 2009 and repositioned as an independent structure of UWC. We highlight the transformative eLearning landscape at UWC by presenting a detailed account of the shift in practices using a comparative research method. By doing so we determine the initial perceptions and objectives of the eLearning division of UWC and its growth. The object of the study is to compare the rate of growth of the eLearning division across a five-year period. By comparing the progressive growth of the eLearning division longitudinally, we will be able to document its successes and achievements. These successes and achievements can serve as a benchmark for future research. More research that delves into the effectiveness of having an eLearning division at HEIs in support of students' teaching and learning is needed.

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Introduction

Over two decades ago the University of the Western Cape (UWC) implemented their first official learning management system (LMS) and the Teaching and Learning Technologies Unit (TLTU) to support e-learning at the university. This included supporting institutional leaders in their policies, strategies and sustainable development goals (SDGs) for an eLearning division. Through the years the eLearning division has contributed to the enhancing of teaching and learning particularly in the integration of online teaching, learning and assessment practices of both blended and distance delivery modes. These contributions included the alignment of course outcomes with online assessment tools as well as the relevant eTools that supported the course design that encouraged student online interaction. The eLearning division has undergone stringent, continuous reviews based on positive feedback. These reviews have improved services to meet the needs of the educators and students of UWC. The aforementioned contributions led to the successes of the eLearning division that escalated into the current Centre for Innovative, Educational and Communications Technologies (CIECT). These processes are accurately documented in an array of publications that outline different stages of merging the ED and EDUS into the present-day CIECT. There is no need to repeat these processes, therefore, in this paper we summarize certain important aspects by highlighting the internal and external processes of the evolution. Our intent is to showcase current processes that continue to shape CIECTs support of implementing digital academic literacies like basic computer literacy, digital information literacy, digital information fluency and digital knowledge in the wider university context. We will do so by highlighting CIECTs functional areas over a five-year period (2019-23) that we believe have been detrimental to sustaining the ongoing processes in different faculties and departments at UWC. The focus areas are digital academic literacy, information and communication technology skills development, multimedia and audio-visual services, instructional design and software development and application, and research.

This research reported here is a quantitative and qualitative comparative analysis. For our qualitative comparative analysis, we use the individualizing and universalizing comparison method/analysis that includes the use of: (a) a minimum number of examples for distinctiveness and, (b) comparison to expand our fundamental theories, with significant relevance to changes taking place in eLearning at HEIs, particularity at UWC. Using this methodology, we examine scientific literature and processes that align with the aforementioned method of analysis. Comparative analysis in qualitative studies was originally developed as a research methodology by Charles Ragin in the 1970s. Qualitative comparative analysis was further developed by Charles Tilly in 1984 who suggested the following methods of doing comparative analysis (a) *Individualizing comparison* that uses a minimum number of examples to understand the peculiarity of each example (b) *Universalizing comparison* that establishes that every example of a observable fact fundamentally follows the same rule of change (c) *Variation-finding comparison* that establishes the principle of variation in examples (d) *Encompassing comparison* that establishes that different locations can yield different functions and characteristics within the same system.

In the quantitative comparative analysis, we compare different units of analysis in order to identify patterns, relationships and factors that contribute to a particular observable fact, namely the annual growth rate. Large datasets related to training and support were used to depict the annual growth rate of training systems that CIECT

put in place from January 2019 to December 2023. This type of analysis allowed us to identify factors that explain the experience under study and to test theoretical hypotheses by using empirical evidence. Neumann and Graeff (2015: 388) suggest that qualitative comparative analysis is advantageous since the "goals of data analyses are prediction, forecasting specific behaviors, events or outcomes based on large sets of data, prior knowledge or prior evidence". In conclusion, we document the progression of CIECT from 2020 to 2023 and its progression during the expansion of artificial intelligence (AI) in teaching and learning processes and technologies.

Documented Reviews of eLearning Systems

In order to determine the success factor of the eLearning systems at UWC we review documented descriptions or characteristics that make up the institutionalization of eLearning systems. By doing so we formulate a comparative foundation with which to measure the continued success of eLearning systems and the implementation of eLearning tools at UWC.

Educators face numerous challenges to make e-learning tools effective therefore educators should stimulate learners to accept and utilize e-learning tools and prompt students to be willing to adopt and accept technology. Kattoua, Al-Lozi and Alrowwad (2016) identify the following variables that are fundamental to the success of an eLearning system namely student behavior, attitude to their cultural backgrounds, and demographics. These variables are key to student learning, "especially in a collaborative e-learning environment" (Kattoua, et al. 2016: 757). These variables are not only valuable in assisting educators to design efficient learning activities that promote learner familiarity with the eLearning system, but also make learning effective and engaging.

The success factors of an institutionalized eLearning system in enhancing teaching and learning in HEIs are often questioned. In examining critical success factors (CSF) in eLearning systems for developing countries, Bhuasiri et al. (2012: 844) postulate that "strong pedagogical foundations, especially content issues, student support and assessment, are essential for the success of e-learning implementation". Bhuasiri et al. (2012) suggest that there are seven aspects that make e-learning systems successful. These are "learners' characteristics, instructors' characteristics, e-learning environment, institution and service quality, infrastructure and system quality, course and information quality, and motivation" (Bhuasiri et al. 2012: 846). The characteristics are further divided into personal, environmental and systems dimensions.

The need to keep e-learning systems campus-bound has gradually diminished over the years since the Covid-19 pandemic. Li (2018: 420) asserts that "the momentum of conventional institutions' involvement in the provision of online learning is accelerating", and that the place of "open learning institutions seems to be gradually losing its edge". As this is the case in many higher education institutions world-wide, there is a definite need for HEIs to evaluate the uniqueness and the institutionalization of their e-learning systems.

In their evaluation of the success of eLearning systems (namely, the integration of technology and education) Al-Fraihat, Joy and Sinclair (2020: 80) suggest four practical solutions. These are: (a) The system must have communication and interactivity facets as well as assessment and evaluation features because "the diversity of

learning styles positively influences utilization of the elearning system, and aids students to be more engaged in their learning" (p. 80); (b) The usefulness and satisfaction of the system depends on the quality of tuition because it has a significant effect on the students' "perceptions of satisfaction and usefulness of the system" (p. 80); (c) To make the system successful it is pivotal to increase "awareness among students about the usefulness and benefits of the e-learning system", which will "increase its usability and popularity" (p. 80); (d) The system should be easy to use, reliable, integrated, personalized, attractive, intuitive, and easy to navigate.

To personate a different approach (see Figure 1) in viewing e-learning systems Eom and Ashill (2016:189) presents a diagram that illustrates the synergistic approach to the system's view of e-learning systems. According to Eom and Ashill (2018: 44) an e-learning system is synergistic and "there exists a dynamic relationship among student motivation, course design quality, instructor's facilitating roles, and students' academic engagement" working together "more than the sum of individual effects".

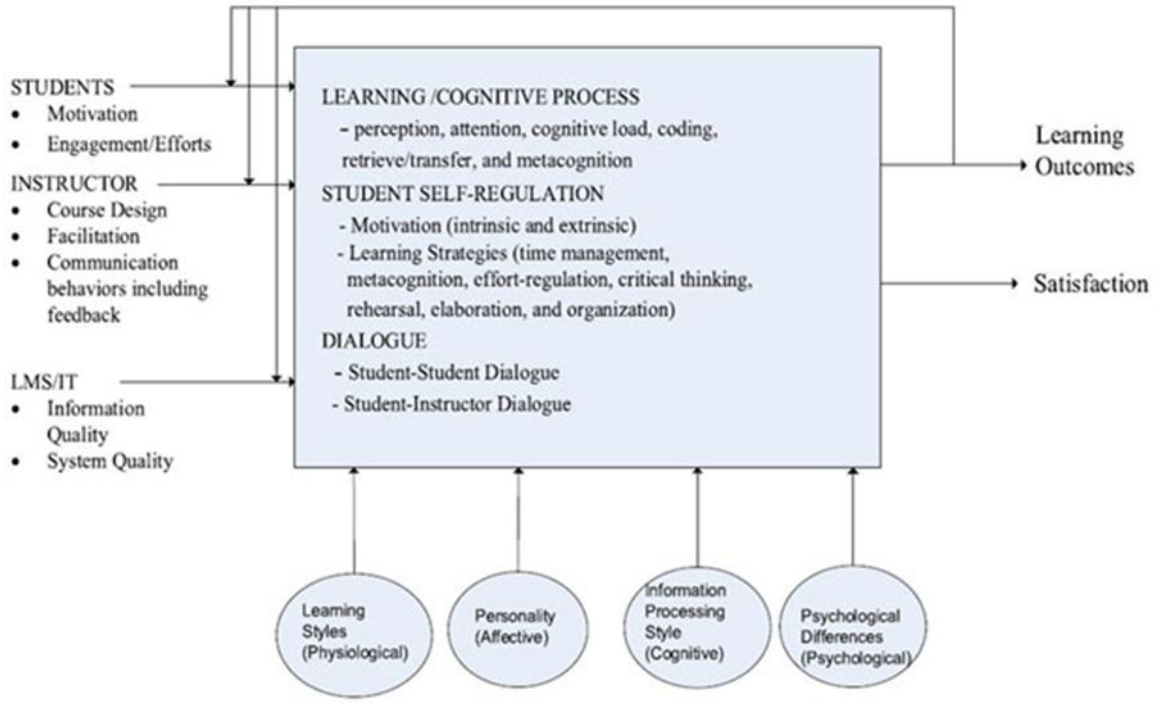

Figure 1. Eom & Ashill, (2016) Synergistic System's View of e-Learning Systems

From the above discussion on the institutionalization of e-learning systems, one can conclude that an e-learning system is a "positive development to extend higher education to meet a larger and more diverse community of people, it is also a significant barrier for universities, which have to achieve better results with less funding" (Vatolkina & Dos Santos Cardoso, 2021: 32). Based on their research of twenty international universities' e-learning systems Vatolkina and Dos Santos Cardoso (2021: 38) identified the following three important advantages in developing e-learning strategies. E-learning systems achieve excellence in education through the implementation of e-learning and digital technologies; they support students and staff in the implementation of e-learning and digital technologies; and support the development of digital infrastructure and relevant resources.

CIECTs Institutionalized Provisioning

Since its inception, CIECT has had to overcome various issues related to the expansion of the institutional eLearning system. Having overcome them, CIECT has delivered sustainable solutions to UWC and continues to do so aggressively especially after the Covid-19 pandemic. The deliverables considered to ensure successful integration include clear motives for going online; gaining the support of top management; building an effective eLearning strategy; and establishing an eLearning support structure. These deliverables were accomplished by creating dedicated teams to support both academic and non-academic staff and students. These teams consist of instructional designers, as well as members of the ICT training team, the digital academic literacy team who oversee student training in computer literacy, the materials development team, the digital media team, audio visual services (AVS), and members of the software development and application and research teams. CIECT also contributes to the mainstream of teaching and learning at UWC by showcasing the culture of a learning institution. This is accomplished by using an online marketing blog environment as a space for reflective practice, engagement, sharing of ideologies, influencing perceptions, and promoting a learning organization. Most of our information regarding CIECTs interventions are compiled on CIECTs blogspace. Reflective practice enables CIECT to share good online practices at UWC. In the area of teaching and learning, CIECT remains up to date with emerging developments in educational technologies, and encourages staff and students to use these while equipping them with the skills required for their successful implementation.

Re-evaluation of CIECTs eLearning Model

eLearning is a rapidly growing option in teaching-and-learning practices at UWC. In 2006 CIECT conceptualized an eLearning model (see Figure 2) to navigate the transformative eLearning landscape in HEIs and the shift in practices at UWC. The eLearning model presents us with various facets related to the pedagogical value of eLearning and is used by researchers to conceptualize and contribute to the eLearning teaching agenda. This is achieved by building the capacity of lecturers to design and facilitate blended e-pedagogy for students.

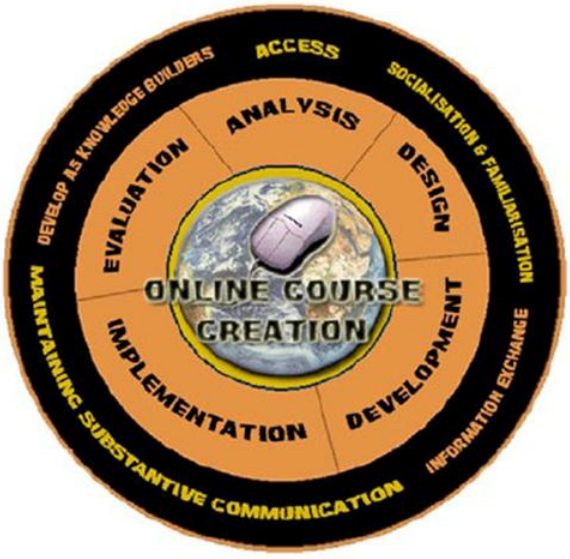

Figure 2. Online Course Creation Model (J. Stoltenkamp, 2006)

They also discuss how important it is for lecturers to grapple with threshold concepts, especially of e-pedagogy. The eLearning model has allowed CIECT to engage with lecturers on how to cope with the shift in the practices at UWC. These practices include: (a) Analysis – having an online presence and access to information technology resources and training; (b) Design – being able to design suitable online environments; (c) Development – being able to produce relevant material to stimulate information exchange; (d) Implementation – being able to implement eLearning in real-life contexts in relation to substantive discussion on knowledge construction; (e) Evaluation – this practice determines both the adequacy of the instruction, and development as a knowledge builder (see, Stoltenkamp & Dankers, 2022). Thus, the model presents a mixed teaching and training approach that is incorporated in UWCs LMS to assist lecturers to improve the quality of their teaching and learning, both face-to-face and online. CIECT facilitates training sessions on digital skills development, ICT and multimedia skills, the use of eTools and development of ICT applications, and, recently, the integration of AI tools. CIECT also provides lecturers with the necessary tools and resources to develop their efficiency in eLearning activities thus allowing them to take ownership of and manage their online experiences, and engage with e-tools to efficiently expedite their teaching and assessment activities.

In this paper we examine various practices that emerged over a five-year period (2019-2023) that we believe were detrimental to sustaining the ongoing processes in various faculties and departments at UWC. These practices include the niche areas mentioned above, mainly: analysis; design; development; implementation; and assessments or evaluation. These niche areas are related to digital academic literacy; information and communication technology skills development; multimedia and audio-visual services; instructional design and software development and application; assessment techniques; and research methods.

This study highlights current processes that continue to shape CIECTs implementation of eLearning and institutionalization in the wider university context. As mentioned above, our quantitative comparative analysis used different units of analysis to identify a particular observable phenomenon, namely, the growth rate. Large datasets that had been collected during the five-year period were analyzed. These data sets depict the annual growth rate of the training and support systems that CIECT had instituted between 2019 and 2023.

The following sections illustrate a number of continuous skills training and support areas that were accelerated across faculties at UWC by CIECT. Practical and measurable deliverables of the support and training activities have been selected. This is necessary to identify how CIECT assisted in and promoted effective teaching-and-learning practices at UWC. We also illustrate how educators and learners across faculties at UWC used various innovative communication, content creation, and assessment eTools in the institutional LMS, iKamva and other applications. We tabulate these outputs and take particular note of the progression and regression of the growth of these processes over the five years, especially before and after the COVID pandemic.

Section One: Information and Communication Technologies (ICT) and Multimedia Skills Training and Support

In this section we examine the growth rate of ICT skills training and support. UWC has provided ICT skills

training and support packages to academic and non-academic staff members since 2005. Examples of these include training in IT and Security Awareness, mobile devices, Microsoft Office, Turnitin, and Marks Administrator.

Stoltenkamp & Siebrits (2015) documents that qualitative and quantitative measures indicate the benefits of ICT skills for all staff in terms of acquisition of eSkills, the effective use thereof within the workplace and their personal lives, and access via various geographical spaces. Hehir, Zeller, Luckhurst and Chandler (2021:2) stress that "there is a need for academics to be supported with necessary technological infrastructures and continuing professional development on effective use of the resources among academics" and a good median is an efficient learning managing system "that enables challenges of delivering curriculum contents".

In addition, CIECT provides digital literacy workshops to staff (academics, non-academics & post-graduate students across faculties and departments at UWC). These workshops are 'one-on-one' consultations conducted by professional CIECT staff. After the online workshops conducted by the multimedia team, lecturers are also assisted through online one-on-one consultations via the different support modes. These consultations include the development of narrated Power Point presentations; screen-recording of lessons; concept mapping; video-editing; and compression and conversion of digital content.

Related to ICT skills training (see Table 1) in the five-year period under discussion 14736 staff members and students received scheduled training workshops, as well as personal one-on-one consultations. The average growth rate of ICT skills training was 17.36% with a significant increase (62.21%) of training during the pandemic.

Table 1. ICT Skills Training

Training	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Student	53	62	580	647	944
Staff	669	334	910	461	478
Consultations	673	1220	1126	939	904
Post-Graduates	98	112	187	181	100
Workshops	83	64	123	129	106
Totals:	1493	1728	2803	2357	2532
Growth Rate:		*15.74%*	*62.21%*	*-15.91*	*7.42%*

Section Two: Training for the Application of eTools in Teaching-and-Learning

In this section we examine the training and support delivered by instructional designers of CIECT focusing on the implementation and use of eTools in teaching and learning. Due to CIECTs continuous drive for the effective use of educational technologies, academics continued to employ eTools for teaching-and-learning, communication, assessment and marketing. CIECT caters for the effective use of eTools and development of ICT applications –

for academics, non -academic units, and students across faculties. Training and support are grounded on established research on learning processes in an online environment (see, Stoltenkamp & Siebrits, 2015). In addition, CIECT has added an iKamva Statistics eTool that allows instructors, lecturers or site owners to have an overview of the site usage statistics and user activity in a specific module.

The CIECT Instructional Design (ID) team designs and facilitates workshops that offer training on eTools, assessments and the design and development of ePortfolios for teaching-and-learning. The eTools and Assessment workshops enable participants to create a structured online environment for blended and distance teaching-and-learning practices. Furthermore, participants are able to design relevant assessment activities related to their disciplines. The design and develop of an ePortfolio workshop highlight the importance of creating an ePortfolio to support and demonstrate teaching-and-learning practices. From 2019 to 2023, an average number of 1288 of online modules were created due to increasing demand.

Related to the creation of online courses (see Table 2) although the average number of online courses from 2019 to 2023 was significantly low with an average growth of 0.95% there was a moderate increase of 16.66% in the creation of online modules during the pandemic.

Table 2. Growth Rate for Number of Online Modules

	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Totals:	1200	1400	1320	1294	1227
Growth Rate:		*16.66%*	*-5.71*	*-1.96*	*-5.17*

Another area of training and support that CIECT offers is the application of eTools for teaching and learning (see Table 3). This becomes an essential means to improve the teaching and learning experiences of students and lecturers, and to guide them on how to use eTools. The average growth rate of the number of eTools training sessions offered over the five-year period (2019-2023) was 33.93% but during the pandemic of 2020 there was a significant increase of 110.34%. Similarly, the average growth rate of ePortfolio training session from 2019 to 2023 was 15.29% with a significant increase of 118.91% during the pandemic.

Table 3. eTools Workshops and Training

Workshops	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
eTools	29	61	66	58	75
Attendees	90	355	606	250	192
Growth Rate:		*110.34%*	*8.19%*	*-12.12%*	*29.31%*
ePortfolio	27	11	11	24	19
Attendees	62	37	81	138	43
Growth Rate:		*-59.25%*	*118.91%*	*70.37%*	*-68.84*

Section Three: Integration of Productivity Tools and AI into the Institutional LMS

In this section we track CIECTs progress of the changing landscape of AI technology in education. We list the tools CIECT familiarized staff and lecturers with – for usage in the LMS consistent with the progressive world of artificial intelligence-driven tools.

CIECTs Advancement of Artificial Intelligence Driven Tools

Due to the progressive landscape of artificial intelligence (AI), CIECT continually creates awareness of AI driven tools that can be incorporated into the LMS, iKamva. The following (see Table 4) is a list of such tools that CIECT encourages lecturers and staff to explore to enhance their productivity when working in Microsoft Word, PowerPoint, and Excel.

Table 4. AI Tools

AI Tool	Functionality
WebChatGPT	AI-driven chatbot that integrates seamlessly with ChatGPT. It can assist with a wide range of tasks, such as content generation and answering questions related to documents and presentations
Chatsonic	AI-powered tool designed to enhance productivity. It offers conversational interface to interact with Google Mail (GMAIL).
ChatGPT Summary for Chrome	An extension that provides a handy summary feature for Google Chrome. It helps in quickly summarizing and extracting key information from lengthy documents.
Talk to ChatGPT	This tool allows for seamless integration of the ChatGPT platform. It's like having a virtual assistant available at our fingertips. Voice can be used to interact with ChatGPT.

CIECTs Integration of AVR/AR Tools into its LMS

In 2021 CIECT successfully added the EON-XR Library to UWCs institutional LMS via Learning Tools Interoperability (LTI) integration. The LTI educational technology allowed users to access the EON-XR platform and content through a Single Sign-On (SSO) method. This enabled lecturers and students to access the interactive module content from their online environments in the LMS. Augmented and Virtual Reality (AVR) education enabled students to actively engage with immersive interactive 3D objects. The benefits of integrating EON-XR extended the capabilities of lecturers. For example, they were able to structure lessons or units of work by linking them to the lesson or tool page in iKamva that was embedded with specific AVR. The AVR resource opened in a new window in the EON site, allowing students to view the resource. Hence, the resource was aligned to a specific lesson and activities. Lecturers gave students instructions on how to view the AVR resource in iKamva by downloading the EON-XR application in iKamva via a specific link. Thereafter students were able to view the resource. Hence, students did not leave the online classroom or the lesson in iKamva, but opened the application

in order to view the resource and easily return to the lesson page. The EON-XR User Roles never changed for users, thus, users were able to view the library resource as in their logged-in role of lecturers, students, project owners, or tutors. Regrettably, in October, 2022 the EON-XR Library project concluded. However, the CIECT team proceeded to collaborate with the JigSpace© organisation and UWCs institutional planning to introduce the JigSpace© (Augmented Reality – AR) project.

Integration of JigSpace© within UWCs LMS

In 2023 the CIECT team collaborated with the JigSpace© team to enable JigSpace© (Augmented Reality – AR), an interactive 3D presentation software on the LMS. JigSpace© allows users to embed 'Jigs' into quizzes, lessons, discussions and other sections on iKamva. This process is similar to embedding YouTube videos in online courses. When using Lecturers do not need to have any prior coding experience to use JigSpace© to create immersive AR demonstrations and rich product stories. Augmented reality is increasingly benchmarking the 'new' future of teaching and learning experiences in education. Huri, Chintamani and Cutting (2024) stress that "in the sector of education, augmented reality offers an immersive learning experience by blending educational content onto real-world objects. It also enables the students to explore complex concepts in a tangible and interactive way".

Integration of Plagiarism Detection Tool, CopyLeaks©

In 2023 CIECT integrated a plagiarism detection tool, CopyLeaks© into the LMS. This integration marked a significant milestone in UWCs ongoing commitment to provide a secure and trustworthy learning environment for all its users. This leading plagiarism detection tool positively identifies short-hand text or short-texting language used on forums like 'Reddit'. It is essential to have this anti-plagiarism tool on the LMS because students often use forums to source the answers to their assignments or tasks. CopyLeaks© uses advanced AI and machine learning algorithms to detect and flag text that has been generated by various online sources like 'Reddit' and 'ChatGPT'. Thus, should a student or lecturer use a data worksheet to illustrate their findings within their specific research, CopyLeaks© will be able to detect if another user has sourced or used their intellectual property (IP).During a Copyleaks© trial period (see Figure 3).

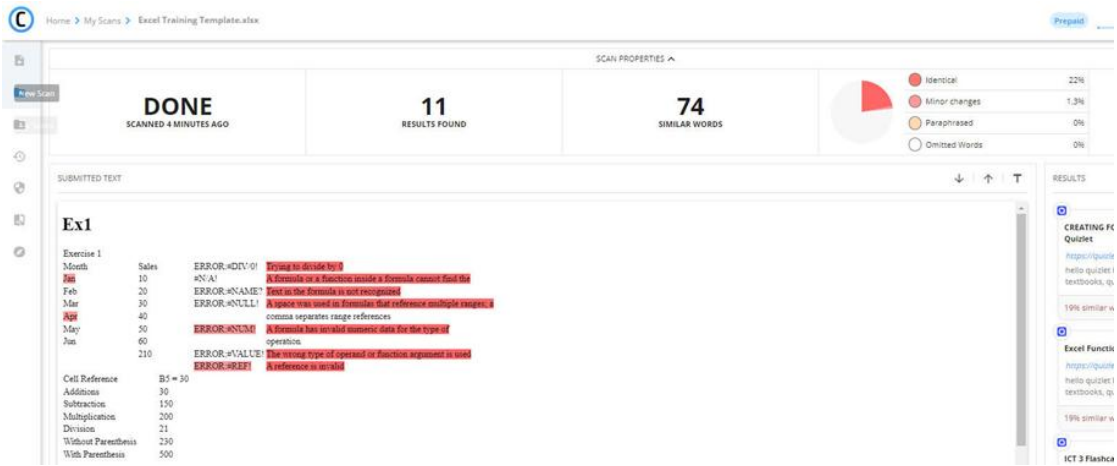

Figure 3. Copyleaks Illustration

CIECT uploaded a Microsoft Excel training template to check if the template was being used by another institution. CopyLeaks© scanned the text and formulae, then produced a detailed report that identified matches found online. In this illustration CopyLeaks© used advanced algorithms to compare the text with an extensive database of online content, which included websites, articles, books, and more. The report then highlighted a 23-percentage match of similarity between the text and formulas and the sources it detected.

As the Internet of Things (IoT) continues to grow, and more content becomes available online, UWC recognizes that tools like CopyLeaks© will become even more essential to maintain the integrity of written content. Furthermore, this advanced plagiarism detection tool employs cutting-edge technology to identify instances of plagiarism, including text similarity, paraphrasing, AI-generated text, and content manipulation. CIECTs seamless integration of this tool has ensured a seamless user experience. Faculty members can now make use of the assignment tool to initiate plagiarism checks directly on the LMS platform, thus simplifying the process for both lecturers and students.

Section Four: Training and Support of Digital Academic Literacy

In this section we highlight the importance of being proficient in digital literacy to be able to navigate current evolving online educational platforms. In this 21st Century CIECT focuses on Digital Academic Literacy (DAL) programs, where on the one hand students are able to easily navigate and interact on online platforms, and on the other hand, acquire basic computer literacy skills. The DAL program is a semester offering and offered to novice users (first-year students), as well as advanced users (senior students or students at other year levels). Faculties and departments sign agreements with CIECT to design customized lessons for certain semesters of an academic year.

Extensive planning and collaboration with departments follows a set procedure. The CIECT team first conducts a formal meeting with a specific department to discuss the scope of delivery of the DAL program. The meeting covers aspects related to the special needs of the department the outline of the program and the delivery of a package. CIECT and the department representatives develop and sign a Service Level Agreement (SLA). Thereafter the CIECT team recruits senior students as Tutors (co-facilitators) to assist with the DAL program as part of a work-study program.

The delivery and facilitation of the DAL program involves face-to-face training in computer laboratories; communication on Google Hangouts; ‘Live’/synchronous classes; and the use of simulations. In addition, students use a Skills Assessment Manager (SAM) platform (an interactive online training system) that complements face-to-face teaching and allows them to practice their digital skills before completing online assessments. This online platform hosts an interactive environment, including simulations, instructional videos and a self-assessment interface. On this platform students are able to view instructional videos on how to complete their tasks. Students use various eTools, such as the announcement, course resource, test & quizzes, assignment, discussion forum, and lessons tools on iKamva. Students are also expected to engage in continuous assessments and participation on iKamva and the SAM platform.

The DAL program includes training packages for basic literacy and eTools training (i.e., familiarization with iKamva). Currently the DAL program is integrated into accredited modules of the faculties of Economic and Management Sciences (EMS), Education, Community and Health Sciences (CHS), Dentistry, Law, Arts and Science at UWC. The DAL team collaborates with these faculties to identify student needs. The table below (see Table 5) presents some of the literacy packages taught.

Table 5. Applications Taught

Functionality/Purpose	Applications
Introduction to Computers	Computer basics
Word processing & Text Editing	Ms Word
Spreadsheets Creation & Data Analysis	Ms Excel
Multimedia Presentation/Graphics	Ms PowerPoint
eTools	iKamva (LMS)

In the period of 2019 to 2023, an average number of 4229 students were trained per year. This data indicates how the definition of basic computer literacy skills continuously expands according to new technological advances. The following table (see Table 6) depicts the number of students trained in different faculties from February 2019 through December 2023. Although the average growth rate of students trained over this five-year period was 3.63% there was a significant increase in training (36.69%) during the pandemic.

Table 6. Students Trained within Different Faculties

Faculty	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Arts	360	348	944	1594	1131
CHS	411	504	596	600	308
Dentistry	119	109	111	111	117
Education	632	539	483	583	484
EMS	1778	1275	1360	1318	1304
Law	606	615	581	581	544
Science	226	270	142	336	126
Totals:	4132	3660	4217	5123	4014
Growth Rate:		*-11.42%*	*15.21%*	*21.48%*	*-21.64*

Section Five: Support and Community Engagement for Multimedia and Audio-visual Services

In this section we focus on the expanding multimedia and audio-visual services (AVS) footprint of the university. It has become increasingly demanding for the AVS team of CIECT to assist different faculties and lecturers to host their institutional events/lectures. The AVS team has progressively grown in their rate of training and support, and they currently offer training to lecturers on how to use hybrid teaching systems.

AVS Focus: Supporting the Physical Teaching and Learning Spaces

The AVS team of CIECT, focuses supporting physical teaching and learning spaces (the lecture venues) across all UWCs campuses. These lectures and stakeholders collaborate with the AVS team to host the audio-visual components of their events. AVS support is booked via ServiceDesk of UWC and the AVS team accepts or rejects the request depending on their capacity and the focus of the academic agenda. With the expanding footprint of the university, it is becoming increasingly difficult for the AVS team to assist all the stakeholders who host institutional events. These events have to be prioritized according to the following criteria: the actual physical space; whether hybrid teaching will be required; classroom technologies; video conferencing; training; reporting of obsolete equipment; installation and replacement of venue equipment; telephone and walk-in support; and many more. The AVS team assesses the 'jot form' and notifies the client accordingly. If the request is rejected, the team substantiates their decision and suggests that the faculty/department should outsource their audio-visual requirements for the event. The stakeholders are given sufficient time (at least 2 weeks) to find a suitable audio-visual provider and the AVS team helps them to find suitable vendors.

The AVS team also provides training on classroom audio-visual systems and hybrid solutions. Staff are encouraged to attend training sessions to learn how to make effective use of emerging technologies. The average growth rate of the number of AVS training sessions over the three-year period (2021-2023) was 164.10% with a significant increase in the number of participants (203.94%) in the same period (see Table 7).

Table 7. AVS Training

Workshops	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Audio-Visual Training	n/a	n/a	13	13	77
Participants:	n/a	n/a	13	95	77
Growth Rate:	*n/a*	*n/a*	*0%*	*0%*	*492.30%*

AVS Campaign - Installation of Smart Tracking Cameras

In 2023 the AVS team embarked on a campaign to install Smart/Tracking Cameras in teaching spaces at UWC. These cameras track the lecturers' facilitators' body movements to enable them to move around the class freely while they engage with students so that multiple types of learning material and content can be included in recordings of sessions/lectures that are uploaded onto the online environment. These cameras are ideal for hybrid teaching because they can zoom in on objects and project images onto the screens in the venues. These images are included when the lectures are streamed to remote students via one the online conferencing tools (Google Meet, Zoom and BBB). This functionality was of great benefit to students even after the pandemic in 2020.

Multimedia Services

CIECT provides multimedia content production workshops to academic and non-academic staff as well as

students. Related to the provisioning of multimedia services (see Table 8) by CIECT the average growth rate of the number of multimedia training sessions during the five-year period under review was 64.18% with a significant decrease of -46.96% in growth after the pandemic during 2022 and 2023.

Table 8. Multimedia Training

Training	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Staff	96	91	246	133	105
Under-Grad	197	188	1202	667	270
Post-Grad	588	0	0	9	31
Totals:	881	279	1448	809	406
Growth Rate:		*-68.33%*	*418.99%*	*-44.12%*	*-49.81%*

Section Six: Training and Support to use iKamva, the LMS of UWC

In this section we track shifts in the usage of the LMS since 2019. We note how over the years use of the LMS has varied considerably with a notable change in the shift to remote access. The institutional LMS is a Sakai platform that has been branded 'iKamva' by the University of the Western Cape. Since 2019 Sakai has been ranked globally as the top Open-LMS because of its positive user experience. Even before the pandemic necessitated the shift to digital platforms, iKamva had provided an interactive and flexible learning environment offering an array of eTools and resources to enhance face-to-face lectures. iKamva can be accessed on a computer, tablet or mobile phone via a normal browser or with the use of an Android mobile application. iKamva allows students to interact/engage in face-to-face lectures that are enhanced by valuable resources that can be accessed online. The resources are used for self-study, reflection and assessment purposes. Lecture material and resources are available online and can be retrieved via various modes of delivery on the LMS. iKamva has been built using responsive web design principles, allowing users to access the platform from multiple devices with internet connectivity from any geographical location.

In order to familiarize students with the iKamva platform, CIECT regularly conducts live/synchronous demonstration sessions via Google Meet. First-year and returning students are encouraged to join these sessions to familiarize themselves with the platform so that they can access and navigate their online modules, engage with learning content and student emails and submit assessments. During these training sessions students are able to ask specific questions, particularly on how to navigate iKamva and how to access their online modules. Over the years in question access to the LMS has varied considerably with a notable change in the shift to remote access. The table (see Table 9) illustrates student device access to iKamva during 2019 to 2023.

Related to the average growth rate of the number of LMS connections on-campus was 94.74%. There was a significant increase (348.18%) of on-campus connections in 2023 (see Table 9). Related to the average growth rate of the number LMS connections off-campus (see Table 10) over was 44.43% with a significant increase of 215.53% during the 2020 pandemic.

Table 9. On-campus Network Connections

Mode	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Windows	1053891	399814	574755	1003052	1067013
Android	544627	263445	173578	290656	5568832
iOS	175600	86345	77917	162275	4432
BB10	379	82	44	0	6
Macintosh	19900	9923	15276	39320	61467
Totals:	1794397	759609	841570	1495303	6701750
Growth Rate:		*-57.66%*	*10.78%*	*77.68%*	*348.18%*

Table 10. Off-Campus (remote) Network Connections

Mode	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Windows	765852	2516870	3026691	3104517	1606908
Android	791809	2543147	2366051	1993100	1290374
iOS	264342	663785	755648	446516	641852
BB10	448	448	627	4	0
Macintosh	46062	171649	186945	225451	135177
Totals:	1868513	5895899	6335962	5769588	3674311
Growth Rate:		*215.53%*	*7.46%*	*-8.93%*	*-36.31%*

Note: All connections are counted as total number of sessions, rather than for total unique users

The average growth rate of unique LMS remote users over the five-year period (2019-2023) was 9.44% with a significant increase of 21.59% of unique remote LMS users during the pandemic of 2020 (see Table 11).

Table 11. Total UNIQUE USERS Remote Access Figures

Mode	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Windows	21104	26511	28188	42140	25174
Android	19667	21599	21987	31404	18892
iPhone	5588	7798	9202	15404	10565
iPad	792	785	580	527	416
BB10	45	24	14	2	0
Opera	0	0	0	13	6
Mac	1780	2837	2986	4079	2836
Totals:	48976	59554	62957	93569	57889
Growth Rate:		*21.59%*	*5.71%*	*48.62%*	*-38.13%*

The average growth rate of unique LMS on-campus users over the five-year period (2019-2023) was 15.27% with a significant decrease of -68.10% unique on-campus LMS users during the pandemic (see Table 12). This is understandable because there was a major shift in teaching and learning at Higher Education Institutions going online because of necessary social distancing during the pandemic.

Table 12. Total UNIQUE USERS On-campus Access Figures

Mode	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023
Windows	21461	18727	10312	20067	18440
Android	16921	14739	4585	11722	12641
iPhone	4816	4540	2168	6613	7995
iPad	578	238	82	166	260
BB10	33	10	2	0	2
Opera	5	4	0	0	0
Mac	1300	939	492	1403	1681
Totals:	45114	39197	17641	39971	41019
Growth Rate:		*-13.11%*	*-54.99%*	*126.58%*	*2.62%*

In order to improve accessibility to the LMS via mobile devices, CIECT incorporated the iKamva Mobile Application, for Android devices only, that can be downloaded from the iKamva platform. The iKamva Android application acts as a dedicated browser for iKamva and users are able to view and engage with online environments (content, discussion forums, eAssessments). The application can be accessed from any geographical space, via a self-contained browser on an Android mobile device that has valid internet connection.

In addition to online navigation, the iKamva mobile application allows users to download lesson pages for offline viewing as a web page that contains the original format of the iKamva webpage, as a PDF document that can be viewed offline and printed to hardcopy, or as a screenshot that can be saved as an image for later offline viewing. Even though staff and students are considered ‘tech-savvy’ and know their way around electronic devices and social media platforms, they might lack the knowledge of how to use multimedia tools to benefit and aid their learning, teaching and administrative goals.

Section Seven: Skills Development in Research on Teaching and Learning Strategies

In this section we highlight how CIECTs practices and strategic decisions have been informed by research and vice versa. CIECTs research-led projects, related presentations and publications include key factors, namely, ePedagogy, assessment, validity and reliability of online assessments, third-space professional, sustaining communities of practice (COPs), digitally enabled classrooms, digital natives, digital literacy skills, and the implementation and support of emerging technologies in complex higher education settings.

CIECT’s research and publications (Braaf, Leonard & Stoltenkamp, 2021; Dankers, Stoltenkamp & Nelson, 2022;

Dankers, Stoltenkamp & Donson, 2022; Braaf, Patel, Chinnian & Mohammed, 2023; Stoltenkamp & Dankers, 2023; Dankers & Stoltenkamp, 2023) have included impact studies related to the institutionalization of eLearning at UWC, change management strategies, training interventions, effective design of blended learning environments, and leadership and ePedagogy. CIECT's research emphasizes publication in open access journals, that play an important role in increasing access to research information and challenge the traditional exclusionary paradigm of barrier-based journals (see, Stoltenkamp & Siebrits, 2015). The following research summary includes the scholarly research conducted by CIECT researchers on trends in recent research, and publications in accredited journals.

In CIECT research (2021) on establishing and rethinking the delivery of the digital media literacy programs at the UWC we established that the shift to a fully online offering during a pandemic had both beneficial and negative impact. Therefore, it was imperative as the Centre for Innovative Education and Communication Technologies to implement a robust practical and hands-on digital media literacy program (Braaf, Leonard & Stoltenkamp, 2021).

In 2022 our research continued to concentrate on analyzing the impact of emerging technologies on the perception of student success as a result of the adoption of blended learning approaches across faculties at UWC. This research highlighted the work of CIECT that encourages and promotes the adoption of emerging technologies and blended-learning approaches. It also guided the support offered to the campus community to enhance face-to-face classroom teaching and the use of e-Tools and emerging technologies. The majority of our research in 2022 was centered on how tutors, students, mature students and lecturers had designed effective teaching and learning interventions during a pandemic. One impact study was on the perception and challenges tutors and students faced during the COVID-19 pandemic as they adapted to remote teaching and learning. Other research was on the limited access experienced by tutors and students embarking on remote teaching and learning. In this research we highlighted the type of changes or conversations that must take place so that action can be fast-tracked and provide greater online resources and support. We also concentrated our research on designing online learning environments by building the capacity of lecturers to design and facilitate blended e-pedagogy for mature students. The research highlighted the importance of effective design for the delivery of theory, practice and assessment and provided a framework that enables lecturers of adult learners to grapple with the concept of ePedagogy. The framework includes ways to use eTools for teaching, learning and assessment effectively for mature learners. Essential themes emerged on the effective design of online environments and the affordances of online teaching/learning for mature students, especially in times of crisis like the Covid19 pandemic (Stoltenkamp & Dankers, 2022; Dankers, Stoltenkamp & Nelson, 2022; Dankers, Stoltenkamp & Donson, 2022).

We presented our research at International Conferences on Education in Mathematics, Science and Technology. Here we presented our findings on how to measure student success and also consider lessons learned in relation to the adoption of innovative teaching and learning practices. This ongoing research explores factors underpinning learning and teaching practices at UWC, as well as examining topics on teaching and learning and notions of student performance. With the abrupt transition in teaching and learning caused by a pandemic, we take cognizance that students had to make major adjustments to their lifestyles to adapt to remote learning and teaching styles.

In 2023 research publications of CIECT emphasized the advances made by UWC in the support of remote online teaching and learning for student access and success. This research reported on the shift to remote teaching and learning practices precipitated by the pandemic, and highlighted how the UWC community responded pro-actively during the pandemic. The major findings of the research were that academic staff need to be informed of and encouraged to use online teaching modes, and that the digital divide continues to disadvantage students with limited resources. The major objectives of this research were to identify how UWC responded pro-actively to this shift and continue to do so, specifically in terms of providing ongoing professional academic support. A related publication on leadership in education discussed the impact of leadership on the successful implementation and support of remote teaching, learning and assessment at UWC. In this research we identified the role of leadership at HEIs in South Africa. Of particular interest was the collective leadership shown at all levels across academic faculties, departments, and professional support teams to ensure that remote teaching and learning was sustainable. The findings of this research agreed with other scientific research that the influence of leadership affects the implementation and support of remote teaching and learning both negatively and positively. As researchers we concluded that the perceived sustainability of remote teaching and learning depends on HEI leaders' continuous review of programs to ensure the maintenance of the alignment of processes, technology and student-centricity. Our research also reflected on how faculties used online assessments to accommodate the different learning styles of students. This research reported on the use of online assessments in English for an educational development module. It highlighted the benefits of using the method of an online test to manage and enable learning by reflection in a large class setting. The research found that this method enabled students to engage with learning materials, stay motivated, and test their own understanding of the English language. It was evident that the use of online methods for testing are beneficial for a large class context, as it makes the learning and management thereof easier for both the learner and educator and accommodates different learning styles (Braaf, Patel, Chinnian & Mohammed, 2023; Stoltenkamp & Dankers, 2023; Dankers & Stoltenkamp, 2023).

Our research in the five years under discussion has fostered quality assurance and has investigated review processes in specific contexts. Our research out-put concurs with Browne's (1915: 109) findings, that "the intersection between these two roads [education and research] is undoubtedly one of the most important strategic points along the entire front [of HEIs]". We acknowledge that our research has focused on impact studies in a complex higher education setting. It has led to the development and sharing of frameworks and models that have impacted the implementation strategies regarding teaching-and-learning and assessment at UWC. Our research further linked our out-puts with UWCs Institutional Operating Plan (IOP) (Goal 3: Research and Innovation, Strategies 1-3), which calls for the establishment of distinctive research niche areas, the expansion of existing collaboration, community engagement, research partnerships, and the improvement of research capacity through realignment of internal research funding resources (University of the Western Cape, 2009: 17-18).

Concluding Remarks

This paper highlights the transformative eLearning landscape at UWC by providing a detailed account of the shift in practices. By doing so we determined the initial perceptions and objectives of the eLearning division of UWC, and its rate of change from 2019 to 2023. The study showcases how continuous skills training and support areas

offered by CIECT accelerated across faculties at UWC. More particularly, we measured the average growth rate of skills training from 2019 to 2023 in the following areas: (a) ICT and Multimedia Skills Training and Support; (b) Training for the Application of eTools in Teaching-and-Learning; (c) Integration of Productivity and Training Tools into the Institutional LMS; (d) Training and Support for Digital Academic Literacy; (e) Training, Support and Community Engagement for Multimedia and Audio-visual Services; (f) Training and Support for the university's LMS, iKamva, and; (g) Skills Development in Research on Teaching and Learning Strategies. By comparing the progressive growth of UWCs eLearning division we have been able to document the successes and achievements of the eLearning center.

More specifically, this paper provides insight on the growth rate, hindrances and uniqueness, as well as the limitations, weaknesses and strengths of CIECTs skills training and support areas. This research highlights the variables that affect the behavior and attitudes of students and lecturers towards training and support, especially in the collaborative e-learning environment. Understanding these variables is helpful for instructional designers and trainers of CIECT to design meaningful educational training activities to make training interventions more effective and appealing.

In particular, this research helps to better understand how a pandemic affected the annual growth rate in certain areas both favorably and unfavorably. The following arears of training were affected: there was a significant increase of 62.21% in ICT training during the pandemic; there was a significant increase of 110.34% in the annual growth rate of eTools training during the pandemic; similarly there was a significant increase of 118.91% in annual growth rate in ePortfolio training during the pandemic; there was a moderate increase of 36.69% in DAL training during the pandemic; in AVS training there was an average growth rate of 164.10% over the three-year period (2021-2023); similarly the average growth rate in the number of multimedia training interventions was 64.18% over the five-year period (2019-2023), but with significant negative growth of -46.96% in multimedia training during the pandemic; and in all areas of LMS training and on-campus and off-campus connections there was a 40.97% average growth rate.

The findings from these comparisons can help policy makers, educators and teaching and learning experts to understand what the students expect from the institution's learning management system. Undoubtedly, these successes and achievements can serve as a benchmark for future research. More research that investigates the effectiveness of institutionalizing an eLearning division at HEIs in support of lecturers and of students' teaching and learning practices is needed.

References

Al-Fraihat, D., Joy, M., & Sinclair, J. (2020). Evaluating E-learning systems success: An empirical study. *Computers in human behavior*, *102*, 67-86.

Bhuasiri, W., Xaymoungkhoun, O., Zo, H., Rho, J. J., & Ciganek, A. P. (2012). Critical success factors for e-learning in developing countries: A comparative analysis between ICT experts and faculty. *Computers & Education*, *58*(2), 843-855.

Braaf, N., Patel, M., Chinnian, K., & Mohammed, T. (2023). Online Assessments for Reflection within a Large Class: A Case Study of English for Educational Development Law Students at the University of the Western Cape. *ALTRALANG Journal, 5*(01), 336-354.

Braaf, C., Leonard Kroutz, L., & Stoltenkamp, J. (2021). Pre- and Mid-COVID: Establishing and Rethinking the Delivery of the Digital Media Literacy Programme at the University of the Western Cape. Paper presented at the HELTASA Conference, South Africa (online) 6 to 10 December 2021.

Browne, A.W. (1915). The Goals of Scientific Research: President's Address Read Before the Cornell Chapter of the Sigma Xi, May 17, 1915. *Sigma Xi Quarterly*, *3*(4), 108-116.

Centre for Innovative, Education and Communication Technologies (CIECT), CIECT Blog; Content Owner: Dr. Juliet Stoltenkamp, Main Contributors: Instructional Design Team, [eLearning Marketing Campaign since 2009]. Available at https://ciect.wordpress.com/

Dankers, P., & Stoltenkamp, J. (2023). Leadership in Education: The Impact of Leadership on the successful implementation and support of remote teaching, learning and assessment, *Edulearn23 Proceedings*, pp. 507-516. https://doi.org/10.21125/edulearn.2023.0222

Dankers, P., Stoltenkamp, J., & Nelson, M. (2022). Contribution of blended learning technologies and teaching practices to student success. *International Journal of Technology in Education (IJTE), 5*(2), 193-205. https://doi.org/10.46328/ijte.220

Dankers, P., Stoltenkamp, J., & Donson, T. (2022). The perception of digital academic literacy tutors during the COVID-19 pandemic at the University of the Western Cape. *International Journal of Technology in Education and Science (IJTES), 6*(1), 1-13. https://doi.org/10.46328/ijtes.318

Eom, S. B., & Ashill, N. (2016). The determinants of students' perceived learning outcomes and satisfaction in university online education: An update. *Decision Sciences Journal of Innovative Education, 14*(2), 185–215.

Eom, S. B., & Ashill, N. J. (2018). A system's view of e-learning success model. *Decision Sciences Journal of Innovative Education, 16*(1), 42-76.

Hehir, E., Zeller, M., Luckhurst, J., & Chandler, T. (2021). Developing student connectedness under remote learning using digital resources: A systematic review. *Education and Information Technologies*, 1-18.

Huri, A. S., Chintamani, A., & Cutting, K. (2024). The Impact of Augmented Reality on Teaching and Learning in the Educational Context: Exploring Its Pedagogical Implications. *Educational Administration: Theory and Practice*, *30*(5), 8057-8062.

Kattoua, T., Al-Lozi, M., & Alrowwad, A. A. (2016). A review of literature on E-learning systems in higher education. International Journal of Business Management and Economic Research, 7(5), 754-762.

Li, K. C. (2018). The evolution of open learning: A review of the transition from pre-e-learning to the era of e-learning. *Knowledge Management & E-Learning, 10*(4), 408–425.

Neumann, R., & Graeff, P. (2015). Quantitative approaches to comparative analyses: data properties and their implications for theory, measurement and modelling. *European Political Science, 14*: 385-393.

Ragin, C. (1984). '*What is Qualitative Comparative Analysis (QCA)*?' Available at: http://eprints.ncrm.ac.uk/250/1/What_is_QCA.pdf

Stoltenkamp, J., & Dankers, P. (2023). Advances made by the University of the Western Cape (UWC) in the support of remote online teaching and learning for student success and access. *Perspectives in Education,*

41(2), 247-257.https://doi.org/10.38140/pie.v41i2.6328

Stoltenkamp, J., & Dankers, P. (2022). Designing online learning environments in higher education: Building capacity of lecturers to design and facilitate blended e-pedagogy for mature students. In Z. Groener, & S. Land (Eds.), *Adult Education and Learning Access: Hope in times of crisis in South Africa.* University of the Western Cape. pp. 168-200. https://repository.uwc.ac.za/bitstream/handle/10566/8030/stoltenkamp%26danker_ciect_2022.197-200.pdf?sequence=1&isAllowed=y

Tilly, C. (1984). *Big structures, large processes, huge comparisons*. Russell Sage Foundation.

University of the Western Cape. Institutional operating plan 2016-2020 white paper [https://international.uwc.ac.za/wp-content/uploads/2020/11/IOP_2016-2020.pdf].

Vatolkina, N., & Dos Santos Cardoso, M. (2021). E-learning development strategy of the university: Comparative study. *International Symposium on Project Approaches in Engineering Education* (Vol. 13). 10.5281/zenodo.5095257.