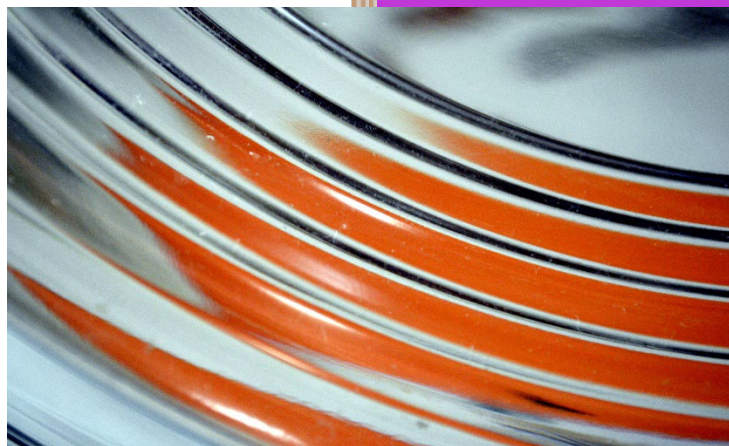


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Identity Matters: A Framework for Bridging Contemporary e-Learning Theory with Online Practice

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Abstract: We are increasingly realizing that technology and its use in learning contexts is not benign. With the advent of more powerful technology tools, including Artificial Intelligence (AI) ones, combined with the historically significant changes that have occurred in education over the last four years, there are more reasons than ever to examine their influence on human beings in the process of “being educated”. The aim of our 3-year longitudinal study was to understand how programs being offered at a fully online technical higher education (HE) institution in Chile influenced the identity development of students from socio-economically and educationally disadvantaged backgrounds. A Participant Action Research (PAR) approach was adopted to the study that involved macro, meso and micro-driven changes being made to programs. These changes involved aligning the instructional design, pedagogical approaches, and technology tools of programs with contemporary e-learning theory and 21st century learning goals. Previously, we provided three in-depth reports of the evolving changes on learners’ identities - in the beginning, mid and end phases of their programs. We also reported on teachers’ perspectives of learners’ evolving identities and the transformation of their own roles and practices during the change period. In this paper, we add to those findings with the results of a recent inquiry into the perspectives of macro-level administrators who were instrumental in the collaborative effort to bring about change to the institution. In this latest study, we employed in-depth focus group and individual interviews to unpack what the change involved on the part of these decision makers in terms of their own epistemological and ontological perspectives, their roles in the institution and their future goals for the organization. The framework we have developed for schematizing the results of these previous inquiries and those of the overall longitudinal study could prove useful in other organizations that are awakening to the need to successfully put e-learning theory to practice in their institutions. The insight to be gained in this framework could add to their efforts to seek pragmatic ways to bring about systemic changes in their online programs and to graduate students with the kinds of identities and skills that will best equip them for the complex world in which they will work and live.

Keywords: Learner identity, Framework for institutional change, Contemporary e-Learning theory and 21st century goals, Higher education, Aligning design/pedagogy/technology in practice, Online learning

1. Introduction

Renowned author, psychiatrist and neuroscience researcher, Iain McGilchrist (2021), sources many of the current metaverse challenges we face in our world, *including those in education*, to a disturbing global dominance of left-brain thinking (McGilchrist, 2021, Hansen, 2016). His arguments are based on hemispheric theories. Although controversial at this point, we see merit in these theories to unpack the complexities and issues being faced in online learning programs in the HE institution in our study, as well as more broadly.

McGilchrist (2021) explains that in left hemisphere thinking, the attention is on tools, their parts and processes whilst guarding a detached view of these objects and uses. Right brain thinking reflects a sensitivity to living things, their organic nature and to considering them with flexibility as they constantly change, keeping the global far-reaching picture in focus. Left hemisphere thinking has a preoccupation with systems, generalizations, numbers, and categorization, and can provide only a static (re)presentation of the world, such as a map will do, giving basic information devoid of the complexities of reality. From this position, change is problematic, and no alternatives are seen but the status quo. In a scenario in which right brain thinking plays a lesser role, the intricacies of what is happening in the world or in a specific context, the ‘realities’ that are taking place all around us and their global consequences go unnoticed and discounted as unimportant. McGilchrist (2021) warns us, backed with substantial empirical research, that the results of this preponderance for left brain thinking can come with grave consequences. The same could be said to apply in education.

Although one might question the legitimacy of hemispheric theory, there are certainly parallels that could be drawn to the kinds of thinking reflected in educational discourse in the last three decades regarding the use of

technology. Historically, it can be said that scholars have shown an increased interest in digitalized learning to which the preponderance of current technology-related journals attests, not to mention the expanding numbers brought on by the hype in AI (Farrokhnia et al., 2023). Yet, much of this attention and effort has been confined to developing effective technological systems, certain procedures, the manipulation of the tools involved, access issues, levels of adoption and acceptance and their operations (Doo, Zhu and Bonk, 2023). The fuller picture of how these systems, particularly within HE institutions, actually impact individuals not only in the present but in their futures, has until recently only received moderate attention (Wright et al., 2023; Vlachopoulos and Makri, 2021). Indeed, research into the digitalization of HE (Jensen, 2020; García-Morales, Garrido-Moreno and Martin-Rojas, 2021) seems to have been primarily preoccupied with the material, its accessibility, assessment, development and the economic concerns and operations related issues, from a decontextualized position. In this scenario, close attention to context and persons involved in e-learning have been relatively unexamined - and not without consequences.

While not negating the usefulness and importance of earlier scholarship based in technology tools and process focused studies, they might lead one to agree with Reeves and Lin's (2020, p. 1991) observation that: "The research we have is not the research we need". More recently, an increased interest in the deeper repercussions of technology use on learners and learning in institutional contexts, is slowly emerging in educational scholarship. Indeed, the surge of literature that has been produced with the forced pivot to online learning during the COVID-19 pandemic certainly attests to this encouraging change in focus. Current reviews of this scholarship (Zhang et al., 2022; Doo, Zhu and Bonk, 2023) clearly indicate a broadening awareness of the challenges that exist in these online learning contexts for learners and their learning especially in HE institutions. At the same time, based on these reviews it appears that relatively few efforts are being made to investigate viable and sustainable solutions to meet those challenges.

Calls for proactive initiatives and interest in redirecting thinking about how technology is being used from a deeper and broader, long-term perspective to meet the challenges that exist in HE, apparently are not being heard. Given the global crisis that many view HE is in at this point post pandemic (Facer and Selwyn, 2021), and that the advent of AI is compounding, without the knowledge of how the use of technology in HE spaces is impacting individual learners, the situation can only worsen.

Of course, redirecting such a focus from systems and instead towards the human beings that occupy the spaces in these systems would involve a significant change of course in institutional thinking. Not an easy call as Gordon Jones, founding dean of the Boise University College of Innovation and Design (cited in Marcus, 2020) has pointed out: "Universities [HE institutions] may be at the cutting edge of research into almost every other field...but when it comes to reconsidering the structure of their own [institutions], they've been very risk averse." It's not surprising then that there is an obvious dearth of e-learning literature examining cross HE institutional changes in how technology-supported learning relates to learners, their identities, and their development. This gap is becoming alarmingly obvious especially given the debates about how HE institutions will face the imminent impact of AI on learners and learning (Farhi et al., 2023).

The institution in which our longitudinal study took place was prepared to reverse its thinking and preoccupation with systems and operations. They recognized from a broader perspective how the online programs they were offering were not meeting their policy goals for the kinds of profiles with which their individual students were graduating. There was a growing acknowledgement that the instructional designs of their programs, the pedagogical practices of their teachers and the use of technical resources in their programs supported industrial era workplace processes and mindsets in their students instead of promoting the identities, competences, and skills that they would need in their 21st century working lives.

The institution acknowledged as well that redirecting the established thinking at the time about how to run an online learning institution would require the collaborative work of individuals at all levels and implicate all programs. One of the co-authors of this report, a senior administrator in the institution, led the PAR project to enact large-scale changes in the institution. The key aim of the longitudinal PAR study was to facilitate a collaborative initiative to make broad changes across the institution, and in so doing, to understand how this sweeping initiative to align instructional designs, pedagogical approaches, and the use of technology with current e-learning theory and 21st century goals might impact learners and their learning both in the context of the institution and beyond.

The focus of our longitudinal study then was not just on learners but on all stakeholders in the institution at the macro, meso, and micro levels, in other words, top administrators, directors, heads of programs, academic support team members ($n=11$), educators ($n=82$), and most especially on learners ($n=2,300$; $n=14$). We were

aiming our focus on the experiences of these groups of stakeholders in the institution over the 3-year period during which the alignment of the change initiative was put in place in all online programs.

The following questions guided the longitudinal action research project:

1. In what ways do individuals at various levels of the institution perceive the changes being initiated across all online programs in the institution?
2. What implications did these changes have for their roles and perspectives of learning?
3. What was the impact of the changes made on the identities of these individuals?
4. How does the experience of the changes made and its sustained impact on learners' identities and learning in the short and long terms predict the nature of online programs in this institution in the future?

In the next sections, we outline the theory and literature that framed and supported all four smaller inquiries conducted during the change trajectory (Charbonneau-Gowdy and Galdames, 2021, 2022, 2023a; Charbonneau-Gowdy et al., 2023). We then provide details about the methodological framework - the participants, the context, the research design of the overarching longitudinal study, the data collection and analysis processes and ethical procedures.

2. Theory and Literature Underpinnings

As explained in the previous reports of the smaller studies conducted within the longitudinal PAR project (Charbonneau-Gowdy and Galdames, 2021, 2022, 2023a; Galdames and Charbonneau-Gowdy 2023b) the core of this change initiative in the institution lay in contemporary e-learning theories, especially those reflecting 21st century socio-cultural perspectives and goals. These perspectives and goals: a) place students and their agency at the centre of the learning process; b) are based on the understanding that learning is a complex interactive social phenomenon; c) engage students in community by collaborating in the co-construction of knowledge, based on their individual social context and experiences; and d) have important implications for students' competencies and identities in a dynamic, technology-driven society. The three components of the initiative we had launched at the institution involved: 1) the pedagogical practices of instructors and online students, 2) the instructional designs at the core of these practices and 3) technological tools used to support the programmes. These components were intended to reflect the principles and theoretical objectives listed above and as a way of possibly influencing students' learner identities and practices throughout their formative process in the institution.

2.1 E-Learning in Higher Education Institutions

Many scholars would agree that up until the pandemic years, a large part of the discourse that did exist in e-learning scholarship around context reflected both the resistance of many stakeholders in HE towards online learning and/or a belief in its ineffectiveness in supporting quality learning. A review of the literature of that period suggests three reasons behind this reservation. One reason can be explained by top-down, financially driven decision making that promoted e-learning for cost-cutting and/or income generating reasons. From this position, decision makers expected greater numbers of students, i.e. "clients" (Calma and Dickson-Deane, 2020), would consume information on LMS platform systems, would work autonomously at content-focused exercises, gain credits in regular assessments that checked levels of information acquisition and where those few who best adhered to this scenario of learning would be categorized as 'ideal', self-regulated learners. Indeed, many prestigious institutions in the western world, despite their democratizing ideals, were attracted to this mindset, investing in large scale MOOC's as a vehicle to promote 'learning'. And yet research even from pioneers of this modality clearly indicated that these utilitarian, so-called efficient systems of educating led to disappointing levels of attrition and questionable degrees of learning (Siemans, Gasevic, and Dawson, 2015).

A second reason for the resistance to online learning in the pre-pandemic era of HE was found to stem from faculty. Investigations of this resistance revealed that many educators saw the use of technology imposed by macro level decision-making, whether for blended or fully online learning, as a relinquishing of their roles as "experts" and as transmitters of key knowledge in their areas of expertise (Bakir, 2016; Singh and Hardaker, 2013). Loss of control of what is being learned and how learning takes place, not to mention the assessment of that learning were frightening for large numbers of faculty. Many of these same fears can be heard today in the conversations around the surge of AI into HE contexts (Thompson, Corrin and Lodge, 2023; Hodges and Ocak, 2023).

A third prime reason for resistance came from students themselves. It is not surprising that many of those resisting saw that, although not ideal, a talking 'expert' on a stage and the company of large numbers of fellow learners in physical classrooms being replaced by a requirement to work in isolation consuming information, and completing content-driven exercises with regular assessment checks, as poor value for the relatively high fees they were paying to be "educated" (Stevanović, Božić and Radovic, 2021; Usher et al., 2021; Charbonneau-Gowdy et al., 2023). In other words, from their view the return on their investment in so-called 'learning' online, yielded poor results.

Importantly, visible signs of resistance permeate many of the stories from the pandemic as well. In accounts of online experiences in the surge of literature documenting this historical period in educational history, scholars have reported many of the challenges that are embedded in this resistance – faculty unpreparedness, lack of engagement on the part of learners and questionable learning outcomes (see a review in Zhang et al., 2022). As pointed out above, despite the knowledge gained from these accounts regarding challenges to online learning, the question still remains on how to respond on a broader scale with solutions. The realization that the challenges our institution was facing in their regular online programs are common to many HE institutions during and post pandemic (García-Morales, 2021). The gap in knowledge in terms of finding viable solutions, was a key driver in our study.

Migocka-Patrzałek et al's (2021) study of the perceptions of students and teachers in a HE institution in Poland towards the move to distance learning offered some insight into the kinds of solutions that could inform our own study. Based on their analysis that indicated a general unfavourable response by students and teachers to the online learning modality, the authors provide valuable recommendations to respond to some of the major issues faced. These recommendations include: the role of teacher training in students' success and satisfaction; the importance of 'soft power' management in a step-by-step process in altering the outlook of resistance on the part of faculty; changes to assessment policies that emphasize positive learning outcomes in distance learning; the key to achieving high-quality programming for teacher training in distance learning practices to be ongoing; the need for an emphasis on community building and student engagement. Each of these recommendations are reflected in the steps we took to revamp the distance programs in the longitudinal project. At the same time, as recommendations they fall short of documenting and grounding the results of implementation which was an explicit goal in our longitudinal study.

2.2 Institutional Changes in e-Learning Practices

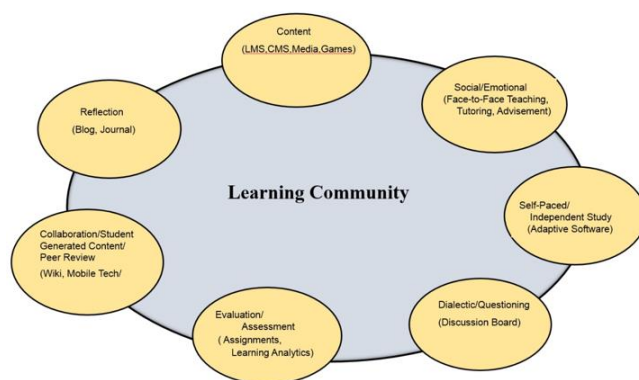
Sources of resistance to online learning in HE might be considered difficult to understand given the e-learning theories that have been produced over the last two decades to support quality practice online (García, 2019). As described in our earlier report (Galdames and Charbonneau-Gowdy, 2023b) based on these theories, *social interaction* is a backbone for the creation of intentional participation in a learning community. From this perspective, collective learning experiences and building community through collaborative or co-constructed learning processes is emphasized over individualism. These theories have a common vision which is to position students as the protagonists of their learning and as active participants involved in a mutual relationship with others supported by social media technology (Picciano, 2017). And yet despite the existence of these well-grounded theories and the principles they promote, which are proven to lead to effective learning in online contexts, scholarship accounts during the pandemic vividly highlight the fact that applying these theories into practice has not been happening.

Some scholars explain the reason for this slow uptake of theory to practice in the lack of clear examples of how to apply sound e-learning theory in "real" online teaching and learning contexts (Pange et al., 2011), especially on a broad institution-wide scale. On the other hand, scholarship in Instructional Design (ID) is indicating that IDs can be successful vehicles for ensuring conformity in the application of theory, models, and technology in practice (Margaryan, Bianco and Littlejohn, 2015; Adinda and Mohili, 2020). In the present study we were guided in developing an appropriate ID by employing both Margaryan's 10 principles of ID development (Table 1) as well as using Picciano's (2017, p.178) Multimodal Model for Online Education (Figure 1). We were confident that these principles and Picciano's model would provide a strong theoretical backbone to our ID and reflect the epistemological goals we were seeking to promote.

Table 1: Guiding principles of effective IDs (Margaryan, Bianco and Littlejohn., 2015)

Guiding Principle	Description
Problem-centred	Learners learn skills in the context of real-world problems
Activation	Learners activate their existing knowledge and skills for developing new skills
Demonstrated	Learners learn when exposed to 'real' examples of new skills to be learned rather than information.
Application	Learners have opportunities to apply their new skills to solve problems.
Integration	Learners have opportunities to reflect on, discuss and defend their new skills
Collective Knowledge	Learners contribute to collective knowledge
Collaboration	Learners collaborate with others to build knowledge
Differentiation	Learners have options according to their individual needs
Authentic Resources	Learners are put in real world situations
Feedback	Learners are given regular feedback

As illustrated in Table 1, Margaryan, Bianco and Littlejohn's (2015) principles reveal practical guidelines in developing effective IDs for online learning. In the context of the 3-year PAR Project, the principles are closely aligned with the pedagogical practices that were initiated in all programs across the institution.

**Figure 1: Multimodal Model for Online Learning (Picciano, 2017)**

Picciano's model (2017) was another important influence on our study in terms of goals we were seeking to promote. The model reflects and is supported by Moore's (1989) Interaction Theory (IT), Garrison, Bianco and Littlejohn's (2000) Online Learning Theory (CoL), Siemens' (2004) Connectivism Theory of Online Learning (CTOL) and Harasim's (2012) Online Collaborative Learning theory (OCL). It is composed of seven interconnected elements that foster the generation of learning experiences needed to deliver a quality online programme. The components are reflected in the pedagogy/design/technology aligned programmes that participants and all newcomers to the institution in our study faced when returning to formal learning after many years, and completely in an online space (Charbonneau-Gowdy and Galdames, 2022). The learning pathway of the online programmes guided by these components generated the types of activities that have been shown to facilitate students to appropriate new learning practices and to reconstruct their identities – a key concern of both researchers and stakeholders in the institution.

In an earlier study conducted by Charbonneau-Gowdy and Chavez (2019) in the context of online learning, a direct line was drawn between institutional change and identity. Analysis of extensive evidence of qualitative data collected at each of the macro, meso and micro levels in a private-for-profit HE institution in Chile revealed identities counterproductive to lasting change and quality online learning. This evidence uncovered a leadership characterized by top-down decision making that conflicted with quality learning outcomes; a program administration forced into a disadvantaged position of learn-as-we-go in terms of academic leadership; teaching faculty that were marginalized in decision-making processes and limited in their power to create quality conditions for learning in their online courses; and a context where learners' varying forms of capital were being ignored and instead they were being programmed to assume identities as "victims" and roles lacking in agency. The model the authors create (Figure 2) for HE institutions offering online learning draws attention to the fact that change involves reflective action on the part of players at all levels in the institution. And further, this multi-level reflection must acknowledge the consequences of any decision making for learners and learning. The authors ask: Will that decision making lead to the empowerment of learners and allow them to become behaviourally, emotionally, and cognitively (Fredrecks, Blumenfield and Paris, 2004) engaged? Will those decisions reflect the current primary goal of education to empower individuals to direct their own learning across multiple settings and throughout their lifetimes (Sharples, 2000)? Yet although these questions and the results of this earlier study guided and benefitted the change process in our PAR project, they fall short of

providing empirical evidence of the actual feasibility of such a large-scale initiative as the one in the context of our longitudinal study.

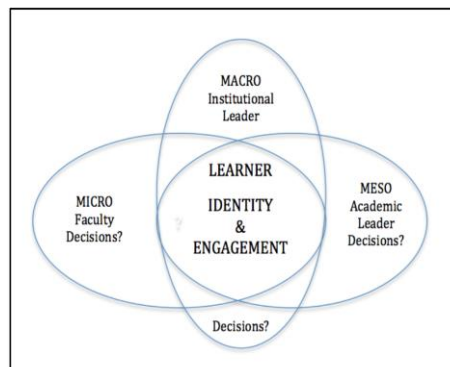


Figure 2: Key decision-making model in institutional change (Charbonneau-Gowdy and Chavez, 2019)

2.3 Identity and Investment as a Reflection of Quality Learning

As we pointed out in a previous report that formed part of the longitudinal study (Charbonneau-Gowdy and Galdames, 2022), learning from a socio-cultural perspective is receiving increased attention in the e-learning literature. Within this perspective, the academic sphere plays a fundamental role in the construction and reconstruction of people's identities. Norton (Darvin and Norton, 2015) defines identity as "how a person understands his or her relationship to the world, how that relationship is constructed across time and space, and how the person understands possibilities for the future" (p. 4). Seen from this perspective, identity is conceived as a site of struggle, structured by the power relations existing in social contexts, including educational systems. As Bourdieu (1998, p.43) points out "A large part of social suffering is due to the poverty of people's relationship with the educational system, which not only determines social destinies, but also the image they have of themselves and the image of their destiny".

Many scholars have shown that online education, based on a lack of human interaction and instead on machine-mediated content, has placed students as passive recipients of information and pushed them to work individually – a scene typical in the migration to the online modality in the wake of COVID-2019. This scenario, reflective of left-brain reasoning, limits the possibility for individuals to become more understanding of themselves and their learning experiences, prevents them from reconstructing their identities, and marginalizes them from accumulating social, cultural, and symbolic capital.

Norton has coined the term 'investment' (Darvin and Norton, 2015) to explain an opposite scenario in which learners are offered opportunities to exercise agency in their learning through interaction and knowledge construction with others. In these social interactions, which increasingly occur in digital spaces, an individual's strengths, experience, and knowledge are made available to others. In reaction to such favourable conditions for exercising agency, a learner's desire to invest in learning is ignited with a view to gaining a broader range of symbolic and material resources. In other words, in these ideal conditions, learners will choose to engage and invest in learning for the value they see in doing so for increasing their capital and social power and for the visions they have of their futures (Darvin and Norton, 2015, p.46).

Engel and Coll's (2021) model of learner identity (LI) also served to frame our inquiry (see Figure 3). This model explains the various components in learning contexts, including multimodal-based ones, that are involved in the act of identity mediation. The elements include: i) reasons for participating in learning activities and the learning goals pursued; ii) significant others participating in the learning experiences and their acts of recognition; iii) discursive resources present in the broader sociocultural context; iv) convergence or interference of other identities of a person; v) characteristics of the learning activities; and vi) emotions associated with the learning. Importantly, the model exposes the critical nature of social context and various material resources to our understanding of learner mediation of identity especially in online sites.

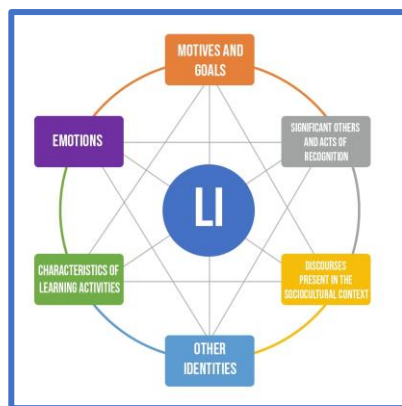


Figure 3: Key Elements in Mediating Learner Identity (Engell and Coll, 2021, p. 5)

Banks et al. (2007)'s work with marginalized communities and the principles they have developed further served to guide our efforts to connect learners with the kinds of quality learning and empowering identity changes that were mediated in online learning in the context of our study. Essentially, the four principles remind us that: 1) learning is situated in both socio-economic and historical contexts; 2) learning is not solely limited to formal contexts but occurs in everyday lives across the lifespan; 3) learners need multiple sources of support; and 4) learning is facilitated when learners are encouraged to build on their own resources and communities to expand their knowledge. Grounded in these principles, their work reveals encouraging evidence of what they call life-long, life-wide and life-deep learning. Important to our PAR study, these principles implicate all stakeholders in the educational process - policy makers, educators, families and learners themselves, as well as the use of technology as an essential ingredient in the learning practices and development of individuals. Yet, whereas the Banks et al. (2007) project involved young marginalized and racialized youth in North American context, students in our study, although they shared similar backgrounds, were full-time working adults in Chile, most learning online for the first time. Also, inherent in the decision to conduct a longitudinal study and to initiate the changes in terms of design, pedagogy, and the use of technology across the institution and in all programs, it was of particular interest to the institution involved to determine the sustained impact of these changes on individuals and their learning over the long term.

Framed by this literature and theory, we set about to redirect thinking about how to conduct online programs across the HE institution in our study. In doing so, we sought to offer an opportunity to those in the institution to redefine their roles, their identities, and their views of what constitutes effective online learning. At the same time positioning ourselves from a qualitative perspective, we were prepared for not knowing what the outcome of the initiative would be. Each context is unique; and there is no one-size-fits-all answer to challenges on any scale. Yet in the process of conducting our longitudinal study across a large online institution, we hoped to gather valuable insight into online learning and explore those hard-to-come by solutions to its effectiveness for learners and learning that have eluded many of us in education for quite some time.

3. Methodology

The longitudinal study spanned 3 years in which bi-monthly a new cohort of students entered the institution. As stated above, we chose to conduct a qualitative action research (PAR) project. Action research is well suited to investigate complex human activity and for uncovering participant voices (Creswell, 2007, Denizen and Lincoln, 2005). Typically, PAR is driven by a collaborative incentive to respond to challenges and effect changes in educational settings and organizations. Within PAR, the collaboration and participation of key players across the institution was possible and expected - in our view vital to the change initiative. We were also aware that using a qualitative research approach, i.e. a domination of right-brain-thinking, would provide us with the tools that could best uncover the type of complex human-centred, rather than process-centred information that was crucial to our understanding. We were seeking to uncover how shifting to a social-based ID in courses and programs which included learner-centred pedagogical approaches and the use of technologies to support community building, were impacting learners' identities and learning and indeed influencing stakeholders at all levels in the institution involved in the PAR process.

While the overall longitudinal project was conducted using a PAR approach we applied case study methodologies when collecting data at various intervals during the larger study – i) at the beginning with cohorts of students who were entering the institution (Charbonneau-Gowdy and Galdames, 2021); ii) then again with a group of

students who had been exposed to changes for 6 months (Charbonneau-Gowdy and Galdames, 2022) and iii) after 18 months in the program as these same students exited the institution (Galdames and Charbonneau-Gowdy, 2023b). In an additional case study, we collected evidence from faculty (Charbonneau-Gowdy and Galdames, 2023a), uncovering their perspectives of how the changes were impacting their roles and approaches as well the students in their courses. Methodological details and research designs for each of these individual case studies can be found in earlier reports as listed above. Findings from these studies as well as a more recent mini case study involving a small group of macro/meso/micro level administrators ($n=11$) are interwoven in the analysis and findings and summarized below.

3.1 Research Design

Table 2 illustrates the various overlapping phases of the longitudinal study and the tools used to collect the data in each phase. These research phases coincided with the 3-pronged program changes in ID, technology tools and pedagogical practices to which all in the institution in parallel were adopting and in which they were playing key roles. For teachers and administrators, and especially for a majority of learners, there was a significant adaptation process to the use of technology for learning as opposed to simply for personal use, to the newly established learning approach and to the expectations of their program design.

Essentially, the institutional changes included: a) adding regular synchronous videoconferencing sessions in all courses for building learning communities; b) providing increased opportunities and resources for student collaboration on both learning assignments/projects and assessment processes; c) using group project-generated media as course content ; d) incorporating forums, padlets, and career-designated community sites into courses for students to exchange ideas and opinions; and e) creating separate institution-wide faculty and student online community sites.

Table 2: Research Design – Longitudinal Study

Phases	Type of data collected	Description
Phase 1: Introducing change November 2020 to June 2021	Survey	Student’s experiences in online courses prior to changes in ID/approach/technology ($n=356$), faculty perceptions of students as changes are being rolled out ($n=57$) and student feedback after 3 months ($n=298$)
	Interviews	Series of student focus groups prior to change ($n=14$), at the initial stages of the roll-out ($n=11$) and after 3 months ($n=40$)
	Field notes	-Faculty online capacity meetings at outset of change ($n=60$), faculty perceptions of newly installed synchronous sessions ($n=49$), collaborative faculty capacity building sessions after 3 months ($n=43$), feedback from area directors ($n=3$), -Institutional documents: previous ID documents, student attendance records, mission statement, digital activity, newly developed ID documents
Phase 2: Setting 3-pronged changes in full motion March 2021- July 2022	Questionnaire	Student participants’ reflective journals ($n=54$)
	Interviews	12 hours of bi-weekly focus group ($n=6$), 17 hours individual ($n= 27$) interviews, 1.5 hours for a whole group ($n=12$) interview
	Observations	3 hours of videoconferencing of synchronous classroom sessions
	Field Notes	Institutional documents including enrolment figures, policy, attendance records, researcher’s reflective journal, digital activity of online forum sessions, student progress reports prepared by faculty
Phase 3: Analyzing and assessing sustained changes August 2022 to November 2023	Surveys	Teacher feedback on institutional changes ($n=73$) General student body feedback of pedagogical resources for 2022 ($n=726$) and 2023 ($n= 544$)
	Interviews	2 hours of a teacher focus group session ($n=9$), 6 hours of individual feedback sessions with original participants ($n=12$), focus group sessions with macro/meso/micro administration ($n=11$)
	Field Notes	Feedback observations ($n=75$) from a teacher strategy building workshop, reports of academic indicators of the institution, qualitative records of students’ academic progress
	Observations	Students’ digital activity (degrees of participation and collaborative work)

3.2 Context and Participants

The study was conducted in a HE technical institute in Chile. Chile is considered an economically stable country, one of only two members of the Organization for Economic Co-operation and Development (OECD) in South America. Yet, this stability has not been enough to appease the social inequality that has led to marked social unrest and protests comprised mainly of students seeking greater access to quality education. This drive for higher levels of education can explain why there has been a sustained growth in enrolment in the first year of undergraduate education in the country. Statistics indicate a 17.9% increase in 2022 compared to the previous year, and a 162.7% increase in the last five years.

Online education in the country has an entry profile mainly of working adult students, since this modality allows them to continue or resume their studies, especially because of the flexibility within this modality to reconcile their different roles (Chávez, 2017). The challenges posed by the social and educational demands in Chile are fully aligned with those outlined by UNESCO (2022, p.4), in the context of lifelong learning: "The abiding challenge for adult learning and education is to reach those who need it most". Reaching those who need it most is considered by UNESCO to be an indispensable factor to achieve equity and inclusion, to alleviate poverty and to build equitable, tolerant, sustainable, and knowledge-based societies. In order to respond to these challenges, HE institutions are required to take their online programmes along the path of continuous improvement to guarantee quality processes in accordance with the learning demanded by the 21st century.

The institute where the study was conducted is privately owned, founded in 1985. Since 2017 it offers all its programmes 100% online, one of the few HE institutes in Chile pre-pandemic to do so. Currently, the institution offers 19 technical careers organised in 5 areas: administration, education, industrial, health and social. Its mission includes not only the development of its students' professional disciplinary skills and competences, but also the promotion of their well-being, attitudes, and capacity to respond to the current dynamic demands of working and social life. As mentioned above, in general, learners are fully employed adults, mostly from socially, educationally, and economically disadvantaged backgrounds. Most are seeking to upgrade their skills or obtain a certification that will enable them to propel their career path in their field of work. The programmes received an average annual intake over the 3 years of the research period of 2,500 new students, composed of 58% women and 42% men. The average attrition rate before the longitudinal study began in 2020 was 44%.

Student participants

At the onset of the study, 14 individual students from an incoming cohort at the time agreed to participate in interviews at various stages of their programs - beginning, middle and end, over the length of their program. Of these original participants, 12 individuals ranging in ages from 20 to 60 years old, participated in the final interviews at the end of their programs - 11 females and 1 male. Their technical careers included: Early Childhood Education (3), Information Systems and Networks (1), Logistics Management (1), Human Resource Management (2), Pharmacy (3), Social Work (1). One of the original participants withdrew for health reasons although continued his studies and another left the institution.

Teaching faculty participants

Teachers in general in Chile are poorly paid and lack employment stability resulting in a recent concerning national drop in interest in the profession. The institution where the study took place employs on average 150-200 faculty members – 46%, permanent and 54% non-permanent, the latter contractual, many of whom must supplement their incomes by teaching elsewhere (Simbürger and Neary, 2016). Faculty participation ($n=82$) included attending collaborative capacity developing and awareness-raising sessions, various guided workshops, and meetings to promote the development of social learning-based teaching practices, focus group interviews and responding to feedback questionnaires.

Administrator participants

The most recent case study in the context of the PAR project involved institutional administrators ($n=11$). At the macro level this included: a) the Rector; b) the Vice Chancellor of Administration and Finance; and c) Vice-rector for Communication and Liaison with the Environment. Each of these individuals performs strategic management functions in their different areas to support training. The Academic Vice-Rector did not participate due to her role as co-researcher in the PAR project. Participants from the meso level included: a) Director of Virtual Education; b) Director of Teaching; c) Head of Administration (program area); and d) Head of Health (program area). Meso level participants are expected to provide teaching support and are responsible for the processes directly connected to the exercise of teaching. "Accompanying tutors", as they are called, who participated in

the more recent inquiry, administer at the micro level by socio-emotionally accompanying students and monitoring their academic progress.

3.3 Data Collection and Analysis

Data were analyzed using qualitative coding methods based on a combined inductive-deductive process (Miles et al., 2014). Through this rigorous process that is recognized for providing meaningful, credible, and practical results (Vaismoradi et al., 2016), we sought to ensure the reliability of the findings. After establishing a conceptual framework, the six steps suggested by Braun and Clarke (2006) were followed: i) familiarization with the data; ii) generation of initial codes; iii) search for themes; iv) review of the data for the verification of the themes; v) defining and choosing representative theme names; vi) preparation of a report in relation to the findings and responses to the research questions.

Descriptive statistics were employed to analyze the data tabulated from the three institutional-generated surveys conducted during the period of the larger study. This analysis provided an overall view of students' experiences online before, during and once the new ID approach had been fully implemented. These perceptions were uncovered from students' perspectives in their responses to the surveys and corroborated with observations and opinions from micro and meso level faculty.

Throughout the data collection and analysis process, adherence to rigorous ethical standards, including rules for privacy, anonymity, and maintaining the rights of participants set by the university to which the researchers are connected, were strictly maintained.

4. Analysis

Over the three years of the study, a large body of data from a variety of data sources (see Table 2) was collected. The ongoing analysis that we conducted over this period and reported on in our previous case studies (Charbonneau-Gowdy and Galdames, 2021, 2022, 2023a, Galdames and Charbonneau-Gowdy, 2023b), provided deep insights into changes that were being made and their implications on the short and long terms - a unique advantage of the cyclical nature of a PAR approach. In summing up the findings of these previous studies, we intertwine an analysis of evidence uncovered in our most recent inquiry into administrators' perspectives ($n=11$) of the changes in the institution. We consider this evidence inextricably tied to a deeper interpretation of the extent of changes being made at all levels and to its sustained impact.

In the 3-year period of the study and the 3-pronged redirection and aligning process in ID, pedagogy, and use of technology, much was required of everyone in the institution. This participation included: i) administrators who relinquished their grasp on status quo policies and processes, ii) teachers who were called to let go, in many cases, of long held ways of being and doing in their practice of teaching, iii) learners who after years outside the classroom and despite their busy "other lives" to open their minds to viewing learning and their roles in that process "through different eyes". Indeed, at each of these levels the stakeholders in the institution were called upon to re-examine their epistemological views, to question their long-held truths about learning and to see the process of learning in ways that meant more engaged participation and agentive actions. Indeed, as Ursula Franklin (2003, n.p.), the renowned scientist and prolific researcher points out: "In order to understand our worlds more deeply, in order to access new knowledge, we have to look at ordinary things differently, through different eyes".

Combining and analyzing the results of the three previous case studies in the PAR change process and the two mini-inquiries, one with faculty and the other with administrators uncovered new knowledge. From this position, two main interconnected themes surfaced from the longitudinal study: 1) Change - a combined and concerted effort; 2) Why identity matters.

Change - a combined and concerted effort

To introduce a new design model based on contemporary online theories and 21st century goals across all programs is not an easy decision for any HE institution to make, let alone for a Chilean one where the connection to conventional pedagogical approaches is still strong. Researchers were aware both through knowledge and experience that a well-constructed plan would implicate all levels of the institution. The combined active engagement of all three levels in the roll-out and its ongoing evaluation was considered crucial to the transition and the sustainability of the changes being introduced (Charbonneau-Gowdy and Chavez, 2019). This transition involved making changes to behaviours and attitudes at each of these levels with no expectations of what would follow.

At the *macro level*, for example, administrators put aside their top-down attitudes to leadership and instead assumed a team-building perspective to decision making. Regular team meetings were held throughout the PAR period that involved individuals at all levels – including students. In these ongoing meetings, the nature of the plan was discussed, feedback was heard and acted upon. Online community sites set up for multi-level collaborative discussions were a further indication of this upper-level change in attitude.

These new roles and actions did not come easily to administrators. One senior manager shared the challenges of this adjustment in the following testimony: “For us, as an institution, as managers from the macro level there were challenges and difficulties, because first we had to convince ourselves that this is useful, that it benefits us. And that is not easy. [Next] you have to convince the group of people who are going to deliver the education later, that this is the way. Then you have to convince those to whom our efforts are directed...convince them that this was what was missing for the institution to take a leap in quality in its training process” (Macro-level interview, Nov. 2023). His words reveal the hurdles that are implicated in making major changes and more importantly the requisite for all to be involved, which he acknowledges as essential to effective change management.

Besides the actual changes made to programs, the empowering advantages of joint meetings and sites proved significant to many in the institution, particularly to *students*. As one student poignantly remarked: “I appreciate this instance [opportunity to meet], to be able to chat and know each other, and know that you are concerned [sic], to improve all that; that’s important; it cheers you up, it is not like a platform where you login and that’s it, like nobody cares, that’s super important, it motivated you even more, so thank you for that as well.” (Charbonneau-Gowdy and Galdames, 2021). These words reveal an awareness on the part of the student of the importance of being heard and being seen by upper and middle management as a key agent in the change process, an awareness that is tied to feelings of motivation and belonging - important prerequisites for change.

Teachers too played a vital role in the roll-out of the PAR changes. Over the 3-year period it is important to point out that teachers received consistent and regular support and guidance. This considerable guided support to adopt new strategies and roles, as well as the fact that their voices and opinions were being heard and acted upon in such sessions, may account for the active engagement teachers demonstrated. As one teacher remarked: “I feel that the accompaniment allows me to work with active methodologies so that my students can create, carry out and put into practice what they have learned” (Charbonneau-Gowdy and Galdames, 2023a). From this excerpt we can recognize the collaborative nature of the change process. The support from macro and meso level administrators played a vital role in this teacher’s ability to put in place the new practices into her teaching, which she acknowledges has direct implications for the learning of her students. Her words are significant especially since for most faculty, the change being made to their teaching approaches was not insignificant. Yet, it is important to note that that over the period of the PAR, faculty’s active engagement online with students went from 69% in 2021 to 90% in 2023.

Why identity matters

In our analysis of the results of the studies conducted over the course of the longitudinal PAR inquiry, a second overarching theme permeates the data – the critical need for recognition of identity in this educational space online. From an in-depth review of the large body of data that emerged from the longitudinal study, this theme is consistently evident. From these combined studies, findings clearly indicate an acknowledgement in the institution that a) human beings are central to this educational context and to the directions it was deliberately taking and b) that the kinds of identities individuals mediate in online spaces is critical to their learning and to the corresponding development that the institution’s aims and goals promise. In other words, the conditions and kinds of activities and actions that existed in online spaces due to the three-pronged cross institutional initiative not only impacted the practices as well as cognitive and social development of individuals at all levels. Implicit in much of the evidence we uncovered was the fact that these same conditions also created a climate in which the kinds of identities that were being mediated mattered and were sustained.

Why does this identity mediation matter? The importance of identity and why it mattered in this change process is reflected in the co-researcher’s decision to initiate the PAR at the institution in the first place. From a marginalized socio-economic background herself, her commitment to those who arrive at the institution seeking possibilities to alter the course of their lives, was deeply personal. The confidence she has in her identity as a senior administrator due to the openings she has had in her own life, convinced her that identities are dynamic and that with the right conditions for learning, students could also find ways to build new trajectories in their lives.

Why identity matters is further reflected in the course of action of the *administrators*. Rejecting the status quo of their organization's operations and instead choosing to mediate new identities as leaders was key to their support of the 3-pronged deep changes being initiated. Evidence of their evolving identity meditation is reflected for example in the testimony of one macro level administrator: "Before [prior to the PAR] I had the vision that studying virtually was studying with the computer and it depended on you. That was [then]. Today we believe that our management should aim towards generating social learning in our students" (Macro-level Interview, Nov. 2023). In these words, the manager reveals the evolving epistemological perspectives of he and fellow senior managers. The words underline the transition he sees in himself and fellow managers from viewing learning as an activity best accomplished alone in front of a computer where knowledge acquisition is solely dependent on the individual learners themselves, to a recognition of the importance of social learning in co-constructing knowledge.

In another excerpt from the data sets, a senior manager shares her insight into the identity transformations that occurred in management over the period of the PAR: "The implementation of things like this is not done authoritatively, in my opinion, but rather they have to be done in some way trying to convince that this model could also serve in the transformation of the type of student that we intended to train" (Macro-level Interview, Nov. 2023). In her testimony this manager explains the change in mindset required for organizations to evolve in terms of offering quality learning. She shares her view of the value of adopting a human-centred perspective rather than a top-down stance in successful organizational change. Through this kind of awareness uncovered in our analysis, we see how the identities of administrators are being transformed in the context of the study from narrow-thinking, autocratic, stubbornly stuck in conventional ways of doing to ones of openness, willingness to look at learning online differently, to value the human element in these spaces and to consider the long-term implications of management's actions. Indeed, these transformations in identity on the part of management were essential to making possible the deep changes to the online learning programs.

Why identity matters is attested to as well in the trajectory of *teachers* during the PAR project. Through the extensive support that was provided by macro and meso level management, teachers were guided in promoting learner-centred, agentive, and social interactive practices in their students. Indeed, over the course of the PAR project, the ongoing support and guidance teachers received led to considerable development of their teaching practices that reflected theoretically grounded new strategies and roles - in other words putting theory to practice. The transformations are evidenced in i) increased focusing on learner-generated content, ii) promoting of group work where students would co-construct new knowledge in their fields and think critically, innovatively, and metacognitively and iii) exploiting interactive tools to engage their students in building enriched professional relationships. As one meso level administrator observed of teachers' online activity: "Most of the teachers generate active participation, open questions in the forum, providing feedback and generating new challenges" (Field notes, Charbonneau-Gowdy and Galdames, 2023a). The transformation in teachers' practices observed by this administrator is representative of a clear change in perspectives that we uncovered on the part of a majority of faculty regarding ways to promote effective online learning.

These changes in practices were accompanied by identity mediation on the part of many teachers: from hesitation and being wary in the face of major adjustments to their teaching approaches that they were being guided to make, to more confident and engaged identities as online learning guides and facilitators. These changes in identity reflected in the transformation of teachers' practices and roles really mattered especially to students. They explain in a large degree the positive advances that were documented in overall student development. This development is implicitly evidenced for example in the decrease in attrition over the period of the longitudinal study from 44% to less than 33%.

As suggested by these statistics, why identity matters can most importantly be explained by *learners* in the institution. In the three case studies focussing on learners, the data revealed that many arrived in the institution with identities that could be naturally expected given their early education and social backgrounds. They either labeled themselves as 'good students' whose life circumstances had denied them opportunities, or "poor students", an identity that was mediated in the less than favourable systems in their early years of schooling (Bourdieu, 1998). Many were returning to formal education in hopes of a second chance – determined but insecure, hesitant, with feelings of inadequacy, indeed fearful that the circumstances they met there would again prevent them from realizing their hopes. In other learning contexts, i.e. in other online institutions and circumstances, those fears may have been realized. If that were the case, burdened by these kinds of pre-set identities, faced with spending long hours alone in front of computers, digesting content, completing exercises, interacting solely with machines, and proving their knowledge through multiple choice tests, undoubtedly many

would abandon their hopes and withdraw (Siemans, 2015). Yet, because they arrived at the particular institution they did where the PAR was being conducted, the outcomes were different.

Initially, the differences in this learning context were surprising and difficult to confront for many incoming students. The new ways of practice that they encountered caused fear among most students. As one meso level administrator reported: “This transformation was challenging for ourselves and for the accompanying tutors who also had to understand why we are doing this and from there [was needed] the communication with the student and to explain to the student... because the student, I am not saying all, but the majority initially rejected it” (Meso-level interview, November 2023). In this excerpt from our more recent inquiry, we see evidence of resistance that permeated both meso and micro levels of the institution at the outset of the PAR study.

Yet, exposed to opportunities to use technology tools to interact with others, to build knowledge and community in groups, to assume agency, i.e. to take control of generating content, to take on leadership roles in group work, to be critical/and or controversial, and to be heard and have their expertise be respected through assignments and group projects, many students were set on a trajectory that was empowering to their identities as learners. And this evolving identity mediation mattered. Ines, one of the student participants shared her views of what was happening in this context: “I feel that it has given me like those kind of tools, to be like a leader in my studies and in my field of work” (Galdames and Charbonneau-Gowdy, 2023b). Ines points to the evidence we uncovered of the kinds of identities that many students like her were assuming – as confident and emerging knowledgeable leaders. The feelings of empowerment that accompanied these identities allowed them to persevere despite the challenges of their personal lives, to seek new opportunities for advancement in their professional lives and to imagine new identities for their futures – that of motivated lifelong learners and successful professionals. Table 3 provides an overview of such evidence collected in a previous case study. This evidence illustrates the deep transformations made by students (Galdames and Charbonneau-Gowdy, 2023b). We understand these transformations in their learning and identities not only as lifelong but also life-wide and life-deep (Valdes and Zhou, 2007).

Table 3: Changes to learners’ identities on leaving the institution (Galdames and Charbonneau-Gowdy, 2023b)

Observable Changes in Students' Learner Identities	Evidence from Teachers	Evidence from Students
Acting in ways that reflect more capable, confident and self-assured in themselves and in their learning	"I think that in each of the existing instances we are seeing a change, a mutation, a migration, at different levels of intensity... So, this empowerment can be seen in all the instances. From the structure of the responses in a forum, for example, in the collaborative work as well, where you see a consolidation and a maturity."	"Honestly, yes, I feel like I make a contribution... you kind of live in the moment through the comments... the instance where you're learning." "Today I really feel much more capable. When I started studying, I said, this is not going to be my thing. So, if I got this far and I have nothing left, I can continue studying". "Oh, look at the confidence, the security and showing young people that if they work hard, they can do it."
Improved participation and analysis in reflection forums	"It is very comforting to see how students broaden their analytical skills by acquiring new learning" (Teachers' questionnaires, January 2023).	"The truth is that when my peers respond, I feel very good... it's what I think from my point of view and that others see it as I see it, I think it's great".
Increased engagement with their learning in all learning experiences	"...and there one sees this maturity that is acquired in the different interventions, in the way of interacting. These are aspects that go beyond knowledge, empowerment."	"Well, I'm committed to studying, so my goal is to do well and be committed." "I want to continue studying... at that level of continuing to advance as a woman, as a mother, etc..".
Actions taken as researchers and agents of their learning	"Through the thematic forums students should reflect, give feedback to peers and generate collective learning, which is very important in this mode of study." "They have developed the capacity to learn quickly and to provide solutions to the problems that arise, I see that they are becoming more and more empowered in their territorial contexts."	"I feel amazing. I am at a stage where I want to study and I like it, I am learning things that I thought I would never learn. The truth is, I have changed... I am a mature woman who does her best to make things go well, I am focused on my future and on getting my degree." "So, there is also feedback from ourselves in that process and that is in the whole group. So, I think that's why we all got good marks."
Increased empathy with peers and signs of assuming leadership roles	"I have been able to see the development of skills such as leadership, problem solving, empathy, tolerance, goal-oriented teamwork, can be appreciated through the synchronous classes with their stories and also in the collaborative work"	"I have developed patience, why not say it too, and in a way empathy with others. I had a difficult time when my mother passed away. Then other colleagues too, others were parents, and we learned to be empathetic and to put ourselves in the other person's place." "I feel that it has given me like those kind of tools, to be like a leader in my studies and in my field of work." "I feel that I no longer have that fear, that fear of saying what I think, I feel calm and I encourage others, there is no need to be afraid of success."

Responses to the research questions

Interwoven in our analysis and the themes that emerged are responses to the research questions that framed the longitudinal study.

RQ1: *In what way do individuals at various levels of the institution perceive the changes being initiated in across all online programs in the institution?*

It was clear from our findings that at the outset of the change initiative and at all levels of the institution, there was a certain fear, various degrees of resistance and skepticism in view of the changes to programs and practices being discussed. Senior leaders were well aware of the challenges and difficulties they faced. They acknowledge that change involved the need to convince themselves, then those in operations, i.e. operational administrators, and teachers and importantly, students that the new direction was useful and beneficial. In expressing his reaction to such a challenge, one senior administrator remarked: "that [meeting these challenges] is not easy". At the same time, of those involved at the *meso* level who were responsible for operationalizing the changes while recognizing the clear necessity for all levels to be involved and engaged in the new direction, many initially were skeptical of whether it was feasible. As for teachers and students on the one hand they seemed to welcome the new openness of senior managers to include them in collaborating in the establishing of a new direction and to be heard. Yet, when it came to actually accepting what these changes involved, many expressed fear and insecurity about "why we are doing this".

RQ2: *What implications did these changes have for their roles and perspectives of learning?*

Along with new directions in online learning practices that were emerging, individuals at all levels foresaw that their roles would change dramatically as well. For teachers, for example, many expressed concerns that their long-held roles as content developers and information distributors, responsible for motivating students to absorb knowledge and provide prescriptive answers to questioning, were being challenged. According to our analysis, many realized that the new climate of learning would force them to abandon these roles and their visions of learning as an autonomous process where they themselves took little initiative to engage with students in virtual classes or online spaces. Instead, they were being called upon to redirect their perspectives of learning to a social interactive learner-centred process where their roles involved acting as active and engaged guides and facilitators.

Learners' roles and perspectives were also called upon to change in reaction to the new ways of learning that they were confronting in online spaces. Instead of passive recipients of information, data clearly suggested that many students took on roles as key agents in their learning development and keenly aware of the importance of social collaborative learning to their learning development and perspectives. Students spoke of assuming leadership roles among their peers, of co-constructing knowledge in group work and of the importance of adopting critical thinking and controversial stances in their learning spaces. And in terms of their perspectives of learning, many projected a long-term view, of the desire for further development and bore witness to the value they saw in lifelong learning.

RQ3: *What was the impact of the changes made on the identities of these individuals?*

These new roles reflected the emerging new identities of individuals that were being mediated at all levels. For senior managers and administrators, their new identities mirrored increased openness and willingness to listen, to evolve and learn, to respect and be active in community with others at the various other levels and to envision through critical and innovative dialogue a better future trajectory for the institution and each other. Evidence of teachers' involvement in terms of their identities emerged as well – as engaged guides and facilitators of active learning online and of the co-construction of knowledge among learners. Increasing numbers portrayed themselves as newly confident and collaborative in virtual spaces, and positive proponents of debate and critical thinking. Students' involvement in terms of their identities as learners were especially noteworthy. As summarized in Table 2 and also in the report in our earlier study (Charbonneau-Gowdy and Galdames, 2022) strong evidence of learners evolving identities from insecure, fearful, and marginalized in online spaces to 21st century learner identities - empowered, self-directed, team-player, strong communicator, critical thinking, innovative, collaborative, confident and invested not only in their present learning but in envisioning their future identities as well. Participants in this group of learners for example shared their aspirations for a future of lifelong learning and their imagined identities as successful ever-developing professionals.

RQ4: *How does the experience of the changes made and its sustained impact on learners' identities and learning in the short and long terms predict the nature of online programs in this institution in the future?*

It was evident from the data generated at the end of the 3-year period that the encouraging positive changes that emerged over the period of the study as a result of the institutional PAR project would have an impact on its further directions. Senior leaders and administrators expressed significant positive reaction to the overall effectiveness of the changes in their institution - the impressive learning results that were being recorded, the encouraging evolving profiles of graduating students and the overall engagement of individuals across the institution in community building, not to mention the decrease in attrition rates. These reactions opened up discussions of ways to continue to enhance the changes that had been made over the 3 years and that had now become part of institutional policy and to introduce other practices and tools as well, including AI, that could support continued development. This evidence not only speaks to the sustainability of the changes that were initiated in the context of the PAR project. They also predict the future positive trajectory the institution is envisioning to ensure growth and continued effectiveness in their online learning programs.

5. Discussion

The solid evidence from the combined mini case studies conducted in relation to the PAR longitudinal project provide insights into the power of multi-level institutional efforts for influencing human development. Picciano's (2017) well-grounded Multimodal Model provided the structure for the changes that were instigated online. Margaryan, Bianco and Littlejohn's work (2015) and its ten guiding principles (Table 1) for developing and using an effective ID, guided us in connecting the contemporary e-learning theory behind this model to the actual approaches and practices of teachers in their respective courses online. At the same time, the evidence that was unpacked from this large study and the widening of our gaze in the process of the PAR have led us to conclude that applying this theory and scholarship alone could have had disappointing results were it not for a) the collaboration of stakeholders across the institution and b) the importance that was placed on the identities of those involved.

Norton's (Darvin and Norton, 2015) concept of 'investment' to explain why learners when offered opportunities to exercise agency through interaction and knowledge construction with others, engage actively in the activity at hand, can be extrapolated to include not just learners but all members of a learning community. The efforts made in the context of the 3-year PAR project to build community in the institution (Garrison et al., 2000) were not just limited to promoting new contemporary teaching/learning approaches framed by 21st century goals and e-learning theories, supported by social learning-based technologies. Our findings indicate that the investment in sustained change that was evident throughout the institution was clearly also due to a combination of a) a concerted effort to build community through multi-level dialogue supported by powerful technology tools and b) to have individuals at all levels of the institution play an agentive role in the changes being initiated. Many recent accounts in scholarship from the period of the pandemic connect the absence of this kind of concerted effort and the agency of multiple levels of an organization to the disturbing challenges they experienced online as a result (Migocka-Patrzałek et al., 2021).

Engell and Coll's (2021) model (see Figure 3 above) have framed our understanding of the sometimes dramatic and impressive development we witnessed in the identities of incoming learners in the institution and as they progressed through their programs (Table 3). The model can also serve to explain the changes in identities we uncovered in individuals at other levels of the organization - for example, faculty as described above and the transforming of senior and middle management's roles and identities. This group's transformation process from identities as top-down decision makers to those of collaborators and cross-institutional team builders with an openness to trust and move in new epistemological directions, can be explained by several of the elements of the model.

Reflecting on these theories and the strong evidence generated in our longitudinal study has led to a framework for the effective institutional changes that were installed over the 3 years and an accompanying taxonomy.

Over the course of the longitudinal study and through the analysis of our findings, we have understood that the key to sustained change lies in the successful connection of theory to 'real' practice. Our framework (Figure 4) underlines the essential components of the theoretical changes made to our institutional online programs – that the changes in learning be identity-centred, that these changes be a multi-level collaborative process, that an effort to build community across the institution and program areas be a critical focus and that the theoretical basis of the ID of programs, the pedagogical perspectives reflective in teaching and learning practices and the use of technology be aligned with 21st century goals and contemporary e-learning practices.



Figure 4: Framework for the institutional change to effective online learning

The taxonomy in Table 4 outlines the essential, practical steps that were taken that connected this framework to practice and resulted in sustained change and quality online programs made over the course of the PAR project. These steps involved institutional policy documents and macro/meso/micro level stakeholders. Within each of these categories lie key considerations that together when followed have been shown in the study to guide the ongoing development in the effectiveness of online programs and deep changes to learners and their identities.

Table 4: Connecting theory to practice in institutional change

Documents	Macro Level Authorities	Meso Level Academic Administrators	Teachers	Students
Educational projects and regulatory frameworks explicitly declare their intention to prepare students to respond to the learning demands of the 21st century, to generate educational experiences that favor the construction and reconstruction of their identities, as well as the educational theories that support such learning.	Collaboration is presented as a fundamental axis of management. When designing, creating, thinking and/or updating regulatory frameworks or institutional processes and strategic decision-making, the whole educational community is actively involved through various instruments such as: i) questionnaires; ii) communications; iii) discussions; iv) awareness and training sessions; v) workshops. The results of these tools are reflected in the new changes or decisions adopted by the institution.	It is critical that the meso level shares in the establishing of new improvements, new ways of doing or proposals that will be implemented. They participate in its design and implementation through collaborative discussion about the project to be implemented, taking an active role with teachers and students in this execution. Suggested collaboration to include the following: i) awareness-raising activities and information; ii) discussion sessions; iii) joint implementation planning; iv) implementation monitoring activities; v) ongoing evaluations of the implementation; vi) the collection of feedback from key actors in the process; vii) adjusting the implementation, if required.	Practical realization of theory into practice requires planning and designing systematic and permanent teaching support. Support provided includes guidance on adopting a social learning model to practice and be clearly reflected in each virtual classroom session, not only through pedagogical resources used such as: i) reflective forums; ii) collaborative activities and projects; iii) synchronous classes, iv) collaborative evaluations, but also through the underlining intention of the interaction generated by teaching practice. Support allows for and guides an evolution in teaching roles and practices.	Experiences designed for students to develop this kind of learning and impact their identities have social interaction as their key axis along with an engaged teacher presence and the co-construction of learning. The pedagogical and evaluative resources of virtual classrooms facilitate this intentional interaction with the teacher and their peers, where acts of recognition, sharing experiences and points of view, and dialogue are permanently present. Promoting an opportunity to generate an online community, for example in discussions with institutional authorities, with academic administrators and among peers, is important.

This visual theory-based representation and its practice-based tool highlight the important elements in the process initiated in the institution. In our minds, they can serve two purposes. Firstly, they are an invitation to others who dare to make broad changes to e-learning practices in their own institutions to look more deeply at their contexts ‘with different eyes’. Secondly, they offer further support to the critical role that awareness of identity and its dynamic development play in changes to any educational context, including online ones.

6. Conclusion

While the combined results of this study including the framework and the taxonomy guide might offer potential insight for promoting dialogue, we also cannot negate its context-specific nature nor that the findings are drawn from relatively early stages of the change movement in the institution – i.e. in the first 3 years. Still, we are strongly convinced that the theories and goals that were collaboratively put into practice and that supported the development of a multi-level learning community within the institution resulted in some impressive findings both in terms of learning and identity mediation. This mediation was evident not just on the part of many learners, but individuals at other levels of the institution as well – leaders, administrators, and teachers. In our view, the implications of these findings send a clear message to e-learning researchers that we know relatively little about how our technology-supported contexts impact human beings in these virtual spaces. We believe strongly that more research in this area with an eye to the future is vitally important especially as we advance so quickly head long into the use of AI. For governments, policy makers and institutional decision makers the results of this study are a confirmation that changes that can have broad development effect on society *are possible* through online learning programs. The caveat is that the development that is promised and sought in these programs, especially for those who need it most, will only come from a concerted effort to attend to human beings in these contexts as opposed to simply the tools and systems.

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Public Discussions about ChatGPT in Malaysian Education During its Initial Launch: A Qualitative Content Analysis of Newspaper Articles

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Abstract: The launch of ChatGPT in late 2022 offers a glimpse into the capability of generative artificial intelligence (AI) chatbots, as well as a future that is both exciting and filled with uncertainty about how powerful chatbots might become. ChatGPT, which has been trained on a huge dataset, can engage in a conversation with its users and respond to their questions. The launch of ChatGPT was followed by newspaper articles speculating on the transformations and impacts that ChatGPT would have on various facets of life, especially education. To gain a better understanding of what people have discussed about ChatGPT in Malaysian education during ChatGPT's initial launch, this study first searched three mainstream national Malaysian English newspapers using the search terms "ChatGPT" and "education" to identify 16 relevant newspaper articles, which were then analysed using a qualitative content analysis. The analysis revealed that the discussions regarding ChatGPT in Malaysian education in these newspaper articles could be categorised into five level-one categories: academic ethics, AI competence, ChatGPT adoption, learning design, and soft skills, which were further divided into 15 level-two subcategories. The findings of this study have various practical implications that may help academics and educational institutions better prepare for the expected increase in chatbot use by students and academics. The findings also make several theoretical contributions and provide a point of departure for future research.

Keywords: Artificial intelligence, ChatGPT, Chatbot, Education, Education policy, Qualitative content analysis

1. Introduction

The launch of ChatGPT by OpenAI in late 2022 has sparked considerable interest in the generative artificial intelligence (AI) chatbot's capabilities and the challenges it may pose to the education sector (Crawford, Cowling and Allen, 2023; Kohnke, Moorhouse and Zou, 2023). ChatGPT is trained on large language models and can respond to questions in a conversational style through a simple user interface. Users have come up with creative ways to ask the chatbot to write things like lyrics, letters, and computer codes, which raises serious concerns about the authenticity and ethics of the work it produces. These concerns are especially relevant to learning assessment in education because students may seek the help of chatbots to complete their assessment tasks, making it difficult for assessors to determine whether the work is written by students or chatbots (Benuyenah, 2023; Geerling et al., 2023).

During ChatGPT's initial launch, as the use of ChatGPT was still in its early stages, people had different views about chatbots. Some consider chatbots a positive development and support their use, while others perceive them negatively and oppose their use (Benuyenah, 2023; Hasanein and Sobaih, 2023). Before academics and educational institutions could better understand its applications and implications for teaching and learning, a US school district in New York (Fahr, 2023), some Hong Kong universities (Mok, 2023), and a French university (The Star, 2023a), banned the use of the chatbot in assessments due to concerns about plagiarism. Others, such as several Japanese institutions (The Star, 2023b), restricted its use, while others, such as some Australian universities (Starcevic, 2023), redesigned their assessment practices.

ChatGPT's initial launch received significant worldwide media coverage; Malaysian newspapers were no exception and had reported on it since its launch, not only in their news section but also in other sections such as education, technology, and editorial. During ChatGPT's initial launch, differing perspectives emerged about its potential impact and future development. However, despite the many discussions surrounding ChatGPT in newspapers, these discussions remain scattered across different newspaper articles, making it unclear whether these discussions can be further synthesised and categorised to better reflect various aspects of ChatGPT in Malaysian education and what these aspects actually represent and mean. This study therefore attempts to answer the question of "what have people been discussing" about ChatGPT in Malaysian education in newspaper

articles published in the first few months following its launch. To collect qualitative data, this study searched newspapers for relevant articles, using a qualitative exploratory research design. It then employed a qualitative data analysis method (i.e., qualitative content analysis), following an inductive approach, to create categories based on the concepts found in the data.

Since its launch, various studies have examined the opportunities, benefits, threats, challenges, and implications that ChatGPT or chatbots pose to teaching and learning. For example, some of these studies analysed ChatGPT's responses to teaching and learning questions (Athilingam and He, 2024; Michel-Villarreal et al., 2023), field diaries (Humble et al., 2023), journal articles (Lo, 2023), and Twitter tweets (Adeshola and Adepoju, 2023). Nevertheless, Skavronskaya, Hadinejad and Cotterell (2023) recommend that more studies be undertaken to better understand the implications of chatbots on education so that academics may stay relevant and adapt their learning design and delivery. Ciampa, Wolfe and Bronstein (2023) also contend that a deeper understanding of the issues surrounding the use of chatbots in education will lead to better measures to mitigate the issues. This study aims to contribute to the historical narrative of ChatGPT by examining what people have discussed about it in newspaper articles since its initial launch.

The remainder of this paper provides a background to the research, explains the research design and method, presents the data analysis and results, discusses the study findings and their practical implications and theoretical contributions, and concludes with a discussion of the research limitations and future research directions.

2. Literature Review

2.1 ChatGPT and Generative AI Chatbots

Generative AI chatbots, driven by large language models, can carry out natural language processing tasks such as language translation, software development, text writing, and so on, by first receiving a question from users and then generating a response accordingly (Sanders, 2023). Some of these chatbots can even understand a question not only in text but also in the form of a picture or audio, making interactions with them feel very human-like, as if a real person were responding to the users' questions and inputs. Besides individual users, businesses in various industries have also deployed specialised chatbots to improve productivity, e.g., healthcare (Fox, 2023), fast-moving consumer products (Johnston, 2023), and banking (The Straits Times, 2023).

Launched on 30 November 2022, ChatGPT is a generative AI chatbot developed by OpenAI, a company that specialises in AI solutions. It is built on the GPT-3.5 model and is free to use. Unlike a traditional search engine, which returns pages of web links, the chatbot returns a specific, summarised text response to the user's questions. Particularly, the chatbot is capable of understanding questions in context and learning from its own responses. Besides using text, users can also use speech recognition and text-to-speech functions to converse with the chatbot. The chatbot can communicate in many languages, although the quality and accuracy of responses may vary (OpenAI, 2022).

ChatGPT quickly gained international fame and surpassed 100 million active users within the first two months of its launch (Diaz, 2023). Although ChatGPT users may find the chatbot useful in many ways, such as planning a trip, writing an essay, or coding a software application, the GPT-3.5 model has several known limitations. Because the model is not connected live to the internet and it was trained on a huge dataset up to 2021, ChatGPT would technically have no responses to questions requiring information after that date (OpenAI, 2022). Furthermore, OpenAI (2022) cautions that ChatGPT responses are not always accurate and may be biased in some cases.

OpenAI launched ChatGPT Plus on 1 February 2023, charging users a monthly subscription price of USD 20 for faster response and improved access (OpenAI, 2023a). ChatGPT Plus customers were given access to a newer model, the GPT-4, on 14 March 2023 (OpenAI, 2023b). The GPT-4 model performs better in advanced reasoning, can handle more complex questions, and can search the web for current information to provide more up-to-date responses (OpenAI, n.d.).

Since the launch of ChatGPT, there have been other chatbots available on the market, e.g., Microsoft Copilot (formerly Bing Chat), Google Bard, and so on. These rival chatbots, which are free to use, also claim to be able to search the web for current information and are capable of citing sources of information (Google, n.d.; Microsoft, n.d.).

2.2 Generative AI Chatbots in Education

Generative AI chatbots are a potentially disruptive technology that can lead to a paradigm shift in transforming conventional teaching and learning (Adiguzel, Kaya and Cansu, 2023; Gill et al., 2024; Tlili et al., 2023). Past studies have explored their use and impact in various educational disciplines, e.g., programming education (Humble et al., 2023), tourism education (Skavronskaya, Hadinejad and Cotterell, 2023), engineering education (Sánchez-Ruiz et al., 2023), and nursing education (Athilingam and He, 2024).

Chatbots can play the role of a teaching assistant, a personal tutor, an assessment partner, and a co-researcher (Ansari, Ahmad and Bhutta, 2023). Kasneci et al. (2023) explain that chatbots can help students learn in various ways, such as developing reading, writing, research skills, and critical thinking and problem-solving skills. Dwivedi et al. (2023) deem that, in addition to obtaining feedback on their work, students can use chatbots to gain foundational information that can be used to develop higher-order thinking skills. Rahman and Watanobe (2023) suggest that chatbots can function as tutors who are constantly available to answer questions and provide feedback to students at any time and location. Chatbots can also assist academics in their teaching, e.g., designing learning activities and exercises, developing lesson plans, generating questions and quizzes (Kasneci et al., 2023; Rahman and Watanobe, 2023; Su and Yang, 2023), and providing research support (Hasanein and Sobaih, 2023; Lo, 2023; Strzelecki, 2023).

However, despite these benefits, chatbots also bring challenges. It has been suggested that chatbots present some challenges, e.g., academic integrity (Adeshola and Adepoju, 2023; Benuyenah, 2023; Lo, 2023; Skavronskaya, Hadinejad and Cotterell, 2023), quality of the responses (Humble et al., 2023; Lo, 2023; Sánchez-Ruiz et al., 2023; Tlili et al., 2023), a decline in critical thinking skills due to over-reliance (Hasanein and Sobaih, 2023; Putra et al., 2023; Sánchez-Ruiz et al., 2023), a decrease in lecturer-student engagement (Hasanein and Sobaih, 2023; Sánchez-Ruiz et al., 2023), and equity in accessibility (Sánchez-Ruiz et al., 2023; Tlili et al., 2023).

The use of chatbots in assessment frequently comes under the spotlight as it raises concerns about plagiarism and cheating (Skavronskaya, Hadinejad and Cotterell, 2023). Student misuse of chatbots might result in plagiarism, and it is difficult for assessors to discern work generated by chatbots (Dwivedi et al., 2023). Another concern is that over-reliance on chatbots may reduce students' desire to learn to write and impede their cognitive development (Dwivedi et al., 2023). Students may lose their critical thinking skills if they accept the responses provided by chatbots without understanding or analysing the information before making decisions or suggesting solutions (Adeshola and Adepoju, 2023; Humble et al., 2023; Putra et al., 2023). Kasneci et al. (2023) also warn that relying too much on chatbots can lead to students not putting in their own effort to problem-solve, which can hinder the development of creativity, critical thinking, and problem-solving skills in students. Thus, academics should use chatbots to augment rather than replace learning delivery.

There have been suggestions to mitigate the challenges posed by chatbots. Students and academics should develop digital competence in using chatbots before adopting chatbots for teaching and learning (Adeshola and Adepoju, 2023; Ciampa, Wolfe and Bronstein, 2023). Academics need to understand the benefits and downsides of chatbots, as well as how to provide students with the knowledge and skills required to use chatbots as a learning tool (Kohnke, Moorhouse and Zou, 2023; Tlili et al., 2023). To maintain academic integrity, educational institutions should have guidelines, codes of conduct, or policies to guide students and academics in using chatbots responsibly and ethically (Adeshola and Adepoju, 2023; Ansari, Ahmad and Bhutta, 2023; Hasanein and Sobaih, 2023; Maheshwari, 2023).

In addition, academics should design assessment tasks that encourage students to use chatbots as a learning tool instead of relying on them to generate answers (Hasanein and Sobaih, 2023; Sánchez-Ruiz et al., 2023). Academics should also create learning environments that provide learning experiences that chatbots cannot replace (Geerling et al., 2023), e.g., encourage students to apply concepts to foster critical thinking rather than simply reiterating information (Abramson, 2023). In addition, academics can use detection tools like Turnitin (www.turnitin.com), GPTZero (gptzero.me), and Checker AI (www.aicheatcheck.com) to detect any irregularities for plagiarism.

Furthermore, in response to technological advances in chatbots, new teaching strategies and pedagogies are required (Benuyenah, 2023; Skavronskaya, Hadinejad and Cotterell, 2023; Tlili et al., 2023). Academics and educational institutions should evaluate course learning objectives (Abramson, 2023) before integrating chatbots into the curriculum, teaching methods, and learning activities to ensure that students achieve the intended learning outcomes (Adeshola and Adepoju, 2023; Sánchez-Ruiz et al., 2023).

Because chatbots do not possess reflective thinking and emotions (Tili et al., 2023), they are unable to provide an equivalent level of human-to-human interaction (Ansari, Ahmad and Bhutta, 2023). Hence, Ansari, Ahmad and Bhutta (2023) contend that chatbots do not replace human academics but rather play a supporting role in teaching, learning, and research.

3. Research Design and Method

As ChatGPT was officially launched on 30 November 2022, this study searched three mainstream national English newspapers in Malaysia (in terms of readership) (adQrate, n.d.) for articles that contained both search terms "education" and "ChatGPT" that were published between that date and 30 April 2023 (i.e., the cutoff date before a qualitative content analysis could begin at the beginning of May 2023). A Google search found a total of 411 newspaper articles. A cloud-based web scraping software was then used to retrieve the contents of the articles from the newspaper websites. These newspaper articles were then filtered to remove any articles that were not specific to ChatGPT in education in the first round and those that were not specific to the Malaysian context in the second round. Table 1 provides a summary of the search and filter results. A total of 16 newspaper articles were retained for the subsequent qualitative content analysis.

Table 1: Summary of the article search and filter results

	New Straits Times	The Sun	The Star	Total
Initial newspaper articles	58	26	327	411
After 1st filter round (not specific to ChatGPT in education)	10	4	37	51
After 2nd filter round (not specific to the Malaysian context)	4	3	9	16

This study conducted a qualitative content analysis to examine the article texts to identify the topics of discussion by categories and subcategories (Mayring, 2014; Schreier, 2012). This study employed the eight-step process proposed by Schreier (2012) to conduct the analysis: (1) decide on the research question; (2) select the material; (3) build a coding frame; (4) segment coding units; (5) conduct trial coding; (6) evaluate the coding frame; (7) conduct the main analysis; and (8) present findings.

Qualitative content analysis is a qualitative data analysis method that works well for descriptive research questions. It can be used with qualitative materials that are written, spoken, or observed, like transcripts, newspaper articles, advertisements, and so on. The method reduces large volumes of qualitative data systematically by employing a coding frame. Qualitative content analysis is a good fit for this study as it aims to answer the question: "what have people been discussing" about ChatGPT in Malaysian education (Schreier, 2012).

Following an inductive approach and based on the 16 newspaper articles, the study created a two-level coding frame that included five level-one categories and 15 level-two subcategories. The level-one categories represent the primary dimensions, and the level-two subcategories represent the subdimensions. The coding frame was built to meet four methodological requirements: unidimensionality, mutual exclusiveness, exhaustiveness, and saturation (Schreier, 2012). Figure 1 depicts the coding frame for this study.

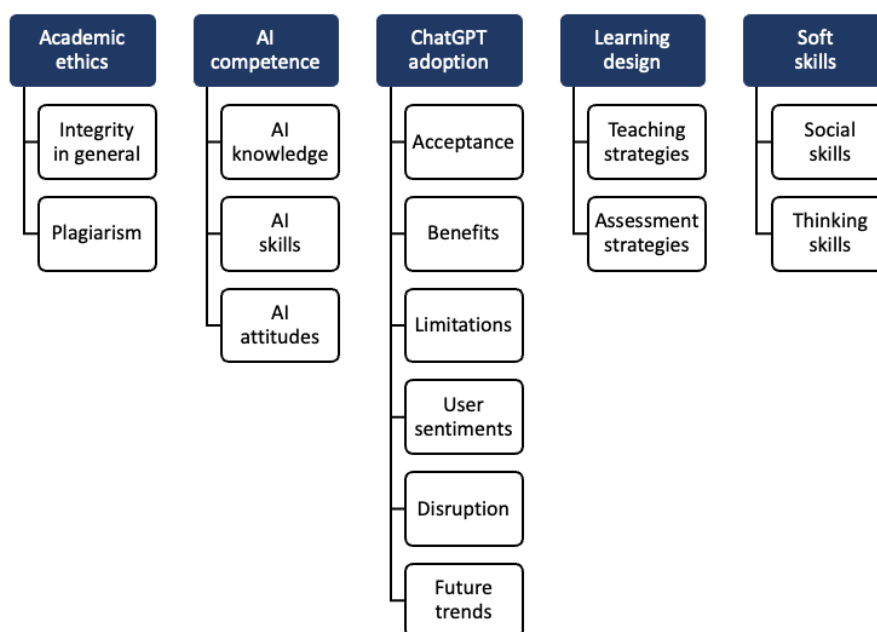


Figure 1: Coding frame

The individual newspaper articles were the units of analysis in this study, and the texts that were relevant to ChatGPT in Malaysian education were segmented into coding units. The coding units could be a partial sentence, a complete sentence, or multiple sentences. There were a total of 209 coding units. The same coder then pilot-tested the coding frame in two rounds, with a two-week gap in between, as suggested by Schreier (2012). There were no modifications to the categories or subcategories between the two rounds. With a percentage agreement of 82.4% (i.e., the number of coding units on which the coder agreed divided by the total number of coded units), intra-coder stability was satisfactory. Each coding unit was then coded into one or more subcategories in the main analysis. A coding unit, however, could not be coded to more than one subcategory within the same category. To maintain coding consistency, the coding was done by a single coder with a two-week gap in between. In total, 209 coding units were coded 244 times in the main analysis, with one coding unit being coded an average of 1.2 times.

4. Data Analysis and Results

Table 2 shows the frequency and percentage of the coding units that have been coded into subcategories. The top five subcategories in order of frequency are: benefits (19.3%), plagiarism (13.9%), acceptance (8.6%), thinking skills (7.4%), and user sentiments (6.6%). The bottom five subcategories are: assessment strategies (4.9%), AI skills (3.3%), future trends (2.9%), AI attitudes (2%), and social skills (2%).

Table 2: Frequency and percentage of coding units coded into a subcategory

Subcategory	Frequency	Percentage (%)
Benefits	47	19.3%
Plagiarism	34	13.9%
Acceptance	21	8.6%
Thinking skills	18	7.4%
User sentiments	16	6.6%
Disruption	15	6.1%
AI knowledge	15	6.1%
Limitations	14	5.7%
Integrity in general	14	5.7%
Teaching strategies	13	5.3%
Assessment strategies	12	4.9%

Subcategory	Frequency	Percentage (%)
AI skills	8	3.3%
Future trends	7	2.9%
AI attitudes	5	2.0%
Social skills	5	2.0%
Total	244	100.0%

Table 3 shows the frequency and percentage of the coding units that have been coded into a subcategory within and across categories. Within the ChatGPT adoption category, the discussion about benefits led other topics by a large percentage (39.2%). AI knowledge (53.6%), plagiarism (70.8%), and thinking skills (78.3%) were the leading topics in the AI competence, academic ethics, and soft skills categories, respectively. There appeared to be a rather equal discussion of teaching strategies (52%) and assessment strategies (48%) in the learning design category. Across categories, the ChatGPT adoption category garnered the most discussion (49.2%), followed by academic ethics (19.7%), AI competence (11.5%), learning design (10.2%), and soft skills (9.4%).

Table 3: Frequency and percentage within and across categories

Category	Subcategory	Frequency	Within category percentage (%)	Across category percentage (%)
Academic ethics	Plagiarism	34	70.8%	
	Integrity in general	14	29.2%	
	<i>Subtotal</i>	48	100.0%	19.7%
AI competence	AI knowledge	15	53.6%	
	AI skills	8	28.6%	
	AI attitudes	5	17.9%	
	<i>Subtotal</i>	28	100.0%	11.5%
ChatGPT adoption	Benefits	47	39.2%	
	Acceptance	21	17.5%	
	User sentiments	16	13.3%	
	Disruption	15	12.5%	
	Limitations	14	11.7%	
	Future trends	7	5.8%	
	<i>Subtotal</i>	120	100.0%	49.2%
Learning design	Teaching strategies	13	52.0%	
	Assessment strategies	12	48.0%	
	<i>Subtotal</i>	25	100.0%	10.2%
Soft skills	Thinking skills	18	78.3%	
	Social skills	5	21.7%	
	<i>Subtotal</i>	23	100.0%	9.4%

5. Discussion

The category with the most subcategories is ChatGPT adoption. ChatGPT adoption was the most often discussed topic, accounting for over half of the total discussion. The launch of ChatGPT has sparked a great deal of interest in the chatbot. As a result, it is not surprising that there was a lot of discussion concerning its adoption for education in terms of benefits, acceptance, user sentiments, disruption, limitations, and future trends. The benefits of ChatGPT were the most frequently discussed topic in this category. People appeared eager to explore how they could benefit from using the chatbot, e.g., receiving feedback on their work or finding solutions to their problems (Ibrahim and Lee, 2023; Mohamed and Razawi, 2023). Furthermore, people also anticipated that it will become more powerful at a faster rate in the future (Ponnudurai, 2023; Rahman, 2023a). Although people

recognised the limitations of ChatGPT, such as issues related to information accuracy or feedback quality (Goh, 2023; Mohamed and Razawi, 2023), and how it may change learning delivery (Ponnudurai, 2023; Wing, 2023) or replace humans in future jobs (Rahman, 2023b; Yeoh, 2023), it appears that people were generally supportive of embracing and adopting the chatbot (Lim, 2023; Wing, 2023). This finding is comparable to Adeshola and Adepoju's (2023) sentiment analysis of Twitter tweets, which revealed that about half of the tweets were positive about ChatGPT, while about one-fifth were negative and about one-fourth remained neutral, and Sánchez-Ruiz et al.'s (2023) study of students in an engineering course found that a large percentage of the students were already using ChatGPT in their learning.

Academic ethics was the second most often discussed topic, accounting for over one-fifth of the total discussion. Plagiarism issues were the most frequently discussed topic in this category. People were concerned about how students may use ChatGPT to complete their assignments while maintaining academic integrity in general (Muthiah and Carvalho, 2023; Yeoh, 2023) and avoiding plagiarism because it can be difficult to distinguish whether an assignment is the student's own work or produced by the chatbot (Muthiah, 2023; Yeoh, 2023). People also discussed the use of anti-plagiarism software to detect plagiarism. These findings are similar to the concerns that have also been reported in past studies (e.g., Dwivedi et al., 2023; Kasneci et al., 2023; Skavronskaya, Hadinejad and Cotterell, 2023).

AI competence was the third most often discussed topic, accounting for slightly more than one-tenth of the total discussion. The discussion centered around a need to help students use ChatGPT ethically and responsibly by establishing some guidelines, principles, or skills (Muthiah and Carvalho, 2023; Yeoh, 2023). This discussion was highly similar to the concept of digital competence as defined by the European Commission in terms of knowledge, skills, and attitudes (European Commission, 2019). The need for AI knowledge was the most frequently discussed topic in this category. These findings support the suggestions made by Adeshola and Adepoju (2023), Ciampa, Wolfe and Bronstein (2023), and Tlili et al. (2023) to develop competence, which includes understanding chatbot capabilities and constraints, using chatbots ethically, and critically evaluating information for accuracy and trustworthiness.

Learning design was the fourth most often discussed topic, accounting for around one-tenth of the total discussion. The discussion was fairly even between teaching and assessment strategies. People discussed the need to adapt teaching strategies, such as teaching methods, pedagogies, the role of academics, and so on (Kuan, 2023; Rahman, 2023b), as well as assessment strategies, such as using authentic assessment or revising assessment criteria, to keep up with the developments in ChatGPT and how the chatbot may be better integrated into learning delivery (Kuan, 2023; Ponnudurai, 2023). These findings are consistent with the conclusions made in past studies that academics and educational institutions should adapt teaching and assessment strategies to coexist with chatbots or mitigate their impacts (e.g., Benuyeh, 2023; Kohnke, Moorhouse and Zou, 2023; Su and Yang, 2023; Tlili et al., 2023), such as redesigning assessment tasks to use authentic assessment (Ansari, Ahmad and Bhutta, 2023; Ciampa, Wolfe and Bronstein, 2023; Skavronskaya, Hadinejad and Cotterell, 2023), formative assessment (Farrokhnia et al., 2023), open-ended assessment (Ciampa, Wolfe and Bronstein, 2023), or reasoning-based assessment (Skavronskaya, Hadinejad and Cotterell, 2023).

Soft skills were the fifth most often discussed topic, accounting for just under one-tenth of the total discussion. The discussion of soft skills can be divided into two categories: social skills and thinking skills. Thinking skills were the most frequently discussed topic in this category. People discussed the idea that using ChatGPT does not help students develop personality traits such as empathy, attitudes, emotions, or interpersonal skills (Ngo, 2023; Raman, 2023). However, the discussion appeared to differ on whether the chatbot supports or hinders students from developing critical thinking, problem-solving, or creativity skills (Muthiah and Carvalho, 2023; Zaideen, 2023). This finding concurs with those of Dwivedi et al. (2023) and Kasneci et al. (2023) that over-reliance on ChatGPT may impede students from learning these crucial soft skills. While Ciampa, Wolfe and Bronstein (2023) and Putra et al. (2023) emphasise that the use of chatbots should not replace critical thinking, Hasanein and Sobaih (2023) and Maheshwari (2023) highlight the importance of learning activities and assessment that foster critical thinking, problem-solving, and creativity.

Overall, based on the top five most often discussed topics, people appeared keen to discuss how they could benefit from using ChatGPT, although it was a relatively new technology. Others, on the other hand, were concerned about the effects of the chatbot, particularly plagiarism issues. It is worth noting that people were open to using ChatGPT as a tool. They were aware, however, that while the chatbot is beneficial for specific tasks, it is limited in terms of enhancing cognitive skills such as creative thinking, problem-solving, and so on. People also had mixed feelings about the chatbot. While some people expressed positive sentiments (e.g., fun,

impressive, exciting), others indicated negative sentiments (e.g., nervous, scary, anxiety). These findings are congruent with those of Benuyenah (2023) and Hasanein and Sobaih (2023), who found that depending on their views of chatbots, some people support their use and others oppose them.

5.1 Practical Implications

The findings have three practical implications for academics and educational institutions as the functions and features of generative AI chatbots evolve and become more widely available. First, to better leverage chatbots as a new educational tool, it is essential to begin experimenting with practical applications of chatbots in learning delivery in order to learn from trial and error and propose frameworks and approaches for using chatbots to achieve the intended learning objectives (Guo and Lee, 2023; Tlili et al., 2023). Second, it is plausible that there will be an increase in the use of chatbots in education in the future (Rahman et al., 2023). Thus, it is crucial to provide adequate training for students and academics to enhance their AI competence in preparation for the anticipated wider use of AI in the future, e.g., incorporating such training through curriculum or continuous learning workshops (Kortemeyer, 2023; Nikolic et al., 2023). Third, to avoid situations in which students misuse chatbots in assessment, whether intentionally or unintentionally, assessment tasks must be designed to evaluate students on their higher-order thinking skills as well as, if applicable, soft skills (Gorichanaz, 2023; Yeadon et al., 2023). Furthermore, developing and communicating clear academic integrity principles and policies to students and academics will help promote the responsible and ethical use of chatbots in education (Chaudhry et al., 2023; Lancaster, 2023).

5.2 Theoretical Contributions

This study makes two theoretical contributions. First, this study synthesises and categorises the discussions in newspaper articles about ChatGPT in Malaysian education during its initial launch to specifically identify the key aspects of these discussions, laying the groundwork for further conceptual development of research models. Future research on chatbots may conceptualise variables based on the categories and subcategories identified in this study to develop a research model. Second, this study offers an example of applying qualitative content analysis to newspaper articles, providing a reference for researchers interested in this method for addressing descriptive research questions.

6. Conclusions

In conclusion, this study has answered the question "what have people discussed" about ChatGPT in Malaysian education following the first few months of its launch by identifying the categories and subcategories (along with frequency and percentage) of the most discussed topics in newspaper articles. The findings capture various aspects of the discussions, which further contribute to the historical narrative of ChatGPT's evolution as people attempted to better understand the technology during its initial launch. In addition, as reflected generally by these aspects, the findings help academics and educational institutions gain a better understanding of people's views, attitudes, and concerns regarding the use of generative AI chatbots in education. As Tlili et al. (2023) and Athilingam and He (2024) have pointed out, restricting the use of chatbots will not solve the issues they present. A better understanding of chatbots and the issues will help academics and educational institutions determine the best approach to adopting the technology.

6.1 Research Limitations

This study has three limitations. First, the search was limited to newspaper articles that were published after the official launch of ChatGPT until 30 April 2023. The study does not reflect people's current perceptions and attitudes towards ChatGPT as they develop a better understanding of ChatGPT over time or when AI technology continues to evolve in terms of functionality and performance. Second, the analysis was only specific to newspaper articles written in the Malaysian context and published in three mainstream national English newspapers in Malaysia. People in other countries may have different perceptions and attitudes towards ChatGPT or chatbots. In addition, newspaper articles are not the only source of information about people's perceptions and attitudes. Third, the search was limited to ChatGPT and excluded other chatbots, such as Microsoft Copilot (formerly Bing Chat) and Google Bard, that became publicly available after the launch of ChatGPT.

6.2 Future Research Directions

There are two future research directions to examine people's perspectives on chatbots. First, when students and academics gain more knowledge and experience using ChatGPT or other similar chatbots, their perceptions of chatbots may shift. Future research may conduct surveys or experiments to investigate whether people's

perceptions, attitudes, or even behaviours have changed. Second, people's perceptions and attitudes towards technology may vary due to cultural differences, educational systems, and so on. Future research may conduct a cross-case analysis (Miles and Huberman, 1994) for a more in-depth examination of people's perceptions and attitudes towards chatbots in different countries to identify whether there are similarities and differences, as well as the factors causing such similarities and differences.

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Design Principles for a Higher Education Course Focusing on Lifelong Learning

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Abstract: Lifelong learning for solving work assignments is essential for societal and personal development. Higher education is one natural part of lifelong learning and, therefore, needs to be re-focused from solely younger students to include professionals and their development goals. One problem related to giving a course for professionals is their struggle between work assignments and the course. Focusing on the added perspective of professionals for higher education, this study presents five design principles for courses for professionals. Design principles are guidelines based on experience and iterative development in higher education. The empirical data comes from a course in digitalisation and digital transformation, which was given thrice. The course participants were professionals from private and public organisations in Sweden. The empirical data originates from the professionals who made a check-in, mid-term evaluation, and evaluation after the course, resulting in 75 entries. Two researchers analysed the first two course entries inductively, forming the foundation for the first round of design principles. The course design for the third round was then revised according to its weaknesses. Based on the strengths and weaknesses found in empirical material from all three courses, the current design principles are *professional pathways* referring to new knowledge directly linked to real-world applications, *knowledge evolution*, meaning gradual integration of knowledge using seminars and examination assignments, *preparedness protocol* focusing on updated information and structured templates for the seminars. Further, the design principle of *collaborative connection* includes discussion where professionals exchange experiences, and the last principle, *learning fusion*, directs toward blended learning by combining face-to-face seminars and films. The revised course design, according to the design principles, implied that the number of professionals graduating and their grades increased. The findings of this study add theoretically to existing knowledge and practical implications by providing design principles that higher education teachers and other stakeholders can use to design or revise professional development courses. The design principles could be used stand-alone or combined to increase professionals' learning and satisfaction.

Keywords: Design principles, Lifelong learning, Higher education, Digital transformation

1. Introduction

In our emerging contemporary knowledge society, lifelong learning is an essential and continuous process involving the human work life. Higher education is an essential part of lifelong learning and broadening its perspective. This requires higher education to rethink pedagogy and didactics for a course design tailored for full-time working adults (Mozelius, 2022). As highlighted by Kennedy (2016), lifelong learning is essential and can, at the same time, improve the existing learning and teaching practices. Moreover, lifelong learning strongly contributes to the current knowledge society.

Furthermore, lifelong learning is a fundamental building block in the ongoing digitalisation of society in areas such as healthcare (Konttila et al., 2019) and technology-enhanced education (Mozelius and Humble, 2020). Previous studies have pointed out that work-integrated upskilling and reskilling should accommodate learners' personal and work lives with a course design different from the traditional (Daugherty and Custer, 2012; Mozelius and Humble, 2020). Knowles, Holton and Swanson (2014) emphasised that the more experienced adult learners participating in professional development often have unique and different educational needs than Bachelor's or Master's students. One example is that adult learning often needs to be more self-directed, life-related, contextual, and have intrinsic and personal values to satisfy the adult learner (Knowles, Holton and Swanson, 2014). Therefore, the design principles for a course for adult professionals should differ from those for bachelor's, master's, or PhD students. However, lifelong learning in the digital era is far from a mature

concept. As Håkansson Lindqvist, Mozelius and Jaldemark (2024) pointed out, there is a complex need to transform higher education to meet the contemporary needs for lifelong learning. What also acts like a catalyst for this transition of lifelong learning is the emerging field of generative AI, which opens opportunities and, at the same time, requires further changes (Chiu, 2024; Rawas, 2024; Yusuf, Pervin and Román-González, 2024). The rationale for this study is the need for a better understanding of which design principles (DPs) can improve the implementation of lifelong learning in a digital era.

This study used the design science research method to design, develop, and evaluate DPs. The DPs were based on data from a higher education course for full-time working professionals aiming to develop their digitalisation and digital transformation skills. To be accepted for the course, participants must have at least two years of work experience in digital transformation. This study aims to analyse, present, and discuss DPs for a professional development course in higher education focusing on digitalisation, digital transformation, and data-driven organisations. The research question that guided this study was:

What design principles could lecturers and course developers follow to design a higher education course for professionals that facilitates lifelong learning?

The paper's structure includes an introduction to DPs, a description of lifelong learning, the study's context, a method description, the creation of design principles, results and discussion, and a conclusion.

2. Design Principles

Gregor, Chandra Kruse and Seidel (2020) view DPs as prescriptive knowledge and emphasise the goal of a DP to reach the user's aim in a specific context and provide the rationales behind the mechanisms. The results from the DP are socio-technical artefacts, such as design patterns for information systems and analysis patterns for business schemas or technical norms. Gebka, Crusoe and Ahlin (2021) specify design principles as including objectives, activities, and deliverables for a co-creation method; in their context, information needs for citizens in various situations. In higher education, the goal of DP can be to synthesise knowledge and express it as guidelines (Kali, Levin-Peled and Dori, 2009). In the form of guidelines, the DP is viewed as experience from previous knowledge that is generalised and replicable. The DP is found inductively from successful activities and revised over time.

There are several example sets of DP related to higher education. One set of guidelines includes flexible and modularisation, personalisation, collaborative learning, real-world application, continuous assessment and feedback, and technology integration (Molenda, 2003; Allen, 2016). These guidelines can be found in design approaches, described on various detailing levels. Examples of the guidelines are ADDIE (Analysis, Design, Development, Implementation, Evaluation) and SAM (Successive Approximation Model). Karlgren, Paavola and Ligorio (2020) add the perspective of lifelong learning in higher education and emphasise the following set of DPs:

- Organising activities around shared 'objects', such as prototypes, practices, or processes
- supporting the integration of personal and collective agency and work through developing shared objects
- emphasising development and creativity in working on shared objects through transformations and reflection
- fostering long-term processes of knowledge advancement with shared objects (artefacts and practices)
- promoting cross-fertilisation of various knowledge practices and artefacts across communities and institutions
- providing flexible tools for developing artefacts and practices

van den Berg (2019) created DPs for HE courses focusing on digital innovation skills. Those DPs aim to ensure collaboration, create a learning environment that encourages adaptability and flexibility by encouraging experimentation, implement a formal process of reflection, enable the development of ethical awareness, implement integrated, authentic assessments, and apply project-based learning to combine inquiry with accountability. The primary aim for this set of DPs is collaboration, which is viewed as the primary influencer for success when it comes to innovation.

3. Lifelong Learning

The role of lifelong learning in higher education has been frequently debated during the last decades. In contemporary knowledge society, most parts of the world are in high demand for reskilling and professional development. This challenge requires continuous lifelong learning, and traditional university programmes must be redesigned to support this continuous lifelong learning. This includes a higher education pedagogy and course design considering lifelong learning students may have different educational needs and expectations than the typical student (Humble and Mozelius, 2021). For example, study groups could support professionals as students by exchanging information, discussing issues, and relating learning to their professional practice (Mozelius and Humble, 2020). As highlighted by Lang (2023), this is a reformation that higher education must address in a reform that must involve inclusion and support equitable and flexible quality education (Atchoarena, 2021). An improved Internet infrastructure with technology-enhanced learning has enabled new forms of lifelong learning involving online conferencing tools for a richer and more flexible study design (Williams, 2020). However, as described in Mozelius (2022), online conferencing requires a pedagogy and instructional redesign to support lifelong learning. This should preferably be built on a pedagogical model that considers the needs of professionals, such as experiential learning and work integration (Haddara and Skanes, 2007).

4. Research Context

The target course for this study is "Digitalisation and Digital Transformation in Organisations", which is part of a professional development project aimed at developing and offering flexible advanced-level courses for professionals. The courses within this project are offered as distance learning and run part-time to enable studies in combination with full-time work. The course for this study contains four modules and runs over 15 weeks, resulting in five ECTS credits, where one ECTS credit equals 28 hours of work. Each week includes a three-hour seminar. The target group for the actual course is professionals who want to develop their skills in digitalisation, digital transformation, data-driven organisations, and change management. The course participants work in public or private organisations and occupy roles such as project leader, manager, business developer, and IT strategist. With their different backgrounds and experiences with digitalisation, their course expectations vary, resulting in challenges to course design and learning activities. The actual course combines both synchronous and asynchronous learning activities, or either of them, with seminars once a week. The course includes four occasions for the participants to give written feedback during and after the course: a check-in before the course starts, a mid-term evaluation, an internal course evaluation, and a formal university-level evaluation.

The course has been offered three times, and the overall impression is that the participants are satisfied. During the course, course participants drop off as the course proceeds due to personal and work concerns. The drop-offs are primarily at the beginning of the course. Only a few course participants graduated during the first two courses and got the credits. From an academic point of view, this is problematic since the pass rate is one of academia's ways to count learning and a quality measure in the higher education system in Sweden. In addition, the allocation of funds partly depends on the number of graduating course participants. One revision requirement has, therefore, been to increase the number of professionals graduating.

5. Method

This study's method followed the five-step design science process outlined by Johannesson and Perjons (2014). This process includes the following five-step, which preferably should be conducted iteratively: 1) explicate the problem, 2) define the requirements, 3) design and develop the artefact, 4) demonstrate the artefact, and 5) evaluate the artefact (Johannesson and Perjons, 2014). In a more general sense, design science is a research approach that contributes by designing and implementing artefacts that address identified problems (Hevner et al., 2010; Johannesson and Perjons, 2014). Given the practical orientation of the artefact, the contribution to knowledge can be either more limited and specific (e.g., one instantiation) or more abstract (e.g., design theories) (Gregor and Hevner, 2013). Design principles belong to the latter and are considered prescriptive knowledge. A design principle aims to capture knowledge about creating other artefacts belonging to the same class, (Sein et al., 2011). It moves the knowledge contribution from the specific case to the generalisation. Design principles should be evaluated based on their reusability and utility in environment (Iivari, Rotvit Perlt Hansen and Haj-Bolouri, 2021).

5.1 Creation of Design Principles

Creating the design principles included an interactive process involving data analysis and design revisions related to the course, focusing on the various steps in DSR. The initial step in this creation process was based on the

data collection and analyses from the first *two courses*. The data collection then included 58 entries consisting of professional check-in presentations (n=19), internal mid-term course evaluations (n=11), internal course evaluations after course completion (n=10), formal university-level evaluations after course completion (n=7) and examination assignments (n=11). Not all 19 participants completed all tasks due to not finalising the first or second course. The empirical material was saved and analysed in Nvivo. The empirical material was inductively analysed following the main steps of thematic analysis (Braun & Clark, 2006). The initial coding was kept close to the data, identifying 70 codes reflecting course design issues, learning activities, course information, and instructions. Through a step-by-step analysis, patterns emerged, and the initial codes were clustered into seventeen more abstract sub-themes relating to the strengths and weaknesses of the course. Two researchers conducted the initial coding individually to decrease the risk of a biased analysis. The following steps were a joint coding procedure to reach a consensus. This part of the analysis included several discussions with the other researchers.

The course design was evaluated and revised according to the strengths and weaknesses based on the empirical material from the first two courses. The strengths related to discussions between the professionals to find contextual solutions, interesting guest lectures, and practical assignments. The weaknesses related to, e.g., the lack of updated course information, the mixed structure of the seminars between the modules, the professionals' difficulties in reading, understanding, and contextualising the articles, and few graduating professionals (Brodén et al., 2023). The strengths and weaknesses were discussed among the authors and agreed upon as revisions for the third course. Some revisions included the lecturers, such as using the same structure in the seminars and other course administration, such as updated formal course information.

The last round of analysis included the answers from the third course, including all 17 additional entries. The entries were as follows: check-in presentation (n=10), internal mid-term evaluation (n=5), internal course evaluation after completion (n=1), and formal university-level evaluations after course completion (n=2) and examination assignment (n=6). The entries were included in the previous analysis material from the two first courses, following the same pattern with strengths and weaknesses. Two authors independently conducted this analysis and then discussed the strengths and weaknesses. The number of strengths was then slightly increased, and the number of weaknesses decreased. The material from the third course followed the same pattern in content.

Two authors then formulated the five design principles based on their previous work with the empirical material in the first two courses, the additional material from the third course, and their teaching experiences. The 17 themes aligned with the different principles, forming their justification.

5.2 Ethical Considerations

The course participants were all informed about the study and willingly consented to using their materials. The study has received ethical approval from an advisor at Karlstad University (HS 2023/690). In line with the principles of pedagogical action research, the issues of dual roles inherent in the roles of teachers and researchers were addressed. As Nolen and Putten (2007) described, this challenge emphasises the complexities of role definition, ambiguity, and conflict when researchers are active members of the system under investigation. To mitigate these dual roles, the two researchers not affiliated with the course have discussed the findings and contributed to the article's writing.

6. Result and Discussion

Here, the results, including discussion, are presented, following this study's aim to provide the reader with DP for a higher education course for professionals to facilitate lifelong learning.

6.1 Design Principles

The artefacts designed here are DP in the form of guidelines (Kali, Levin-Peled and Dori, 2009). They emphasise that DP should be iterative in their development, formed by generalisable and replicable experiences from previous knowledge. Therefore, we present the experience behind parts of the DP and follow the discussion of Kali, Levin-Peled and Dori (2009) on how to form the DP on successful activities, revised over time. As presented in the method section, the revision has been ongoing in all courses, from the first to the third. The formation of DP is based on the participants' check-ins and course evaluation. The DP is presented on a general level in Table 1 and further explicated individually.

Table 1: Design Principles

Principle	Name	Objective
1	Professional Pathways	The new knowledge is directly linked to real-world applications.
2	Knowledge Evolution	Gradual integration of knowledge over time using the examination assignment and seminars.
3	Preparedness Protocol	Weekly sessions focusing on preparation and working with emerging concepts.
4	Collaborative Connections	Group discussions where professionals exchange experiences, ideas, and perspectives on emerging concepts.
5	Learning Fusion	Blended learning combines face-to-face seminars, films, and articles.

6.2 Professional Pathways

Objective: The new knowledge of digitalisation is directly linked to real-world applications. The professionals link the new knowledge to their context.

Professional Pathways aims to integrate new knowledge of digitalisation directly into real-world applications, emphasising the relevance of learning experiences to professionals' contexts.

As Kember, Ho and Hong (2008) highlighted, the significance of relevance in higher education resonates with professionals' expressed anticipation of acquiring new tools and insights into digitalisation. This anticipation and the relevance of new knowledge form the cornerstone of the Professional Pathways design principle.

Implementation of this principle spans various aspects of the course, including the check-in process, guest seminars, integrated exercises within examination assignments, and contextualisation of articles within both the course framework and professionals' contexts. An essential aspect of lifelong learning is the concept of Bring Your Own Device (BYOD), which, in the context of this course, could be reinterpreted as Bring Your Own Data (BYOD). Mozelius, Olofsson and Håkansson Lindqvist (2022) emphasise incorporating authentic, real-world problems and data from companies and organisations into course activities. This approach aligns with the pedagogical principles of self-determination and contextualised learning, offering opportunities for skill development and organisational enhancement.

Integrating workplace data enriches learning experiences and contributes to organisational development and the acquisition of practical skills relevant to the workplace. However, it is essential to balance academic theory and the practical application of knowledge in solving real-world problems, as mentioned by Mozelius, Olofsson and Håkansson Lindqvist (2022).

In summary, Professional Pathways endeavours to bridge the gap between theoretical knowledge and practical application, fostering meaningful learning experiences that resonate with professionals' real-world contexts and contribute to individual skill development and organisational advancement.

6.3 Knowledge Evolution

The objective of knowledge evolution is gradually integrating knowledge over time using seminars and examination assignments, in this case, the learning diary. The professionals expect the evolution of knowledge to inspire and contribute to their curiosity, as one respondent described it as "it [the course] started my thinking activity and contributed to my curiosity."

The goal for the professionals for this DP is to develop themselves regarding knowledge, competence, and personal development, focusing on their lifelong learning (Jaldemark, 2020). The division of lifelong learning into these three categories follows the patterns of Blaschke (2019), adding to the professional and personal aspects of lifelong learning. As such, the course must be relevant to the bigger societal picture and add to the personal learning goals.

One way to look upon personal development is that professionals should feel more confident in their work role; where one professional emphasised it: "It [the course] has given me stronger faith that I will succeed in my role as responsible for digital services" and another: "I have learned so incredibly much, never could have guessed that this could leave such a mark partly about digitalisation but also about leading in change and daring to question whether all change is good or valuable."

There are several ways to design for knowledge goals. Here, the authors have decided to keep teacher-led seminars within each module. The seminars are recorded, and the professionals can revisit new knowledge or

concepts from seminars to decrease the burden of keeping up with work and the course, as emphasised e.g. by Atchoarena (2021). Further, based on the first evaluation, the seminars should follow the same structure, including presentations, discussions, and work on the examination assignment. The presentation forms the base for the following discussion, where the professionals can discuss their professional practice and learn from each other (Mozelius and Humble, 2020). On an overall level, one could describe that as informal study groups.

One particular part of the knowledge evolution is the examination assignment. Often, the professionals do not need the credits, like younger students. Professionals are more interested in the evolution of their knowledge. Therefore, one-course revision was to use seminar time, focusing on the literature and supporting the writing of the examination assignment. The examination assignment should be inspirational and based on the seminars, discussions, and the professionals' work context, confirmed by one of the course professionals: "Appreciate the submission task design as it was inspiring to write the submission". Therefore, learning to write the examination assignment in detail is attractive, increasing the number of submissions. The results show an increasing number of professionals graduating, from 50% to 60 % in the third course. One participant emphasises the focus on the examination assignment: "The only thing I think I did wrong from the beginning is how I set up my learning diary, and that is because I want a document with models and reflections that I take with me as my toolbox, that is, after the course. That is how I started writing. It is not until now that I realised that it does not fit with what we want; it is not the same document I perceived from the beginning".

In summary, knowledge evolution is formed by scientific knowledge contributing to further knowledge for professionals as individuals and their organisations. The course content should consider the current domain knowledge that interests the participants and encourage them to increase it.

6.4 Preparedness Protocol

Objective: The information about the course and the course follows the same pattern, such as weekly sessions simultaneously. That will give the participants time to focus on preparation and working with emerging concepts.

The professionals describe it as hard to combine work and studies and often miss parts of the course due to work assignments. Therefore, to mark their calendars and prepare themselves, the course information on external channels, such as the universities' website, needs to be updated and correct, emphasised like this by one professional: "I would have made even more time in my calendar if I knew that there were so many individual assignments". Besides describing the dates and content of the course, the information should describe the expectations on the professionals. The interested professionals thereby get a better picture of their required effort. It is also in favour of having a long time between the acceptance and the course start to avoid clashes in their work calendar.

Parts of the course design differ from other higher education courses (Haddara and Skanes, 2007). One difference is that the seminars are held in one particular afternoon and digitally. The professionals can adjust their schedules accordingly and be at work during the seminars. Another design decision is that the course is divided into modules, where the professionals can adjust their schedules depending on their interests and favoured knowledge. The modules should have clarity and similarities, e.g., clear module instructions in the virtual learning environment and the same structure in the seminars, phrased by one professional: "All instructions have been clear, so that makes it easier." The exact structure could include presenting film clips beforehand and preparing discussion questions. In the actual seminar, the teacher can give a presentation followed by group discussions related to the articles, film, and presentation.

The virtual learning environment (VLE) is often new to professionals and could even be a phenomenon that did not exist when they were students. It is, therefore, essential to make a walk-through at one of the first seminars to make their studies more efficient. As expressed by one professional: "Once canvas [the VLE] 'landed' with me, it is a good tool that makes it easy to get a good overview". To make the studies flexible, all course material should be accessible from the course start, and the articles should be available, either as uploaded documents or links for open-access articles. It is also preferable that the recordings related to the articles are prepared beforehand.

In summary, the preparedness protocol should guide the administration and teachers in updating public information immediately. The course should be structured to ease the burden of working and studying simultaneously.

6.5 Collaborative Connections

Objective: Group discussions where professionals exchange experiences, ideas, and perspectives on emerging concepts.

Collaborative Connections fosters group discussions among professionals, facilitating the exchange of experiences, ideas, and perspectives on emerging concepts. The teacher sets and articulates expectations for professionals to learn from one another, recognising that high expectations can positively impact motivation (Rubie-Davies, 2006). Professionals joining the course hail from diverse work contexts, enriching discussions with varied perspectives and insights. The check-in highlighted the value of "exchanging experiences between different roles, industries, or sectors," reflecting professionals' interest in learning from peers. Group discussions, inquiries, reflections, and pre-reading seminar articles provide platforms for dialogue and mutual sharing.

Collaborative Connections is designed to stimulate discussions and occasionally introduce initial topics for exploration. As Jenó (2015) recommended, embracing challenging tasks encourages professional motivation and deeper engagement with complex topics.

Feedback received from the professionals underscores the value of seminars in providing opportunities for professionals to receive feedback on their thoughts. The design principle thrives on the expectation for discussion and sharing, fostering a conducive arena for interaction. Small group discussions with diverse professionals are preferred, fostering productive exchanges over the 12-week program.

As Jenó (2015) discuss, the group's sense of relatedness contributes to learning motivation. While discussions alone may not lead to learning, Collaborative Connections serves as a platform for collaborative discourse. The professionals are often provided with focus areas or topics to initiate discussions. However, concerns about insufficient participants for discussion, raised in evaluations, have yet to materialise as an issue.

In summary, Collaborative Connections cultivate an environment where professionals actively engage in dialogue, leveraging diverse perspectives to deepen understanding and enhance learning outcomes.

6.6 Learning Fusion

Objective: Blended learning combining face-to-face seminars, films, and articles.

Learning Fusion is a pedagogical approach integrating various learning modalities, including face-to-face seminars, films, and articles, to enhance the learning experience. Inspired by the principles of Blended Learning and the flipped classroom model (Van der Zwan and Afonso, 2019), Learning Fusion has received positive feedback from evaluations, with participants expressing appreciation for its effectiveness. Statements such as "It is easier to learn when we utilise film and articles" and "The combination of film, articles, and discussions was beneficial" reflect the success of this approach.

Moreover, the professionals have emphasised the importance of engaging in discussions with colleagues to explore the relevance of course content to their professional activities, fostering reflective practice and nuanced analyses. This highlights another dimension of Learning Fusion—bringing course concepts into one's professional context and integrating external perspectives into the learning process.

Active learning is an essential aspect of Learning Fusion; as described by Van der Zwan and Afonso (2019) in their principle of Collaborative connections. It involves preparation, discussion, and contextualisation of new concepts, contributing to long-term learning outcomes.

Learning Fusion is a convergence of technological opportunities, a supportive seminar environment, and peer-to-peer knowledge exchange (Mozelius and Humble, 2020; Humble and Mozelius, 2021). Coupled with the Preparedness protocol, this approach offers professionals flexibility in engaging with the course content, including access to recorded seminars for review or catching up on missed sessions. Participants have lauded the availability of recorded seminars, recognising its value in facilitating flexible learning: "I could watch the seminar afterwards."

In essence, Learning Fusion embodies an innovative and adaptable approach to professional development, leveraging diverse learning resources and technologies to optimise learning outcomes and accommodate the varied needs of professionals.

7. Conclusion

Due to the rapid technological development in today's work life, lifelong learning is becoming increasingly essential. What is new today, such as the digital transformation, has to be understood by professionals. Higher education needs to establish itself as an interesting actor, providing courses with high satisfaction ratings for professionals. Therefore, this study aimed to analyse, present, and discuss design principles (DP) for a professional development course in higher education. In this context, design principles are guidelines, forming the theoretical contribution for further knowledge development. The set of DP developed in this study is: professional pathways referring to new knowledge directly linked to real-world applications; knowledge evolution, meaning gradual integration of knowledge using seminars and examination assignments; preparedness protocol focusing on updated information and structured templates for the seminars; collaborative connection, including discussion where professionals exchange experiences; and the last principle, learning fusion, directs toward blended learning by combining face-to-face seminars and films.

Lecturers and other stakeholders can use the set of DPs in practice to design or revise new or existing professional development courses. Further, the DPs can form the foundation for a new course or be the evaluation factors related to an existing one. The revision can then include one or several DP, depending on the need for revision. Another usage is to add evaluation questions for the professionals, using their perspective on what is essential to change. One future avenue for research is to add measurement points to find what revisions affect professionals' satisfaction with the course. One limitation of the study is that the number of professionals could be higher, and one additional direction for further research can be to increase that number and understand the efficiency of each DP.

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Strategies for e-Assessments in the Era of Generative Artificial Intelligence

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Abstract: The rapid advancement of generative artificial intelligence (AI), particularly tools like ChatGPT, is reshaping educational landscapes by enabling students to generate responses that closely mimic human-written answers. This development presents both opportunities and challenges for e-assessments, especially concerning academic integrity and the authenticity of student learning outcomes. Traditional assessment methods, which often emphasize memorization and standardized testing, are proving insufficient in this new context, as they may not effectively measure higher-order skills like critical thinking, creativity, and problem-solving. This study employs a systematic literature review (SLR) to investigate adaptive e-assessment strategies in higher education that address the integrity challenges posed by generative AI while supporting meaningful learning. Through an in-depth analysis of recent literature on e-assessment practices and AI integration, this study identifies key adaptive strategies such as randomized questioning, project-based assessments, open-book exams, and AI-enhanced plagiarism detection. The findings reveal that while generative AI complicates the assessment process, it also provides an impetus for rethinking assessment design in ways that promote application-based knowledge and discourage cheating. By advocating for a shift towards assessments that evaluate critical skills rather than rote knowledge, this study proposes a framework that can support educators in creating robust, integrity-focused e-assessments. This research contributes to the evolving discourse on educational assessment, offering practical recommendations for institutions aiming to balance the benefits of AI-enhanced learning with the need for fair and accurate assessments.

Keywords: ChatGPT, Generative AI, e-Learning, e-Assessments, Higher education, Academic integrity

1. Introduction

There has been a remarkable transformation in the field of education, primarily driven by the rapid advancement of technology (Ebner et al., 2020). As digital technologies have revolutionized the way knowledge is acquired, disseminated, and accessed, e-learning has emerged as a prominent mode of education delivery, offering unprecedented flexibility and accessibility to learners worldwide (Ebner et al., 2020). However, despite the remarkable progress in e-learning methodologies, the assessment practices employed in this digital era often lag, relying on traditional methods that have roots dating back to ancient times. This paper delves into the critical issue of assessment practices in 21st-century e-learning environments and examines the extent to which these practices align with the dynamic and evolving educational landscape. Specifically, we explore the idea that contemporary e-learning, coupled with transformative language models like ChatGPT, has unveiled the shortcomings of traditional assessment methods, which are reminiscent of practices from as early as the 7th century.

In recent years, the integration of artificial intelligence (AI) and natural language processing (NLP) technologies into e-learning has provided new avenues for personalized and adaptive learning experiences (Baidoo-Anu and Owusu Ansah, 2023). Among these AI-powered innovations, ChatGPT, an advanced language model developed by OpenAI, has significantly reshaped the landscape of human-computer interaction and information processing. ChatGPT's ability to generate coherent, contextually relevant responses and its capacity to simulate human-like conversation have sparked a need for reevaluation of traditional educational practices, including assessments (Gundu, 2023a).

The 7th-century assessment methods, characterized by written examinations, oral recitations, and tests which were all memorization-based evaluations (Monroe, 1905), have become questionable. These have served as the primary means of evaluating knowledge and understanding for centuries. While these methods may have been suitable for the educational needs of their time, they fail to accommodate the multifaceted demands of modern e-learning environments (Bryan and Clegg, 2019). The dynamic nature of digital education requires assessments that can assess critical thinking, problem-solving, creativity, collaboration, and adaptability skills that are pivotal in a rapidly changing world (Cahapay, 2020).

The transformative potential of ChatGPT and similar AI technologies in e-learning has highlighted the need for a paradigm shift in assessment practices as students can use these technologies to generate answers for assessments. This has shown a need to shift from static, standardized assessments to dynamic and adaptive evaluations for lecturers to have a deeper understanding of the students' progress (Cotton, Cotton and Shipway, 2023).

Literature highlights the challenges with the current assessment methods and this paper discusses strategies for redesigning assessment practices for e-learning in the 21st century, with an emphasis on fostering a learner-centric approach that nurtures creativity, critical thinking, and a growth mindset.

Ultimately, this paper aims to shed light on the transformative potential of e-learning assessment practices, prompting educators, policymakers, and stakeholders to reconsider the traditional methods inherited from the past by exploring alternative assessment methods, such as project-based evaluations, portfolios, and performance assessments can better assess students' critical thinking, creativity, and problem-solving skills vs assessing knowledge retention. These innovative assessment approaches seem to align better with the evolving needs of learners and the ever-changing knowledge economy.

The rest of the paper is structured as follows, next, the background and problem statement of the study will be discussed followed by the purpose and objectives of the study. A literature review and methods applied will then be discussed, these would then be followed by findings and discussion of the findings. The paper will round up with a conclusion that will discuss the recommendations and possibilities for future studies.

1.1 Background

In the ever-evolving landscape of education, the integration of technology has led to significant advancements in both e-Learning and e-Assessments. This comprehensive exploration aims to elucidate the interconnected dynamics of e-Learning and e-Assessments, underscoring the symbiotic relationship between these two components in the era of generative artificial intelligence. The surfacing of ChatGPT in November 2022 has led to a rise in the use of artificial intelligence to enhance the learning process (Baidoo-Anu and Owusu Ansah, 2023).

The role of technology as an enabler in eLearning is paramount. This subsection explores the technological tools and platforms that facilitate eLearning experiences, from Learning Management Systems (LMS) to interactive multimedia content, setting the stage for effective e-Assessments by providing a robust digital learning infrastructure.

1.2 Problem Statement

The integration of generative artificial intelligence (AI), such as ChatGPT, in education has created unprecedented opportunities for enhanced learning but also significant challenges for academic integrity and assessment authenticity. Traditional assessment methods, which often rely on memorization and standardized testing, are increasingly inadequate in an environment where students can leverage AI to generate answers that mimic human responses. This raises critical concerns about the reliability and fairness of e-assessments and challenges educators to ensure that assessments accurately reflect student learning and capabilities. Without adapting assessment strategies to address these issues, institutions risk compromising the validity of their assessments and undermining educational outcomes. This study seeks to address this urgent problem by exploring adaptive e-assessment strategies that maintain academic integrity and promote meaningful learning in the AI-enhanced educational landscape.

1.3 Purpose of the Study

The purpose of this study is to address this urgent problem by exploring adaptive e-assessment strategies that maintain academic integrity and promote meaningful learning in the AI-enhanced educational landscape, particularly focusing on the potential for students to use AI to generate answers.

1.4 Objective of the Study

The objective of this study is to recommend practical, AI-Resistant Strategies for educators and institutions to proactively address the potential misuse of generative AI in e-assessments. This includes designing assessments that are resistant to automation and promoting higher-order thinking skills that are challenging for AI to replicate.

2. Related Literature

The evolution of artificial intelligence (AI) and natural language processing has given rise to language models, for example ChatGPT, fundamentally altering the landscape of human-computer interaction. This paradigm shift has ignited scholarly discourse on the implications of such advancements for educational practices. This literature review undertakes a critical examination of the role of traditionally ascribed assessment methods within the contemporary context shaped by ChatGPT and similar AI technologies.

2.1 Generative AI

Generative Artificial Intelligence (AI) refers to a class of AI systems that have the capability to generate new and original content, such as text, images, or even audio, resembling human-created content (Gundu and Chibaya, 2024). Unlike traditional AI systems that rely on rule-based programming or predefined responses, generative AI models are trained on large datasets and learn patterns and features to generate content autonomously.

Models like GPT-4o (Generative Pre-trained Transformer 4o), developed by OpenAI, are examples of sophisticated generative AI language models. These models are pretrained on diverse datasets and can then be fine-tuned for specific tasks or applications. Generative AI operates on the principles of machine learning, particularly deep learning, where neural networks with multiple layers are employed to process and generate complex patterns (Gundu, 2023b). The generative process involves the model predicting the next element in a sequence based on the patterns it has learned from the training data.

2.2 The Evolution of Assessment Methods

As technology advances, so should the nature of assessments. This section delves into how assessments have evolved beyond traditional formats, incorporating adaptive learning algorithms, real-time feedback mechanisms, and the integration of artificial intelligence to provide a more nuanced and responsive evaluation of student performance.

The history of written exams spans across various epochs, reflecting the evolving nature of educational assessment. In ancient civilizations like China and Mesopotamia, the roots of written exams can be traced, with civil service exams in China during the Han Dynasty focusing on Confucian classics and administrative prowess, and Mesopotamian scribes being evaluated for their proficiency in writing and interpreting cuneiform script. Transitioning to the medieval period, monasteries and cathedral schools in Europe utilized written exams to gauge students' comprehension of religious texts, arithmetic, and grammar. The Renaissance marked a shift towards humanism, broadening the scope of education to include literature, history, and philosophy, leading to a more widespread adoption of written exams in universities. The 19th century witnessed the establishment of standardized examination systems like the British "General Certificate of Education" (GCE) and the French "baccalauréat." In the modern era, the digital revolution has prompted a shift from traditional paper-based exams to computer-based formats, offering efficiency in grading and enabling remote testing. As the trajectory of written exams unfolds in the digital era, there is a growing exploration of alternative assessment forms, such as project-based evaluations, aimed at assessing a broader spectrum of skills beyond mere rote memorization (Brooks, 1993; Eskelson, 2020; Herckis, 2018; Li and Hayhoe, 2012; Mounier-Kuhn, 2020)

e-Assessments, encompassing a variety of digital assessment formats, have become more prevalent in the recent years. These assessments are not limited to multiple-choice questions; they can include simulations, interactive elements, and adaptive testing (Woldeab and Brothen, 2019). e-Assessments have become increasingly popular due to the benefits they offer in terms of efficiency, flexibility, and the ability to leverage technology for various types of evaluations.

2.3 e-Assessments

In the advent of Generative AI, the significance of e-Assessment serves multifaceted purposes that significantly contribute to the overall e-learning experience and student development (Bryan and Clegg, 2019). The pivotal role of these assessments lies in their capacity to assess student progress, foster effective learning, and ensure the achievement of educational objectives in the context of e-learning environments (Gamage et al., 2020). The primary aim is to measure and evaluate the extent to which students have successfully attained the specified learning outcomes. Through diverse e-assessment methods, educators can discern the levels of knowledge, skills, and competencies acquired by students, thereby providing valuable feedback to both learners and instructors.

Moreover, e-assessments serve the purpose of offering students constructive feedback for improvement and fostering active learning in digital landscapes (Winstone and Boud, 2022). Through various e-assessment formats such as quizzes, projects, and discussions, e-learning actively engages students with the course content. Interactive assessments encourage critical thinking, problem-solving, and the application of knowledge, fostering deeper understanding and the development of higher-order cognitive skills.

This study advocates for a shift towards assessing the ability to apply knowledge and skills rather than focusing solely on the retention of information which Generative AI can be used to cheat. Consequently, there is a compelling need to reimagine assessments in order to optimize the educational experience for students, promote continuous improvement, and adequately equip them for the evolving demands of a global workforce.

2.4 Impact of Generative AI on e-Assessments

Students may exploit Generative AI during online exams or quizzes to seek answers in real-time, bypassing the intended evaluation process. This form of cheating can compromise the fairness and accuracy of assessments. Studies suggest that Generative AI is here to stay and that being so, there is a great need for an e-Assessment mindset shift, from focusing on memorisation to application, encouraging critical thinking and problem-solving skills that AI algorithms cannot emulate (Baidoo-Anu and Owusu Ansah, 2023).

3. Methodology

This study is grounded in a pragmatic philosophy. Pragmatism is suitable for this study because it focuses on generating practical and actionable insights into e-assessment strategies within higher education. This approach allows the research to emphasize both real-world applications and the implications of emerging technologies (like generative AI) on current assessment practices, prioritizing solutions that enhance academic integrity and effective e-assessment design.

3.1 Research Approach

A deductive approach is applied, as the study begins with established theories and frameworks on assessment practices and academic integrity. It seeks to validate these theories within the specific context of generative AI, testing their applicability and identifying any necessary adaptations. This approach aligns well with the systematic literature review (SLR) design, as it allows the research to analyze existing studies, derive conclusions, and propose recommendations based on the current evidence.

3.2 Methodological Choice

The research adopts a qualitative approach, using a systematic literature review (SLR) to consolidate and synthesize findings from previous research. This approach allows for an in-depth exploration of themes and patterns in e-assessment literature, drawing on qualitative insights to understand the effectiveness, challenges, and innovations within e-assessment practices in the context of generative AI.

3.3 Research Strategy

A systematic literature review is selected as the primary research strategy. The SLR is appropriate because it enables the study to rigorously examine and synthesize a wide range of peer-reviewed literature and conference proceedings, providing a comprehensive overview of global best practices in e-assessment. This strategy also facilitates the identification of gaps in existing research, which informs the development of new assessment frameworks that address the unique challenges posed by generative AI. The research strategy is structured in a way that aligns with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure rigor and reproducibility.

3.4 Techniques and Procedures

3.4.1 Data collection techniques

A comprehensive search of peer-reviewed articles, conference papers, and relevant academic databases was conducted. Keywords such as "e-learning," "artificial intelligence," "Generative Artificial Intelligence," "assessment practices," and "redesign" were used in various combinations to ensure the inclusiveness of the search.

A 'who', 'what', 'how' and 'where' (WWHW) structured approach was used to assist in the creation of the key search terms and ultimately the research string. The WWHW table, Table 1 is presented below.

Table 1: WWHW Table

	WHO	WHAT	HOW	WHERE	OTHER ISSUES
What are the Best Practices for e-Assessments in the advent of Generative AI	Lecturers/ students	Assessment Methods	Assessment Plan	University/ College	E-Learning/ Remote Learning

The development of the search string was an iterative process. The resultant research string was:

("Assessment Method" OR "Assessment Plan") AND ("e-learning" OR "remote learning") AND ("higher education" OR "tertiary education" OR "university" OR "College")

3.5 Inclusion Criteria

This study made use of several bibliographic databases, including EBSCOhost Research database, Emerald Insight, Science Direct, and Google Scholar. The same search string was applied consistently across all the selected databases. The research process involved both initial and secondary screening of the search results. To manage the systematic reviews efficiently, the researchers employed Rayyan, a web-based application designed to assist researchers in creating and organizing their reviews. The inclusion and exclusion criteria are shown in Table 2.

Table 2: Inclusion and exclusion criteria

INCLUSION CRITERION	EXCLUSION CRITERION
<ul style="list-style-type: none"> assessment methods Higher education; university; college; tertiary education Learning technologies; digital technologies; e-learning; e-Assessments; remote learning 	<ul style="list-style-type: none"> Not applicable Not relevant (outdated) No abstract Full-text unavailable No translation for foreign language

3.6 Data Synthesis

The selected studies were subjected to data extraction, including information on research design, methodology, key findings, and implications. Thematic analysis was employed to identify common themes, patterns, and contradictions across literature.

The aim of data synthesis is to combine multiple sources of information into a single, integrated, and comprehensive representation. This process involved collecting and integrating data from various sources discussed in section 3.5, and then using meta-analysis, and modelling techniques to create a synthesized dataset that provided a more complete and accurate picture of the subject matter. The goal of data synthesis is to improve understanding and decision-making by combining the strengths of individual sources and reducing the limitations and biases inherent in any one source.

4. Findings

A total of 248 articles were identified and retrieved for the research. The study focused on publications from 2014 up to the present, except for referenced articles specifically related to the learning style models mentioned in numerous citations. Refer to Table 3 for further details.

Table 3: Results of searches

Search String	("Assessment Method" OR "Assessment Plan") AND ("e-learning" OR "e-assessment") AND ("higher education" OR "tertiary education" OR "university" OR "College")		
Database	Number of Hits	Database	Number of Hits
Google Scholar	103	Science Direct	78
EBSCOhost	14	Emerald Insight	53

After implementing the research string and obtaining the outcomes as described in Table 3, a PRISMA diagram was created. The PRISMA diagram serves as a visual representation of the information flow through the

various phases of the systematic review, and it was utilized to report the findings from the conducted searches. Refer to Figure 1 for the diagram.

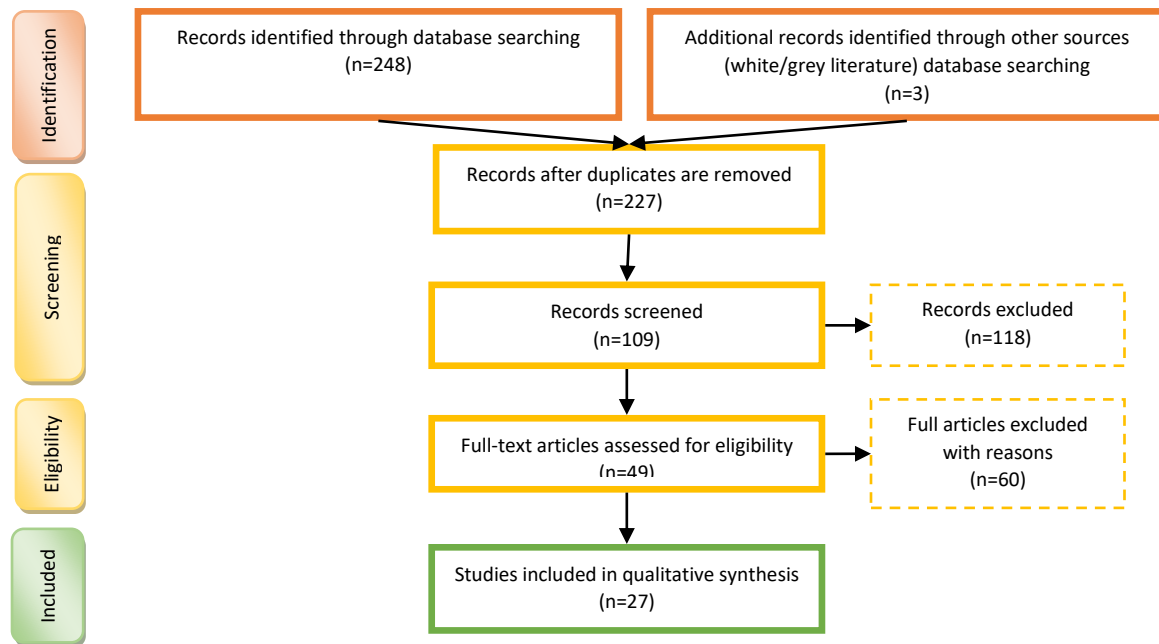


Figure 1: Systematic review flow

A total of twenty-seven (27) articles that met the eligibility criteria underwent a quality assessment. Out of these, twenty-one (21) papers were deemed suitable for inclusion in this systematic review.

To present the relevant and significant findings from these selected papers, data extraction tables were utilized. These tables contained valuable information and insights related to the research. Due to conciseness, the six (6) pages of data extraction tables have been summarized in Table 4.

Table 4: Summary of data extraction table

Subcategories	Major assessment methods			Learning Style			
	Projects	Tests/Exams	Assignments	F2F	Online	Blended	Other
Citing	4	21	11	0	19	5	3

As may be seen in Table 4, most papers reviewed were based on e-learning (19) and are largely reliant on tests and exams (21).

5. Discussion

Traditional assessment methods, such as written examinations and standardized tests, were designed for a different era and often fall short in assessing the diverse skills and competencies required in the modern workforce. This section discusses recommendations based on what was found in literature review. It was revealed that the 21st century education systems demand a more holistic approach to assessments that goes beyond testing memorization and instead evaluates critical thinking, problem-solving, creativity, collaboration, and digital literacy (Bryan and Clegg, 2019). E-learning provides a unique opportunity to rethink assessment practices and align them with the needs of the skills and knowledge economy.

This section will critically discuss recommended strategies based on the findings from literature.

5.1 Recommended Strategies for Implementing e-Assessments in the era of AI

5.1.1 Implementation of varied assessment formats

To foster a robust and authentic assessment environment within e-learning, a diversified mix of assessment formats is recommended, including open-ended questions, case studies, and projects, to diminish the dependence on easily searchable content and create challenges for potential cheating (Şenel and Şenel, 2021). Open-ended questions, characterised by their demand for thoughtful and analytical responses, propel

students beyond surface-level understanding and discourage reliance on readily available answers (Winstone and Boud, 2022). Case studies, by immersing students in real-world scenarios, evaluate not only comprehension but also the application of theoretical knowledge to practical situations, making it less likely for students to find pre-existing solutions online (Gamage et al., 2020). Lastly, project-based assessments, requiring in-depth exploration of a specific topic, produce tangible outcomes that uniquely showcase individual efforts (Gundu, 2023b). These diversified approaches encourage critical thinking, analytical skills, and practical application, collectively contributing to a comprehensive evaluation that deters cheating by emphasising originality and individualised understanding of the subject matter.

5.1.2 Randomisation of questions and answer choices

By randomizing the order of questions, each student faces a unique sequence, preventing the sharing of question order and reducing the effectiveness of collaborative cheating (Ranger, Schmidt and Wolgast, 2020). This method disrupts the predictability of assessments, challenging students attempting to coordinate responses systematically in real-time (Whisenhunt et al., 2022). Furthermore, randomizing the order of answer choices within multiple-choice questions adds an additional layer of complexity. This dynamic approach ensures that answer choices are presented in a different order for each student, significantly diminishing the effectiveness of collaborative efforts. Even if students share information, the corresponding answers may not align across different versions of the assessment. Collectively, these randomization techniques fortify the authenticity of assessments, promoting individual engagement and understanding while minimizing opportunities for collaborative cheating (Manoharan, 2019).

5.1.3 Use of time limits strategically

Tailoring time constraints to match the cognitive demands of each question ensures an equitable opportunity for students to demonstrate their understanding while simultaneously discouraging external assistance or prolonged searches for answers (Stadler, Kolb, Sailer, 2021). Recognizing that different questions necessitate varied degrees of critical thinking and problem-solving, this approach aims to strike a balance that challenges students appropriately without creating undue barriers (Ryznar, 2022). Moreover, beyond serving as a deterrent to seeking external help, strategic time limits play a crucial role in cultivating essential time management skills among students. The constraints prompt learners to prioritize effectively and make efficient decisions (Ellis, 2021), reinforcing the significance of time management as a crucial aspect of their overall academic development during assessments.

5.1.4 Leveraging AI for plagiarism detection

The integration of AI-powered plagiarism detection tools represents a pivotal strategy in upholding academic integrity within the realm of e-assessment practices. By employing advanced algorithms and machine learning, these tools play a crucial role in identifying instances of academic dishonesty (Khalil and Er, 2023), ensuring that student submissions are authentic and reflective of their individual understanding and work.

AI-powered plagiarism detection tools employ sophisticated algorithms to analyse written content comprehensively (Ibrahim, 2023). These algorithms can detect similarities, even in paraphrased or rephrased text, and identify instances that may indicate potential plagiarism (Santra and Majhi, 2023).

5.1.5 Enabling secure online proctoring

Secure online proctoring, fortified by advanced AI technologies, emerges as a robust solution to uphold academic honesty and ensure the credibility of assessments. Through the implementation of online proctoring tools, educators gain the capability to monitor students during assessments, utilising sophisticated algorithms to track eye movements, identify suspicious behaviour, and verify the test-taker's identity in real-time (Gribbins and Bonk, 2023).

This approach introduces key features integral to the effectiveness of secure online proctoring with AI. Firstly, the use of facial recognition technology aids in identity verification, ensuring that the individual taking the assessment is indeed the registered student, thereby enhancing the overall security of the evaluation process. Advanced AI algorithms contribute to behavioural monitoring, analysing eye movements, facial expressions, and body language to identify signs of potential cheating or irregular behaviour (Aurelia et al., 2023). Real-time alerts generated by online proctoring tools with AI capabilities enable educators to swiftly intervene when suspicious behaviour is detected, maintaining the integrity of the ongoing assessment. AI algorithms also conduct an environment analysis through webcam feeds, ensuring that the testing environment is conducive

to fair and honest assessments, free from external aids or distractions. Additionally, the incorporation of secure browser technology in some online proctoring solutions prevents students from accessing external websites or resources during the assessment, adding an extra layer of security and mitigating the risk of cheating through online searches (Selwyn et al., 2023).

5.1.6 *Promoting academic integrity policies*

Establishing and maintaining a culture of academic integrity begins with transparent guidelines that clearly define acceptable conduct (Möller, 2023). These guidelines, including details on plagiarism, unauthorised collaboration, and cheating during assessments, should be communicated extensively to students. Making these policies easily accessible through course materials, syllabi, and online platforms ensures that students can readily refer to them. Furthermore, articulating expectations regarding acceptable academic conduct and specifying permitted types of collaboration versus inappropriate ones provides the necessary clarity for students to navigate ethical boundaries effectively. To enhance understanding, offering concrete examples and scenarios illustrates acceptable and unacceptable behaviour, providing practical insights into how academic integrity policies apply in diverse contexts (Sullivan, Kelly and McLaughlan, 2023). In this way, a comprehensive approach to communicating and reinforcing academic integrity guidelines contributes to a community where ethical behaviour is prioritised and upheld (Perkins, 2023).

5.1.7 *Consideration of open-book assessments*

In the evolving landscape of education, the consideration of open-book assessments represents a progressive shift in pedagogical approaches. By intentionally designing assessments that allow students to refer to external resources, educators aim to foster a learning environment that emphasises the application of knowledge over rote memorisation (Rehman et al., 2022). Open-book assessments acknowledge the reality of the information age, where access to a vast array of resources is readily available. This approach encourages students to develop critical thinking skills, problem-solving abilities, and the capacity to synthesise information (Radha, 2023). Unlike traditional assessments that prioritise memorisation, open-book assessments challenge students to navigate and interpret a variety of sources, promoting a deeper understanding of the subject matter. Importantly, this shift in assessment strategy also serves as a deterrent to cheating, as the focus transitions from recalling facts to demonstrating a comprehensive grasp of concepts and the practical application of acquired knowledge. Embracing open-book assessments reflects a commitment to preparing students for real-world scenarios where the ability to access and apply information is often more valuable than memorising it (Masengu et al., 2023).

5.1.8 *Facilitating real-time interaction*

By designing assessments that require students to engage with course material in a real-time, interactive setting, educators introduce a layer of complexity that makes it challenging for students to depend on external sources or collaborators. This approach shifts the focus from rote memorization to the immediate application of knowledge in dynamic situations, fostering a deeper understanding of the subject matter (Nilimaa, 2023).

Real-time interactive assessments often emulate real-world scenarios, demanding quick thinking, problem-solving, and on-the-spot decision-making. This not only aligns assessments with practical, professional situations but also mitigates the opportunity for students to seek external help or collaborate during the assessment period. The dynamic nature of these assessments ensures that students draw upon their individual understanding and skills, discouraging reliance on external aids.

Moreover, the real-time element introduces an element of unpredictability, making it difficult for students to anticipate specific questions or scenarios (Gök, 2012). This not only enhances the authenticity of the assessment experience but also minimizes the potential for cheating through pre-prepared answers or coordinated efforts with peers.

5.1.9 *Monitoring communication channels*

Vigilant monitoring of communication channels serves as a proactive strategy to maintain the integrity of the evaluation process. Regular oversight of the channels used by students during assessments, such as chat platforms or discussion forums, is essential in preventing and detecting instances of academic dishonesty (Ngqondi, Maoneke, and Mauwa, 2021). By staying attuned to these channels, educators can swiftly identify potential collaboration or unauthorized communication among students. Creating an environment that encourages the reporting of suspicious behavior is crucial, emphasizing the collective responsibility of the

learning community to uphold academic honesty. Clear communication about a zero-tolerance policy for cheating reinforces the seriousness of maintaining integrity within the educational setting (Alguacil et al., 2023). This vigilant monitoring not only acts as a deterrent to dishonest practices but also ensures that assessments accurately reflect the individual understanding and effort of each student, contributing to a fair and trustworthy assessment process (Sabbah, 2017).

5.1.10 Educating students on ethical use of technology and encouraging academic honesty pledges

In navigating the digital age, where AI permeates every facet of education, it becomes imperative to integrate discussions on the ethical use of AI technologies directly into the curriculum. By doing so, educators can address the nuanced challenges posed by digital tools and platforms, fostering a heightened awareness among students about the consequences of cheating in this technologically advanced era (Mata, 2021). These discussions go beyond establishing what is deemed acceptable behavior; they delve into the broader implications of dishonest practices on the individual's educational journey and the broader academic community. Emphasizing the value of genuine learning and academic honesty becomes pivotal in this context, urging students to view their educational pursuits not merely as a means to an end but as a transformative process that shapes their intellectual growth.

Moreover, requesting students to actively participate in and sign academic honesty pledges prior to assessments adds a tangible layer of commitment to maintaining high ethical standards (Peer and Feldman, 2021). This formalized agreement creates a sense of responsibility, prompting students to reflect on the significance of their academic integrity. By publicly affirming their commitment to ethical conduct, students are not only reinforcing their personal dedication to honest academic practices but are also contributing to the creation of a culture that values and prioritizes integrity. The act of pledging serves as a visible reminder of the shared responsibility to uphold the principles of academic honesty, ultimately acting as a deterrent against cheating by fostering a community committed to ethical educational practices (Bates et al., 2016).

6. Conclusion

This study presents a contribution to the field of e-assessment by addressing the unique challenges posed by generative AI in higher education. In light of tools like ChatGPT, traditional assessments are increasingly inadequate, as they often fail to capture the depth of students' critical thinking and problem-solving abilities. Through a systematic literature review, this research identifies and evaluates adaptive e-assessment strategies that promote academic integrity while fostering meaningful learning. By focusing on application-based methods such as randomized questioning, project-based assessments, and open-book formats the study proposes a framework that enables educators to create AI-resistant assessments that prioritize skill application over rote memorization.

The contributions of this research are significant in advancing the discourse on e-assessment in the era of AI. This study not only offers practical recommendations for assessment design but also encourages a shift toward a learner-centered approach that emphasizes critical skills essential in modern education. These insights are valuable for educators and policymakers as they seek to uphold academic standards while embracing the potential of AI-enhanced learning.

Despite its contributions, the study has certain limitations. The reliance on existing literature restricts the ability to validate proposed strategies through empirical data, and the rapidly evolving nature of AI technologies means that new assessment challenges may soon emerge. Additionally, the study does not address the practical implementation barriers, such as institutional readiness or resource constraints, that educators may face when adopting these adaptive strategies.

Future research could focus on empirical studies to test the effectiveness of the recommended strategies across diverse educational settings. Longitudinal studies could also explore how AI influences student learning outcomes and integrity over time. Expanding research to include the perspectives of students, faculty, and administrators would provide a more comprehensive understanding of the practicalities involved in integrating AI-resistant e-assessments in higher education.

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