A framework for the design of online course induction components

by

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Abstract

Students from all over the world now have the opportunity to access a wide variety of high-quality educational resources thanks to the rise of online learning. In recent years, there has been a rise in popularity of online education among both students and teachers. This pattern has only continued to increase with the occurrence of global events such as the COVID-19 pandemic, which forced many people to work and study from home. Therefore, it is crucial that online courses are presented in a manner that is suitable for a diverse range of potential students.

Many educators lack the necessary experience to move their physical courses to an online environment, which has become a recent trend. Educators tend to teach in the manner in which they were taught, which may not translate well to online learning delivery. Moreover, many learners today are assumed to possess the necessary knowledge and skills to participate in online learning without much thought. The combination of assumed learner knowledge and lack of online-specific teaching experience can result in the introduction of artificial barriers to the student's learning by educators. If left unaddressed, these artificial barriers or artificial learning thresholds can cause the student to experience anxiety, a lack of engagement, and a lack of motivation to complete the course for which they are enrolled in.

The global expansion of online education has increased the demand for professional training and specialised knowledge to help teachers instruct students and create online course materials.

First, this dissertation highlights some of the success and challenge factors of online learning. It discusses threshold concepts and suggests that artificial barriers or artificial thresholds can hinder online learning. The dissertation

demonstrates a simple example of what an artificial learning threshold can be and presents the development of a framework that can guide an educator to construct courses with the aim to eliminate artificial learning thresholds.

Second, the dissertation verifies and discusses the resulting framework by presenting and discussing feedback based on an expert educator review of the framework.

This dissertation proposes that educators can be guided, by following the developed framework, on how to design courses with no artificial learning barriers. It is the researcher's contention that doing so will reduce student anxiety and increase motivation and engagement.

Contents

List of Figures

Part I

Dissertation

Chapter 1

INTRODUCTION

1.1 Introduction

Online education has been increasing in popularity over the last few years. The flexibility of learning delivery models is continually evolving, and there is an increasing demand for educators to move from the traditional classroom to an online delivery model (Gillett-Swan, 2017). Furthermore, in recent times, reports indicate a drastic proliferation in online and degree programs across higher educational institutions. Not only is this a trend among certificate or short courses, but graduate degrees are also quickly moving away from the traditional classroom-based programs toward fully online deliveries (Thompson, Leonard, & Bridier, 2019).

The continual expansion of online education brings with it the demand for knowledge and professional programs that can guide educators through the process of teaching and developing course material (Gosselin et al., 2016; Northcote, Kilgour, Reynaud, Gosselin, & McLoughlin, 2019). Moving to online education not only brings the need to move the courses being taught into the online realm, but also raises the question of what that realm should look and feel like from a learner's perspective. Online learning, distance learning, remote delivery, engagement, and motivation—these are all terms that educators are bombarded with when looking at online learning. With increased flexibility come increased options and opportunities, as discussed in the literature (Baldwin, 2019; Gillett-Swan, 2017; Ruth, 2018). However, the possibilities and opportunities that come with online education highlight

many issues in providing a suitable learning experience for students as well as challenges for educators (Gillett-Swan, 2017; Ruth, 2018; Wylie, 2020). Often content is taken from the traditional classroom and merely placed online to be used. Education is education, whether online or non-online. Thus adherence to learning strategies such as pedagogical (Child learning) or andragogical (adult learning) learning strategies are still necessary (Scoppio & Luyt, 2017). Online and blended learning, on the other hand, require a different approach than classroom and face-to-face engagements (Gurley, 2018). The various approaches apply not only to learning strategies, but also to 'best practices' in online education. Best practices can be defined as "a method that has been deemed more effective than other alternatives due to the positive outcome produced. A best practice is a technique or methodology that has been shown by experience and/or research to lead to a desired result" (Luscinski, 2017, p. 13).

As their primary discipline, university lecturers are frequently trained as educators. Most lecturers base their own classroom practices on what they experienced as students (Oleson & Hora, 2014). However, when it comes to online learning, most university lecturers probably do not have a wealth of experience to draw from on how to teach their courses online (Kerkhoff, 2020; Scoppio & Luyt, 2017). Additionally, the educators are expected to provide guidance on how to learn, and in online learning, there is once again often a lack of experience on how to accomplish this (Martin, Budhrani, Kumar, & Ritzhaupt, 2019). Many challenges exist for educators when transitioning to online learning, which can lead to scepticism.

To compound online education challenges, the assumption that many learners who are born after a certain date are digital natives and do not need to be taught how to learn online, has been shown to not be a definitive truth (Gillett-Swan, 2017; Warf, 2019). In fact, this varies vastly in studies. For example, students that demonstrated competencies in social media and mobile use, still failed to use relevant platforms to upload and share files, create documents, read articles or use calendars (Blayone, VanOostveen, Grebeshkov, Hrebeshkova, & Vostryakov, 2018; Warf, 2019). Online learning environments can be an entirely autonomous learning experience or

set up to be a one-on-one teacher-student environment where every action is tracked (de Freitas, Morgan, & Gibson, 2015). On the one hand, students perceive online presence between educator and learner as far more engaging and personal than a physical classroom (Reese, 2015). On the other hand, online learning could enable totally autonomous and self-paced learning scenarios, but this could lead learners to experience anxiety, and a feeling of being on their own (Reese, 2015). For example, attending a physical lecture in a classroom may only involve one-way communication, while a discussion and collaboration using a text-based group messaging system or discussion forum can be very interactive.

There are various levels of potential engagement due to the learner's freedom to engage using various forms of tools. In contrast to interactive freedom, the quality of online learning is not always better because the interactive technologies are merely available to use. When the learner is given complete freedom in environments such as Massive Online Open Courses (MOOCs) there are usually high dropout rates (van der Sluis, van der Zee, & Ginn, 2017). The freedom that complete autonomous learning provides by enabling self-paced progression could also lead to a potential lack of student engagement and the ability of the educator to spot a lack of progression. In the case where progression and engagement are not tracked, it could lead to student dropout before intervention by the educator can occur (van der Sluis et al., 2017). This contrasts with studies showing that opening up material and activities that are mandatory as soon as possible for as long as possible helps ease anxiety in students and leads to better results (Muir et al., 2019). Learners may not take part in the course because they don't understand the environment, what's expected of them, and what to expect from the way the course is taught. Consequently, to have a positive and engaging online learning experience, the student needs to be equipped for online learning (Dumford & Miller, 2018; Keskin & Yurdugül, 2020).

A relevant development in online education is the notion of threshold concepts. Threshold concepts represent crucial points of learning. Threshold concepts, defined as difficult or unsettling areas of learning that cause anxiety and uncertainty, play an important role in the learner stopping or

inquiring about new knowledge (Kilgour, Reynaud, Northcote, McLoughlin, & Gosselin, 2018). Threshold concepts can help educators think about the barriers to entry that students may face when learning essential but difficult-to-grasp knowledge. A threshold concept describes areas and ideas that are crucial to effective knowledge acquisition (Morley, 2020). These threshold concepts can manifest in educators needing to move their courses online and in learners taking their education online. Previously conducted studies show that students who experience anxiety often have more anxiety at the beginning of the course and that anxiety levels usually decrease when the course progresses and when they get more experience in the environment (Abdous, 2019; Amushigamo, Hidengwa, & Herman, 2018; Muir et al., 2019). Therefore, it is reasonable to propose that having some form of an introduction, orientation, or induction process for online course environments is vital. Moreover, such an orientation or induction process would need to be specifically adapted to the approach used in a given course since modalities, course requirements, LMS, user interfaces, and technologies used may differ between courses.

The ability to learn online can be influenced by a variety of underlying factors, all of which play a role in the learners' ability to complete the course online (Gray & DiLoreto, 2016). Intrinsic motivation, self-efficacy, knowledge of previous learning, and specific technical skills such as manipulation of streaming video, web browsers, input methods, computer and device literacy could all influence the quality of the learning experience (K. Li & Keller, 2018; B. Wu & Chen, 2017). Another factor that can have a significant influence on the learning experience is the learner's willingness to engage with the technologies used. The Technology Acceptance Model (TAM) is a widely used model that is used to explain the likelihood of humans using technology. In TAM, three factors determine the likelihood of accepting technology. The perceived usefulness of the technology, the perceived ease of use, and lastly, the attitude towards using the technology (Taherdoost, 2018). The TAM model suggests that if a user perceives technology as complicated or difficult, they will be unwilling to engage and participate (B. Wu & Chen, 2017). Therefore, educators could remove the perceived barrier to entry by introducing students to low-risk, high-reward activities early on and letting

them know what to expect. By doing this, it could make the students less anxious than they would have been otherwise, which would remove artificial learning thresholds (ALT).

Educators that implement courses need some form of guidance that can introduce the learner to an environment in an engaging and motivating way (Scoppio & Luyt, 2017). The process needs to introduce the essential elements to get the learner comfortable with the layout and assessment strategy and thus, provide an environment that encourages engagement and continuation. A key element in this aspect is learner induction and orientation. When factoring in that not all online learning takes place in areas with high bandwidth available, a framework that allows for a low bandwidth experience is also needed.

Educators may have different methods and pedagogical theories they subscribe to. Therefore, catering to the vast number of possible learning theories lies beyond the scope of this research. However, the researcher believes that it is possible to create a pragmatic framework for introducing students to online learning that does not depend on adherence to a specific pedagogical theory.

1.2 Problem Statement

Threshold concepts show that there are barriers to entry for educators and students. Many educators lack formal online pedagogical training and, therefore, do not have the necessary theoretical background to design courses that will teach students how to study online. Furthermore, they may lack personal experience in learning online.

Educators thus create courses based on physical classroom experience instead of online learning experience and therefore creates artificial learning thresholds for the students. As far as could be determined, no current framework exists that introduces educators to methods of how to create suitable induction methods for their online courses to equip students with the necessary skills and competencies to make effective use of an online course.

1.3 Thesis Statement

A suitable orientation or induction course, introducing students to the online learning environment and components used in a specific course, will lower the learning thresholds experienced by students and thereby decrease anxiety and improve student motivation and engagement.

1.4 Research Objectives

This dissertation's primary objective will be to propose a framework to guide educators in designing an online induction course. The induction course aims to familiarise the learner with the learning environment's requirements to equip them with the required skills and competencies to overcome identified artificial learning thresholds.

1.4.1 Research Questions

In order to achieve the primary research objective, the following research question and sub-questions have been identified:

Primary Research question (RQ)

1. RQ1: How should educators design online induction courses to familiarise the learner with the requirements of the online learning environment?

Sub-Research Questions (SRQ)

1. SRQ1: What creates artificial learning thresholds within an online learning environment?
2. SRQ2: How should an educator identify the components in a given online course that could introduce learning thresholds?
3. SRQ3: How can an educator ensure that all the required skills and competencies are included in the introductory activities and introduce them in the correct sequence to overcome learning thresholds?

4. SRQ4: How can an educator assess that each learner has achieved the necessary learning skills and competencies to overcome identified learning thresholds?

1.5 Delineation

The research aims to develop a generic framework. There would be no specific modality of teaching and learning discussed since online learning could include too many possible modalities. Instead, the aim is to develop a framework that can be adapted by any course designer to their chosen modality.

1.6 Research Process

This section will outline and discuss the framework development research process shown in figure 1.1.

1. **Literature review**

   A Literature review was conducted to establish the online learning problems that educators, Instructional designers and students are experiencing. The initial literature review identified threshold concepts as an interesting measure of establishing areas of critical attention and potential barriers to acquiring new knowledge. These barriers exist for both the student and the educator. These barriers could play a critical role in whether a student is motivated to continue studies or not, especially when it comes to the self-paced nature of many online studies. Crucially it was found that in the early stages of the studies that technology acceptance also plays a significant role in the ability to engage in online studies and continue to do so. Furthermore, these barriers also exist for educators as they can lack the experience to develop online courses in a way that motivates and eases study anxiety for the student.

   Learners need to learn how to use the online course environment and in order to do this effectively, educators and instructional designers need to know how to design the online course to facilitate this need. The findings discovered from the literature led to the problem statement

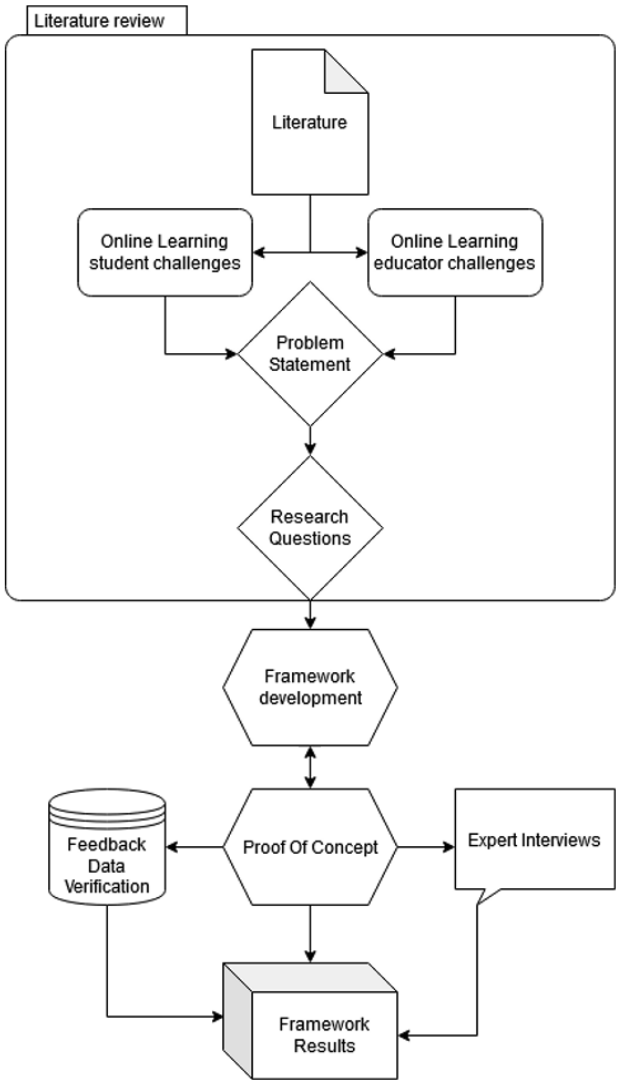

Figure 1.1: Framework development research process.

and research questions. How should educators introduce their courses to students in order to enable effective learning? Could a framework or method be developed that enables the reliable replication of this process? There are some frameworks and guides that lay out methods that could be used in online studies to talk about how technology can be applied or how certain technologies can contribute to making students more engaged. Many of the studies look at students that went through an established course but do not account for students that dropped out in the beginning or educators that perhaps never finished developing a course. Furthermore, there are frameworks for specific

courses or subject matter. There are no tested authoritative pragmatic guides or generic frameworks that could be discovered in how to effectively develop an online course from the perspective of the educator to lower study anxiety and adequately prepare the student for the study environment.

2. **Framework Development**

   Using theories gathered during the literature reviews as a guide, a framework will be developed to direct educators on how to implement an online course in an LMS that introduces a student to the learning environment and course, to increase motivation by familiarising the learner with the delivery model and thus decrease study anxiety.

3. **Proof of Concept**

   A proof of concept will be developed based on the initial literature review. Methods will be identified that can be implemented that lowers barriers to entry for the student. Thereafter, a proof of concept orientation or induction course based on the framework will be implemented in a re-developed Network and IT Security course and a new Back-end Development course.

4. **Expert Reviews**

   A research verification instrument will be constructed and distributed to expert educators and instructional designers to get their feedback on the results. The participant in the expert reviews will be selected using a purposive and convenience approach to sampling (Robinson, 2014). A purposive sample is one where participants are specifically selected "so that those sampled are relevant to the research questions that are being posed" (Bryman & Bell, 2012, p. 442). A convenience sample is a sample that is "available to the researcher by means of its accessibility" (Bryman & Bell, 2012, p. 190). The research will approach various educators and instructional designers with at least three years of experience in online education (purposive) to whom the researcher has access through professional relationships (convenience) and request voluntary participation.

5. **Framework Results**

Using feedback from the findings, the framework will be enhanced and tweaked if necessary, to enhance the framework and the findings discussed.

1.7 Ethical Considerations

This research project adheres to all research ethics requirements of Nelson Mandela University. Formal ethics approval was acquired (Reference: H21-ENG-ITE-007). Documentation relating to the research ethics process can be found in Appendix F. Written permission to use this data was obtained from the relevant authority and adheres to the research ethics requirements of the institution described in the documentation. Furthermore, there is a legislative requirement to adhere to the stipulations of the General Data Protection (GDPR) [1] act.

[1]Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) [2016] OJ L 119/1

Chapter 2

LITERATURE REVIEW

2.1 Introduction

A literature review was conducted to establish the problems with online learning that educators, instructional designers, and students are experiencing. The initial literature review identified threshold concepts as an interesting measure for establishing areas of critical attention and potential barriers to acquiring new knowledge. These barriers exist for both the student and the educator. These barriers could play a critical role in whether a student is motivated to continue studying or not, especially when it comes to the self-paced nature of many online studies. Crucially, it was found that during the early stages of a student's studies, their ability to adjust to new technology also plays a significant role in student retention and their ability to succeed.

Furthermore, these barriers also exist for educators, as they can lack the experience to develop online courses in a way that motivates and eases study anxiety for the student. Learners need to learn how to use the online course environment, and in order to do this effectively, educators and instructional designers need to know how to design the online course to facilitate this need.

The findings discovered from the literature led to the problem statement and research questions. How should educators introduce their courses to students in order to enable effective learning? Could a framework or method be created that would make this process easy to replicate? Some frameworks and guides exist that establish methods that could be implemented in online

studies, discussing how technology can be used, or how the engagement of students is increased by the use of specific technologies.

Many of the studies focused on students who completed an established course but did not account for students who dropped out at the beginning or teachers who may have never completed constructing a course (Gillett-Swan, 2017). According to the findings of Rõõm, Lepp, and Luik (2021), the early parts of the courses are critical for student retention. These authors found that the majority of students who dropped out did so during the initial stages of a course. Therefore, they suggest that the underlying cause of such a dropout should be investigated so that students receive the necessary help.

There was no existing evidence-based, authoritative, pragmatic guide or generic framework that would guide the development of an online course from the educator's perspective in order to reduce study anxiety and prepare students for the expected study environment in this literature review.

2.2 Online Learning

2.2.1 Success factors

The internet is a fantastic platform for communication. With its combination of device-agnostic ubiquity, a user-centered security model, and the fact that neither its specification nor its implementation is dominated by a centralized company, the internet is a useful platform for developing all kinds of experiences. It is possible to search for information and share what you have discovered, thanks to the natural linkability of the internet. Being connected to the internet means that services are available to anyone, anywhere, on any device, all from a single code base.

One area in which the web has played a considerably important role is in online education, which has become increasingly popular in recent years(Simamora, 2020; C. Li & Lalani, 2020a). With online learning or education, which is made possible by the internet, students can study and teachers can teach from anywhere in the world. This means that a student can access content, programs, universities, and teachers from anywhere in the world, no matter what time it is or where they are from. Also, it can

give students more options for when they can study, so they don't have to make sacrifices like working instead of studying.

Every student has the opportunity to further their knowledge via online courses. When students are unable to attend physical classroom studies for any reason, they may take online classes from the comfort of their own homes. In these types of situations, online education may assist in reducing obstacles and borders, allowing students to effortlessly receive information while sitting at a desk at home or anywhere there is a computing device with an internet connection. Online education allows students to obtain a high-quality education from anywhere.

Online learning is an extremely convenient and useful tool for students who want to improve their knowledge and skills and have access to world-class educational programs (Liang, 2012; Reese, 2015). Over the last few years, online education has grown in popularity among students and educators alike and this has only expanded with global situations such as COVID-19 pandemic period (C. Li & Lalani, 2020b). As a result, there is greater pressure on educators to transition away from the traditional classroom and toward a digital, online, or mixed delivery model (Gillett-Swan, 2017).

Consequently, in recent years, there has been a dramatic increase in the number of online and degree programmes available at various higher education institutions. Besides certificate and short-course programmes, graduate degrees are also increasingly moving away from traditional classroom-based delivery methods and toward entirely online delivery methods (Thompson et al., 2019).

2.2.2 Challenge factors

Even though online learning and technological advances can make education much more accessible by opening doors to many subjects in different settings, some university faculty members worry that online education may not be as good as learning face-to-face. People who are opposed to online learning often express concern that the absence of a personal connection with the teacher depersonalizes the educational experience.

Effective teachers must possess both subject-matter expertise and teaching abilities, as well as an effective teaching style (Alsaleh, 2020). Increased use of virtual learning platforms in primary and higher education is dependent upon teacher training programs that build teachers' competence to teach with technology. Kilgour et al. (2018) notes that the continued spread of online education has increased the need for knowledge and professional programs that can assist educators through the process of teaching and generating course content. Transitioning to online education requires not only the transfer of courses from the classroom to the online environment, but also consideration of how that environment should be experienced from the viewpoint of the student, as well as how the educator needs to facilitate this.

When it comes to online learning, educators are assaulted with terminologies like online learning, distance learning, remote delivery, engagement, and motivation. Online learning is a subset of distance learning. As highlighted in the literature by Baldwin (2019); Gillett-Swan (2017); Liang (2012) and Ruth (2018), increasing flexibility results in additional alternatives and possibilities but the possibilities and opportunities that come with online education also bring to light a number of issues.

These are issues that must be addressed in order to provide a suitable learning experience for the learner, as well as a good teaching experience for the educators. Education is education, whether it is received online or in person. In order to achieve success in learning techniques, such as pedagogical (child learning) or andragogical (adult learning), commitment to learning strategies is still required, according to (Scoppio & Luyt, 2017). The referral of the word pedagogy seems to have evolved from the traditional referral of 'pedagogy' in terms of its initial meaning as instruction for children. The term pedagogy is used these days to refer to teaching theory and methods in general, as is evident from many articles in the literature (Gupta, 2021; Pathak, 2022; Picciano, 2017; Y.-L. Wu, 2015). In this dissertation, the term pedagogy will thus also be used as an all-encompassing term.

Pedagogy is the same whether it is used in a traditional classroom setting or in an online learning environment. However, these pedagogical theories

can and have been adapted for online delivery modes and referred to as 'online pedagogy'. Online pedagogy is a theory, method, or strategy for teaching that helps and supports the delivery of online education in an online learning environment by using technology and digital ways to communicate.

Effective online pedagogy prioritises student-centered learning and needs to incorporate active learning activities. Student-centered learning environments require student presence, educator presence and effective use of learning activities (Deák, Kumar, Szabó, Nagy, & Szentesi, 2021). Nonetheless, online and blended learning need a different strategy than traditional classroom instruction and face-to-face interactions (Gurley, 2018). The various methods apply not just to learning methodologies but also to 'best practices' in online education, which are discussed below. Best practices are those that are considered to be the most successful. It is defined as follows:

"A method that has been deemed more effective than other alternatives due to the positive outcome produced. A best practice is a technique or methodology that has been shown by experience and/or research to lead to the desired result. Best practices typically gather information from a variety of sources to determine what factors lead to success" (Luscinski, 2017, p.13).

When it comes to their core field, university lecturers mostly have some experience in classroom-based pedagogy. The majority of lecturers base their own classroom approaches on their own learning experiences as undergraduates (Oleson & Hora, 2014). In contrast, when it comes to online learning, most university lecturers are unlikely to have a collection of knowledge and expertise to rely on when it comes to how to teach their courses on the internet (Kerkhoff, 2020; Scoppio & Luyt, 2017) Additionally, instructors are supposed to offer assistance on how to learn, and in the case of online learning, there is sometimes a lack of knowledge in how to execute this task successfully (Martin et al., 2019).

There are several obstacles that educators face while transitioning to online learning that might lead them to be hesitant. There are widespread historical generalisations about the nature of technology education. Educa-

tors who qualified before online learning was so prevalent rely heavily on prior pedagogical experience, and there is a good possibility of gaps in knowledge. In such situations, teachers were not always aware of their need to change, or they had observed failed attempts at change, which made them apprehensive about trying new perspectives or switching back to past practice (Reinsfield, 2020).

For the rising usage of virtual learning platforms in primary and secondary schools to be successful, teacher training programs that develop instructors' ability to teach using technology are required. For added complexity, online education challenges the idea that many students who were born after a specific date are digital natives and do not need instruction on how to study online. It has been shown that this is not a universally true statement (Gillett-Swan, 2017; Warf, 2019). In contrast, the research yielded a diverse variety of outcomes.

For example, students who indicated competency in social media and mobile usage were unable to utilize relevant platforms to upload and share data, create papers, read articles, or use calendars while demonstrating competency in other areas (Blayone et al., 2018; Warf, 2019). Online learning environments may be set up to be a one-on-one teacher-student setting where every activity is logged, or they can be set up to be a totally independent learning experience (de Freitas et al., 2015). While on the one hand, students may consider an online presence between an instructor and a learner as much more engaging and intimate than a traditional classroom setting, this is not always the case (Reese, 2015).

Furthermore, online learning may provide students with entirely independent and self-paced learning settings, but this may cause students to feel anxious and as if they are on their own (Reese, 2015). Joining a physical lecture in a classroom context, for example, may only include one-way communication, but participating in a debate and cooperation using a text-based group messaging system or discussion forum may be quite involved. The ability to participate utilizing various tools that the student may choose from implies that there are a variety of degrees of possible engagement for the learner.

Although interactive freedom allows for more flexibility in learning, the quality of online learning is not necessarily improved by the fact that interactive technology is simply made accessible for usage. When students are allowed total autonomy in situations such as Massive Online Open Courses (MOOCs), dropout rates are often relatively high (van der Sluis et al., 2017; Rõõm et al., 2021). Students' capacity to participate in total autonomous learning by allowing them to proceed at their own speed may be compromised due to this freedom, as may the educator's ability to detect a lack of progression.

If student advancement and engagement are not recorded, it is possible that students may drop out before an instructor can intervene (van der Sluis et al., 2017). This is in contrast to research that has shown that opening up material and activities that are mandatory as soon as possible for as long as feasible helps to relieve student tension and leads to better performance in the long run (Muir et al., 2019).

Students may simply choose not to engage in the course because they do not have a basic grasp of the environment, what is required of them, and what to anticipate from the course's presentation. To have a pleasant and engaging online learning experience, the student must be prepared for online learning (Dumford & Miller, 2018; Keskin & Yurdugül, 2020).

2.3 The Technology Acceptance Model

Another aspect that might have a significant impact on the learning experience is the student's desire to interact with the technologies that are being employed. It is commonly accepted that people will utilize technology. The technology acceptance model (TAM), figure 2.1, is one model that may be used to explain why this is likely to happen.

The technology acceptance model (TAM) is a popular model for explaining how likely humans are to adopt technology. Three variables influence the possibility of technological acceptance in TAM. First, consider the perceived utility of the technology, simplicity of use, and attitude toward using the technology (Taherdoost, 2018). Due to its validity, simplicity, and predictive ability in research, including a vast array of information systems, TAM has

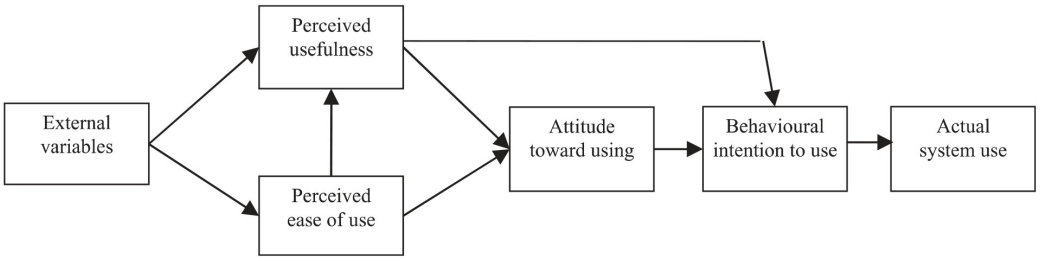

Figure 2.1: The technology acceptance model

(Davis, 1989).

arguably become the most common technology acceptance theory (Tao, Fu, Wang, Zhang, & Qu, 2022).

While *perceived ease of use* directly influences perceived usefulness and attitude toward technology use, which has an indirect effect on behavioural intention to use technology, *perceived usefulness* directly influences attitude toward technology use (Davis, 1989). If a user *believes* technology to be hard or difficult, the TAM model predicts that they will be less likely to engage and participate (B. Wu & Chen, 2017). Perceived ease of use and perceived usefulness are essential components of a customer's adoption of technology (Davis, 1989). If the technology is useful and seems easy to use, there will be more of a likelihood that the user would accept the technology. According to the TAM model, if consumers believe technology to be confusing or difficult, they will be hesitant to engage and participate (B. Wu & Chen, 2017).

Educators can boost perceived ease of use while also raising perceived usefulness by introducing students to a low-risk, high-reward activity early on. Creating methods to assist students in overcoming false learning boundaries will allow them to focus on the actual subject of study. Educators want direction on how to expose students to a new environment in an engaging and encouraging manner (Scoppio & Luyt, 2017). The approach must present the necessary pieces to familiarise the learner with the layout and evaluation technique while also creating an environment that fosters engagement and continuing. Student orientation and induction are critical components in this regard (Brunton, Brown, Costello, & Farrell, 2018).

Therefore, by introducing students to a low-risk, high-reward activity upfront, educators could remove the perceived barrier of entry so that students perceive and experience ease of use. Educators that have to implement courses need some form of guidance that can introduce the student to an environment in an engaging and motivating way (Scoppio & Luyt, 2017).

The process must introduce the necessary elements to familiarise the student with the layout and assessment strategy, creating an environment that encourages engagement and continuation. Another factor to consider is how technology is used and configured within the learning environment. Technology is frequently used without regard for how it improves student learning. Educators' inadequacy in digital content and students' lack of adaptation could significantly diminish learning motivation in digital classrooms and could lead to high dropout rates (Deák et al., 2021).

Professor Richard E. Mayer, who is a Professor of Psychology at the University of California, discusses in his book Multimedia Learning, the issues with how the potential of learning technologies can be a distraction if implemented incorrectly. He writes:

> *"What went wrong with these technologies that seemed poised to tap the potential of visual and worldwide learning? I attribute the disappointing results to the technology-centered approach taken by the promoters. Instead of adapting technology to fit the needs of human learners, humans were forced to adapt to the demands of cutting-edge technologies. The driving force behind the implementations was the power of the technology rather than an interest in promoting human cognition. The focus was on giving people access to the latest technology rather than on helping people to learn through the aid" (Mayer, 2009, pp.14).*

With the advent of so many technologies, the learner is perhaps, indeed, left battling with the different aspects of different technologies, and thus distracting from the learning material. Due to the myriad of modalities that online teaching brings there has been the development and adoption of numerous learning theories and concepts. Some are seemingly more successful than others.

2.4 Applicable Learning Design Models and Concepts

The primary objective of covering design models and concepts in this section is to draw attention to the fact that many methods were considered and used in the development of the LXID framework, in addition to the success and challenge factors considered in online learning. When reviewing the literature, a number of applicable design models and concepts for establishing a framework emerged, which are discussed below. The theoretical foundation of this section is made up of models from various domains, specifically learning design models and design concepts. The LXID framework was created using models and concepts from the educational, information technology, web development, and user experience design disciplines, as well as expert verification.

Online learning platforms operate under the fundamental premise that they are usable. Ensuring that the educator has a solid understanding of how a learner might utilise and interact with technologies like an LMS, when developing a course, is a key component of this thesis. This is based on the idea that a learner who is familiar and comfortable with the overall learning process will learn more effectively. Therefore, it is important to take usability and user experience (UX) design into account in addition to instructional design and learning concepts.

Applicable to instructional design, the ADDIE model, four-component instructional design, design thinking and understanding by design will be discussed. These instructional design models all lend themselves to be valid and useful when educators design online learning instruction. Furthermore, the ARCS-V motivational model and Bloom's taxonomy will be discussed. In the case of ARCS-V, the model can be applied to enhance engagement and motivation in the learner. Bloom's taxonomy is one of the most well-known and used methods of categorising educational learning objectives.

Interaction design and personas are two other applicable methods from the user experience design methods that will be discussed in this section.

Interaction design and personas are key elements in UX design and can be useful and applicable to course development, especially in the initial phases of online course design.

2.5 User Experience Design Methods

Numerous user experience design approaches are applied when designing for online and offline everyday interactions. This section will examine Usability and Personas in relation to the development of an online course

2.5.1 Interaction design

The utility and usability of a design depend on its adaptability to the particular demands and situations of its intended users. The interaction design should guarantee that users can complete activities as quickly and easily as possible, thereby increasing productivity. Interaction design must develop and maintain interest. When the user believes that the interface is natural to use and appropriate for the topic at hand, they will be comfortable using the technology.

The simplicity of understanding where and why particular interactions occur is a factor that must be examined according to Alshehri, Rutter, and Smith (2019). First-time users may easily attain their objectives, and repeated use will make activities and objectives simpler. On their first engagement with an interface, users should be able to fulfill their goals without consulting other resources or relying on the expertise of specialists. Important variables like how to utilise and traverse the LMS's navigation and interaction elements play a big role in the creating an experience where the student can focus on the subject matter instead of struggling with the technology (Alshehri et al., 2019).

A design that is highly useful directs people to the path that requires the least amount of work and effort overall. Therefore, instructors must have a full awareness of the student's operating environment. To accomplish this, the educator must evaluate the student's potential limitations, such as the

nature of their environment, the probability of distractions, and the amount of mental effort necessary to complete a specific activity. Understanding people's sensitivities, such as ageing, is equally as vital as understanding how to build their skills. Awareness of cultural variations is also a crucial aspect of interaction and interface design, particularly for products aimed at varied user groups from different nations. Examples of cultural differences include the usage of different dates and times in various nations. In the United States, the date is written as month, day, and year, although in other countries it may be written as day, month, and year. (Sharp, Preece, & Rogers, 2019).

2.5.2 Personas

Creating user personas can aid user experience (UX) designers in facilitating a better user experience. Personas are usually archetypes of users created by combining research data and insights from interviews, surveys, and user testing. Personas can also be designed from existing data. A persona is a fictional yet realistic description of the product's typical or intended user. This persona is a template of a comprehensive synthesis of key characteristics, habits, interests, wants, aims, and obstacles of a typical user, client or student.

The persona is characterised by a name, typical gender, age range, and other fundamental demographic information. Personas help UX designers to better understand their users and design for them more effectively. They allow designers to think about the needs of their users, prioritize features, and create a better user experience. Personas also help designers to identify and solve issues from the user's perspective, and to create a unified design strategy. By creating personas, UX designers can create better products for their users.

An important use for personas in education and course design is to create an understanding of the audience that will be participating in the course. A persona is the epitome of a user rather than a real person, but it should be described as if it were a real person. The description should include specifics about the persona's needs, concerns, and objectives, as well as background information such as age, gender, behaviours, and occupation (Kopacz, 2022).

Focusing on a single individual, or a small group of individuals if using multiple personas, fosters empathy for the particular users the educator could be designing for. An organisation will likely have multiple personas to represent users of the various areas of their business, with one or two personas identified as the primary targets for each product or service, feature set, or content area on a website (Harley, 2015). It is important to base personas on current factual information.

By creating personas, UX designers can create better products for their users. Personas can be used in education in the following manner:

- Personas can help educators to understand their students better. By understanding the needs and wants of their students, educators can create a better learning experience (Haag & Marsden, 2019; Baaki, Maddrell, & Stauffer, 2017).
- Personas can help educators to create lessons and materials that are tailored to the individual student (Baaki et al., 2017).
- Personas can help educators to create a better user experience in their online courses. They can institute changes in the LMS environment and materials that will better serve their students (Baaki et al., 2017).
- Personas can help educators to better distinguish between students' individual needs and wants. This can help them create a more personalized learning experience and help empathise with the student's needs (Haag & Marsden, 2019).

In their paper 'Quantitative Evaluation of Personas as Information' Chapman, Love, Milham, ElRif, and Alford (2008) cautions that authors designing personas should anticipate that a description with a large number of qualities identified from the information used, could have a relatively low prevalence for actual persons. Consequently, the informational content and population relevance of personas must be evaluated and not merely assumed. Personas require empirical data to support claims that they convey accurate information about groups of individuals.

With this in mind, an online educational institution would also have a few depictions of the typical student that can be used as a persona. A persona does not need to document every aspect of the fictitious person's life; rather, it should focus on the characteristics that have an impact on the design. When creating personas, the course developer or instructional designer also needs to look at specific touch points of that of a learner as they will engage with the learner management system and educator. Developing personas of the typical learner that will be taking the courses would help in making more educated observations and assumptions when developing a course.

2.5.3 Instructional design: Applicable common models

Instructional design plays a key role in the development of online learning content and learning activities. In instructional design (ID) the principles are founded on learning theory and extend across age groups, settings, skill levels, and content domains. ID is a methodical distillation of best practices in curriculum design and strategies. Furthermore, ID emphasises deliberately selecting learning events that contribute to the attainment of learning objectives. ID promotes learning by including structured, logically grounded educational activities and practices that promote student engagement, learning, and achievement.

This section discusses some popular instructional design models that are applicable to online course design namely ADDIE, design thinking model, and understanding by design. There are a myriad of models available and seemingly emerging every year. This is not an exhaustive list but allows for different approaches in designing courses for online delivery. These theories and models can be applied by educators to consistently design online courses.

ADDIE Model

Although numerous ID models and approaches have been established, they all involve the key parts of research, design, development, implementation, and evaluation (ADDIE) to guarantee consistency between the goals, strategies, assessment, and effectiveness of the subsequent instructions (Alsaleh,

2020). The ADDIE model is one of the most often used models in instructional design that prescribe the generic, systematic, dynamic, and adaptable instructional design approach, which is frequently employed in instructional design for effective learning. It assists instructional designers and teachers in developing efficient and successful instructional content by applying the ADDIE model's procedures to any educational product.

The ability of ADDIE to be both descriptive and prescriptive is one of its strongest features. ADDIE is a descriptive method as it reveals relationships and depicts what happens during a process. It is also an interactive method because it explains and provides checks for the instructional designer at each step. Furthermore, it's adaptable to almost any development scenario. ADDIE receives criticism for being somewhat less flexible than more modern models. Often times additional considerations such as rapid prototyping should be considered by instructional designers in addition to following the ADDIE model (Branch, 2009).

Design Thinking Model

Initially, design thinking refers to the concept of a human-centered approach. Thus, design thinking in education emphasises the need for instructional designers and educators to prioritise their students' needs. Human observations, feedback interviews, brainstorming, and prototype creation are prioritised in design thinking before content writing tools and learning management systems. The five progressive stages of design thinking are empathy, define, ideate, prototype and test. The design thinking paradigm creates online learning content that is tailored to the student using these learner-centered techniques (Girgin, 2021).

At its core, design thinking is a problem-solving strategy that allows you to identify a challenge or issue that a learner or organisation is experiencing and reach an agreement on how that problem may be addressed in the online environment. It is not a 'cookie-cutter' learning experience since each online learning delivery is tailored to the audience's preferences and needs.

In many respects, design thinking in online learning is a mindset that e-learning practitioners must cultivate. To develop a memorable and effective

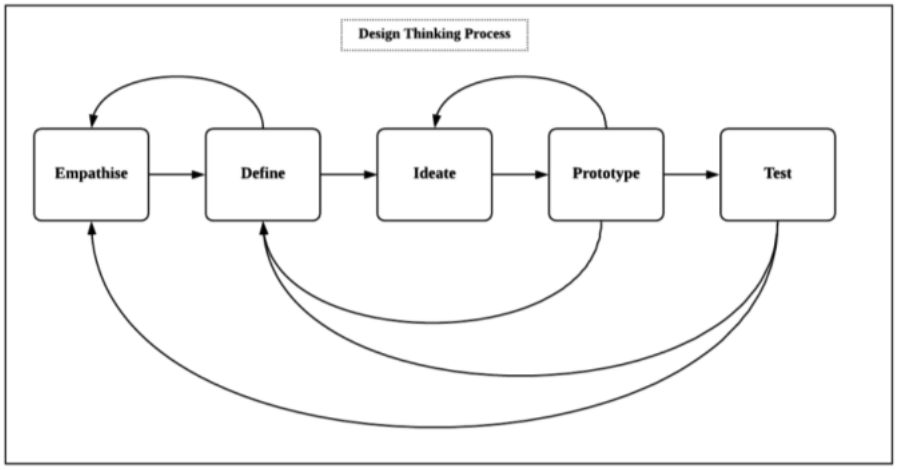

Figure 2.2: Design thinking

(Shé, Farrell, Brunton, & Costello, 2022).

online learning deliverable, the educator must be able to see an issue through the perspective of the learner (Shé et al., 2022).

Understanding by Design (UbD) Model

According to Lumbreras and Rupley (2020), understanding by design is a 'backward design' methodology for developing courses and content modules. understanding by design (UbD), has been identified as an effective planning tool for providing results-based, student-centered learning experiences. UbD, which seeks for students to comprehend the content and apply or transfer what they have learned to different contexts, provides a robust assessment-oriented design framework for curriculum developers to create their programs systematically and thoughtfully (Uluçinar, 2021).

UbD uses three main stages for accomplishing a backward design. Firstly it focuses on identifying desired results. Secondly, consider assessments based on learning activities by analyzing multiple sources of data. This stage is intended to excite the students' current knowledge, encourage them to seek out new ideas, pique their curiosity and interest, and encourage their participation in the activities. Thirdly, determining an appropriate action plan to achieve the predetermined desired learning results (Dack & Merlin-Knoblich, 2019; Lumbreras & Rupley, 2020).

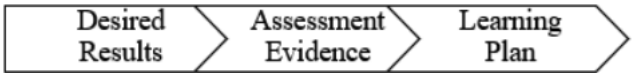

Figure 2.3: Understanding by design

(Shé et al., 2022)

2.5.4 ARCS-V Model

The ARCS-V model (an acronym for attention, relevance, confidence, satisfaction, and volition) is a combination of motivational and volitional principles and theories that serves as the framework for a verified motivational design process (Keller, 2016). The attention category places an emphasis on attracting the attention of the learners and retaining their engagement throughout the course. The relevance category is concerned with the process of establishing necessary connections between the experiences of the learners and the instruction that is currently being provided. The confidence category focuses on providing the students with support as they work toward the achievement of their goals and the development of optimistic expectations. The satisfaction category is associated with the feelings that the learners experience following the class or learning activity and maintaining their motivation to learn, and the volition component is concerned with the intrinsic drive to successfully complete the activities or course. ARCS-V can enhance educator understanding of learner motivational aspects when developing online courses.

2.5.5 Bloom's Taxonomy

Bloom's taxonomy, figure 2.4, is one of the best-known and most widely used frameworks for categorising educational learning objectives according to their complexity and specificity. Bloom's revised taxonomy of six categories: (1) remember, (2) understand, (3) apply, (4) analyse, (5) evaluate, and (6) create.

There are quantifiable learning objectives for each category that indicate what the learner will accomplish after the learning is completed. The categories are arranged in descending order of complexity, with remembering being the most basic and creating the most complicated.

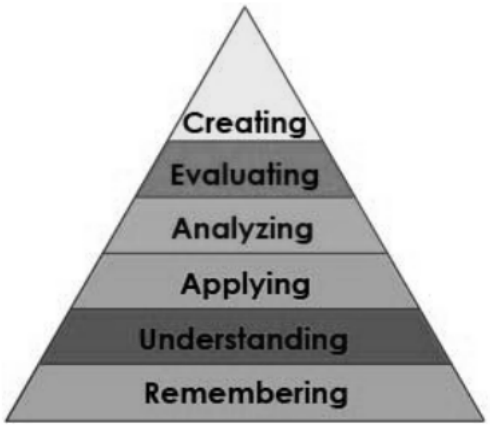

Figure 2.4: The Bloom's taxonomy triangle

(Phillips, Klein, Dunne, & Siriwardena, 2019).

Students must be able to accomplish all of the preceding categories before they may progress to higher levels of Bloom's taxonomy (Phillips et al., 2019).

2.6 Threshold Concepts

The premise behind threshold concepts is that there are key stages in the process of learning. These key stages are defined as the possibility to experience unpleasant or distressing sections of learning that produce anxiety and uncertainty. Threshold concepts play a significant role in the individual halting or discovering new information (Kilgour et al., 2018).

Threshold concepts may present educators with a beneficial method of thinking about the obstacles a student may have in acquiring critical, hard-to-understand information. A threshold concept defines topics and concepts that are critical to optimal knowledge acquisition (Morley, 2020). Threshold concepts could be thought of as learning objectives. Threshold concepts are similar to learning objectives in that they can serve as a focal point for curriculum development and as a means to assess student learning. In contrast to learning objectives, threshold concepts are gates to student comprehension that, once passed, reshape the learner's understanding. Understanding the attributes of threshold concepts can have a significant impact on the structure and design of curricula, as well as on the establishment of effective

learning and teaching environments (Kallia & Sentance, 2021).

An interesting way to think about threshold concepts in the area of designing online courses is that threshold concepts could not only show up in the course topics for students. Threshold concepts could also present themselves to the educator having to relocate their courses online. This means that there are layers of thresholds that educators and students possibly need to overcome in online education.

To assist inexperienced online educators build confidence and competence, it is essential for them to comprehend the threshold concepts they will experience when they begin to teach online (Kilgour et al., 2018). However, according to Kilgour et al. (2018) past research has not yet studied online pedagogy's threshold notions in great detail. Moreover, applying the notion of threshold concepts to teachers as learners is an emerging topic of study that may be utilised in a higher education environment to construct a successful curriculum for the professional development of new online instructors (Kilgour et al., 2018).

Studies undertaken in the past have shown that students who suffer from anxiety frequently have higher levels of anxiety at the beginning of the course and that their anxiety levels often decrease as the course goes on and as they get more experience in the learning environment (Abdous, 2019; Amushigamo et al., 2018; Muir et al., 2019). This could also be the case why there are high dropout rates in the first two weeks presented in MOOC courses as shown by findings (Rõõm et al., 2021). As a result, it is plausible to suggest that having some kind of induction procedure for online classroom settings is essential.

A further consideration is that an induction procedure of this kind would need to be tailored to the approach taken in a particular course, since the modalities, course requirements, learning management system, user interfaces, and technologies used may change from course to course. The capacity to learn online may be influenced by a variety of underlying elements, all of which play a significant effect on the learners' ability to complete the course online (Gray & DiLoreto, 2016). Learning experiences are influenced by a variety of factors including intrinsic motivation, self-efficacy, knowledge of

past learning, specialized technical abilities such as manipulation of streaming video and online browsers, computer and gadget literacy, and many other factors (B. Wu & Chen, 2017; K. Li & Keller, 2018).

2.6.1 Artificial Learning Thresholds

Identifying the learning thresholds of online educators has the potential to aid novice academics involved in the preparation of resources and instruction because the process of identifying the learning thresholds of such staff can provide direction for professional development. The identification of learning thresholds requires the creation of a framework and standards (Wilson, Williams, Long, & Northcote, 2017). Learning thresholds are divided into two types.

The first of them concerns thresholds that require the student to possess a specific amount of preparatory knowledge. These limits are built into the subject discipline. The second form of learning threshold, on the other hand, is artificial in the sense that it provides a barrier to learning that is unrelated to the subject matter. For instance, unfamiliarity with a specific web component, visual element or application.

These learning thresholds might result in a variety of obstacles for students participating in the same course. This research focuses on the second category of threshold notions. These learning thresholds can impede students from participating in the subject and create obstacles that are perhaps introduced artificially in the LMS, content or interaction elements, and these should not exist as they impede the student from focusing on the actual learning content. When a student starts a new course or starts learning on a new platform, these thresholds could be encountered and act as a barrier to learning. These thresholds were termed artificial learning thresholds (ALT's) in this research.

Artificial learning thresholds are referring to extrinsic and germane thresholds that are introduced. Overcoming ALT's is critical in solving the extrinsic challenges a student might face. The educator will therefore need to implement effective learning and teaching methods to overcome the identified artificial learning thresholds. As a result of assumptions about the learner's

skills and abilities, learning thresholds are typically generated in areas outside of the course topic. For example, an instructor may mistakenly believe that a student is a 'digital native' who will know how to submit a file to an LMS. Because of the technology provided in the course, these assumptions may result in a learning threshold for the learner (VanOostveen, Desjardins, & Bullock, 2019). Digital competence is unquestionably one of the most important skills that students and teachers must possess. Digital competence or digital skills refers to the skills and knowledge needed to use information and communication technologies efficiently (Tomczyk, 2021).

Previous studies have found that when a course begins, students experience increased anxiety. However, when they get more expertise in the research area, their anxiety decreases (Amushigamo et al., 2018; Muir et al., 2019). An introduction procedure for online learning settings can be critical to student success. However, such an introduction procedure should be tailored to each course, as modalities, course needs, learner management systems, user interfaces, and technology may change. The capacity to study online can be influenced by a variety of circumstances, including the learners' ability to complete the course online (Gray & DiLoreto, 2016).

Intrinsic motivation, self-efficacy, knowledge of prior learning, specialised technical abilities such as manipulation of streaming video, online browsers, computer and gadget literacy, and so on might all have an impact on the quality of the learning experience (B. Wu & Chen, 2017; K. Li & Keller, 2018). It is shown that students could also overestimate their digital competency skills (Tomczyk, 2021). A false sense of digital skill competency in students could also cause ALTs after the first encounter with the LMS and assessments. Another element that might create an ALT is the student's level of willingness to participate in the technologies chosen and implemented.

The technology acceptance model (TAM) is a popular model for explaining how likely humans are to adopt technology. Three variables influence the possibility of technological acceptance in TAM. Consider the perceived utility of the technology, simplicity of use, and attitude toward utilising the technology (Taherdoost, 2018). According to the TAM model, if consumers believe technology to be confusing or difficult, they will be hesitant to engage

and participate (B. Wu & Chen, 2017). Educators can boost perceived ease of use while also raising perceived usefulness by introducing students to a low-risk, high-reward activity early on. Creating methods to assist students in overcoming false learning boundaries will allow them to focus on the actual subject of study. Educators want direction on how to expose students to a new environment in an engaging and encouraging manner (Scoppio & Luyt, 2017). The approach must present the necessary pieces to familiarise the learner with the layout and evaluation technique while also creating an environment that fosters engagement and continuing. Student orientation and induction are critical components in this regard (Brunton et al., 2018).

Identifying ALTs is challenging, especially when creating a course for the first time. The approach to be utilised in developing an online course and the individuals that must be involved are two of the most fundamental factors. A good approach for determining learning thresholds in this regard, has yet to be discovered (Kallia & Sentance, 2021). However, the researcher believes that a pragmatic framework for exposing students to online learning in a motivating manner and overcoming ALTs could be developed.

2.7 Conclusion

The chapter introduced relevant literature that lead to the development of the learning experience induction design (LXID) framework that will be presented in chapter 4. The literature review looked at and discussed factors that make online learning useful and contemporary in our society today. However, online learning does not come without its pitfalls and challenges. This is especially true in the case where educators are quickly rushed and expected to move physical classroom-based courses to online delivery. Online pedagogy is pedagogy whether in the classroom or not, however, the online delivery model and course design are distinct.

The availability of e-learning platforms and systems results in several educational advantages. In addition, there is a link between the success of e-learning environments and their capacity to meet their objectives in terms of their usability, learners' views of its anticipated advantages, and the en-

suing enjoyment of learning. Previous research has highlighted the need of establishing predictive models and conceptual frameworks to investigate the aspects and factors that predict usability in online learning (El-aasar & Farghali, 2022). In addition, relevant theories and concepts from instructional design and instructional design models, as well as the ARCS-V motivational model and Bloom's taxonomy, were discussed throughout this review.

In addition, it was discovered that threshold concepts are an important factor in learning. However, according to the research, technology acceptability influences how the learning experience is perceived. If the parts of the learning platform that the student interacts with and has to use are hard to understand, the student may focus more on the problems with the systems and interactions than on the content of the topic. This could introduce artificially created barriers to learning the subject content and cause anxiety, a lack of engagement, and a lack of motivation. Drawing on learning thresholds and the technology acceptance model (TAM), this research termed these artificial barriers, artificial learning thresholds (ALT's) and established them as possible significant obstacles to online learning.

The interplay of the concepts discussed will play an important role in developing the LXID framework, as discussed in chapter 4, as a method to lower or remove ALT's for the online learner.

Chapter 3

Research Process

3.1 Problem Statement

Threshold concepts show that there are barriers to entry for educators and students that must be overcome. Many educators lack formal online pedagogical training and, therefore, do not have the necessary theoretical background to design courses that will teach learners how to study online. Furthermore, they may lack personal experience with learning online. Educators create courses based on physical classroom experience rather than online learning experience, creating artificial learning thresholds for students. This leads to a lack of confidence, less motivation, higher anxiety levels, and unneeded time spent focusing on barriers to learning.

As far as could be determined, no current framework exists that introduces educators to methods of how to create suitable induction methods for their online courses to equip students with the necessary skills and competencies to make effective use of their specific online course.

3.2 Thesis Statement

A suitable induction course, introducing students to the online learning environment for a specific course, will lower the artificial learning thresholds experienced by the students and thereby decrease anxiety and improve student motivation and engagement.

3.3 Research Questions

The primary research questions discussed in chapter 1.4 are: *How should educators design online induction courses to familiarise the students with the requirements of the online learning environment?*

3.4 Research Objectives

The primary research objective of this study is to propose a framework that can guide educators in designing an online induction course. The induction course aims to familiarise the student with the learning environment's requirements and equip them with the needed skills and competencies to overcome identified learning thresholds. Secondary research objectives for this study include determining whether a framework of this type can be useful for educators to follow and use in online learning courses.

3.5 Research Design and Methodology

All research begins with philosophical assumptions (Collins & Hussey, 2003). Even if the researcher is unaware of these assumptions, they still exist. Every person has a certain world view or ontology, and to a certain extent, this world view will influence their research. The choice of a research paradigm and methodology will also be influenced by this worldview. This research was conducted using a design-science paradigm. Hevner, March, Park, and Ram (Hevner et al., 2004) provided seven guidelines for how this kind of research should be done. This section details how this research adheres to the suggested requirements for each guideline.

Design as an artefact: The suggested framework meets all requirements for a produced artefact, as suggested by (Hevner, March, Park, & Ram, 2004)

Problem relevance: The relevance of the research topic was established in this paper's introduction. Online education has become an integral method of delivery for the majority of institutions. The need to ensure that all students possess the necessary competencies to benefit from this kind of instruction

should be evident.

Design evaluations: The framework proposed in this research has been used in a production environment at a leading vocational college in Norway to guide the creation and refinement of online induction courses. Both the framework and the induction courses were used and evaluated over several iterations. However, the specific evaluation is about the perceived usefulness of the framework from an educator's perspective and is based on the LXID framework presented in this dissertation.

Research contributions: The framework itself, which meets the requirements of a research artifact as described by (Hevner et al., 2004), is the primary contribution of this research.

Research rigour: As mentioned under the guideline for evaluation, an iterative design process was followed. This process is typical for projects of this nature.

Design as a search process: This guideline requires that the artefact's creation is designed using an iterative 'searching' process. The research spanned several iterations during which the design was continuously improved and refined, which satisfies this requirement.

Communication of research: The produced framework has been distributed in the researcher's organisation to assist lecturing staff with the design of induction courses. This paper is the first step towards more formal communication of the research.

3.6 The Learning Experience Induction Design Framework

Using theory gathered during the literature reviews as a guide, a framework was developed to guide educators on how to implement an online course in an LMS that introduces a student to the learning environment and course,

to increase motivation by familiarising the learner with the delivery model. The aim of the learning experience design (LXID) framework is to decrease study anxiety and lower artificial learning thresholds (ALT's).

3.7 Proof of Concept Prototype

The proof of concept work on the LXID framework had specific design decisions that were made based on the realities of the online environment for which it was developed. The goal of design science is utility, as stated by Hevner et al. (2004). The output of the design science methodology was the major proof of concept.

The proof of concept was developed based on the initial literature review and methods discovered for developing online courses. Using the 'design as a search' process, the guideline requires that the artefact's creation is designed using an iterative 'searching' process. The research on developing the framework spanned several iterations, as shown in figure 3.1, during which the design was continuously improved and refined through several rapid prototype sessions, which satisfies this requirement. Thereafter, a proof of concept induction course based on the framework was implemented in a re-developed Network and IT Security course, and a new Back-end Development programming course within an online production environment of a large education institution in Norway. The decision to test the utility in both instances was based on establishing the framework as a useful artefact in both newly developed courses and courses that might already be online but could have pre-existing ALT's.

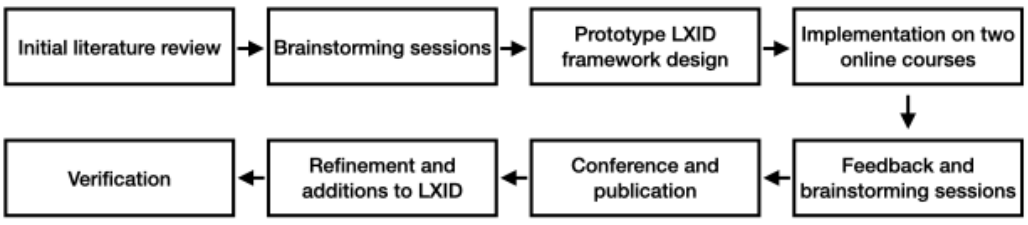

Figure 3.1: The iterative design process that led to the LXID framework.

The prototype framework was created and modified using rapid prototype

development and an iterative design cycle process. As stated by Hevner et al. (2004) and discussed in section 3.5, iterative prototyping sessions are typical of Hevner's Design Science process. There were several techniques used in the development of the LXID framework. Rapid prototyping consisted of initial concept development based on the literature review. Following this, brainstorming sessions were held by several members of an online educational team that were responsible for developing and delivering the courses mentioned in an online environment. There were many rapid prototype sessions held to establish the first established concept.

One of the areas that proved to be slightly problematic was that of the initial learner knowledge. In other words, how does the educator know what the typical learner knows and has to know? In many cases, the educators could draw from previous experience of what students have asked or they themselves had knowledge or experience of. This is aligned with the literature that shows educators teach the way they were taught, as discussed in chapter 2. The educators who had not previously taught online or in the same environment did not have this tacit knowledge. This led to the establishment of the student persona during initial course development.

Informing these sessions were the concepts of student personas derived from user experience design concepts, as discussed in 2.5.2. These personas were created where possible, based on actual data that the educational institution had on the student at course sign-up. The educators in the brainstorming teams that have previous experience could also draw from tacit knowledge if they have already delivered a course in the environment or, used the same LMS that the course will be delivered on.

Those educators who did not, on the other hand, could now draw knowledge from data derived from the establishment and the development of the 'typical student' persona. The student persona also helped the educators with previous tacit knowledge to develop new thoughts in the brainstorming sessions. A common issue that came up was the use of specific LMS interface areas that were not obvious. A simple demonstrative example of this is discussed in the section 4.2.2.

3.8 Expert Reviews

After the proof of concept was established, the framework needed to go through a verification process to ensure that it could be useful for educators in designing online induction courses to lower ALTS and familiarize students with online learning environments. The initial work was developed and iterated upon, presented at the 20th European Conference on E-Learning, and published in a double blind peer reviewed journal (DOI: 10.34190/EEL.21.124), Appendix A. Following the publication, work continued further, and the framework was iterated upon.

A survey was used as an instrument, and expert educators and instructional designers were asked to participate and record their feedback on the LXID framework. The participants in the expert reviews were selected using a purposive and convenience approach to sampling (Robinson, 2014). Firstly, a convenience sample is a sample that is "available to the researcher by means of its accessibility" (Bryman & Bell, 2012, p. 190) Secondly, a purposive sample is one where participants are specifically selected "so that those sampled are relevant to the research questions that are being posed" (Bryman & Bell, 2012, p. 442). The research approached various instructional designers and online educators with at least three years of experience in online education (purposive) to whom the researcher has access through professional relationships (convenience) and requested voluntary participation.

3.9 Feedback Data Verification

To verify the proof of concept, an analysis of standardised educator feedback data from a survey was performed in order to establish if, by following the framework, the educator finds that it has a perceived usefulness in constructing a course that lowers barriers of entry to online learning, increases motivation, and decreases study anxiety in the learner.

As discussed in chapter 5, the verification of the framework was done using a triangulated development approach, shown in figure 5.1, encompassing a literature review that guided the framework development, which led to a

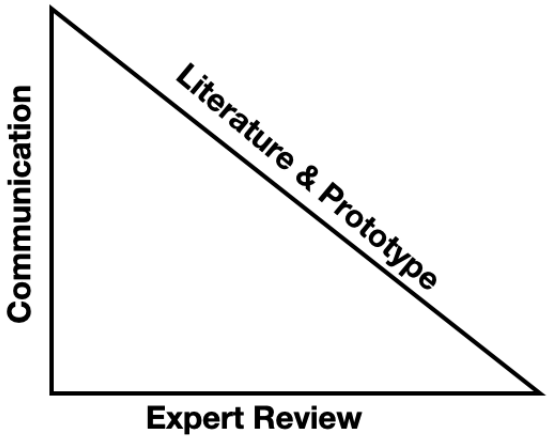

Figure 3.2: Triangulated design process

conceptual framework prototype. The prototype was tested and further verified by an expert review process. The third part of the triangulated design process is the communication of the artefact. The triangulated development process tested the concept and utility of the framework and communicated the result. As discussed in the design science process, testing rigour is solidly grounded in the literature, and mechanisms such as personas, ARCS-V and TAM demonstrate that the constructed framework is validated further by the expert review.

3.10 Framework Results

Using feedback from the findings, the framework was modified where necessary to increase clarity or enhance usefulness.

3.11 Conclusion

This section presented the research process in developing the LXID framework. The research questions were presented and the triangulated design process that was discussed namely the literature review, the proof of concept prototyping and expert reviews. The triangulated design process was chosen to align with the design as an artefact approach by (Hevner et al., 2004).

In the next chapter the LXID framework will be presented and each step will be discussed in more detail.

Chapter 4

Framework Development

4.1 Introduction

This chapter introduces the Learning Experience Induction Design (LXID) framework. As discussed in section 3.1, the problem that this research addresses is to guide educators in implementing courses that can decrease artificial learning thresholds (ALTs), lowering the barriers learners might experience or perceive in an online course. Doing so can increase motivation and engagement and also decrease anxiety in the learner. This led to identifying questions, as discussed in section 1.4. The LXID framework establishes a method to design and create courses that lowers the ALTs in any online course.

This is done by following the framework to set up an induction course before the student enters the course with the actual topic and starts the learning activities. In order to lower ALTs, the framework can be followed in order to develop an experience that mimics and lets the student practice activities and elements where they may gain knowledge and skill to interact with the course LMS and material. Therefore, by building a course using the LXID framework, the educator can identify, remedy, or have the learner practice elements that could lower motivation by causing a lack of engagement and a feeling of anxiety when studying online.

Threshold concepts show that there are barriers to entry for educators and students. Many educators lack formal online pedagogical training and, therefore, do not have the necessary theoretical background to design courses that

will teach learners how to study online (Brunton et al., 2018). Furthermore, they may lack personal experience with learning online. Educators create courses based on physical classroom experience rather than online learning experience, resulting in artificial learning thresholds for students. As far as could be determined, no current framework exists that introduces educators to methods of how to create suitable induction methods to their online courses that can equip students with the necessary skills and competencies to make effective use of an online course. With the correct approach to setting up and designing courses, educators can prepare online students for the workforce by cultivating adaptive learners that are experienced in 'learning to learn' in a digital environment utilizing current and emerging technologies.

4.2 Presentation of Framework

The following section will present the framework concept, framework design, then discuss a simple example of a typical case that causes ALTs and how the LXID can be used to address these challenges. An overview diagram of the LXID framework is presented in figure 4.1. This flow diagram summarizes the concept that is introduced in Section 4.2.1, and is then used in Section 4.2.2 to frame the systematic discussion of each individual framework component.

4.2.1 Conceptual framework

Educators must ensure that students have a sufficient understanding of the learning environment and the tools needed to engage in their studies. Students will have varying levels of digital proficiency. A digital competency may also be less effective in a different environment or in an environment that has non-standard ways of presenting content, navigation, or functionality. To evaluate the knowledge of the environment, there needs to be a way to gauge the skills and competency gaps in a non-intimidating way. This is a key factor in overcoming ALTs that may exist, building confidence in the student, and creating a positive learning experience (Keller, 2016).

Conducting a learning experience design necessitates considering current learning skills, competency, and capability when formulating the design. The

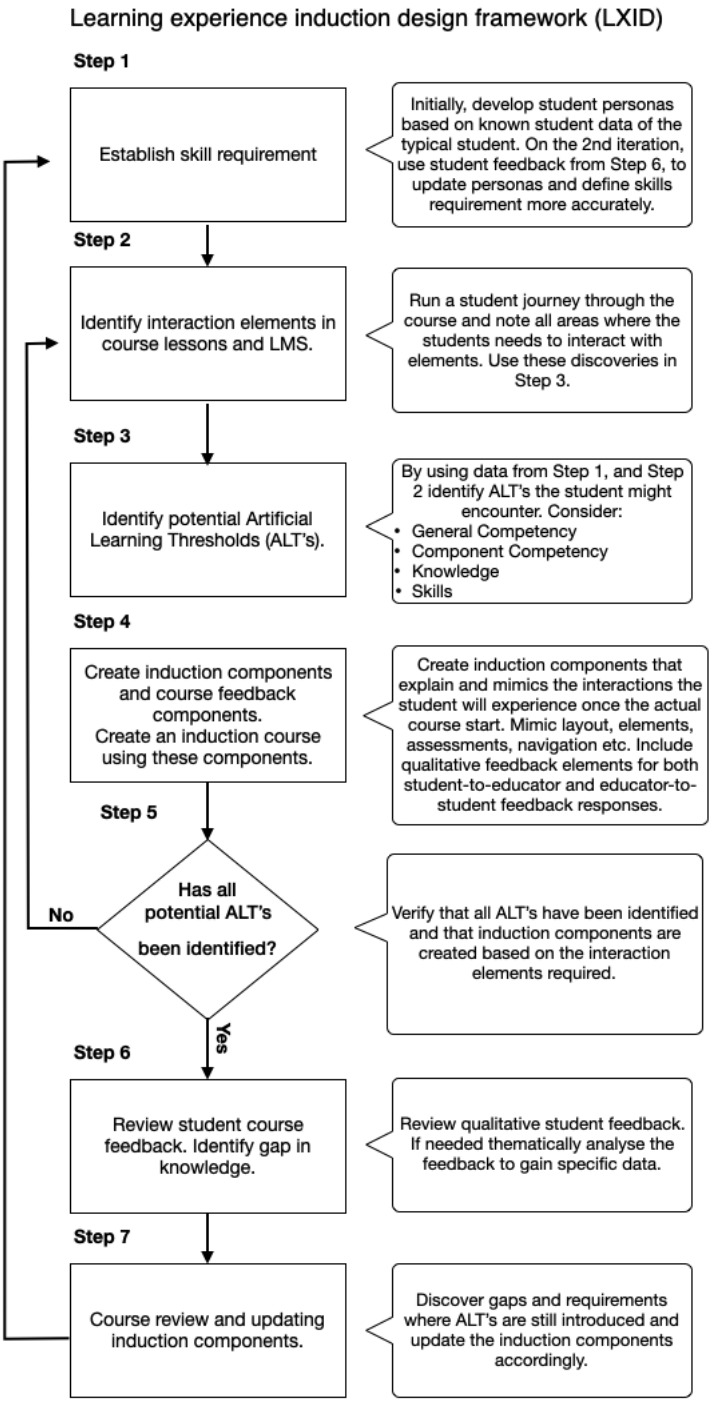

Figure 4.1: Learning experience induction design framework (LXID framework).

design of learning experiences combines multiple design disciplines and the field of education. Learning experience design incorporates interaction design, user experience design, graphic design, and game design. These design

approaches are combined with educational, training, and development principles, instructional design, cognitive psychology, and neuroscience (Picciano, 2017). Without high-fidelity prototyping or live site usability testing, it will be difficult to develop all the potential ALTs that the environment could contain when the course is first developed. At first, the potential artificial learning thresholds should be identified using a tacit knowledge approach if no student learner experience test or persona development can be completed beforehand. However, developing student personas based on tacit knowledge and existing student data could greatly help in the initial development of the course.

When creating a course, it is essential to develop an introductory course or walk-through that emphasizes the learning environment and interaction elements. This research refers to this initial course as an 'induction course' to distinguish it from the content of the actual course material, which could include an introduction module based on the curriculum. Furthermore, by iterating on the course based on student feedback, knowledge about what elements are difficult for the student to understand or engage with can move from the tacit to the explicit.

The course developer will need to look at the following set of criteria to find the artificial learning thresholds in the course environment:

- Typical student: Define the general competencies that a typical student could have or lack.
- General competency: Define general competencies that are overarching across all components.
- Component competency: Define what the specific competencies are for each of the particular components that were identified.
- Knowledge: Define the knowledge that is needed to understand, interact and complete tasks with this component.
- Skills: Define the skills needed to complete the task.

Once the interaction components and knowledge needed to use them are identified, the educator should design and develop the induction elements.

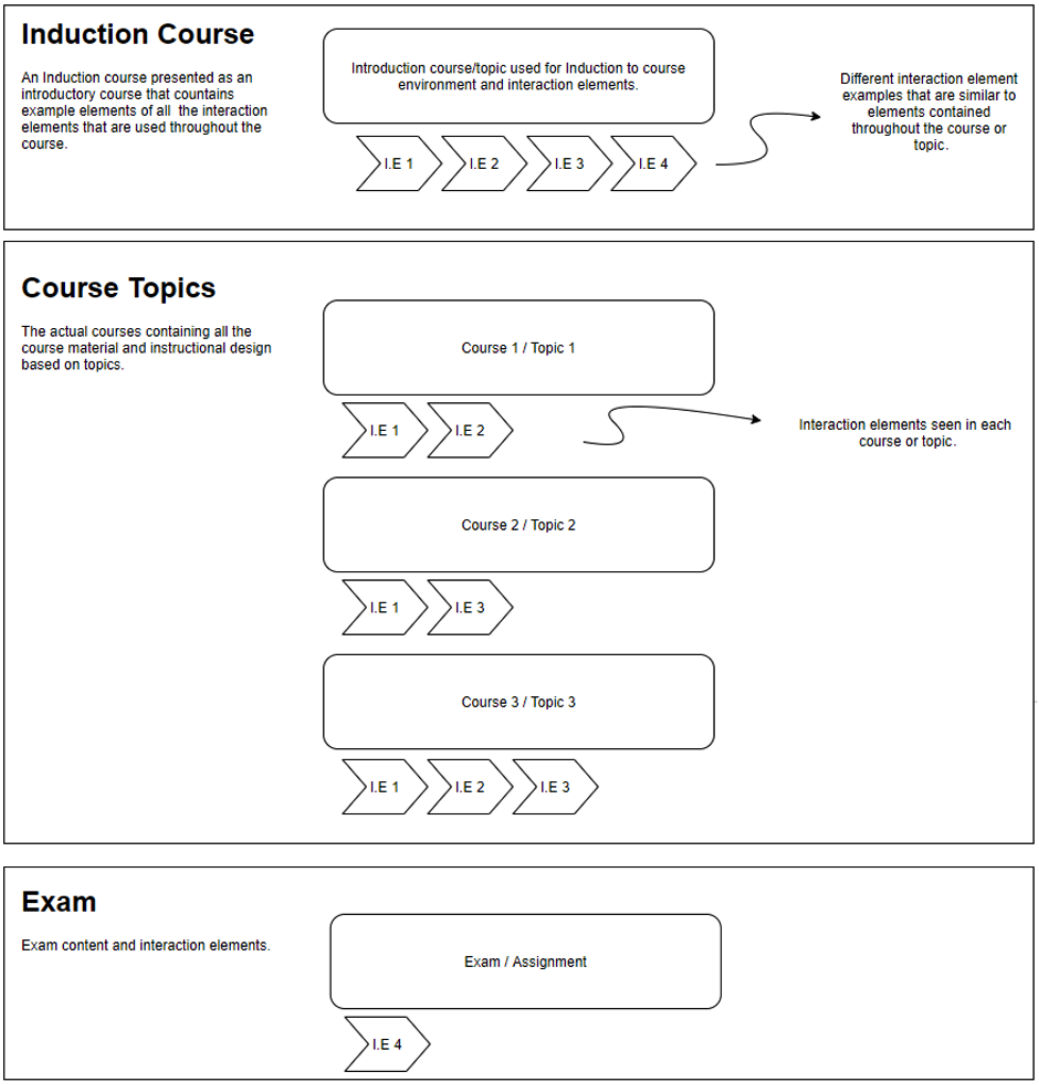

Figure 4.2: Template model induction course design showing interaction elements

The induction elements should be available at the beginning of the course. Typically, these induction elements should form part of an introduction to the course that explains the rest of the study environment, course layout, and functions. This course and its activities should not have any impact on the students' evaluation of the subject matter. Figure 4.2 depicts an example course construction layout of what a course could look like, after it has been developed using the LXID framework.

The structure presented is a high-level overview, with only the most important pieces shown. The interaction elements (I.E.) are all identified as-

pects that could potentially create ALTs and are displayed in various areas of each course or subject. The induction elements should mirror the elements used in the course material and the rest of the LMS, shown in figure 4.2.

The induction course addresses all IEs found throughout the main course topics. For example, suppose an image is to be submitted in the course. In that case, the induction element in the introduction course must require the student to submit an image in the same manner with instructions on how to do this. Introducing the induction elements early and without consequence to grades or negative feedback is key to encouraging engagement and a positive attitude toward perceived ease of use, as discussed in sections 2.2.2 and 2.5.4.

Introducing a positive feedback loop at this stage, such as a grade or badge is beneficial to give the student a sense of confidence in the use of the element (Keller, 2016). After the students have received a grade for the induction course, there must be a way for them to provide feedback on their experience. Successful completion could even be a requirement to unlock the rest of the course. This will aid the educator in assessing which students have overcome the ALTs and which students need guidance. This information can be used to further improve the course, as will be discussed in Section 4.2.2.

In the case of self-paced, non-facilitated courses such as some MOOCs, the grades can have specific feedback that points to documentation or videos explaining the concepts again. The course designer should build in a revision management process to look at the feedback and evaluate perceived ALTs using the student responses. This ensures that the educator can identify what the students perceive as challenging. When a revision is complete, the course designer can iterate on the introduction course's design by including revised induction elements and using the LXID framework from step 1 again.

4.2.2 Demonstrative example

In this demonstrative example, the practical usage of the LXID framework is presented in an incremental format, illustrating and discussing each step individually. The framework in it's entirety is shown in figure 4.1 and again in figure 4.13 in section 4.2.3.

Developing the introduction course should be based on elements and in-

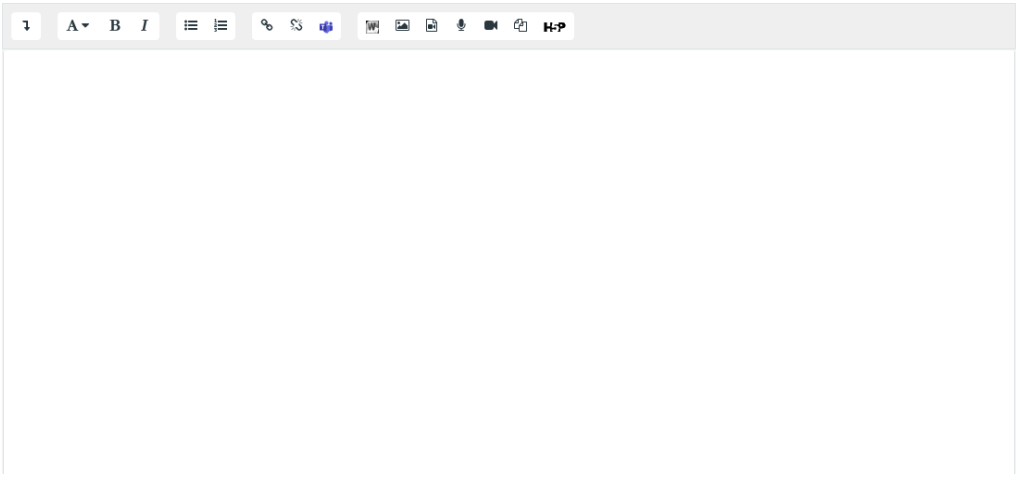

Figure 4.3: Moodle quiz input box.

formation that are easy to understand and provide knowledge of the course and environment. An LMS examination input box interaction element from the Moodle LMS (Moodle 3.11) was used as a very simple example to showcase the LXID framework's applicability on a specific interaction element that could generate an ALT. Moodle's default quiz input box is shown as an example in figure 4.3.

Step 1: Establishing Skill Requirements

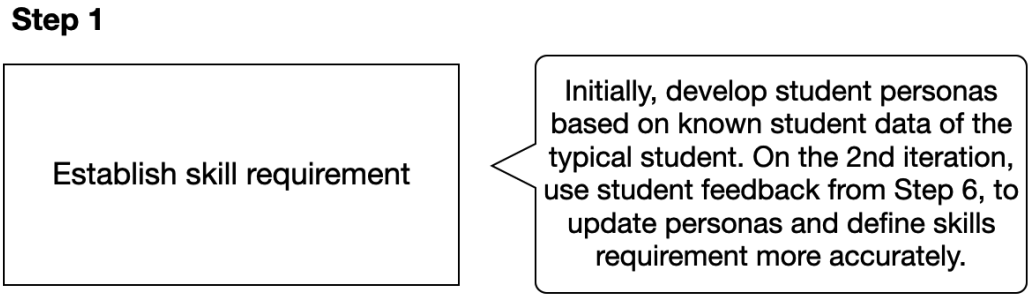

Figure 4.4: LXID Step 1.

The course designer should first establish the skill requirements that a student will need to complete a task or activity (see figure 4.4).

When a brand-new course is offered for the first time, determining what the student will know presents a formidable challenge. For this reason, using

personas is an appropriate method to apply when the educator establishes the student's needs in the first instance, as discussed in chapter 2.5.2. Empirical data about students is not always available to the educator; therefore, in this situation, tacit knowledge derived from the instructor's prior experience can be beneficial if combined with user experience (UX) design principles as discussed in 2.5. By using student personas, the educator can identify what the typical student's motivation, needs, and possible skill levels would be and use that to guide the identification of the interaction elements to be used in step 2 of the LXID framework.

Creating a user persona is a common method for gaining an understanding of a typical user. Thus, the educator could create the profile of the typical student to gain a better understanding of the types of students they typically engage with. A user persona is a composite representation of the actual users of a product (or whom you typically would like to use the product). Ideally, the educator would employ multiple personas and might even consider exploring various persona spectrums to ensure that the development decisions are accessible and comprehensive for all students. It is essential to note that the development of a student persona should be based on student data (Harley, 2015). An example of a typical student persona is presented in Appendix B.

Using personas will allow the educator to create a student-centered design for their course environment. Subsequent iterations should make use of the student feedback data collected and analysed in step 6. When a course has been taken at least once, the information gathered in steps 6 and 7 can be used to refine and rethink the skills and knowledge that a typical student would need to have in order to avoid ALTs. The student persona can then be updated based on the knowledge and insights gained from the first iteration. In this demonstrative example, the typical student was identified as someone who had never studied online before. Furthermore, this typical student might be confident with a web browser and a computer.

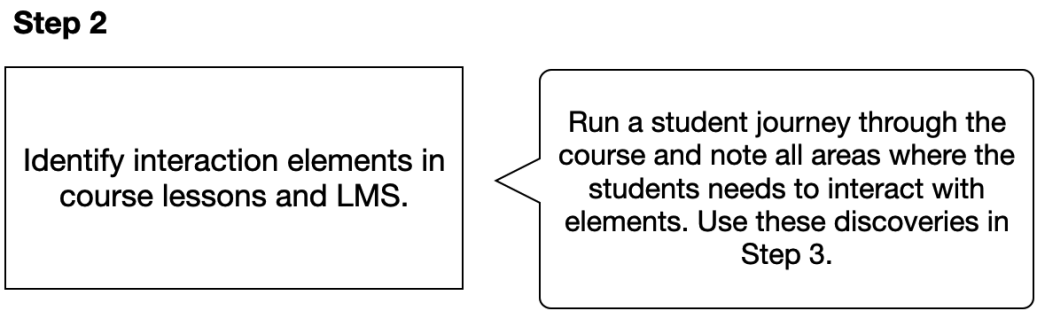

Figure 4.5: LXID Step 2.

Step 2: Identify Interaction Elements

When studying online, a student needs to interact with elements to traverse the course material in the study environment by using online technology components and elements from the browser and other areas. These elements that the student needs to interact with (interaction elements) can cause ALTs. Interaction elements are all elements that the student will need to use to effectively complete the overall course. In this step, figure 4.5, the educator needs to identify these interaction elements.

An effective way to identify all the interaction elements is to establish a student journey that the student will take through the course and list the interaction elements. For example, a student might have to click on a video to start playing it. The educator needs to list this interaction so that it can be addressed at a later stage in the induction course. During subsequent reviews, this list might be altered. In this demonstrative example, the course designer knows that the student would need to answer questions using Moodle's quiz input box (see figure 4.3). Thus, the designer lists this interaction element to be looked at in step 3.

Step 3: Identify Potential Artificial Learning Thresholds

Learning thresholds can be experienced by students in a variety of ways, as discussed in the literature review in chapter 2. One of the ways learning thresholds are introduced is in an artificial manner. These ALTs are often introduced by educators in the course design, the study environment and other online technologies they may employ in designing a course. In order to identify potential ALTs in step 3, figure 4.6, the educator need to assess the

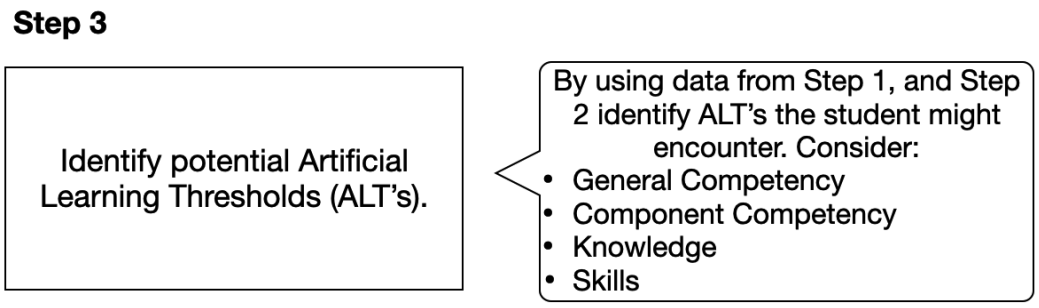

Figure 4.6: LXID Step 3.

interaction elements noted in step 2.

If the educator notes that a particular interaction element can cause an ALT, an induction element needs to be created that requires the student to use the element that created the ALT. Step 3 will repeat for each interaction element identified in step 2 of the LXID framework. Initially, the ALTs that will be identified in the study environment are informed by analysing the student data from the student persona, educator experience, and assumptions. Reducing learner frustration and anxiety during their studies using the LMS and traversing the content and assessments is vitally important to student satisfaction and motivation, as discussed in chapter 2. In this demonstrative example, the Moodle LMS quiz input box was identified, as shown in figure 4.3.

In this demonstrative example, the designer identifies that the students would need the knowledge to answer exam questions and know how to identify the quiz input box, additional tools, and some of the text editing tools. In this example, it is assumed that in this course, the student needs to create a table that lists a few items in the quiz input box to answer a certain question. Looking at the input box in figure 4.3 the student may wonder how to do this as there is no functionality shown in creating a table. The ALT created in this instance may lead to the student experiencing some anxiety or frustration.

While this is a very simplified version of an ALT, it demonstrates assumptions that can be made by someone who might already have experience using

Moodle such as an educator designing the course. This creates an ALT by assuming every student knows how to use the additional functionality button that Moodle employs.

Step 4: Create Induction and Course Feedback Components

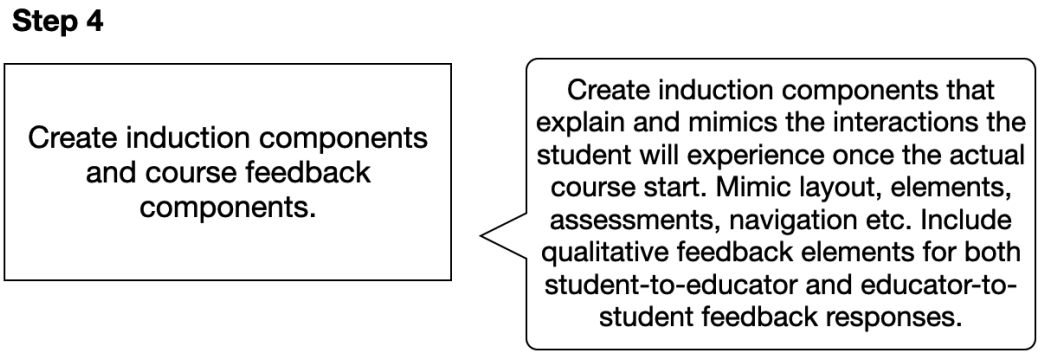

Figure 4.7: LXID Step 4.

In step 4, figure 4.7, the designer should craft a question that requires the student to utilise the input box tools as they would be needed to do in the main course while developing the induction components. In this instance, the designer identified the ALTs for the Moodle input boxes in steps 2 and 3. The designer can now develop the interaction component indicated as displaying a difficult-to-use or concealed aspect. When designing these elements, the instructor can use explanations or graphics to indicate where students can interact with the element. The objective of the induction components is to introduce the learner to the difficult-to-use components in a non-critical and non-threatening setting.

In addition, during the level of the introductory course, none of the parts will contribute towards actual grades. However, the student will need to be able to give feedback on the activities just completed. The student would also need to receive feedback. This is an essential element of the design. Not only does this set the stage for follow up engagement between educator and student, it also informs the educator on how the interaction elements were perceived. Thus, the educator needs to provide an area directly after the student completes the task to provide feedback. Feedback should preferably be open-ended. In the case where a student fails, the student should also be

provided with a feedback opportunity. Typically, feedback is conceived of as an educational tool intended to enhance academic achievement (Wisniewski, Zierer, & Hattie, 2020). Even though open-ended feedback should still be available so that the student can give their own feedback to the educator, research has shown that five important questions can be asked, like:

1. When in this course did you, as a student, feel most engaged? (Brookfield, 1998; Samuel & Conceição, 2022).

2. At what point in the course did you feel the most disconnected from what was going on? Why? (Brookfield, 1998; Samuel & Conceição, 2022).

3. What activity did you find most encouraging and useful in the online environment? Why? (Brookfield, 1998; Samuel & Conceição, 2022).

4. What action taken by anybody in the online environment puzzled or confused you the most? Why?(Brookfield, 1998; Samuel & Conceição, 2022).

5. What aspect of the online environment shocked you the most over the semester? Why? (Brookfield, 1998; Samuel & Conceição, 2022).

In the LXID framework's design, the induction course's feedback is designed to enhance engagement and motivation as well as decrease anxiety in the student. Thus, it is vital that the educator provides feedback back to the student or intervene if there is a problem. It can be noted that the feedback provided by tutorials is especially important in distance-learning environments that require learners to engage in self-study to improve clarity. Research indicates that instructor feedback helps learners actively participate in lesson processes and concentrate on lesson subjects. In addition, educators' feedback is perhaps one of the most essential components for fostering a sense of connection in online learning settings (Hattie & Timperley, 2007; Wisniewski et al., 2020).

Referring to figure 4.8, the input boxes have additional tools hidden under a relatively obscure icon that, when clicked, reveals the row of icons and functionality below, as seen in figure 4.9. This is often missed by students. The row contains a button that enables the creation of a table to answer the

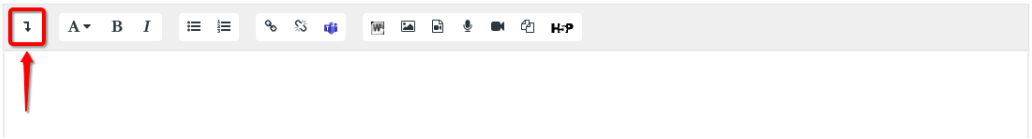

Figure 4.8: Moodle quiz input box.

question from step 3. Thus, in this example, the course designer can ensure that if any additional tools are needed to answer the exam question, details on how to access these tools are covered in the induction material. In the introduction course, a video can be shown where this icon is clicked to reveal the additional tools, as well as having the student practice it in an induction element. Such practice should ideally follow shortly after the students are first introduced to the non-intuitive interaction component.

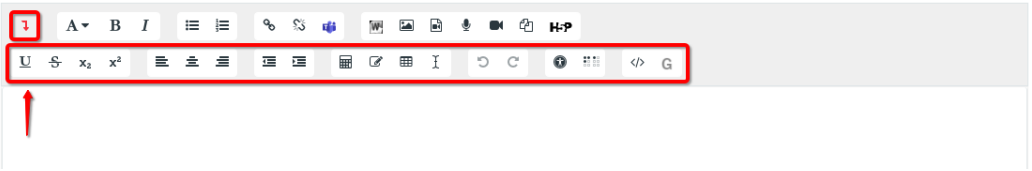

Figure 4.9: Moodle quiz input box showing previously hidden toolbar.

Step 5: Confirmation

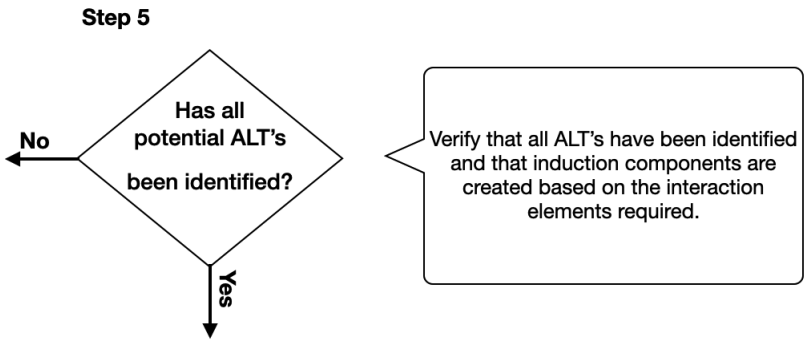

Figure 4.10: LXID Step 5.

Step 5, shown in figure 4.10, is a decision and self check step. If all ALTs are identified, the designer can continue to step 6; if not, the designer iterates

from step 2 until all ALTs are identified. If additional ALTs are identified at a later stage, the confirmation at step 5 should be flagged as incomplete until those have been incorporated.

Step 6: Review Course Feedback

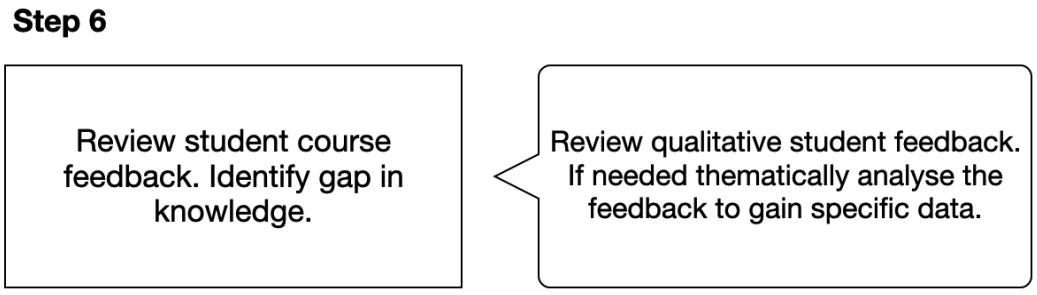

Figure 4.11: LXID Step 6.

In step 6, figure 4.11, the designer should review the feedback from the students, as was introduced in the feedback area that the students are required to complete in step 4. The feedback step is essential to getting feedback from the specific students currently participating in the course. Feedback of this nature will inform the educators and designers if all the potential ALTs are identified and addressed by the induction components. This step informs us of the induction components that still need to be included and are reviewed in step 7 to alleviate any ALTs that might still exist.

Step 7: Course Review

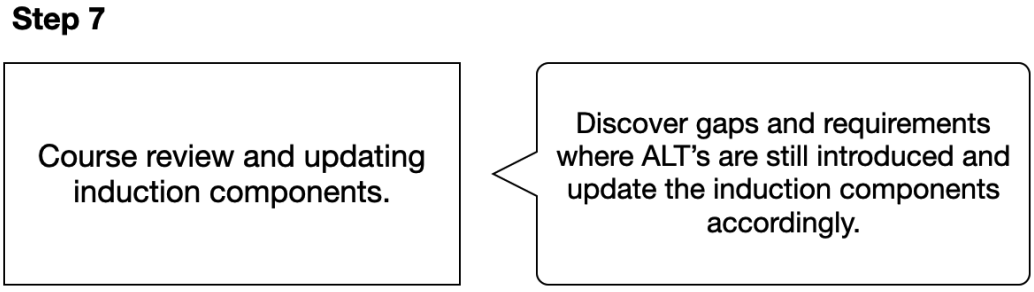

Figure 4.12: LXID Step 7.

In step 7 shown in figure 4.12, the course should be reviewed. The course is reviewed in its current form with its current induction components and

then compared to the feedback and identified ALTs in step 6. Additionally, student personas for the typical student can be updated based on the data gathered in the feedback. This step is typically performed during the conclusion of the course or when a cohort of students have completed the course.

This step is typically performed when a student belonging to a specific intake completes the course. ALTs experienced by this intake that were not addressed by the previous induction course are identified during this step. Such feedback must be incorporated into the induction course before the next intake.

4.2.3 Conclusion

As was shown in chapters 4.2.1 and 4.2.2 by following all the steps presented in the LXID framework, figure 4.13, the educator can assure that artificial learning thresholds are addressed and consequently create a more student-focused design within their course. Doing so would help relieve student anxiety, increase engagement with the subject matter content, and lead to a more positively experienced course.

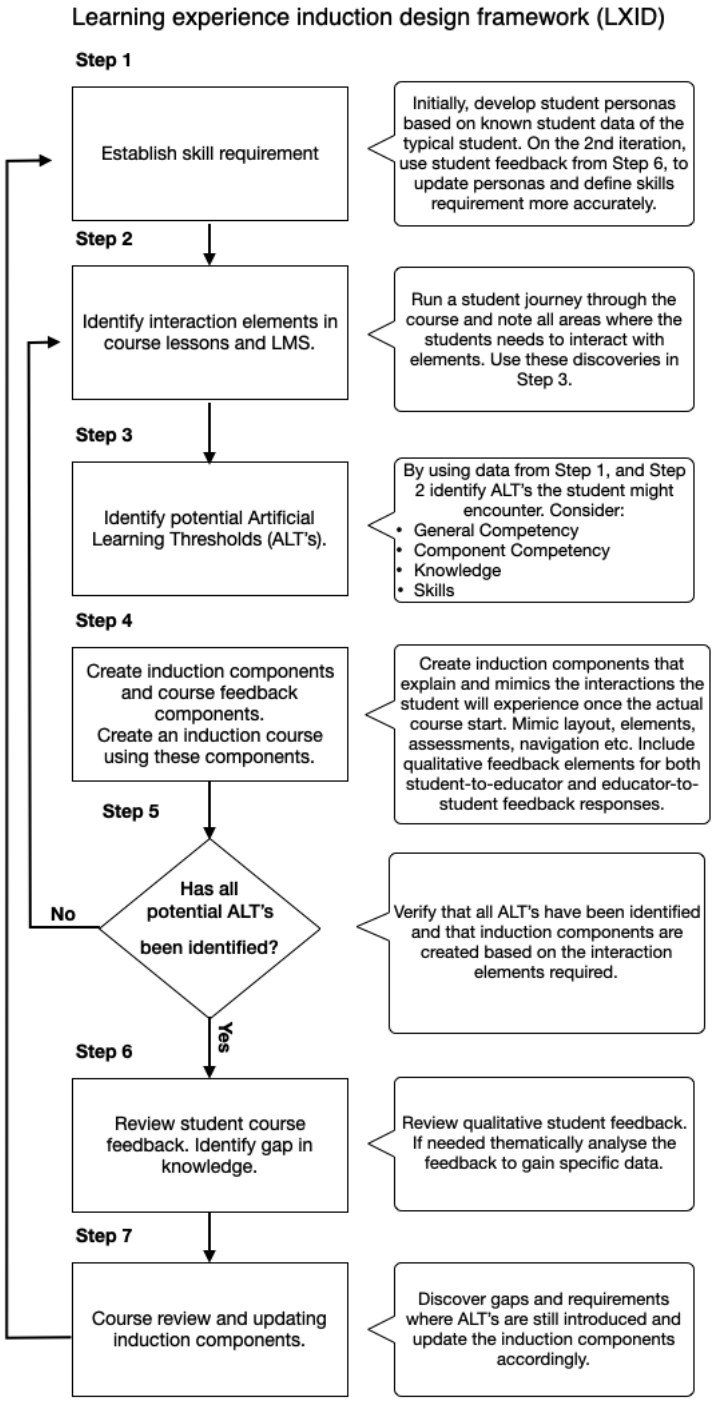

Figure 4.13: Learning experience induction design framework (LXID framework).

Chapter 5

Verification

This research uses a design science approach, as discussed in 3.5. Three of the seven characteristics of design science research are applicable to the verification approach used in this research, namely, research rigour, design as a search process, and communication of research.

First, this research adheres to the requirement for research rigour based on the fact that the research was grounded in the literature and theoretical instruments, such as the technology acceptance model that was used in the construction of the underlying framework. Furthermore, the research used formal expert reviews as a methodological tool to verify the initial prototype in a rigorous way.

Second, this research adheres to the requirement for design as a search process in several ways. The initial prototype was constructed based on the literature by a team of teachers working together in a joint application development approach, during which initial prototypes were proposed, discussed, modified, and tested. Various candidate prototypes were implemented or partially implemented until a first working version was agreed upon. This working prototype was then implemented and, after initial use, further refined via the expert review process.

Third, Hevner et al. (2004) proposes that the design should be communicated. The initial iterative version of the framework was published as a peer-reviewed conference paper (Appendix A). Feedback gained from con-

ference attendees and participants was also used to further refine the final version of the framework presented in this dissertation.

This chapter will first provide insight into how the framework was grounded in the literature. Second, the chapter will provide a complete overview of the expert review process conducted and how the results thereof were incorporated into the final design. Communication of the research is further provided as a result of this dissertation.

5.1 Literature Grounding and Theoretical Basis

The verification of the LXID framework presented in this dissertation is grounded in three perspectives, resulting in its triangulated design process shown in figure 5.1. This is a triangulation between existing literature, a prototype of the framework, and verification using expert reviews.

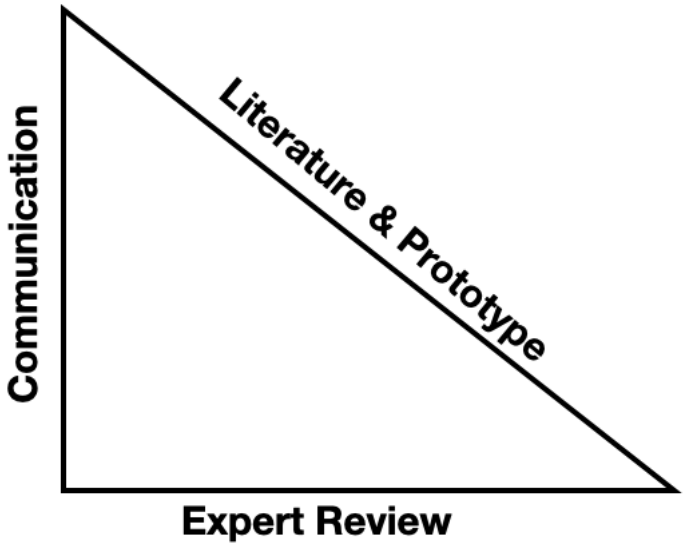

Figure 5.1: Triangulated design process

- Perspective 1 - Rigour through formal methods.

The literature grounding and expert review formed the theoretical basis

for the development of the proposed LXID framework. Accepted theories, concepts, and design elements could be drawn from this list to inform the initial development of the LXID framework. As discussed in chapter 2, when looking at the literature, it was discovered that threshold concepts showed barriers of entry for educators and students. For educators, the effect showed that they may lack formal online pedagogical training and therefore do not have the necessary theoretical background to design courses that will teach learners how to study online. Furthermore, they may lack personal experience with learning online. Educators thus create courses based on physical classroom experience rather than online learning experience, creating learning thresholds for students.

These learning thresholds are, in many cases, artificially created by the lack of online course development experience. This dissertation referred to these learning thresholds as Artificial Learning Thresholds (ALTs). When students come across these artificial learning thresholds, it can cause factors such as anxiety, lack of motivation, and low engagement. Another contributor to ALTs in known models, as explained by the TAM in section 2.3, is the student's lack of acceptance of the technology used in an online course. This can be due to a lack of perceived usefulness or ease of use, which can have several negative effects on the student as discussed in section 2.2.2. Further grounding based on literature, discussed the use of user experience design aspects, namely interaction design and personas, as a basis from which the educator can work if they have no prior student data to draw upon.

- Perspective 2 - Search process

The results of the literature review were used to inform brainstorming sessions that were held to produce a conceptual framework. Using the literature review and the brainstorming sessions as a basis, an initial design of the LXID framework was constructed. In this phase, an iterative design and searching process was followed to create the initial prototype. Because multiple people were involved in conducting

brainstorming sessions on how the framework could be improved in a 'real-world' production setting, this process took place in a pragmatic and rigorous manner. After iterating on the initial concept, the first prototype of the LXID framework was developed. This prototype was implemented, and as mentioned before, the more formal approach was to assess and verify the findings using an expert review process.

- Perspective 3 - Communication of design

  In the third leg of the verification phase, the design was communicated through publication and presentation, where it was exposed to peer review and comments from participants at a conference (Appendix A). Notable feedback was incorporated into the design in the form of minor revisions where applicable. This phase is the output of this dissertation and involves confirming the LXID framework through expert evaluations and communicating the findings.

The literature grounding has already been discussed above. The design as a search process has been detailed in perspective 2 above. The remained of the chapter will focus on the verification and expert review feedback.

After the proof-of-concept framework was developed based on the initial literature review, expert educators were presented with the framework and surveyed to get their feedback on the framework's perceived usefulness.

As discussed in chapter 3.9, verification of the framework was done using the following (triangulated review) approaches: first researching the literature, then developing a prototype of the LXID framework using findings from TAM and threshold concepts, and finally assessing expert feedback.

Secondly, the initial prototype has been verified with an accepted publication and presented to an audience of researchers at the European E-Learning Conference hosted in Germany. The final check was to use peer reviews from other expert educators.

5.2 Expert Review Process

A sample of experts was selected using a convenience sample process described in 5.2.1 Thereafter a questionnaire was distributed as shown in Appendix C. The experts had the opportunity to go through the LXID framework and respond anonymously based on the framework's perceived usefulness. The results were collected and are discussed in chapter 5.2.3.

5.2.1 Setting and sample

The setting wherein the research was conducted was a vocational and university college in Norway, specializing in the technology and digital media sectors through online delivery. Within the setting, the sampling approach was both convenience-based and purposive. The used artefact has been adopted and is now being used in a production environment. Two different programs have adopted the framework as a design and development framework and have gone through two phases of iterative design on their courses. The feedback on the use of the framework has been positive. Educators are finding that students have fewer challenges with interaction elements.

Participants were invited by email using the invitation letter shown in Appendix D, based on their experience as educators. The participants also received an introduction to the framework, which is shown in Appendix E. It is important to note that the educators who were invited were a mix of those who had been involved with an early versions of a course where the framework was used and those who had never seen or used the framework. The participants were informed in accordance with Nelson Mandela University's research ethics Appendix F.

5.2.2 Data gathering instruments

The data gathering instrument was a description and a questionnaire composed of 18 questions shown in Appendix C.

5.2.3 Results and discussion of expert review

In this section, each of the 18 questions that were asked to the expert educators will be presented, the aggregate of the results will be shown, and how this was interpreted, including any subsequent steps taken, will be discussed. Furthermore, triangulating the results from further findings with the literature.

Due to the sample and setting and the nature of the questions, this section presents an integrated presentation of the results, a discussion of the researchers, and an interpretation of the results. Furthermore, this section discusses the way in which the framework was adjusted in order to address the specific concerns or feedback received from the expert educators in the verification process. Using feedback from the verification findings, the framework and descriptive text were modified as needed to account for any gaps, issues, or unclear information presented and to enhance the framework. When presented, any scale from 1 to 5 represents (1) not important to (5) extremely important, or (1) not confident to (5) very confident.

Question 1

Question type: Open-ended.
Question: In which field do you work?

As can be seen in figure 5.2 all the respondents are in the education field, with some specializing in higher education and technical information technology teaching fields. These educators answered quite specifically. For example, one respondent answered that they are in the machine learning field. The respondents were all expert educators, which more than likely means that this particular one is an educator in the machine learning field. This is the same type of response from another educator who stated that they are in the technical design field. It is also assumed that they mean they are an educator in the technical design field.

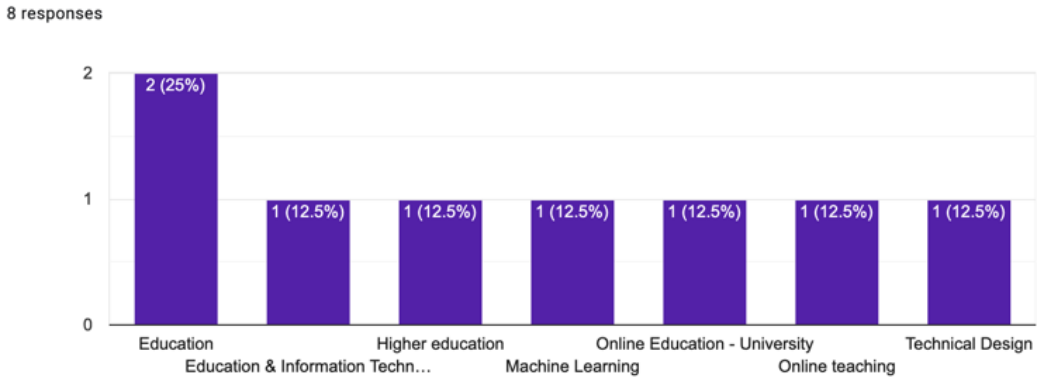

Figure 5.2: Question 1.

Question 2

Question type: Multiple-choice.
How many years have you been working in the above mentioned field?

As can be seen in figure 5.3, all the respondents have more than 3 years of experience, thus, satisfying the minimum experience requirement established in the research design discussed in 3.8.

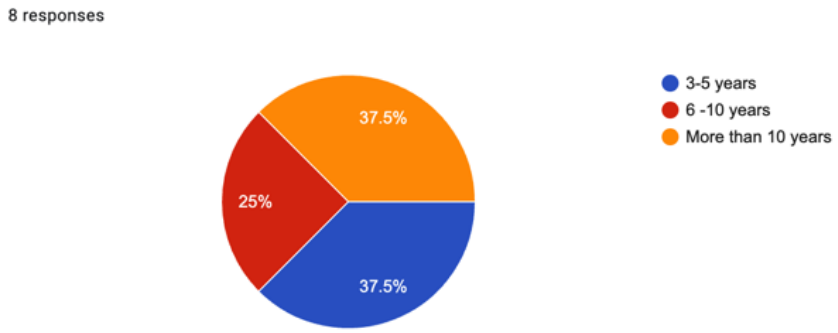

Figure 5.3: Question 2.

Question 3

Question type: Multiple-choice.
Question: How many years of experience do you have in Online Learning or related fields?

Interestingly, 6 out of the 8 respondents have 5 years or less of online-specific learning experience, as can be seen in figure 5.4. These educators are perhaps a prime target audience to make use of the LXID framework due to their relatively high educator experience but relatively low online education-specific experience.

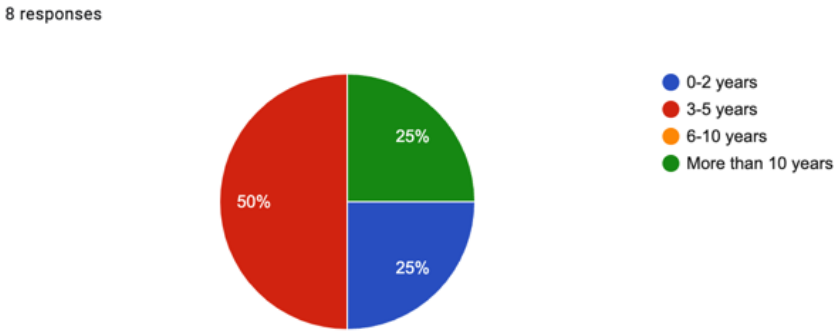

Figure 5.4: Question 3.

Questions 4 and 5

Question type: Likert scale.
Question 4: In your opinion, how important is it for a learner to understand the Learner Management System; or the platform they use to interact with content or assessments? Taking into account engagement with content, progression and completion.

Question type: Likert scale.
Question 5: How important is it to understand the layout of the learning program? Taking into account that the learner must engage with content, progression and completion.

When presented with the question shown in figure 5.5 on how important it is for the learner to understand the LMS, taking into account engagement with content, progression, and completion, the participants were asked to rate it from 1 to 5. 1 being not important, and 5 being extremely important. All of the respondents chose option 5 - extremely important. Overwhelmingly, 6 out of 8 respondents also chose that it is extremely important for the

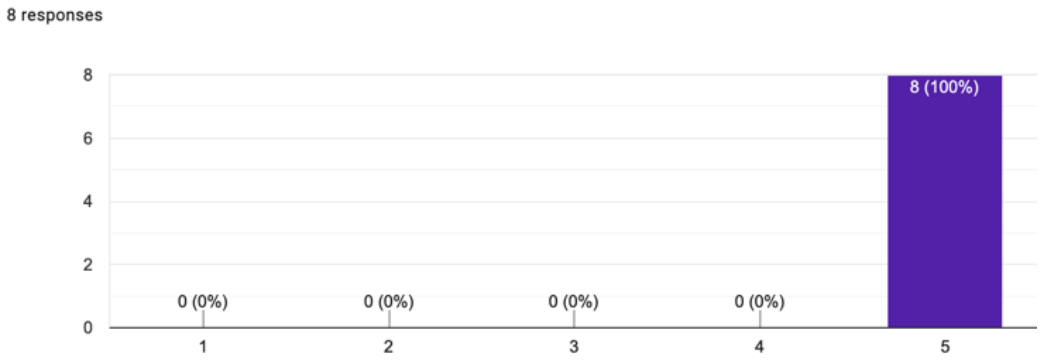

Figure 5.5: Question 4.

learner to understand the layout of the program, as seen in figure 5.6.

This is significant as it shows that, in the opinion of expert educators, the connection between the LMS, content, and the learner is inherently linked. This is pointed out in the literature by Taherdoost (2018), by making the argument that perceived utility, simplicity and the attitude the user has to the technology can impact their perceived usefulness of the technology interaction(Davis, 1989; Tao et al., 2022).

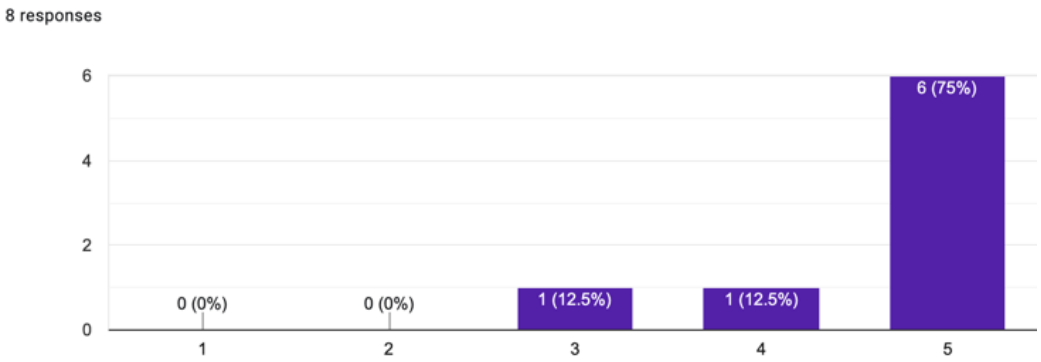

Figure 5.6: Question 5.

The implication that good technology acceptance will have on the learner is that of higher engagement and motivation to interact with the LMS and course material (El-aasar & Farghali, 2022). By using the LXID framework, the educator can take deliberate steps to include the interaction elements in the induction components. The induction components should then be included in the induction course. By incorporating interaction elements and

induction components into a preceding induction course, the orientation of the student ensures that the student has the necessary skills in an environment that does not directly induce anxiety due to the fear of failing the course or receiving poor grades and negative feedback.

Question 6 and 7

Question type: Likert scale.
Question 6: In an online course, how important is general competency when a student engages with interaction components? For example, being able to use a browser properly, how to upload files, how to view videos, unzip archives how to do assessments etc.

Question type: Likert scale.
Question 7: How important do you think component competency is in online learning? For example, in any Learner Management System, does the student know where to find the exam? Does the student know where to find the assignment upload button and know how to check plagiarism? Can the student interact with all the components in the course material?

A similar tendency is presented in the following questions, shown in 5.7 and figure 5.8. Respondents all chose 4 or 5 out of 5 when asked how important it is for a student to have general competency on interaction elements used in the course, whether at the general competency level or at the component level.

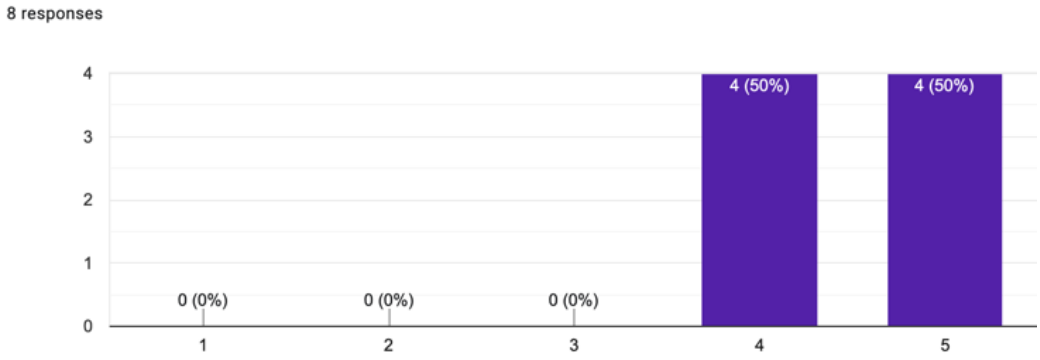

Figure 5.7: Question 6.

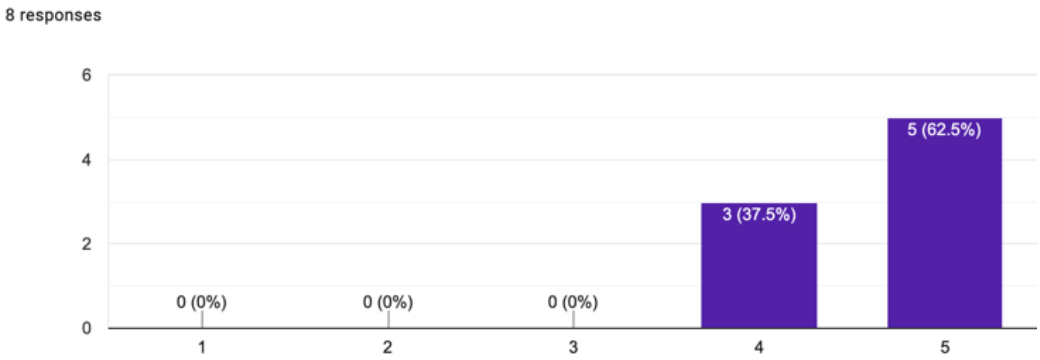

Figure 5.8: Question 7.

The responses from figure 5.7 and figure 5.8 indicate that the educators could draw a strong connection between the importance of having the skills to interact with the interaction components and familiarity with the environment of study. This correlates with Keller (2016)'s ARCS-V model, especially with regards to relevance and confidence (the R and C in ARCS-V). These factors contribute to fostering personal development by encouraging students to take incremental steps and then to promptly present them with feedback. Thus, by adhering to the LXID framework, the instructor is able to provide instances of interaction features in the induction components that may serve as a model for enhancing student knowledge and contributing to their success. When students realise that they have successfully navigated and accomplished a task for which they will require specialised knowledge or abilities, they perceive the online course as advantageous, which helps build their confidence. Also having the learner use the learning components rapidly after learning about how to use it, aids in giving it relevance to the studies (Keller, 2016).

Question 8

Question type: Open-ended.
Question: How would you know that the student has knowledge in the areas above?

When the question was posed on how an educator would know that the student has knowledge in the areas posed in questions 6 and 7, the respon-

dents had some interesting feedback. Some respondents said that they would use some sort of test or quiz. The next respondent also mentioned an introduction course but added that feedback would be useful to monitor student progress with the LMS;

"From an introduction course, with feedback from the student, After that you can monitor the students progress on the management platform to see if they are engaging and doing what is needed".

Feedback collected from the learner is an important component of the LXID framework and thus aligns with this way of thinking. When educators give feedback on student work it promotes and strengthen teacher and learner relationships (Ryan, Henderson, Ryan, & Kennedy, 2021). Thus, providing a way for the learner to give feedback on the course and learner environments can aid in the building on the knowledge the educator has on the learner. The feedback that the learner provides can lead to actionable improvements in the induction course and interaction components in steps 1 to 4 of the LXID framework. Other answers shown below highlights the problem with leaving the student to their own devices within the actual course. For example, the following answer suggests that the educator should wait until grades are received to determine if the student has the knowledge or skill.

"If the student is capable of successfully navigating the Learner Management System in all aspects, it will be evident in their grades and success rate. The student dropout rate will also decrease".

When a student is having difficulty engaging in the material and is forced to battle with the learning management system (LMS) or the interaction aspects, this will produce ALTs in the environment of the course, which will result in poor marks. When that time comes, it won't be possible to make any adjustments for the learner. This might result in the student not being engaged in the course, having heightened anxiety, or even potentially withdrawing from the class. The subsequent reply from the respondent, in which they also note the significance of feedback, makes a passing reference to this as well;

"The simplest indicator would be the completion rate of the students on given activities. The second would be communication with the student. I have found that students tend to reach out when something is unclear. Unfortunately, this only tends to happen when a deadline is looming".

This correlates well with findings from literature such as Rõõm et al. (2021) and Mourdi, Sadgal, El Kabtane, and Berrada Fathi (2019) that state high dropout rates at the beginning of courses. The prior remarks indicate that there should be a mechanism to engage students early and perhaps receive intervention earlier, such as while undertaking an introductory course, before the students are confronted with the core material of the course they are taking. In this dissertation, such an introductory course is referred to as the induction course. Thus, by designing the induction course in accordance with the LXID framework, the educator enables the learner's involvement and feedback process in order to identify any ALTs. The following respondent shared a viewpoint that was consistent with the LXID framework's beginning: step 1 of determining who the typical student of a particular course is.

"This can be accomplished by creating a baseline, which can be used to measure the level of comfort a user has with the learning management system. For example, measure the time it takes for an end-user familiar with the LMS to complete a task. Then measure the same for a novice user to complete the same task. This can be done by using multiple samples with end-users with varying skill levels. The average time to complete a task can be set as the baseline. Student actions can then be measured against the baseline to determine the level of comfort with the LMS and interface".

Therefore, by following the LXID and assessing what the typical student might know and matching that with what the learner might be struggling with, the educator can include induction components that will alleviate ALTs. This can be done by creating a student persona as well as perhaps a pre-test, as this respondent suggests. Following that, it can be improved and tweaked using feedback from steps 6 and 7, and then on a new iteration from steps 1 and 2.

The framework is intended to be a reference for educators to use in identifying the checks that should be in place in an induction course to assist

students with familiarisation and overcoming ALTs, and therefore can be used whenever a new group of students gets to use the learning environment, for example.

Question 9

Question type: Open-ended.
Question: The framework is intended to be a reference for educators to use in identifying the checks that should be in place in an induction course to assist students with familiarisation and overcoming artificial learning thresholds. The framework proposes an induction course that allows for identification of artificial learning thresholds, firstly for the educator to apply their experience and subsequently through student feedback. How useful do you think this feedback could be to identify artificial learning thresholds? Please explain:

The framework proposes an induction course that allows for the identification of artificial learning thresholds, firstly through the educator's application of their experience and, subsequently, through student feedback. When asked how useful the feedback element introduced in step 4 of the LXID framework could be to identify artificial learning thresholds, all of the respondents replied positively. The respondents recognized that the feedback is an essential step in increasing quality factors and relieving the ALTs a student might experience. One respondent notes;

"I think it can be very beneficial and useful provided that the students give accurate feedback on their barriers to learning/understanding. If a student struggles, but does not voice this, it can be difficult for the educator to learn of this in an online setting".

The following respondent also sees the benefit the LXID framework plays in helping drive feedback as a key step in the design of online courses;

"Very useful as we as educators will never be able to predict all student interpretations and actions, so student feedback will be essential in increasing the quality of a course".

The following respondent responding with the idea from the LXID framework that certain interaction elements could be redesign based on student feedback;

"The feedback is imperative in establishing a fit-for-purpose learning experience that will benefit learners. Student feedback can assist the course constructor with valuable insights into the potential inhibitors to the learning experience. Similarly, feedback can highlight drivers of learning, which can be applied in other learning areas, thus improving the overall learning experience. Furthermore, the feedback data can be analysed using qualitative and quantitative means; the findings may assist in identifying challenges that may not be obvious or apparent".

This response helps support the feedback loop, which starts with a review based on what students say and then checks to make sure that certain skill criteria have been met. Feedback helps shape the design of the course by building on the experience gained from validating the feedback from the induction course. Elements of interaction that have been identified as ALTs are also taken into account. The student feedback informs the design of the course by building on the experience gained in validating and addressing ALTs in the induction course, as the following respondent states;

"This feedback is extremely important in the overall effectiveness of your course. The feedback is there to 'close the loop' of your course. This enables growth and becoming better in terms of not only experience, but also learning/knowledge transfer".

This respondent also states that getting feedback from the learner is important to perhaps develop different means to present content or activities which could be useful when addressing ALTs in the interaction elements;

"Extremely useful. With most/many lecturers not having formal pedagogical training, they may be setting the induction course by leaning too much on their own level of experience with the online tools. Things which may be apparent to someone familiar with the platform may be difficult for a student to grasp if they have little or no prior experience with the tool. By

incorporating student feedback, the educator may see things from the student's perspective and investigate alternative means of presenting the content and/or activities".

Question 10

Question type: Open-ended.
Question: Do you think that the proposed framework can help guide an educator to deliver an online induction course that will have less Artificial Learning Thresholds and improve student confidence in the particular online study environment they are interacting with? Please explain:

All the respondents replied positively, saying that they think the LXID framework can help guide educators in lowering Artificial Learning Thresholds for the students.

"yes. again - it is impossible to 'read' all students minds".

"Yes, with guidelines on what is needed for the introduction course".

"Yes, I do. The proposed framework addresses the two types of learning thresholds and how to develop an Induction Course to limit these thresholds as well as the anxiety that students might experience when first experiencing a new online learning platform".

The feedback from these responses is encouraging and indicates that the educators would be aided by a method that helps in building courses that contribute to alleviating ALTs. The prior remarks indicate that there should be a mechanism to engage students early and perhaps receive intervention earlier, such as while undertaking an introductory course, before the students are confronted with the core material of the course they are taking. Thus, by designing the induction course in accordance with the LXID framework, the educator enables the learner's involvement and feedback process in order to identify any ALTs. The following respondent shared a viewpoint that was consistent with the LXID framework's beginning: step 1 of determining who the average student who will be taking the course is.

The following participants are likely respondents that has used an early version of the LXID framework as it was implemented and iterated upon;

"Yes. From past experience this type of framework assisted us greatly to cater for student needs in this area and resulted in a much smoother learning environment";

"Yes, I believe so. The primary justification is in the fact that it provides a guide by means of a self-check of what is necessary. I also think that fact that its success was proven by means of implementation already speaks for itself".

The above responses are quite positive. The respondents indicate that by using such a framework, they felt the framework provided a more optimal environment. It is also positive that the framework could be used as a guide to guide educators that perhaps have the inherent knowledge but aiding them to have as the respondent calls it, a 'self-check' to implement interaction elements as induction components. This is a positive start toward providing a framework that can help educators in the creation of a more effective learning platform for students, which can help enhance motivation and engagement in the learning process. This constitutes a step towards the suggested work needed to explore factors and conceptual frameworks as suggested by Alshehri et al. (2019) and El-aasar and Farghali (2022).

The following respondent also made reference to the guidance that the LXID framework brings to assuring students and creating a more satisfactory learning environment. It also shows that the respondent understood the improvements that the LXID framework brings to identifying and eliminating ALTs if followed through iteratively as described. Furthermore, the expert educator refers to the importance of the feedback that the framework highlights in identifying gaps in the student learning environment.

"Yes, the suggested conceptual framework can guide a teacher in delivering an online introductory course with fewer artificial learning thresholds and greater student assurance in the specific online learning environment they are utilising. The LX induction design framework addresses critical concerns that affect student leadership experience, such as identifying essential components required by students. Understanding the student's core needs is imperative in establishing a framework for improving online

learning. This, coupled with the expected knowledge, skills, and competence, will aid in identifying potential challenges and formulating appropriate steps to remediate them. In addition, step 5 allows for an iterative approach to addressing deficiencies with learning thresholds. Effectively, this means that the residual identified learning thresholds can be reanalyzed and the expected knowledge skills and competencies redefined. Also, concerning step 6, feedback on experience is essential in identifying gaps, particularly given that the learning needs are not static. With the progression of time, coupled with advances in technology and redesigns of the LMS by the vendor, student learning requirements will likely change. As a result, the feedback will assist in identifying gaps in the evolving learning environment".

The response from the following participant was interesting and prompted some more research on the information required up front for the student from the educator's perspective.

"The only construct of the conceptual framework that the respondent considered may need attention is step 1, i.e., 'skills requirements of an ideal student'. What metric of measurement is used to define the 'ideal student'? Also, won't the framework be better served by establishing requirements based on students' multiple skill levels?".

Based on the feedback of the respondent above and subsequent research, the framework was adjusted. At the onset of the research, the idea was that the framework would answer the research question: How should an educator identify the components in a given online course that could introduce learning thresholds? When designing the framework to address this question, the research identified a need to have some form of baseline setting where the educator can assume the needs and requirements.

Initially setting this as a first step and defining step 1 to identify the skills requirements that an 'ideal student' would have to have in order to present no ALTs. It was anticipated that the 'skills requirement of an ideal student' could be perceived as a perfect student. Research by Wong and Chiu (2021) indicated that indeed, this could cause a dilemma as educators could have different interpretations and ideas of what an ideal student would need or be. Thus, instead of trying to classify the ideal student to identify the skills

requirements they might need to navigate the course, it was altered to identify the typical student.

The typical student would be the student that would be expected by the institution, to take the course being delivered. Consequently, this led to more real-world examples and a pragmatic approach that has the benefit of using tools and processes developed in the UX design arena to come up with personas of the typical student. Additionally, educators should also gather longitudinal data as students subsequently complete the course. The framework guides the educator through a continuous improvement process that drives quality in the induction course and program and helps streamline the motivational and confidence-building areas. By doing so, the ALTs that are introduced at the beginning of a developed course continuously decrease as the framework is used. The following comment is also insightful;

"Definitely. By aligning the perceived ALTs of the students with the components required in the induction course, the course may be continuously adjusted and/or improved to suit the needs of the students. Online components frequently change and so too does the skill sets of students. Educators need to realise that the framework represents a continuous cycle of improvement. With this mindset, such a framework will ensure that the induction course not only includes elements which are procedural or fundamentally required knowledge, but that it will be represented in a way that is intuitive to use to students. When students have fewer obstacles to overcome with regard to the tools/platform, they can focus more of their attention on the actual learning content and activities".

The respondent brings attention to the challenge of changing online components and interaction components. This change could be due to an upgrade of the LMS, changes in web standards, or different compatibility with operating systems and devices. For this reason, the LXID framework would also be useful as a way to ensure that the revisions are applicable to the current software used by the organisation and learners.

Question 11

Question type: Likert scale.
Question: How confident are you that you understand the proposed framework described in the information supplied?

When asked how confident the respondents were that they understood the proposed framework, 5 responded that they were extremely confident and selected 5 out of 5, while the other 3 respondents selected 4 out of 5. The responses to this question are seen as positive and encouraging. This indicates that the LXID framework is relatively easy to understand and follow, and educators could easily use it as a guide if need be.

However, the flow was even further improved and enhanced for clarity and ease of understanding.

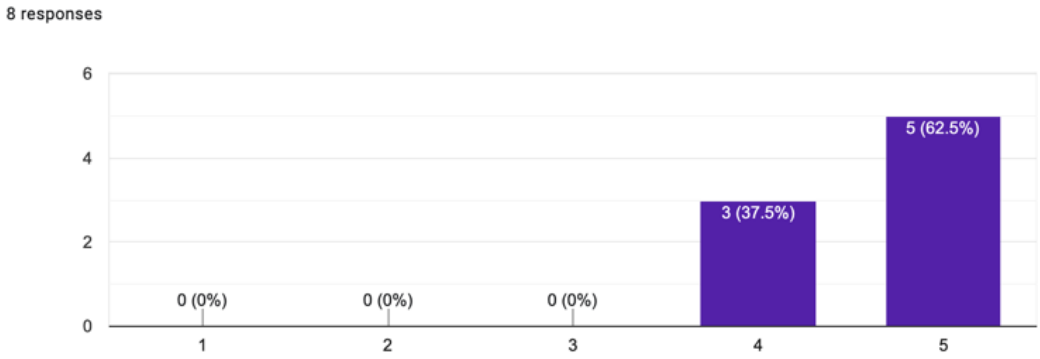

Figure 5.9: Question 11.

Question 12 and 13

Question type: Multiple-choice.
Question 12: Do you have any prior experience with implementing an induction course before the start of a course?

Question type: Multiple-choice.
Question 13: Have you previously applied elements proposed in the framework and description in such a induction course?

In questions 12, figure 5.10 and 13, figure 5.11, the respondents were asked if they have experience with implementing an induction course and if they have implemented elements proposed in the induction course before. The results were that 6 out of 8 respondents said that they have experience implementing an induction course and have applied induction elements in a course before. Educators should design induction courses to use them as orientation for the online student. By developing such induction courses, educators can lower the perceived barriers of entry to a course that the student might be experiencing.

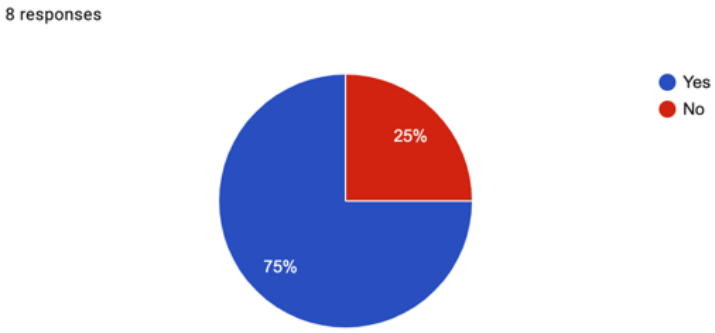

Figure 5.10: Question 12.

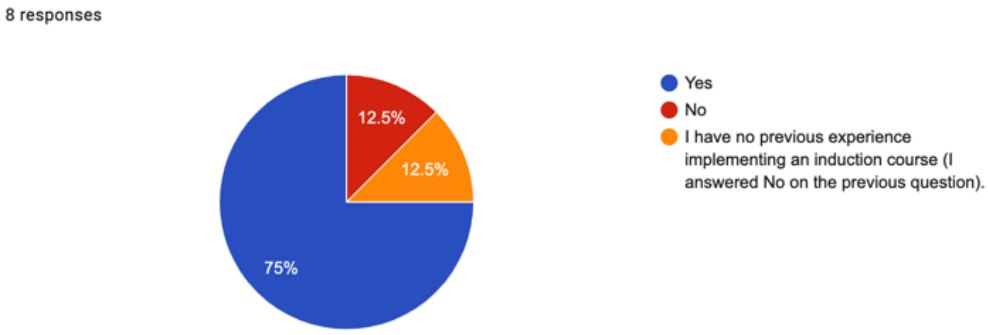

Figure 5.11: Question 13.

Question 14

Question type: Likert scale.
Question: How would you rate the importance of these elements you mentioned above?

As can be seen from the response to question 14, figure 5.12, all the respondents deem these interaction elements important to extremely important. Interaction elements are the specific elements that the student will interact within a course. They can range from a single mouse-to-click interaction to more complicated navigation and multiple user interface control elements. It is therefore vital that the user—in this case, the student—can use the interaction element to complete their learning.

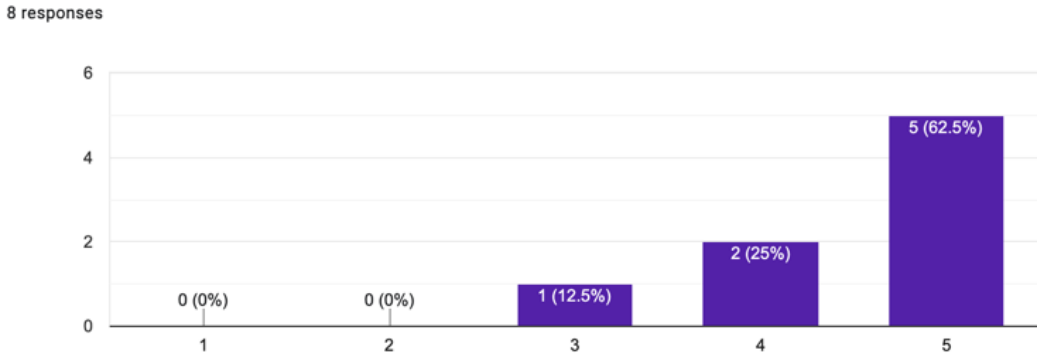

Figure 5.12: Question 14.

Question 15

Question type: Open-ended.
Question: In which way could one identify possible learning thresholds up-front, before the first course is attempted, other than a tacit ('Just by knowing' from experience) approach? Please explain:

Question 15 is posed: In which way could one identify possible learning thresholds up-front, before the first course is attempted, other than a tacit ('just by knowing' from experience) approach? The respondents were asked to explain their answers. Many of the respondents described that a test or an assessment could be used.

The majority of the respondents' feedback comprised of some sort of test or assessment to implement so that the students can be tested if they can complete a required task before the start of the course;

"...you can implement a quiz in the introduction course, or ask some

questions and evaluate the feedback from the students to get a competency level for the class, and from that deduct the learning threshold".

This is a relatively sound idea if it is set up together with the induction elements. The danger would be that if a student is asked to be assessed based on areas they may not have had any experience with, that in itself can raise the anxiety level. It is shown that students have raised levels of anxiety before and after assessments (Walden, 2022). Thus, if any assessment is implemented in the induction courses, it should be accompanied by pre-learning and not based on the course topics. The following respondent replied that a type of aptitude test can be taken to test the induction elements and thus test for ALTs. The next respondent describes this;

"A manner could be to have a pre-course exercise that students can complete as part of their induction/enrolment week. The course or quiz could be setup in such a way to enable a teacher to estimate the level of competency of students on a personal level as well as an amalgamated level. I think the primary manner would be to do it directly with students' participation. This would give the most accurate results. This type of approach can easily be referred to something the military use (Armed Services Vocational Aptitude Battery) in order to identify where you would be more suited to work (mechanic, soldier, intelligence, pilot etc). By using something similar, one could potentially identify learning thresholds up-front".

Typically, when a regular course solicits student feedback, the feedback can only be incorporated into the subsequent version of the course, thereby failing to benefit the students who provided the feedback (Samuel & Conceição, 2022). By following the LXID framework, it allows for an iterative design that does indeed benefit the students that take the next iteration of the course. However, because feedback is collected early on before the course topics are attempted, it can also benefit the current group of students enrolled in the course. By including all the interaction elements in the induction course, the student's knowledge and skills can be tested in a more real-time setting. These challenges can be addressed early on so that anxiety can be lowered, as surmised by the following two respondents;

"A questionnaire can be used to gauge the students basic knowledge needed for the course/program. A basic practical task can be issued to see if a

student is capable of doing the required tasks for the course or program. Feedback form the tasks and questionnaire can then be used in the design of the Induction Course";

"Utilise an assessment to assess the skill levels of new students being on-boarded on the course. Then analyse the data to see if there are common challenges with specific learning areas; these can be addressed by the way a tailor-made course teaches the students how to perform the challenging task".

These respondents' view is that a more collaborative approach could work by seeking out other expertise from other educators that have experience with the course;

"Researching and collaboration with other teachers can give one a good idea on what will work, and what won't work";

"There are several ways to attempt this. If the course is not the first to be presented at an institution; start by speaking to other educators and gathering their experience and insights with regards to setting up induction courses. These experiences can also extend to your own or the experiences of other educators on other courses with regards to activities and experiences which their students have reported to be problematic".

The respondent above goes further involving other students not involved with the course to test it;

"If there are other students (possibly unrelated to the current course), who are willing to complete the induction course and provide feedback, it will allow many of the issues to be resolved before the induction course goes into first use".

The respondent continues further;

"Train proof readers in self awareness and provide them with the proper scenario before proofing, this being they seeing themselves as the students and making sure they are aware what the student is familiar with and not familiar with beforehand....; Make a list of all procedures required in

assignments whilst developing content, make sure that the development team agrees on those methods and then make sure those are a part of the induction course. Update this list after completing a subject to check its validity".

As can be seen from all the responses above, establishing a first baseline for use without involving actual feedback and student testing is challenging. The discussed methods of establishing a first version of an induction course are useful and pragmatic ideas to help establish the induction course, and an educator can consider what is available to them. However, these ideas mentioned by the respondents are highly dependent on the setting. Therefore, the LXID framework proposes establishing the student persona and identifying all the ALTs. The student persona and ALTs could be established by brainstorming sessions based on ideas of collaborative testing, discussion, and validation. However, the use of open-ended student feedback within the induction course is recommended for establishing that ALTs are addressed before students start the actual course subject.

Question 16

Question type: Multiple-choice.
Question: Is the way that the Framework is presented easy to understand?

The respondents were then asked if the LXID framework was easy to understand. 7 out of 8 respondents chose yes, that the framework is easy to understand and 1 responded that it was neither easy nor difficult. This was again a positive result in that the meaning and flow was clear to the expert educators and that someone developing a course using the LXID framework would be able to do so in easy-to-follow steps.

While 1 respondent did rate that the framework was neither easy nor difficult, it left room for improvement. The flow was further clarified by more meaningful text, and the flow was refined with easier-to-read graphics.

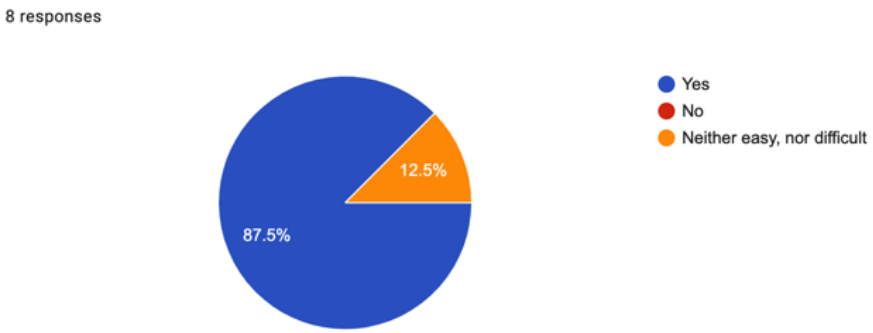

Figure 5.13: Question 16.

Question 17

Question type: Open-ended.
Question: Is the way that the Framework is presented easy to understand?Please motivate your answer above:

When asked to motivate the answer on why it was easy to understand, the respondents motivated with the following responses;

"Reading the framework made sense, and was set out logically, and the citations and references were valid and aligned with the content".

"Clear steps, diagrams and images".

"It was clearly explained".

"The constructs of the framework flow logically and can be comprehended with relative ease".

"Yes, the framework illustration and description are easy to follow. The provided example serves to clarify things further".

The above responses are positive and show an easy-to-follow framework. The response from the respondent below framed step 5 as slightly unclear.

Any graphical representation is easy to understand, as is the case in this framework. Perhaps try and polish some of the steps as you have explained it. For instance, it could be argued that Step 5 is not really a step as it is

currently described. However, if rewritten to be seen as an actual point to do a check or a loop back, this may be more of a step".

The response initiated an enhancement of step 5 to provide more helpful information. The response above prompted some further development addressing the flow to actually show that from step 7 one can go back instead of ending the flow.

Question 18

Question type: Open-ended.
Question:ny other suggestions on the proposed framework or identifying artificial learning thresholds?

The final question posed asked if there are any other suggestions on the proposed framework or identifying artificial learning thresholds?

"The need to understand if there are any external factors or student biases that could impact their feedback, for example, experiences on other platforms or learning management systems, In addition, what checks and balances can be put in place to ensure that change implemented to resolve deficiencies with artificial learning thresholds does not introduce new artificial learning thresholds, resulting in a vicious circle of cause and effect? How does the framework address the influence of elements outside the educating organisation's control? For example, modifications to the LMS by the vendor like Moodle, such as the addition and removal of functionalities deemed necessary by the students, Or modifications to the interface that require the students to be re-educated on how to use the new interface midway through a course".

The following response suggested that the feedback should guide the learners' responses rather than leave it open-ended so that known ALTs can be addressed.

"With regards to the provided example: It may be more useful to guide the induction course participants in their feedback, than to leave it completely open-ended. There should be areas in the feedback survey dedicated to

gathering participant feedback on known ALTs and then a general (open) section for general comments on other areas".

This is something that was considered during the initial development of the framework. J. Li, Wong, Yang, and Bell (2020) found that several characteristics render feedback effective. There are four basic aspects (language, substance, time, and form) as well as six additional factors (source, emotion, recipient, knowledge, feedback providing, and pedagogy) that are necessary for effective feedback. The research further revealed that feedback might be ineffective if the kind of tasks, process phases, and future objectives are not considered.

Consequently, a guided feedback questionnaire would have the potential to uncover missing ALTs that were not thought of. At the very least, it could miss subtle ALTs presented in a way that could perhaps not be anticipated by the course designer or educator. By having open-ended questions, there is more room for building on existing knowledge that a student has built on. Nevertheless, in step 4 of the framework development discussed in section 4, five questions that could guide the educator in what to ask the student was presented. Furthermore, as the respondent also mentions;

"This feedback form would also be fluid, i.e. continuously changing, as the induction course matures and/or the needs/skills of the students change or changes are made to the platform".

Open-ended feedback allows for changes to be made to the platform and factors that are introduced from an external perspective. This external factors are also raised by another respondent;

"How does the framework address the influence of elements outside the educating organisation's control? For example, modifications to the LMS by the vendor like Moodle, such as the addition and removal of functionalities deemed necessary by the students, Or modifications to the interface that require the students to be re-educated on how to use the new interface midway through a course".

The above concern is addressed by the iterative design approach that is incorporated within the LXID framework. This ensures that open-ended

feedback is collected so as not to funnel preconceived notions. According to the findings of Brookfield (1998), the course design and pedagogical decisions made by educators will be incomplete and poorly informed if they do not take into consideration the student's perspective. Furthermore, the only way instruction quality can improve is if teachers have an understanding of how their students perceive the content of the course and the challenges they face in completing it. Therefore, for teachers to successfully construct useful online courses, they require comprehensive feedback on the design choices they employ. Feedback is therefore crucial.

The instructors can use the students' feedback to make adjustments to the curriculum or online learning environment so as to improve the overall quality of the learning experience for the students (Samuel & Conceição, 2022). Continuing on this theme, the preconceived notions are continuously addressed by the use of the persona and the classification based on the 'typical student'. The typical student persona is continuously evaluated if the LXID framework is followed. Therefore, any changes in the LMS can be anticipated, and any other ALTs introduced can be addressed and then correlated in the open-ended feedback of the induction course. However, even though initial questions are recommended to be left as open-ended as possible, feedback could be refined in later iterations of the course, when more is known, to perhaps ask some specific questions based on the knowledge gained.

5.3 Communication of the Research

The final requirement for design research is for it to be communicated. Firstly, this dissertation itself communicates the research. Secondly, a conference paper was prepared presenting the initial framework after some iterative design (van Wyk, van Niekerk, & Petratos, 2021). This paper is shown in Appendix A. The paper was presented at the European Conference on E-Learning. **Feedback from conference attendees was gathered and also incorporated into subsequent versions of the framework.**

Further publications may stem from this work and will serve as additional

communication of the research, thus meeting the requirements of Hevner et al. (2004) for design research to be communicated.

5.4 Findings

First, the research asked the following main research question:

How should educators design online induction courses to familiarise the learner with the requirements of the online learning environment?

This research question led to finding answers to some sub-research questions, where findings are discussed below.

Sub-Research Questions (SRQ) *SRQ1: What creates artificial learning thresholds within an online learning environment?*

Answer: It was found that threshold concepts are an important topic of research. Stemming from this research is the concept of learning thresholds. Learning thresholds play a role in gaining new knowledge. However, these learning thresholds can be a barrier to entry for educators as well as students, and they can generate the chance of experiencing unpleasant or uncomfortable parts of learning that produce anxiety and uncertainty.

When a student reaches a certain point in their education, they are faced with the challenge of overcoming that particular learning threshold in order to continue their education. When this is the goal, like in the case of gaining knowledge in a certain subject area, it is normal for this to occur. It is typical for this to happen when this is the intention, such as when accumulating knowledge in a certain topic area. When the barrier, on the other hand, is not directly connected to the topic being studied, this may result in what is known as an artificial learning barrier or an artificial learning threshold (ALT). A student may encounter such a barrier if they are unaware of how to explore a certain component inside the course or if they are unaware that hidden parts exist inside an examination input box.

Therefore, the goal of the LXID framework is to provide the educator with a process to follow in order to recognise and call attention to ALTs. This will allow the educator to construct an orientation or induction course that, if the LXID framework is implemented, will ensure that ALTs are minimised with each new iteration of the course or student group.

SRQ2: How should an educator identify the components in a given online course that could introduces learning thresholds?

Answer: Following the LXID framework, the educator can establish a student persona of the typical student that will enroll in a course. This way, without any additional knowledge of the student, conclusions can be drawn and the student's level of technology acceptance can be assumed. This assumption will not always allow for all challenges to be met, but it is a starting point to address ALTs. Therefore, the instructor navigates the course with this hypothetical student in mind, identifies all interaction features, and then incorporates them as induction components into the induction course.

Interaction components need to be incorporated so that students who have completed the introduction course and experienced any of the areas in which they have difficulty can submit feedback on those experiences. The educator can then address it with the learner and also construct an induction component for that issue, or improve the induction component.

SRQ3: How can an educator ensure that all the required skills and competencies are included in the introductory activities and introduce them in the correct sequence to overcome learning thresholds?

Answer: The educator can ensure all competencies are included by following the LXID framework, identifying all of the interaction elements, and creating induction components from those interaction elements in an orientation or induction course. The sequence should be kept as the learner will come across them in the course, but all of the interaction elements should be covered by the end of the induction course.

The educator can ensure that the student is exposed to the induction components built from the identified interaction elements by allowing the student to interact with them in an area of the course that has no bearing on the student's grades.

SRQ4: How can an educator assess that each learner has achieved the necessary learning skills and competencies to overcome identified learning thresholds?
Answer: By following the LXID framework and building induction components in an induction course. The student is also required to provide feedback on their experience to the educator before continuing. Therefore, the educator can address any further ALT the student may have. Thereafter, the educator can use the student feedback to further improve and iterate on the course.

The primary research question:
RQ1: How should educators design online induction courses to familiarise the learner with the requirements of the online learning environment?

Answer: An educator needs to make it as easy as possible for a student to focus on the actual subject of learning without introducing them to artificial learning thresholds. The barriers to entry and difficult-to-understand interactions should be kept to a minimum. Alternatively, the student should be exposed to a friendly environment that has no negative consequences for their grade through an orientation course that introduces the elements they will use in the rest of the course. Such a course is called the induction course in this research.

By following the LXID framework, the educator can design a course that lowers the barriers to interacting with the environment, thus aiding in relieving study anxiety and lack of engagement and motivation caused by artificial learning thresholds (ALTs).

5.5 Conclusion

The findings that were obtained through the verification of the learning experience induction design (LXID) framework are encouraging. It was simple to understand and helpful in constructing a method to design an introduction to a course, which was found to assist students in gaining confidence, feeling more motivated, and reducing the barriers to admission that are introduced by artificial learning thresholds (ALTs).

The instructor can set a baseline by adopting a typical student persona and by allowing for continual input from the student. Despite the fact that it may initially be difficult to determine what the typical student would experience in terms of ALTs, it is possible to establish a relatively complete baseline with this method. Brainstorming and discussions with other educators or student test groups are also encouraged but not always possible.

By adhering to the LXID framework, an educator will be able to continuously expand their understanding of the learning environment they are responsible for since the framework allows for iterative design and development that is based on the comments and data provided by students. When it comes to establishing a positive environment for the purpose of reducing student anxiety, one of the most important steps that must be taken is to design and implement an orientation or induction course, complete with induction components and interaction elements, before the student encounters the subject matter of the course in which they are enrolled.

As was discussed in this chapter, the literature review was used to ground the research in the literature and theoretical concepts. Furthermore, the research constructed a prototype based on the literature and theoretical concepts. Thereafter, the initial prototype was further developed, enhanced, and tested via various brainstorming sessions and iterative implementations, satisfying the design as a search process. Finally, the prototype was developed and presented in order to provide input for verification. This satisfies the requirements of research rigour and communication as described by Hevner et al. (2004).

Chapter 6

Conclusion

6.1 Introduction

The research set out to develop a useful and pragmatic framework to aid educators in designing an online course that can familiarise learners with the learning environment. If followed, such a framework should help the educator design the course in such a manner that it lowers artificial learning thresholds, decreases learner anxiety, and increases motivation and engagement.

6.2 Summary

The research asked the following main research question:

How should educators design online induction courses to familiarise the learner with the requirements of the online learning environment?

An educator needs to make it as easy as possible for a student to focus on the actual subject of learning without introducing them to artificial learning thresholds. The barriers to entry and difficult-to-understand interactions should be kept to a minimum. Alternatively, the student should be exposed to a friendly environment that has no negative consequences for their grade through an orientation course that introduces the elements they will use in the rest of the course. Such a course is called the induction course in this research.

By following the LXID framework, the educator can design a course that lowers the barriers to interacting with the environment, thus aiding in reliev-

ing study anxiety and lack of engagement and motivation caused by artificial learning thresholds (ALTs). This thus answers the above primary research question.

The primary contribution of this research was the LXID framework. Furthermore, this framework is already in use in a production environment.

Student feedback on the effects of the course built using the framework is overwhelmingly positive, but due to the need to gain ethics approval for the gathering and use of such data, a formal analysis of such data could not be included in this dissertation.

An early version of the framework was presented at a conference and the feedback from the conference was used to improve later iterations.

Thus far, one publication stems from this research:
Learning Experience Design: A Framework for the Design of Online Guidance Components (van Wyk et al., 2021).

The opportunity for more publications stemming from this research has been identified.

6.3 Possible Further Enhancements

Developing a course online has many different elements to consider. The LXID framework is a step to help an educator establish an online environment that lowers the artificial learning threshold that might be experienced. Further enhancements could be made if there was a formal student verification process for the framework. Such a student verification process could be developed to learn more about specific barriers that can create artificial learning thresholds or if certain elements are overused.

6.4 Suggestion for Future Research.

There appear to be a significant number of artificial learning thresholds that are the result of poor or substandard interface or usability design. A course structure that is inefficient and that makes incorrect assumptions about the students' prior knowledge can have a negative impact in a student's ability to learn.
Therefore, it is suggested that additional research into user experience design and usability design be conducted from the perspective of course design and implementation.

6.5 Concluding Remarks

We live in a world where online education is becoming increasingly relevant. It is important to not make assumptions about students' technological or other skills, especially when education is presented online, so that all students have a fair chance to take part. Anxiety is a common problem among students, and if not addressed, it can lead to a lack of motivation and engagement, which can have a negative impact on the learner's student journey.

Assumptions and overestimates about the knowledge and skills of today's digital learners with technology lead to the creation of unnecessary entry barriers, such as artificial learning thresholds. A student's anxiety, lack of engagement, and lack of motivation can all be attributed to these barriers.

Online education is now the norm, but not every student necessarily possesses the skills necessary to participate. Educators should not develop online courses based solely on a personal preconceived notion of education. If educators want to guarantee equal opportunity for all students, we must eliminate artificial learning thresholds so that all students have equal access and standing.

References

Abdous, M. (2019). Influence of satisfaction and preparedness on online students' feelings of anxiety. *The Internet and Higher Education*, *41*(December 2018), 34–44. Retrieved from https://doi.org/10.1016/j.iheduc.2019.01.001https://linkinghub.elsevier.com/retrieve/pii/S1096751617305729 doi: 10.1016/j.iheduc.2019.01.001

Alsaleh, N. (2020). Educational research and reviews the effectiveness of an instructional design training program to enhance teachers' perceived skills in solving educational problems. , *15*, 751-763. Retrieved from http://www.academicjournals.org/ERR doi: 10.5897/ERR2020.4082

Alshehri, A., Rutter, M., & Smith, S. (2019). Assessing the relative importance of an e-learning system's usability design characteristics based on students' preferences. , *8*(3), 839–855. Retrieved 2022-11-13, from https://eu-jer.com/assessing-the-relative-importance-of-an-e-learning-systems-usability-design-characteristics-based-on-students-preferences doi: 10.12973/eu-jer.8.3.839

Amushigamo, A. P., Hidengwa, M. H., & Herman, S. N. (2018). Enhancing Large Classes With Active Learning Pedagogical Skills. In (pp. 331–348). Retrieved from http://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/978-1-5225-3949-0.ch018 doi: 10.4018/978-1-5225-3949-0.ch018

Baaki, J., Maddrell, J., & Stauffer, E. (2017). Designing authentic and engaging personas for open education resources designers. , *8*(2). Retrieved 2022-12-01, from https://scholarworks.iu.edu/journals/index.php/ijdl/article/view/22427 doi: 10.14434/ijdl.v8i2.22427

Baldwin, S. J. (2019). Assimilation in Online Course Design. *American Journal of Distance Education*, *33*(3), 195–211. Retrieved from https://doi.org/10.1080/08923647.2019.1610304https://www.tandfonline.com/doi/full/10.1080/08923647.2019.1610304 doi: 10.1080/08923647.2019.1610304

Blayone, M.-O., Todd J. B., VanOostveen, R., Grebeshkov, O., Hrebeshkova, O., & Vostryakov, O. (2018, may). Surveying digital competencies of university students and professors in Ukraine for fully online collaborative learning. *Technology, Pedagogy and Education*, *27*(3), 279–296. Retrieved from http://doi.org/10.1080/1475939X.2017.1391871https://www.tandfonline.com/doi/full/10.1080/1475939X.2017.1391871 doi: 10.1080/1475939X.2017.1391871

Branch, R. M. (2009). *Approach, Instructional Design: The ADDIE* (Vol. 53) (No. 9).

Brookfield, S. (1998). Critically reflective practice. , *18*(4), 197–205. Retrieved 2022-12-06, from https://journals.lww.com/00005141-199818040-00001 doi: 10.1002/chp.1340180402

Brunton, J., Brown, M., Costello, E., & Farrell, O. (2018). Head start online: flexibility, transitions and student success. *Educational Media International*, *55*(4), 347–360. Retrieved from https://doi.org/10.1080/09523987.2018.1548783 doi: 10.1080/09523987.2018.1548783

Bryman, A., & Bell, E. (2012). *Business Research Methods* (3rd Editio ed.). Online Resource Centre.

Chapman, C. N., Love, E., Milham, R. P., ElRif, P., & Alford, J. L. (2008). Quantitative evaluation of personas as information. , *52*(16), 1107–1111. Retrieved 2022-10-09, from http://journals.sagepub.com/doi/10.1177/154193120805201602 doi: 10.1177/154193120805201602

Collins, J., & Hussey, R. (2003). Business Research: a practical guide for undergraduate and postgraduate students. *Hampshire: Palgrave Macmillan*.

Dack, H., & Merlin-Knoblich, C. (2019). Improving classroom guidance curriculum with understanding by design. , *9*(2), 80–99. Retrieved 2022-06-27, from http://tpcjournal.nbcc.org/category/

pdf-articles/volumes/volume-9/volume-9-issue-2/ doi: 10.15241/hd.9.2.80

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. , *13*(3), 319. Retrieved 2022-11-08, from https://www.jstor.org/stable/249008?origin=crossref doi: 10.2307/249008

de Freitas, S. I., Morgan, J., & Gibson, D. (2015). Will MOOCs transform learning and teaching in higher education? Engagement and course retention in online learning provision. *British Journal of Educational Technology*, *46*(3), 455–471. Retrieved from http://dx.doi.org/10.1111/bjet.12268http://researchrepository.murdoch.edu.au/26283/https://onlinelibrary.wiley.com/doi/10.1111/bjet.12268 doi: 10.1111/bjet.12268

Deák, C., Kumar, B., Szabó, I., Nagy, G., & Szentesi, S. (2021, 7). Evolution of new approaches in pedagogy and stem with inquiry-based learning and post-pandemic scenarios. *Education Sciences*, *11*. doi: 10.3390/educsci11070319

Dumford, A. D., & Miller, A. L. (2018). Online learning in higher education: exploring advantages and disadvantages for engagement. *Journal of Computing in Higher Education*, *30*(3), 452–465. Retrieved from https://doi.org/10.1007/s12528-018-9179-zhttp://link.springer.com/10.1007/s12528-018-9179-z doi: 10.1007/s12528-018-9179-z

El-aasar, S. A., & Farghali, G. (2022). Predictive study of the factors and challenges affecting the usability of e-learning platforms in the light of COVID-19. , *10*(3), 568–589. Retrieved 2022-11-14, from https://ijemst.net/index.php/ijemst/article/view/2428 doi: 10.46328/ijemst.2428

Gillett-Swan, J. (2017, jan). The Challenges of Online Learning: Supporting and Engaging the Isolated Learner. *Journal of Learning Design*, *10*(1), 20. Retrieved from https://www.jld.edu.au/article/view/293 doi: 10.5204/jld.v9i3.293

Girgin, D. (2021). A sustainable learning approach: Design thinking in teacher education conditions of the creative commons attribution li-

cense (cc by-nc-nd). *Derya Girgin / International Journal of Curriculum and Instruction*, *13*, 359-382.

Gosselin, K. P., Northcote, M., Reynaud, D., Kilgour, P., Anderson, M., & Boddey, C. (2016). Development of an Evidence-based Professional Learning Program Informed by Online Teachers' Self-efficacy and Threshold Concepts. *Online Learning*, *20*(3), 178–194. Retrieved from `https://olj.onlinelearningconsortium.org/index.php/olj/article/view/648` doi: 10.24059/olj.v20i3.648

Gray, J. A., & DiLoreto, M. (2016). The Effects of Student Engagement, Student Satisfaction, and Perceived Learning in Online Learning Environments This. *NCPEA International Journal of Educational Leadership Preparation*, *11*(1), 98 –119.

Gupta, G. (2021). Pedagogy in theory and practice. , *14*, 143.

Gurley, L. E. (2018). Educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments. *Online Learning Journal*, *22*(2), 197–220. doi: 10.24059/olj.v22i2.1255

Haag, M., & Marsden, N. (2019). Exploring personas as a method to foster empathy in student IT design teams. , *29*(3), 565–582. Retrieved 2022-12-01, from `http://link.springer.com/10.1007/s10798-018-9452-5` doi: 10.1007/s10798-018-9452-5

Harley, A. (2015). *Personas Make Users Memorable for Product Team Members.* Retrieved 6 August 2022, from `https://www.nngroup.com/articles/persona/`

Hattie, J., & Timperley, H. (2007). The power of feedback. , *77*(1), 81–112. Retrieved 2022-11-27, from `http://journals.sagepub.com/doi/10.3102/003465430298487` doi: 10.3102/003465430298487

Hevner, March, Park, & Ram. (2004). Design science in information systems research. , *28*(1), 75. Retrieved 2022-11-23, from `https://www.jstor.org/stable/10.2307/25148625` doi: 10.2307/25148625

Kallia, M., & Sentance, S. (2021). Threshold concepts, conceptions and skills: Teachers' experiences with students' engagement in functions. *Journal of Computer Assisted Learning*, *37*(2), 411–428.

Keller, J. M. (2016). Motivation, Learning, and Technology: Applying the ARCS-V Motivation Model. *Participatory Educational Research*, *3*(2),

1–15. doi: 10.17275/per.16.06.3.2

Kerkhoff, S. (2020). Collaborative Video Case Studies and Online Instruments for Self-Reflection in Global Teacher Education. *Journal of Technology and Teacher Education*, *28*(2), 341–351. Retrieved from https://www.learntechlib.org/p/216212

Keskin, S., & Yurdugül, H. (2020). Factors Affecting Students' Preferences for Online and Blended Learning: Motivational Vs. Cognitive. *European Journal of Open, Distance and E-Learning*, *22*(2), 72–86. Retrieved from https://content.sciendo.com/view/journals/eurodl/22/2/article-p72.xml doi: 10.2478/eurodl-2019-0011

Kilgour, P., Reynaud, D., Northcote, M., McLoughlin, C., & Gosselin, K. P. (2018). Threshold concepts about online pedagogy for novice online teachers in higher education. *Higher Education Research Development*, *38*(7), 1417–1431. Retrieved from https://doi.org/10.1080/07294360.2018.1450360https://www.tandfonline.com/doi/full/10.1080/07294360.2018.1450360 doi: 10.1080/07294360.2018.1450360

Kopacz, M. A. (2022). Who is julia? teaching audience analysis through the concept of audience persona. , *36*(2), 146–152. Retrieved 2022-11-27, from https://www.tandfonline.com/doi/full/10.1080/17404622.2021.1955142 doi: 10.1080/17404622.2021.1955142

Li, C., & Lalani, F. (2020a). The covid-19 pandemic has changed education forever. this is how. *World Economic Forum*. Retrieved from https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/

Li, C., & Lalani, F. (2020b). *The COVID-19 pandemic has changed education forever. This is how.(14 April 2020).* Retrieved from https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/

Li, J., Wong, S. C., Yang, X., & Bell, A. (2020). Using feedback to promote student participation in online learning programs: evidence from a quasi-experimental study. , *68*(1), 485–510. Retrieved 2022-11-19, from http://link.springer.com/10.1007/s11423-019-09709-9 doi: 10.1007/s11423-019-09709-9

Li, K., & Keller, J. M. (2018). Use of the ARCS model in education: A literature review. *Computers and Education*, *122*(May 2017), 54–62. Retrieved from https://linkinghub.elsevier.com/retrieve/pii/S0360131518300782

Liang, D.-T. V., Rose Chen. (2012). Online Learning: Trends, Potential and Challenges. *Creative Education*, *03*(08), 1332–1335. doi: 10.4236/ce.2012.38195

Lumbreras, R., Jr., & Rupley, W. H. (2020). Pre-service teachers' application of understanding by design in lesson planning. , *9*(3), 594. Retrieved from http://ijere.iaescore.com/index.php/IJERE/article/view/20491 doi: 10.11591/ijere.v9i3.20491

Luscinski, A. (2017). Best Practices in Adult Online Learning. *ProQuest LLC*. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=ED578790&site=ehost-live%0Ahttp://gateway.proquest.com/openurl?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&res_dat=xri:pqm&rft_dat=xri:pqdiss:10608529

Martin, F., Budhrani, K., Kumar, S., & Ritzhaupt, A. (2019). Award-Winning Faculty Online Teaching Practices: Roles and Competencies. *Online Learning*, *23*(1), 184–205. Retrieved from https://olj.onlinelearningconsortium.org/index.php/olj/article/view/1329 doi: 10.24059/olj.v23i1.1329

Mayer, R. E. (2009). *Multimedia learning second edition*.

Morley, C. (2020). Towards the co-identification of threshold concepts in academic reading. *Journal of University Teaching and Learning Practice*, *17*(2).

Mourdi, Y., Sadgal, M., El Kabtane, H., & Berrada Fathi, W. (2019). A machine learning-based methodology to predict learners' dropout, success or failure in MOOCs. , *15*(5), 489–509. Retrieved 2022-11-13, from https://www.emerald.com/insight/content/doi/10.1108/IJWIS-11-2018-0080/full/html doi: 10.1108/IJWIS-11-2018-0080

Muir, T., Milthorpe, N., Stone, C., Dyment, J., Freeman, E., & Hopwood, B. (2019). Chronicling engagement: students' experience of online learning over time. *Distance Education*, *40*(2), 262–277. Retrieved from

https://doi.org/10.1080/01587919.2019.1600367 doi: 10.1080/01587919.2019.1600367

Northcote, M., Kilgour, P., Reynaud, D., Gosselin, K. P., & McLoughlin, C. (2019). A professional learning program for novice online teachers using threshold concepts. *Online Learning Journal*, *23*(4), 336–353. doi: 10.24059/olj.v23i4.1573

Oleson, A., & Hora, M. T. (2014). Teaching the way they were taught? Revisiting the sources of teaching knowledge and the role of prior experience in shaping faculty teaching practices. *Higher Education*, *68*(1), 29–45. Retrieved from http://link.springer.com/10.1007/s10734-013-9678-9 doi: 10.1007/s10734-013-9678-9

Pathak, D. N. (2022). Idea of pandemic-pedagogy: Reflexive rumination on teaching and learning practices. *Higher Education for the Future*, *9*, 62-74. doi: 10.1177/23476311211046184

Phillips, J., Klein, J. D., Dunne, E., & Siriwardena, M. (2019). Using Formative Data to Make Evidence-Based Decisions During Re-Design. *Journal of Formative Design in Learning*, *3*(2), 133–145. doi: 10.1007/s41686-019-00036-z

Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning Journal*, *21*, 166-190. doi: 10.24059/olj.v21i3.1225

Reese, S. A. (2015). Online learning environments in higher education: Connectivism vs. dissociation. *Education and Information Technologies*, *20*(3), 579–588. Retrieved from http://link.springer.com/10.1007/s10639-013-9303-7 doi: 10.1007/s10639-013-9303-7

Reinsfield, E. (2020). A future-focused approach to the technology education curriculum: the disparity between intent and practice. , *30*(1), 149–161. Retrieved 2022-08-06, from http://link.springer.com/10.1007/s10798-019-09497-6 doi: 10.1007/s10798-019-09497-6

Robinson, O. C. (2014, jan). Sampling in Interview-Based Qualitative Research: A Theoretical and Practical Guide. *Qualitative Research in Psychology*, *11*(1), 25–41. Retrieved from http://www.tandfonline.com/doi/full/10.1080/14780887.2013.801543 doi: 10.1080/14780887.2013.801543

Ruth, S. (2018). Faculty Opposition to Online Learning: Challenges and

Opportunities. *International Journal of Technology in Teaching and Learning*, *14*(1), 12–23.

Ryan, T., Henderson, M., Ryan, K., & Kennedy, G. (2021). Designing learner-centred text-based feedback: a rapid review and qualitative synthesis. , *46*(6), 894–912. Retrieved 2022-11-12, from https://www.tandfonline.com/doi/full/10.1080/02602938.2020.1828819 doi: 10.1080/02602938.2020.1828819

Rõõm, M., Lepp, M., & Luik, P. (2021). Dropout time and learners' performance in computer programming MOOCs. , *11*(10), 643. Retrieved 2022-11-13, from https://www.mdpi.com/2227-7102/11/10/643 doi: 10.3390/educsci11100643

Samuel, A., & Conceição, S. (2022). Using the critical incident questionnaire as a formative evaluation tool to inform online course design: A qualitative study. , *23*(2), 151–169. Retrieved 2022-12-04, from http://www.irrodl.org/index.php/irrodl/article/view/5959 doi: 10.19173/irrodl.v23i2.5959

Scoppio, G., & Luyt, I. (2017). Mind the gap: Enabling online faculty and instructional designers in mapping new models for quality online courses. *Education and Information Technologies*, *22*(3), 725–746. Retrieved from http://link.springer.com/10.1007/s10639-015-9452-y doi: 10.1007/s10639-015-9452-y

Sharp, H., Preece, J., & Rogers, Y. (2019). Interaction design, 5th edition. , 657.

Shé, C. N., Farrell, O., Brunton, J., & Costello, E. (2022). Integrating design thinking into instructional design: The openteach case study. *Australasian Journal of Educational Technology*, *2022*, 38. Retrieved from https://openteach.ie/home/

Simamora, R. M. (2020, 8). The challenges of online learning during the covid-19 pandemic: An essay analysis of performing arts education students. *Studies in Learning and Teaching*, *1*, 86-103. Retrieved from https://scie-journal.com/index.php/SiLeT/article/view/38 doi: 10.46627/silet.v1i2.38

Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. *Procedia Manufacturing*, *22*, 960–967. Retrieved from https://doi.org/10.1016/j.promfg.2018.03.137https://

linkinghub.elsevier.com/retrieve/pii/S2351978918304335 doi: 10.1016/j.promfg.2018.03.137

Tao, D., Fu, P., Wang, Y., Zhang, T., & Qu, X. (2022). Key characteristics in designing massive open online courses (MOOCs) for user acceptance: an application of the extended technology acceptance model. , *30*(5), 882–895. Retrieved 2022-11-14, from https://www.tandfonline.com/doi/full/10.1080/10494820.2019.1695214 doi: 10.1080/10494820.2019.1695214

Thompson, C. J., Leonard, L., & Bridier, N. (2019). Online discussion forums: Quality interactions for reducing statistics anxiety in graduate education students. *International Journal of E-Learning Distance Education*, *34*(1), 1–31.

Tomczyk, (2021). Declared and real level of digital skills of future teaching staff. , *11*(10), 619. Retrieved 2022-08-06, from https://www.mdpi.com/2227-7102/11/10/619 doi: 10.3390/educsci11100619

Uluçinar, U. (2021). The effects of technology supported ubd based instructional design training on student teachers' technological pedagogical content knowledge and learning–teaching conceptions. *International Online Journal of Education and Teaching*, *8*(4), 2636–2664.

van der Sluis, F., van der Zee, T., & Ginn, J. (2017). Learning about Learning at Scale. In *Proceedings of the fourth (2017) acm conference on learning @ scale - l@s '17* (pp. 131–140). New York, New York, USA: ACM Press. Retrieved from http://dl.acm.org/citation.cfm?doid=3051457.3051461 doi: 10.1145/3051457.3051461

VanOostveen, R., Desjardins, F., & Bullock, S. (2019). Professional development learning environments (pdles) embedded in a collaborative online learning environment (cole): Moving towards a new conception of online professional learning. *Education and Information Technologies*, *24*, 1863-1900. doi: 10.1007/s10639-018-9686-6

van Wyk, N., van Niekerk, J., & Petratos, S. (2021). Learning experience design: A framework for the design of online guidance components. In *European conference on e-learning* (pp. 495–XX).

Walden, P. R. (2022). Student Motivation, Anxiety and Pass/Fail Grading: A SoTL Project. *Teaching and Learning in Communication Sciences and Disorders*, *6*(1). Retrieved from https://ir.library

.illinoisstate.edu/tlcsd/vol6/iss1/13/ doi: 10.30707/TLCSD6.1.1649037808.651639

Warf, B. (2019). Teaching Digital Divides. *Journal of Geography*, *118*(2), 77–87. Retrieved from https://doi.org/10.1080/00221341.2018.1518990https://www.tandfonline.com/doi/full/10.1080/00221341.2018.1518990 doi: 10.1080/00221341.2018.1518990

Wilson, D. P., Williams, P., Long, W. R., & Northcote, M. T. (2017). Learning thresholds: A journey in online learning and teaching. , *11*(1). Retrieved 2022-06-27, from https://research.avondale.edu.au/teach/vol11/iss1/9 doi: 10.55254/1835-1492.1334

Wisniewski, B., Zierer, K., & Hattie, J. (2020). The power of feedback revisited: A meta-analysis of educational feedback research. , *10*, 3087. Retrieved 2022-11-27, from https://www.frontiersin.org/article/10.3389/fpsyg.2019.03087/full doi: 10.3389/fpsyg.2019.03087

Wong, B., & Chiu, Y.-L. T. (2021). Exploring the concept of 'ideal' university student. , *46*(3), 497–508. Retrieved 2022-08-18, from https://www.tandfonline.com/doi/full/10.1080/03075079.2019.1643302 doi: 10.1080/03075079.2019.1643302

Wu, B., & Chen, X. (2017). Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model. *Computers in Human Behavior*, *67*, 221–232. Retrieved from http://dx.doi.org/10.1016/j.chb.2016.10.028https://linkinghub.elsevier.com/retrieve/pii/S074756321630735X doi: 10.1016/j.chb.2016.10.028

Wu, Y.-L. (2015). Applying culturally responsive pedagogy to the vocational training of immigrants. *Journal of Education and Training Studies*, *4*. doi: 10.11114/jets.v4i2.1165

Wylie, N. (2020). Face-to-face to online: PhD academic writing @Maastricht University. (2020), 13–19. Retrieved from https://research-publishing.net/manuscript?10.14705/rpnet.2020.40.1060

Part II

Appendices

Appendices

During the research conducted towards this thesis, a peer-reviewed conference paper, stemmed directly from the work in this thesis. The publication is:

1. **Appendix A**
    - **Conference Publication** - van Wyk, N., van Niekerk, J., Petratos, S. (2021, October). Learning Experience Design: A Framework for the Design of Online Guidance Components. In European Conference on e-Learning (pp. 495-XX). Academic Conferences International Limited.
2. **Appendix B**
    - **Example Persona** - Example student persona of a 'typical student'.
3. **Appendix C**
    - **Survey Questions:** - Survey questions that was used in the verification process.
4. **Appendix D**
    - **Invitation Letter:** - Expert educator invitation to participate.
5. **Appendix E**
    - **Framework Introduction:** - Introduction information to the framework.
6. **Appendix F**
    - **Ethics Documentation:** - Ethics process documentation.

6.6 Appendix A - Conference Publication

Proceedings of the

20th European Conference on e-Learning

ECEL 2021

a Virtual Conference

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Learning Experience Design: A Framework for the Design of Online Guidance Components

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Abstract: Several factors, commonly referred to as threshold concepts, can act as barriers of entry for educators and students in an online learning environment. Additionally, many educators lack pedagogical training, and theoretical context, making it challenging to create effective online studies. Furthermore, they may lack personal experience in online learning. Thus, educators create courses based on physical classroom experience instead of an online learning experience, creating artificial learning thresholds. Identifying problematic areas and designing a suitable induction course can effectively introduce students to the learning environment, lowering dropout rates and decreasing online study anxiety. This study explores a process of identifying artificial learning thresholds and presents a learning experience design framework that can be utilised to overcome learning barriers while building courses in online environments. Online learning has specific requirements to that of on-campus studies that can be challenging to identify by educators. It is particularly challenging to those educators who do not have a wealth of experience developing online courses. These problematic areas often only introduce themselves as issues when the student's grades are tallied, lack of engagement is experienced or when the student drops out. This is especially true now that an epidemic has accelerated the move to online studies, often with ill-prepared and pressured educators carrying the bulk of the frustrations that students might experience. Identifying potentially problematic areas and introducing the students to the experience early and effectively in a safe environment, will reduce anxiety and stress in the students and the teachers.

Keywords: instructional design, course development, learning experience design, learning thresholds, study anxiety, artificial learning thresholds, LXID framework, technology acceptance model

1. Introduction

Most university lecturers have not had formal pedagogical training, but rather learned to teach through the so-called *apprenticeship of observation* as described by Lortie (1975). Teachers learned how to teach through being students themselves. However, many university lecturers have never been students in online courses and thus may lack even the most fundamental skills needed to design online learning experiences.

Online learning has become increasingly more important. Additionally, many university courses have migrated to online delivery through necessity. Educators may not have been adequately prepared for such migration to online learning. However, the difficulties presented by online delivery is not only experienced by educators. Many learners also experience certain artificial barriers to effective learning in an online environment, often referred to as threshold concepts (Kallia and Sentance, 2021).

This research is based on the premise that the negative impact of such thresholds can be reduced through an appropriately designed induction course that teaches learners how to learn in the specific online learning environment. However, educators are not necessarily equipped to design such induction courses.

This paper proposes a framework that will assist educators and course designers in designing induction components for online courses in order to overcome possible artificial learning thresholds among students. The purpose of the framework is to propose a procedure for designing courses so that artificial learning thresholds are not barriers to online learning. A good induction program in the form of an introduction course will reduce artificial learning thresholds. However, to design suitable introduction components, one needs to identify the artificial learning thresholds in order to make it easier for students to learn and participate in the course.

The remainder of this paper is structured as follows; section 2 explores the context for the research. Section 3 introduces the methodology. Section 4 provides an overview of the relevant literature and provides the theoretical basis of the research. Section 5 presents the framework proposed by this research whilst, section 6 demonstrates its utility through an example. Section 7 concludes the paper.

2. Research context

Online education has been increasing in popularity over the last few years. Consequently, this increased pressure on educators to move from the traditional classroom to a digital, online, or mixed delivery model (Gillett-Swan, 2017). There has been a drastic proliferation in online and degree programs across higher education institutions in recent times. Not only is this a trend among certificate or short courses, but graduate degrees are also quickly moving away from the traditional classroom-based programs toward fully online deliveries (Thompson, Leonard and Bridier, 2019).

The continual expansion of online education increases the demand for knowledge and professional programs that can guide educators through the process of teaching and developing course material (Gosselin et al., 2016; Northcote et al., 2019). Moving to online education not only brings the need to move the courses being taught into the online realm, but also raises the question of what that realm should look and feel like from a learner's perspective. With increased flexibility come increased options and opportunities (Liang and Chen, 2012; Gillett-Swan, 2017; Ruth, 2018; Baldwin, 2019). However, the possibilities and opportunities that come with online education highlight many problems in providing a unified learning experience to the learner and challenges to the educators (Gillett-Swan, 2017; Ruth, 2018; Wylie, 2020).

Often content is taken from the traditional classroom and merely placed online to be used. However, online and blended learning needs a different approach to classroom and face to face engagements (Gurley, 2018). The different approaches do not only apply to the learning strategies but also to online education' best practices'. Best practices can be defined as "a method that has been deemed more effective than other alternatives due to the positive outcome produced. A best practice is a technique or methodology that has been shown by experience or research to lead to a desired result" (Luscinski, 2017, p. 13).

University lecturers are primarily not formally trained as educators. Therefore, most lecturers base their classroom practices on what they experienced when they were students (Oleson and Hora, 2014). However, when it comes to online learning, most university lecturers probably do not have a wealth of experience to draw from with regards to how to teach their courses online (Scoppio and Luyt, 2017; Kerkhoff, 2020). Additionally, the educators are expected to provide guidance on how to learn, and in online learning there is once again often a lack of experience on how to accomplish this (Martin *et al.*, 2019).

3. Methodology

This research was conducted using a design-science paradigm. The research adhered to the seven guidelines for such research as described by Hevner, March, Park and Ram (Hevner et al., 2004). This section details how this research adheres to the suggested requirement for each guideline.

Design as an artefact - The suggested framework meets all requirements for a produced artefact, as suggested by Hevner, et al. (2004)

Problem relevance - The relevance of the research problem was argued in the introduction to this paper. Online learning has become an essential delivery mode for most universities. The relevance of ensuring that all learners have the requisite skills to benefit from this modality should be clear.

Design evaluations - The framework proposed in this research has been successfully used in a production environment to guide the creation and refinement of online induction courses at a leading vocational college in Norway. Both the framework and the induction courses were used and evaluated over several iterations with favourable results. Due to space limitations, empirical data to show the rigour of the evaluation process will be reserved for future publications.

Research Contributions - The framework itself, which meets the requirements of a research artefact as described by Hevner et al. (2004), is the primary contribution of this research.

Research Rigor – As mentioned under the guideline for evaluation, an iterative design process was followed. This process adhered to the research rigour guidelines for iterative designs in technology-based research proposed by Olivier (2004).

Design as a Search process - This guideline requires that the artefact's creation adheres to an iterative process during which a design is continuously improved over several cycles. The research spanned several iterations during which the design was continuously improved and refined, which satisfies this requirement.

Communication of Research - The produced framework has been distributed in the researcher's organisation to assist lecturing staff with the design of induction courses. This paper is the first step towards more formal communication of the research.

4. Literature and theoretical basis

Two key factors came to the fore when researching; how to address the students' learning experience and threshold concepts.

4.1 Learning experience

The assumption that many students who are born after a certain date are digital natives and do not need to be taught how to learn online, has been shown not to be a definitive truth (Gillett-Swan, 2017; Warf, 2019). For example, students that demonstrated competencies in social media and mobile use, still failed to use relevant platforms to upload and share files, create documents, read articles, or use calendars (Blayone *et al.*, 2018; Warf, 2019). Online learning environments can be an entirely autonomous learning experience or set up to be a one-on-one teacher-student environment where every action is tracked (De Freitas, Morgan and Gibson, 2015). On the one hand, online presence between educator and learner can be perceived by learners as vastly more engaging and personal than a physical classroom (Reese, 2015).

On the other hand, online learning could enable autonomous and self-paced learning scenarios, but this could lead students to experience anxiety and a feeling of being on their own (Reese, 2015). For example, joining a physical lecture in a classroom environment may only involve one-way communication, whereas a discussion and collaboration using a text-based group messaging system or discussion forum can be very interactive. The freedom that autonomous learning provides by enabling self-paced progression could also lead to the potential lack of student engagement and the ability of the educator to spot the lack of progression (van der Sluis, van der Zee and Ginn, 2017). The case where progression and engagement are not tracked could lead to student dropout before intervention by the educator can occur (van der Sluis, van der Zee and Ginn, 2017). These progression and engagement issues contrast with studies showing that making material and activities that are compulsory available, as soon as possible for as long as possible, help ease anxiety in students and lead to better results. (Muir *et al.*, 2019). Students may simply not participate in the course because they lacked a fundamental understanding of the environment, what is expected of them, and what to expect from the course delivery. Consequently, in order to have a positive and engaging online learning experience, the student needs to be equipped with the skills for online learning (Dumford and Miller, 2018; Keskin and Yurdugül, 2020). The interactive learning environment is crucial in determining whether the learning experience is pleasant or unpleasant. However, all stakeholders involved in the course development can contribute to a student achieving optimal learning (Fournier and Kop, 2015).

4.2 Thresholds concepts

A relevant development in online education is the notion of threshold concepts, which are areas of learning that create anxiety and uncertainty. These concepts play a key role in the student dropping out or acquiring new knowledge (Kilgour *et al.*, 2019). Threshold concepts can provide educators with a valuable way of thinking about the barriers to entry a student may have in learning essential, hard to grasp knowledge (Morley, 2020). It is important to note that while a framework like Universal Design for Learning (UDL) exists, the focus in UDL is on inclusive content of the course material There are still challenges regarding how the online student experiences the environment and the aspects of interaction (Khan *et al.*, 2017). Learning thresholds are frequently created in areas outside the course topic as a result of assumptions about the learner's skills and abilities. For example, an educator might incorrectly assume that a student is a 'digital native' and will know how

to upload a file to an LMS. These assumptions could create learning thresholds for the student because of the technologies introduced in the course (VanOostveen, Desjardins and Bullock, 2019).

There are two broad categories of learning thresholds. The first of these deals with thresholds that require the learner to have a certain level of prerequisite knowledge. These thresholds are inherent to the subject discipline. However, the second type of learning threshold is artificial in that it creates a barrier to learning that is unrelated to the subject matter. For example, unfamiliarity with a particular online component or tool. These learning thresholds can lead to different challenges in student participation in the same course. This paper focuses on the second group of threshold concepts which will be referred to as artificial learning thresholds (ALT's), as they could prevent the student from participating in the material and experience barriers that should not exist.

Previous research reveals that students tend to have higher anxiety when a course begins. However, the anxiety reduces when they have more experience in the study environment (Amushigamo, Hidengwa and Herman, 2018; Muir *et al.*, 2019). Having an induction process for online course environments can be vital for student success. However, such an induction process should be specifically adapted per given course, since modalities, course requirements, learner management systems, user interfaces, and technologies might differ between courses. The ability to learn online can have many underlying factors that also play a role in the learners' ability to finish the course online (Gray and DiLoreto, 2016). Intrinsic motivation, self-efficacy, knowledge of previous learning, specific technical skills such as manipulation of streaming video, web browsers, computer and device literacy could all influence the quality of the learning experience (Wu and Chen, 2017; Li and Keller, 2018).

Another factor that can cause an ALT is the willingness of the student to engage with the technologies used. The Technology Acceptance Model (TAM) is a widely used model to explain the likelihood of humans using technology. In TAM, three factors determine the likelihood of accepting technology. Firstly, the perceived usefulness of the technology, the perceived ease of use, and the attitude towards using the technology (Taherdoost, 2018). The TAM model suggests that if users perceive technology as complicated or challenging, they will be unwilling to engage and participate (Wu and Chen, 2017). By introducing students to a low risk, high reward activity upfront, educators can increase the perceived ease of use whilst simultaneously increasing the perceived usefulness. Developing ways to help students overcome artificial learning thresholds will allow students to concentrate on the actual focus of study.

Educators need guidance on how to introduce the student to an environment in an engaging and motivating way (Scoppio and Luyt, 2017). The process must introduce the essential elements to get the student comfortable with the layout and assessment strategy, providing an environment that encourages engagement and continuation. A key element in this aspect is student induction and orientation (Brunton *et al.*, 2018).

Identifying learning thresholds is fraught with difficulties, especially when the course is created for the first time. Two of the most fundamental problems include the method to be used and the participants that must be involved. A best-suited method for finding learning thresholds has yet to be identified (Kallia and Sentance, 2021). However, the researcher believes that it is possible to create a pragmatic framework for introducing students to online learning and overcoming ALT's.

5. Conceptual framework

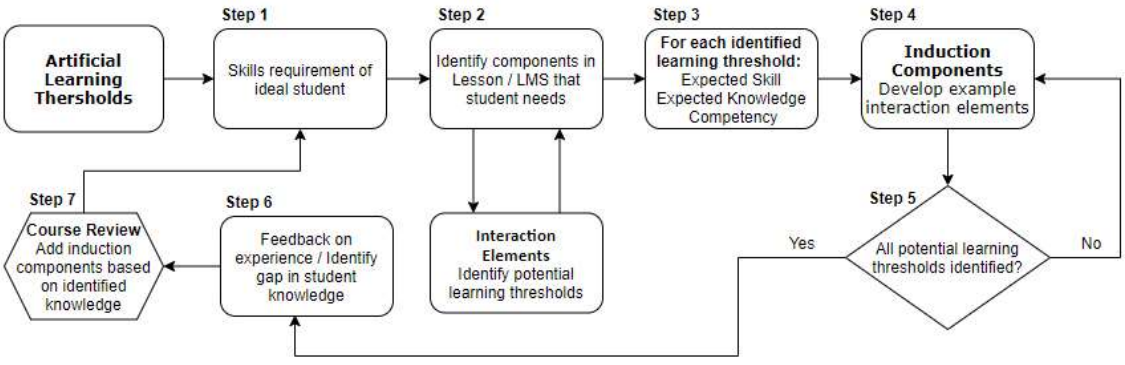


Figure 1: Learning experience induction design framework (LXID framework)

Educators need to ensure that the student demonstrates sufficient knowledge in using the learning environment and tools needed to engage with the studies. To evaluate the knowledge of the environment, there needs to be a way to gauge the skills and competency gaps in an unintimidating way. This is a key factor in overcoming ALT's that may exist, building confidence in the student, and creating a positive learning experience (Keller, 2016). Conducting a learning experience design (LXD) necessitates considering current learning skills, competency, and capability when formulating the design. The design of learning experiences combines multiple design disciplines and the field of education. LXD incorporates interaction design, user experience design, graphic design, and game design. These design approaches are combined with educational, training, and development principles, instructional design, cognitive psychology, and neuroscience (Picciano, 2017). The UDL framework mentioned in 4.2, could be helpful to apply together with the framework proposed in this research when looking at building more inclusive course material for a diverse group of students. Without high fidelity prototyping or live site usability testing, it will be difficult to develop all the potential learning thresholds that the environment could contain when the course is first developed. The potential learning thresholds should be identified, at first, using a tacit knowledge approach if no student learner experience test can be completed beforehand. Developing an introductory course focusing on the learning environment and interaction elements is vital. Furthermore, by iterating on the course based on student feedback, knowledge about what the student finds as a learning threshold can move from tacit to explicit (Keller, 2010; Brunton *et al.*, 2018; Baldwin, 2019).

In order to identify the artificial learning thresholds within the course environment, the course developer will need to look at the following set of criteria:

- General Competency*:* Define general competencies that are overarching on all components.
- Interaction Components: Identify interaction components where the student needs to interact with the content, learner management system (LMS) and other content technologies such as instant messaging.
- Component Competency: Define what the specific competencies are for each of the particular components that were identified.
- Knowledge: Define the knowledge that is needed to understand, interact and complete tasks with this component.
- Skills: Define the skills needed to complete the task.

Once the interaction components and knowledge needed to use them are identified, the educator should design and develop the induction elements. The induction elements should be available at the beginning of the course. Typically, as part of an introduction to the course which explains the rest of the study environment, course layout and functions.

The induction elements should mirror the elements used in the course material and the rest of the LMS. For example, suppose an image is to be submitted in the course. In that case, the induction element in the introduction course, must require the student to submit an image in the same manner with instructions on how to do this. Introducing the induction elements early and without consequence to grades and negative feedback is key to encourage engagement and a positive attitude to perceived ease of use. Introducing a positive feedback loop at this stage, such as a grade or badge is beneficial to give the student a sense of confidence in the use of the element (Keller, 2016). After the students have received a grade for the induction course there must be a way for the student to provide feedback on the experience. Successful completion could even be a requirement to unlock the rest of the course. This will aid the educator in knowing which students have overcome the ALT's and which students need guidance. In the case of self-paced non-facilitated courses such as some MOOCs, the grades can have specific feedback that points to help documentation or videos explaining the concepts again. The course designer should build in a revision management process to look at the feedback and evaluate perceived ALT's using the student responses. This ensures that the educator can identify what the students perceive as challenging, as discussed in section 4.2. When a revision is complete, the course designer can iterate on the introduction course's design by including revised induction elements.

6. Demonstrative example

Developing the introduction course should be based on elements and information that is easy to understand and gives knowledge of the course and environment. An LMS examination input box interaction element was used as a simple example to showcase the LXID framework's applicability on a specific interaction element that could generate an ALT. The default quiz input box example is shown in Figure 2.

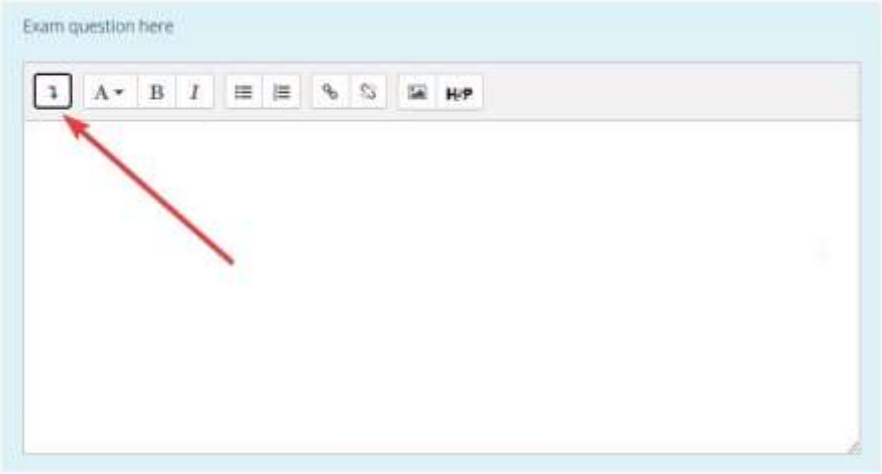


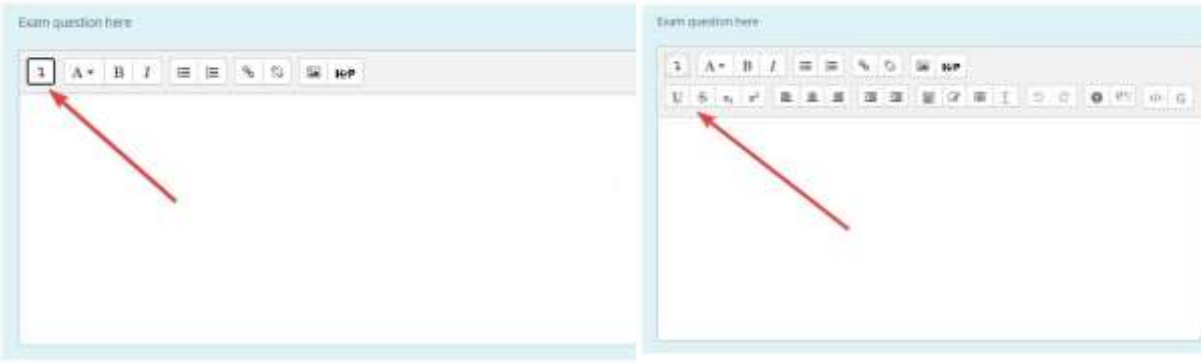
Figure 2: Moodle LMS exam quiz input box

Step 1: As a first step course designer should identify the skills an ideal student should have.

Step 2: Identify all interaction elements within the study environment and course material that the student needs to complete in the overall course effectively. Experience and assumptions from the educator can inform the first iteration. During subsequent reviews, this list might be altered.

Step 3: Steps 3 and 4 will be repeated per interaction element identified in step 2 of the LXID framework. In this example, the Moodle exam input box was identified. For example, the designer identifies that the students would need the knowledge to answer exam questions and know how to identify the box, additional tools, and some of the text editing tools. They would need the skills to do so by using Moodle's default exam input box.

Step 4: The designer creates a question that necessitates the student to use the tools in the input box as they would be required to do in the main course. Identify hidden or hard to use toolbars and toolboxes in the interaction element. Referring to Figure 3, the input boxes have additional tools hidden under a relatively obscure icon, as indicated by the arrow shown in Figure 3 (a), and are often missed. When clicked, it reveals an additional row of tools, as shown in Figure 3 (b). Thus, in this example, the course designer can ensure that if any additional tools are needed to answer the exam question, details on how to access these tools are covered by the induction material. In the introduction course, a video can be shown where this icon is clicked to reveal the additional tools as well as have the student practice it in an induction element.



(a) Additional tools icon (b) Toolbar visible

Figure 3: Additional tool icon dropdown button and additional tools toolbar

Figure 4 shows an example of a multiple-choice question. When questions are completed, they can provide important feedback to provide extra information. This aids in having the student build a connection between where to navigate back to the content; thus, even wrong questions can provide a positive engagement experience. The format and presentation of the questions and comments should be the same as those the student will encounter in the actual course. These induction interaction elements help set student expectations for interactive elements they may encounter in the exam.

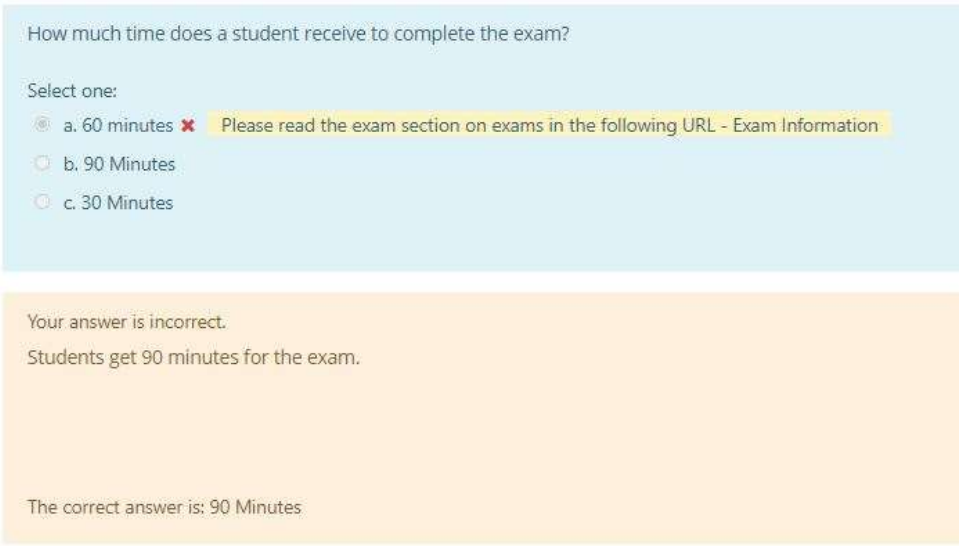


Figure 4: Multiple-choice questions

Step 5: If all ALT's are identified the designer can continue to the next step.

Step 6: Create an open-ended feedback area that the students are required to complete. The feedback step is essential to get feedback from the specific students currently participating in the course. Feedback of this nature will inform the educators if the induction components need to be iterated upon to alleviate the ALT's identified.

Step 7: Review course and iterate on induction component and identified ALT's.

After completing the induction course following the LXID framework, the course structure could look as depicted in Figure 5. The structure depicted is a high-level overview with minimal elements shown. The interaction elements (I.E) are all elements identified that could produce ALT's and are presented in different areas of each course or topic. As shown in Figure 5, all I.E.'s are addressed in the Induction course (Introduction course).

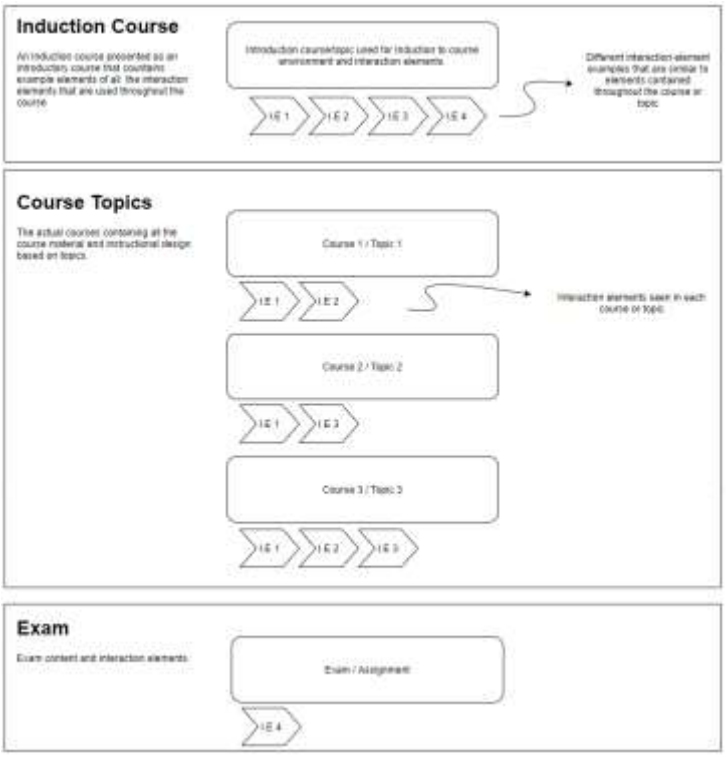


Figure 5: Template model of a designed course

7. Conclusion

Many educators are not necessarily experts in the field of online learning. Most educators are disciplinary specialists at a university level without a strong pedagogical or learning experience design background. Additionally, educators may not have experienced online learning while they were students themselves. As such, they do not have a body of online learning experience to draw upon when designing courses. These educators may not understand which factors could artificially act as learning thresholds when designing a new course for online delivery. This LXID framework provides a guide to assist such lecturers in overcoming such ALT's through appropriately designed induction elements for online courses. The framework has been used and tested in a production environment. Educators reported that the use of the framework made it easier to design the appropriate elements for use in the course, with fewer problems reported by students. Furthermore, student evaluation in the courses showed that these induction components had an improved student learning experience and had an overall positive effect. However, formal verification based on student experience data has not yet been published. Future work will focus on this.

References

Amushigamo, A. P., Hidengwa, M. H. and Herman, S. N. (2018) "Enhancing Large Classes With Active Learning Pedagogical Skills," in, pp. 331–348.

Baldwin, S. J. (2019) "Assimilation in Online Course Design," *American Journal of Distance Education*, 33(3), pp. 195–211.

Blayone, T. J. B. *et al.* (2018) "Surveying digital competencies of university students and professors in Ukraine for fully online collaborative learning," *Technology, Pedagogy and Education*, 27(3), pp. 279–296.

Brunton, J. *et al.* (2018) "Head start online: flexibility, transitions and student success," *Educational Media International*, 55(4), pp. 347–360.

Dumford, A. D. and Miller, A. L. (2018) "Online learning in higher education: exploring advantages and disadvantages for engagement," *Journal of Computing in Higher Education*, 30(3), pp. 452–465.

Fournier, H. and Kop, R. (2015) "MOOC learning experience design: Issues and challenges," *International Journal on E-Learning: Corporate, Government, Healthcare, and Higher Education*, 14(3), pp. 289–304.

De Freitas, S. I., Morgan, J. and Gibson, D. (2015) "Will MOOCs transform learning and teaching in higher education? Engagement and course retention in online learning provision," *British Journal of Educational Technology*, 46(3), pp. 455–471.

Gillett-Swan, J. (2017) "The Challenges of Online Learning: Supporting and Engaging the Isolated Learner," *Journal of Learning Design*, 10(1), p. 20.

Gosselin, K. P. *et al.* (2016) "Development of an Evidence-based Professional Learning Program Informed by Online Teachers' Self-efficacy and Threshold Concepts," *Online Learning*, 20(3), pp. 178–194.

Gray, J. A. and DiLoreto, M. (2016) "The Effects of Student Engagement, Student Satisfaction, and Perceived Learning in Online Learning Environments This," *NCPEA International Journal of Educational Leadership Preparation*, 11(1), pp. 98–119.

Gurley, L. E. (2018) "Educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments," *Online Learning Journal*, 22(2), pp. 197–220.

Kallia, M. and Sentance, S. (2021) "Threshold concepts, conceptions and skills: Teachers' experiences with students' engagement in functions," *Journal of Computer Assisted Learning*, 37(2), pp. 411–428.

Keller, J. M. (2010) *Motivational Design for Learning and Performance*, *Motivational Design for Learning and Performance: The ARCS Model Approach*. Boston, MA: Springer US.

Keller, J. M. (2016) "Motivation, Learning, and Technology: Applying the ARCS-V Motivation Model," *Participatory Educational Research*, 3(2), pp. 1–15.

Kerkhoff, S. (2020) "Collaborative Video Case Studies and Online Instruments for Self-Reflection in Global Teacher Education," *Journal of Technology and Teacher Education*, 28(2), pp. 341–351.

Keskin, S. and Yurdugül, H. (2020) "Factors Affecting Students' Preferences for Online and Blended Learning: Motivational Vs. Cognitive," *European Journal of Open, Distance and E-Learning*, 22(2), pp. 72–86.

Khan, A. *et al.* (2017) "Active learning: Engaging students to maximise learning in an online course," *Electronic Journal of e-Learning*, 15(2), pp. 107–115.

Kilgour, P. *et al.* (2019) "Threshold concepts about online pedagogy for novice online teachers in higher education," *Higher Education Research & Development*, 38(7), pp. 1417–1431.

Li, K. and Keller, J. M. (2018) "Use of the ARCS model in education: A literature review," *Computers and Education*, 122(May 2017), pp. 54–62.

Liang, R. and Chen, D.-T. V. (2012) "Online Learning: Trends, Potential and Challenges," *Creative Education*, 03(08), pp. 1332–1335.

Lortie, D. C. (1975). Schoolteacher: A sociological study. Chicago, IL: University of Chicago Press.

Luscinski, A. (2017) "Best Practices in Adult Online Learning," *ProQuest LLC*.

Martin, F. *et al.* (2019) "Award-Winning Faculty Online Teaching Practices: Roles and Competencies," *Online Learning*, 23(1), pp. 184–205.

Morley, C. (2020) "Towards the co-identification of threshold concepts in academic reading," *Journal of University Teaching and Learning Practice*, 17(2).

Muir, T. *et al.* (2019) "Chronicling engagement: students' experience of online learning over time," *Distance Education*, 40(2), pp. 262–277.

Northcote, M. *et al.* (2019) "A professional learning program for novice online teachers using threshold concepts," *Online Learning Journal*, 23(4), pp. 336–353.

Oleson, A. and Hora, M. T. (2014) "Teaching the way they were taught? Revisiting the sources of teaching knowledge and the role of prior experience in shaping faculty teaching practices," *Higher Education*, 68(1), pp. 29–45.

Olivier, M. S. (2004). *Information Technology Research: A practical guide for computer science and informatics.* (2nd ed.). Van Schaik Publishers.

Picciano, A. G. (2017) "Theories and Frameworks for Online Education: Seeking an Integrated Model," *Online Learning*, 21(3), pp. 166–190.

Reese, S. A. (2015) "Online learning environments in higher education: Connectivism vs. dissociation," *Education and Information Technologies*, 20(3), pp. 579–588.

Ruth, S. (2018) "Faculty Opposition to Online Learning: Challenges and Opportunities.," *International Journal of Technology in Teaching and Learning*, 14(1), pp. 12–23.

Scoppio, G. and Luyt, I. (2017) "Mind the gap: Enabling online faculty and instructional designers in mapping new models for quality online courses," *Education and Information Technologies*, 22(3), pp. 725–746.

van der Sluis, F., van der Zee, T. and Ginn, J. (2017) "Learning about Learning at Scale," in *Proceedings of the Fourth (2017) ACM Conference on Learning @ Scale - L@S '17*. New York, New York, USA: ACM Press, pp. 131–140.

Taherdoost, H. (2018) "A review of technology acceptance and adoption models and theories," *Procedia Manufacturing*, 22, pp. 960–967.

Thompson, C. J., Leonard, L. and Bridier, N. (2019) "Online discussion forums: Quality interactions for reducing statistics anxiety in graduate education students," *International Journal of E-Learning & Distance Education*, 34(1), pp. 1–31.

VanOostveen, R., Desjardins, F. and Bullock, S. (2019) "Professional development learning environments (PDLEs) embedded in a collaborative online learning environment (COLE): Moving towards a new conception of online professional learning," *Education and Information Technologies*, 24(2), pp. 1863–1900.

Warf, B. (2019) "Teaching Digital Divides," *Journal of Geography*, 118(2), pp. 77–87.

Wu, B. and Chen, X. (2017) "Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model," *Computers in Human Behavior*, 67, pp. 221–232.

Wylie, N. (2020) "Face-to-face to online: PhD academic writing @Maastricht University," in *Innovative language teaching and learning at university: treasuring languages*. Research-publishing.net, pp. 13–19.

6.8 Appendix B - Example Persona

- Name: 'Lauren'
- Life-stage: Finishing college/university
- Age: 18-22 years
- Annual income: Under 10000
- Industry: Student
- Internet usage: Many times a day on mobile or pc
- Social media usage: Very active
- Marital status: Single
- Children: No
- Education level: A high school diploma
- Technical level: Somewhat comfortable using cellphones and browsers
- English level: Native
- Motivations: Enter a career in the professional field in a years time

Lauren is a college student who plans to enter the workforce within the next two years. This persona's motivations include education and stepping outside of her comfort zone. This persona is aged 18 to 22 and resides in a seaside region. Lauren is childless, childless, and frequently occupied with socialising with her pals.

People like Lauren are relatively at ease with technology and web browsers, although they might experience anxiety in specific technical scenarios.

She has always been an excellent student but has always been anxious in classrooms or environments with many students. She is from a small town and desires to leave her comfort zone by moving to a large metropolis.

6.9 Appendix C - Survey Questions:

1. In what field does the respondent work?
2. How many years have you been working in the above mentioned field?
3. How many years experience do you have in Online Learning or related fields?
4. In your opinion how important is it for a learner to understand the LMS?
5. How important are understanding the layout of the learning program?
6. How important do you think general competency of a student on interaction components are in a online course? For example, being able to use a browser properly, how to upload files, unzip archives etc.
7. How Important do you think component competency is in online learning? For example, in the particular LMS, does the student know where to find the Exam. Does the student know where to find the assignment upload button and know how to check plagiarism? Can the student interact with all the components in the course material?
8. How would you know that the student has knowledge in the areas above?
9. The framework aims to be a guide that an educator can follow to help identify the checks than need to be in place in an Induction Course that can aid the student in familiarisation to overcome artificial learning thresholds. The framework proposes a induction course that allows for identification of artificial learning thresholds, firstly for the educator to use experience and then via student feedback. How useful do you think this feedback could be to identify artificial learning thresholds?
10. Do you think that the proposed framework can help guide an educator to deliver a online Induction Course that will have less artificial learning thresholds and improve student confidence in the particular online study environment they are interacting with?

8. References

Amushigamo, A. P., Hidengwa, M. H. and Herman, S. N. (2018) "Enhancing Large Classes With Active Learning Pedagogical Skills," in, pp. 331–348.

Baldwin, S. J. (2019) "Assimilation in Online Course Design," *American Journal of Distance Education*, 33(3), pp. 195–211.

Blayone, T. J. B. *et al.* (2018) "Surveying digital competencies of university students and professors in Ukraine for fully online collaborative learning," *Technology, Pedagogy and Education*, 27(3), pp. 279–296.

Brunton, J. *et al.* (2018) "Head start online: flexibility, transitions and student success," *Educational Media International*, 55(4), pp. 347–360.

Dumford, A. D. and Miller, A. L. (2018) "Online learning in higher education: exploring advantages and disadvantages for engagement," *Journal of Computing in Higher Education*, 30(3), pp. 452–465.

Fournier, H. and Kop, R. (2015) "MOOC learning experience design: Issues and challenges," *International Journal on E-Learning: Corporate, Government, Healthcare, and Higher Education*, 14(3), pp. 289–304.

De Freitas, S. I., Morgan, J. and Gibson, D. (2015) "Will MOOCs transform learning and teaching in higher education? Engagement and course retention in online learning provision," *British Journal of Educational Technology*, 46(3), pp. 455–471.

Gillett-Swan, J. (2017) "The Challenges of Online Learning: Supporting and Engaging the Isolated Learner," *Journal of Learning Design*, 10(1), p. 20.

Gosselin, K. P. *et al.* (2016) "Development of an Evidence-based Professional Learning Program Informed by Online Teachers' Self-efficacy and Threshold Concepts," *Online Learning*, 20(3), pp. 178–194.

Gray, J. A. and DiLoreto, M. (2016) "The Effects of Student Engagement, Student Satisfaction, and Perceived Learning in Online Learning Environments This," *NCPEA International Journal of Educational Leadership Preparation*, 11(1), pp. 98–119.

Gurley, L. E. (2018) "Educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments," *Online Learning Journal*, 22(2), pp. 197–220.

Kallia, M. and Sentance, S. (2021) "Threshold concepts, conceptions and skills: Teachers' experiences with students' engagement in functions," *Journal of Computer Assisted Learning*, 37(2), pp. 411–428.

Keller, J. M. (2010) *Motivational Design for Learning and Performance*, *Motivational Design for Learning and Performance: The ARCS Model Approach*. Boston, MA: Springer US.

Keller, J. M. (2016) "Motivation, Learning, and Technology: Applying the ARCS-V Motivation Model," *Participatory Educational Research*, 3(2), pp. 1–15.

Kerkhoff, S. (2020) "Collaborative Video Case Studies and Online Instruments for Self-Reflection in Global Teacher Education," *Journal of Technology and Teacher Education*, 28(2), pp. 341–351.

Keskin, S. and Yurdugül, H. (2020) "Factors Affecting Students' Preferences for Online and Blended Learning: Motivational Vs. Cognitive," *European Journal of Open, Distance and E-Learning*, 22(2), pp. 72–86.

Khan, A. *et al.* (2017) "Active learning: Engaging students to maximize learning in an online course," *Electronic Journal of e-Learning*, 15(2), pp. 107–115.

Kilgour, P. *et al.* (2019) "Threshold concepts about online pedagogy for novice online teachers in higher education," *Higher Education Research & Development*, 38(7), pp. 1417–1431.

Kumi-Yeboah, A. *et al.* (2020) "Exploring the use of digital technologies from the perspective of diverse learners in online learning environments," *Online Learning Journal*, 24(4), pp. 42–63.

Li, K. and Keller, J. M. (2018) "Use of the ARCS model in education: A literature review," *Computers and Education*, 122(May 2017), pp. 54–62.

Liang, R. and Chen, D.-T. V. (2012) "Online Learning: Trends, Potential and Challenges," *Creative Education*, 03(08), pp. 1332–1335.

Lortie, D. C. (1975). Schoolteacher: A sociological study. Chicago, IL: University of Chicago Press.

Luscinski, A. (2017) "Best Practices in Adult Online Learning," *ProQuest LLC*.

Martin, F. *et al.* (2019) "Award-Winning Faculty Online Teaching Practices: Roles and Competencies," *Online Learning*, 23(1), pp. 184–205.

Morley, C. (2020) "Towards the co-identification of threshold concepts in academic reading," *Journal of University Teaching and Learning Practice*, 17(2).

Muir, T. *et al.* (2019) "Chronicling engagement: students' experience of online learning over time," *Distance Education*, 40(2), pp. 262–277.

Northcote, M. *et al.* (2019) "A professional learning program for novice online teachers using threshold concepts," *Online Learning Journal*, 23(4), pp. 336–353.

Oleson, A. and Hora, M. T. (2014) "Teaching the way they were taught? Revisiting the sources of teaching knowledge and the role of prior experience in shaping faculty teaching practices," *Higher Education*, 68(1), pp. 29–45.
Picciano, A. G. (2017) "Theories and Frameworks for Online Education: Seeking an Integrated Model," *Online Learning*, 21(3), pp. 166–190.
Reese, S. A. (2015) "Online learning environments in higher education: Connectivism vs. dissociation," *Education and Information Technologies*, 20(3), pp. 579–588.
Ruth, S. (2018) "Faculty Opposition to Online Learning: Challenges and Opportunities.," *International Journal of Technology in Teaching and Learning*, 14(1), pp. 12–23.
Scoppio, G. and Luyt, I. (2017) "Mind the gap: Enabling online faculty and instructional designers in mapping new models for quality online courses," *Education and Information Technologies*, 22(3), pp. 725–746.
van der Sluis, F., van der Zee, T. and Ginn, J. (2017) "Learning about Learning at Scale," in *Proceedings of the Fourth (2017) ACM Conference on Learning @ Scale - L@S '17*. New York, New York, USA: ACM Press, pp. 131–140.
Taherdoost, H. (2018) "A review of technology acceptance and adoption models and theories," *Procedia Manufacturing*, 22, pp. 960–967.
Thompson, C. J., Leonard, L. and Bridier, N. (2019) "Online discussion forums: Quality interactions for reducing statistics anxiety in graduate education students," *International Journal of E-Learning & Distance Education*, 34(1), pp. 1–31.
VanOostveen, R., Desjardins, F. and Bullock, S. (2019) "Professional development learning environments (PDLEs) embedded in a collaborative online learning environment (COLE): Moving towards a new conception of online professional learning," *Education and Information Technologies*, 24(2), pp. 1863–1900.
Warf, B. (2019) "Teaching Digital Divides," *Journal of Geography*, 118(2), pp. 77–87.
Wu, B. and Chen, X. (2017) "Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model," *Computers in Human Behavior*, 67, pp. 221–232.
Wylie, N. (2020) "Face-to-face to online: PhD academic writing @Maastricht University," in *Innovative language teaching and learning at university: treasuring languages*. Research-publishing.net, pp. 13–19.