

# Embedding an information literacy course into a learning management system: a case study

376

Janine Lockhart

*CPUT Libraries, Cape Peninsula University of Technology, Cape Town, South Africa*

Received 7 September 2020  
Revised 22 January 2021  
Accepted 25 January 2021

## Abstract

**Purpose** – This article outlines how an existing information literacy (IL) course was developed and embedded into a Learning Management System (LMS) with the aim of creating a blended learning environment for the course. It outlines how the platform was chosen, choice of learning design (LD) approaches, tools and processes used, Open Educational Resources (OERs) incorporated, the choice of Creative Commons (CC) licensing, branding, usage options and formats of materials.

**Design/methodology/approach** – A mixed-method approach was used in conducting this research. The online course was piloted in 2017 with two groups of students who completed an online questionnaire to provide their evaluation and feedback.

**Findings** – The results showed a very positive evaluation by the students, which shows that the university is on the correct path with embedding IL into a learner management system.

**Research limitations/implications** – The author could not have the second face-to-face class with group 1 as was intended due to the student unrest at the university during this time. Also, with the disruption to the academic programme, the author had less feedback from students than expected; however, the 20% response rate was sufficient to inform the author's future developments.

**Practical implications** – The flexibility (not a one size fits all) in usage was relevant and necessary to accommodate a number of student needs and socio-economic factors.

**Originality/value** – This article adds value to the academic project by showing how IL courses can successfully be embedded within an LMS, student preferences and socio-economic factors to be considered in a South African context.

**Keywords** Information literacy, Learning design, Design thinking, Learning management system, Academic library

**Paper type** Case study

## 1. Introduction

This article outlines how an existing information literacy (IL) course was developed and embedded into a learning management system (LMS) with the aim of creating a blended learning environment for the course. This article reports on the first phase of this development, it is envisaged that further phases will be necessary, especially around interactive activities and further content development, also to address any feedback received from students for further improvements. The existing course, consisting of five modules, is taught in the classroom in a team-teach approach by librarians and faculty members over a period of five weeks and the standard IL summative assessment in week six. It is taught with a subject-specific assignment and relevant subject-specific examples. This article highlights how the platform was chosen as well as the choice of learning design (LD) approaches, tools and processes used, Open Educational Resources (OERs) incorporated, the choice of Creative Commons (CC) licensing, branding, usage options, formats of materials and challenges met by

The author would like to thank and acknowledge:

- CPUT Libraries Management for supporting this research
- All the librarians who formed part of the peer-review panel to review all online material
- The CPUT multi-media department for assisting with video development and voice-recordings
- Staff members who did the voice-overs.



students within the South African context. IL skills integration into the curriculum at the university has been ongoing for many years for undergraduate and postgraduate levels, formalised by an IL policy since 2009, formation of an IL Committee (ILC) as a subcommittee of the Senate Teaching and Learning Committee, development of an IL curriculum, initially for undergraduates and offering it as a short course called certificate of information literacy (CIL) from 2013 to 2017 (Lockhart, 2015a), measuring application of IL skills (Lockhart, 2015b), IL assessment strategies that include item analysis for a multiple-choice test (Lockhart, 2014) and continuous development of the teaching skills of librarians teaching the course. The university is situated in Cape Town, South Africa, and offering qualifications across its six faculties (applied sciences, business and management sciences, education, engineering and the built environment, health and wellness and informatics and design). The university has a student population of around 34,000 over eight campuses. During 2017, the Senate passed a resolution that all first-year students must complete the existing CIL, write the standard online IL assessment and the mark of this assessment to carry a 15% weighting within one first-year subject from 2018. This resolution led to the review of whether the course could continue as a short course, and it was decided to change it to the course of information literacy (CIL), integrated within a first-year subject and team teaching between the faculty members and the librarians. With a move to more blended learning methodologies, the CIL was developed in an online format during 2016/2017 within the LMS, Blackboard, and piloted in the second semester of 2017 with two groups of students. This research was important as it highlighted the blended learning preferences of students, the socio-economic factors that could influence online learning and how those could be overcome as well as embedding library teaching and learning support within an LMS.

## 2. Literature review

The importance of IL skills at university level has been well researched and published; Shao and Purpur (2016, p. 671) highlight some studies that focussed on the impact of IL and how these skills positively contributed “with student grade point averages, retention and graduation rates”. In another study (Blake *et al.*, 2017) done over 12 participating universities around retention, what instruction methods have had the greatest impact on retention and academic success, it was found that library instruction contributed greatly to educational success and retention. Teaching IL skills to over 8,000 first-year students presents many challenges. Challenges listed by Julien *et al.* (2018, p. 187) include scheduling of classes, repetition due to large classes, venues and many more. According to Shaver (2017, p. 441), “online growth and delivery is one of the most pressing issues facing higher education”. With a move to more blended learning methodologies and online learning strategies, the CIL was developed in an online format during 2016/2017 within the LMS, Blackboard, and piloted in the second semester of 2017 with two groups of students. This online format promotes what is referred to as “self-regulated learning” (Mayes *et al.*, 2013, p. 86), where students learn independently and have a sense of self-efficacy. Blended learning is described by Peter *et al.* (2017, p. 1110) as a combination of classroom and online learning.

### 2.1 Design thinking and learning design

Design thinking (Razzouk and Shute, 2012, p. 330) is defined as an “analytical and creative process that engages a person in opportunities to experiment, create and prototype models, gather feedback, and redesign”. There are a number of models available to draw from for the LD process. As indicated by Shaver (2017, p. 439), the analysis, design, development, implementation and evaluation (ADDIE) model, the Kemp model (planning, design, development and assessment), also reflects on the LD meetings as an effective tool to

ensure the creation of significant online learning experiences. These meetings are dealt with in three phases: storyboard layouts including content introductions, measureable learning outcomes generation, assessments and learning activities and application and revision (Shaver, 2017, p. 442). The interview, develop, embed and assess (IDEA) model is a step-by-step curriculum design process for integrating IL within the academic programme (Mullins, 2016, p. 55). The identify, choose, create, engage and evaluate (ICCEE) model (Chen, 2016) proposes a more detailed focus on online instructional design.

### *2.2 Teaching methodologies*

At CPUT, the CIL has been offered for many years in a face-to-face classroom environment with some incorporating flipped classroom methods. This course is offered mostly to first-year students and moving to only an online teaching environment is not ideal. This is also confirmed by Abunadi (2018, p. 120), whose study shows that students who follow an online learning approach only do not show better results than those who follow a blended learning approach.

### *2.3 Learning styles and students with disabilities*

Understanding of the different learning styles of learners will offer course developers means to design and provide interventions that is designed to individual learners' needs (Truong, 2016, p. 1185; Stash, 2007). Mayes *et al.* (2013, p. 107), indicating that when the different learners' approaches to learning are recognised, it improves teaching.

Kolb and Kolb (2013) have worked on and developed theories around learning styles since the 1970s and in their latest version describe learning style as the "unique ways individuals spiral through the learning cycle based on their preference for the four different learning modes". Concrete Experience (CE), Reflective Observation, Abstract Conceptualization (AC) and Active Experimentation (AE). Keefe (1985, p. 140) as part of the National Association of Secondary School Principals (NASSP) task force defines learning style as "the composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment". An and Carr (2017, pp. 410–414) believe that learning styles theories have a number of problems including the lack of a solid explanatory framework, poor reliability and validity of constructs, and a failure to link learning styles to achievement. Therefore, they propose multiple approaches to explaining and predicting individual differences in learning and suggest that educators provide multiple sensory representations of information such as using multimedia where text, pictures, sound, movies and animation can be combined. Using learning style theories in the context of online learning development, this study (Tortorella and Graf, 2017, pp. 298–301) considers learning styles and context awareness for mobile adaptive learning, by using the Felder-Silverman learning style model (FSLSM). The FSLSM has an index of learning styles (ILS) questionnaire that includes 44 questions to identify a user's learning style. They explain further that "for the course to be adaptive to not only the student's particular learning style, but also to changes with respect to the device's and user's context, every section of the course is available in four different formats: Audio (mp3), Video (mp4), Presentation (ppt) and Text-based (pdf)". Therefore, this adaptive engine is responsible for making the course a personalised experience in the way that the course content is made available to learners. As stated by Peter *et al.* (2017, p. 1120), IL concepts should be designed to accommodate students' strengths and weaknesses. Another very important area to consider when developing an online course is students with disabilities, including learning disabilities (LDs). May and LaMont (2014, p. 960) describe LDs as a "significant and persistent difficulty in learning" and are referred to as "invisible" disabilities.

### 3. Considerations

The following were considered for this development.

#### 3.1 Platform

For online course development, an important consideration is the platform that will be used for delivering the course to the students. CPUT has an LMS called Blackboard; at the time of the pilot, it was version 9.1 of 2017, and every academic subject automatically has a Blackboard presence. It therefore made sense to develop the course within what already existed and where the students were enrolled for all their subjects. The CIL was registered with its own course code and developed as a separate subject within the LMS. From 2019 onwards, the CIL subject code automatically formed part of every academic subject within the LMS. Blackboard delivers content in a folder system, which was not suitable for the development of the CIL as the author wanted the students to see the full course outline in a visually appealing way and be able to see at a glance the full IL process that the course will follow. After experimenting with a number of possibilities, the course was finally developed within a banner as this provided more options and possibilities to present the course content and layout.

#### 3.2 Learning design

The CIL curriculum has been developed and refined over many years at the university. The curriculum was initially developed in 2012 for implementation in 2013, and it was based on the Association of College and Research Libraries (ACRL) IL standards at the time. When the ACRL IL standards were rescinded and the ACRL framework was adopted in 2016, the curriculum was then checked against the ACRL framework and it fitted well within the new framework. It was becoming necessary to develop the current curriculum in more improved online formats, than was previously the case, to address a number of challenges. Volunteers from the group of librarians who were involved with teaching the CIL as well as some specialist librarians in quality assurance and marketing were asked to be part of a peer-review panel of all online material. It was important to consider and address the various learning styles, LDs and disabilities of students. CPUT has a disability unit that attracts and supports students with disabilities to study at the university. There are also many LDs that are not visible, and the goal therefore was to develop the already existing curriculum in an online format that could work for all our students. These disabilities include, but not limited to, visually impaired, hearing impaired, impaired mobility, LDs such as dyslexia, attention deficit disorder (ADD), attention deficit hyperactivity disorder (ADHD) and learning difficulties.

The CIL curriculum covers a number of concepts for students to learn, understand and apply in their daily lives, academic work and later in the workplace. It is also taught with a subject-specific assignment to ensure that the learning process is made real and of value for the students and aligns to the relevant subject areas. It is taught in the classroom and various activities and examples are given to assist subject-specific learning. The online development does not include interactive activities yet, but it is planned for future developments. The CIL curriculum is described in [Table 1](#).

To address the various learning styles and disabilities, it was decided to develop the various concepts in a number of different formats. All students would have access to all the various formats available. They would then be able to decide which one or more of the available formats they prefer as per their learning styles. The various formats are described in [Figure 1](#).

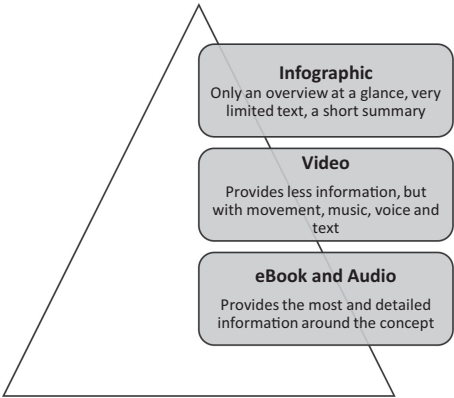
Each of the modules has the different concepts to be covered within each module developed in all of the various formats indicated in [Figure 1](#).

To illustrate an example in [Figure 2](#), within module 2, one of the concepts is “How to use a book”. This is what the students will see in the CIL subject in the LMS, and the students

**Table 1.**  
Summary of CIL  
curriculum

| Module | Description                         | Concepts                                                                                                                                                                                                                                                        |
|--------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Develop a search strategy           | (1) Analyse your topic<br>(2) Identify keywords<br>(3) Find related terms<br>(4) Use search techniques<br>(5) Develop your search string(s)<br>(6) The search box<br><i>Relate to key discussions in the field of study, examples in the workplace and life</i> |
| 2      | Using information tools and sources | (1) Use of information tools such as a library discovery tool and Dewey Decimal Classification system<br>(2) Use of information sources                                                                                                                         |
| 3      | Evaluating information              | The CRAAP test:<br>Currency, relevance, authority, accuracy and purpose<br><i>Further to CRAAP, does the information relate to key discussions, journals or authors in your field?</i><br><i>Awareness about Fake News</i>                                      |
| 4      | Ethical use of information          | (1) Plagiarism, including the CPUT plagiarism policy<br>(2) Copyright                                                                                                                                                                                           |
| 5      | Referencing                         | (1) What is citing and why?<br>(2) Elements needed for referencing and referencing styles                                                                                                                                                                       |

**Figure 1.**  
Various formats



**Figure 2.**  
Example

**MODULE 2:**  
**Information Sources**

**Introduction**  
These are some sources that you could use to find the information you need:

**Books**

[eBook](#) / [Audio](#) / [Infographic](#) / [Watch Video](#)

have the choice to use one to four various options suited to their learning styles, LDs or disabilities.

Table 2 is an example of what the students will see once they click on any of these formats.

Information  
literacy course  
in LMS

381

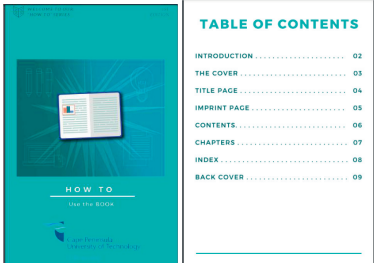
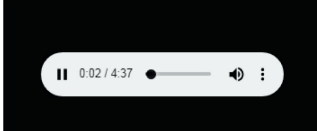
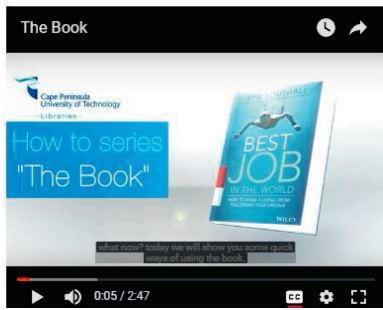
|                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>eBook</b></p> <p>Only the cover and table of contents of this eBook is shown here, this eBook has 11 pages</p>                           |  <p>The screenshot shows two panels. The left panel is the eBook cover for 'How to use the book' by Cape Peninsula University of Technology, featuring a blue background with a book icon and the text 'HOW TO use the book'. The right panel is the 'TABLE OF CONTENTS' with the following items and page numbers: INTRODUCTION (02), THE COVER (03), TITLE PAGE (04), IMPRINT PAGE (05), CONTENTS (06), CHAPTERS (07), INDEX (08), and BACK COVER (09).</p> |
| <p><b>Audio</b></p> <p>An audio recording will open, no text or visuals, only voice and reading the eBook</p>                                  |  <p>The screenshot shows a standard audio player interface with a play button, a progress bar at 0:02 / 4:37, a volume icon, and a settings menu icon.</p>                                                                                                                                                                                                                                                                                                    |
| <p><b>Infographic</b></p> <p>An infographic is at a glance and covers the content in a summary format</p>                                      |  <p>The screenshot shows a vertical infographic titled 'How to use a book'. It contains various text boxes, icons, and a small image of a book cover, providing a summary of the book's content.</p>                                                                                                                                                                                                                                                         |
| <p><b>Watch video</b></p> <p>The start of the video with voice, movement, music and sub titles. All videos are under 3 minutes in duration</p> |  <p>The screenshot shows a video player interface. The video title is 'The Book'. The video content shows a book cover for 'How to series "The Book"' and 'BEST JOB IN THE WORLD'. The video player controls at the bottom show a play button, a volume icon, and a progress bar at 0:05 / 2:47.</p>                                                                                                                                                        |

Table 2.  
Example

### *3.3 Tools and platforms used for this online course development*

Various tools, platforms and technologies were used to develop this online course. The course is hosted in an LMS called Blackboard. All the eBooks and infographics were developed in Canva (an online graphic design tool that provides various templates for free). All audios of the eBooks were outsourced to a professional recording company and went through a process of editing until the final product. Adobe Captivate was used for screen casting to demonstrate how to search the library discovery tool. Video templates were bought from online sites for some of the videos. For the videos, we were assisted by the university's multimedia department for video development and recording of voice-overs.

### *3.4 Open Education Resources (OERs) and Creative Commons (CC) licensing*

CPUT Libraries actively promote open access and OERs. The 2018 Horizon Report (Becker *et al.*, 2018, p. 14) highlights the importance of developing or using OERs and the opportunity it provides for “institutions to develop a broader set of investments in course development and infrastructure”. It was therefore decided to develop all these educational resources as OERs and make them available through the CPUT libraries’ institutional repository. All of these educational resources have been allocated CC licences. In total, two of the videos were OERs found from other universities and reused and adapted for our needs; in those cases, the originally assigned CC licence given by that creator applied.

### *3.5 Branding*

Branding becomes an important aspect to consider when learning materials are made available as OERs and are therefore openly accessible to the world. The university’s branding requirements with regards to logo and colour specifications had to be considered as well as carrying the branding through to all the learning materials and formats.

### *3.6 Usage*

The online course can be used in a number of ways. Firstly, as a full course that is available to the students and that they could access as a self-regulated option. Secondly, as a flipped classroom, where students need to access and go through some of the material on their own before class where the learning material is discussed and tested. Thirdly, the lecturer or librarian could use the online material in the class to teach the various concepts; in this case, the eBook can be used as the guide in the class to cover the material. Fourthly, the course can be used by the students as a “Just-in-Time” (JIT) concept, where they use the parts they need at the time of need.

### *3.7 Student challenges*

A number of student challenges within a South African context, as described in Table 3, had to be considered and addressed.

Students make use of a number of different devices, software and browser versions. It was therefore important to make use of file formats that could be used on most devices, software and browser versions, such as Portable Document Format (PDF), Joint Photographic Experts Group (JPEG), MP3 or MP4. All eBooks are in PDF format, infographics in JPEG format, audio in MP3 and videos in MP4.

Due to the high cost and lack of data that students have when they are off-campus, it was important to make the course material accessible and mobile. To do this, each format and concept was developed to easily download while on-campus on a device so that the students would be able to access those when off-campus without incurring any extra costs or needing



data. One of the main goals when the course was developed was that no student should be disadvantaged due to financial constraints.

#### 4. Methodology

A mixed-method approach was used in conducting this research. The ADDIE model was used as the theoretical framework for designing the online course. Elements of the ICCEE model were also incorporated as it proposes a more detailed focus on online instructional design.

The first phase of the online CIL development was during 2016 and part of 2017. It was piloted with two groups of students over two faculties in the second half of 2017, described in Table 4. The one academic programme (group 1) was taught on-campus in a full-time and part-time format. The other academic programme (group 2) was taught in a distance learning format as they did not have class time on-campus. It was planned to start the online course with a face-to-face class session with the students in group 1 to explain the process and how to access and use the online course. The students would then work through the online content in their own time, working on a subject-specific assignment they received from their faculty member for a number of weeks and end the pilot with another face-to-face session. The second face-to-face session never took place due to the fact that the day the pilot project started with group 1, the university was severely hit with another period of student unrest due to a student movement called #FeesMustFall, demanding free higher education. This period lasted for six weeks where all campuses were closed, limited teaching continued within the LMS and staff worked from home. The pilot project was extended to allow students and staff the time to adjust to this environment. On the positive side, the students had the course in an online format and could continue to work through the course in a self-regulated way off-campus. Group 2 was not affected by this as these students were following a distance learning course

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Devices               | Students can use a number of devices to access online material, such as a university computer, personal computer, laptop, tablet or smart phone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Software versions     | Various software and browser versions are used by the students                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Cost and lack of data | When students access the online material on campus, there will be no added cost for them, it is when students access the online material off-campus that data cost becomes a challenge. South Africa currently has some of the highest data costs in the world and therefore accessing the online material would not be possible for a large part of the student population at the university. In the Horizon Report (Becker <i>et al.</i> , 2018, p. 30), one of the difficult challenges listed is the “advancing digital equity” and it states that “although this advancement in Internet access is crucial to foster digital equity, other barriers have surfaced. A lack of high-speed Internet, disproportionate access based on socioeconomic status and gender” |

**Table 3.**  
Student challenges  
within a South African  
context

| Academic programme | The number of students enrolled | The number of students who completed the online evaluation of the course | Level of students      | Format of study                                      | Numbers    |
|--------------------|---------------------------------|--------------------------------------------------------------------------|------------------------|------------------------------------------------------|------------|
| Group 1            | 667                             | 146                                                                      | First and second years | Full time (FT) on-campus<br>Part time (PT) on-campus | 140<br>19  |
| Group 2            | 200                             | 26                                                                       | First year             | Distance learning                                    | 13         |
| <i>Total</i>       | <i>867</i>                      | <i>172</i>                                                               |                        |                                                      | <i>172</i> |

**Table 4.**  
The number of  
students part of  
the pilot



and could still continue as before. Research limitations are therefore that we could not have the second face-to-face class with group 1 which they could have benefited from to strengthen the programme as was intended. Also, with the disruption to the academic programme at the time, we had less feedback from students than what was expected. However, the 20% response rate received from students completing the questionnaire still provided very relevant and enough data to inform our future developments.

An online questionnaire was developed ([Annexure](#)) to get feedback from the students with regards to doing this online course and how they experienced it. The questionnaire consisted of 17 questions which included age of students, level/study year of students, type of accommodation used, off-campus online access, devices used to access course, on-campus online access, downloading course material while on-campus option, technical difficulties experienced, helpfulness of course material, did the students learn by doing the course, rating overall course content, course content made available in various formats, did course enable more usage of library resources, what did students like the most or least about the course and their preference for learning online. The online questionnaire was uploaded to their Blackboard subjects where they had the access to the online course. The students also had to complete the online IL summative assessment via Blackboard, which is a multiple-choice assessment of 100 questions, of which the students received a randomised 50 questions to answer.

Group 1 had a total of 667 enrolled students and group 2 had 200 enrolled students; therefore, a total of 867 students over the two groups. The number of students completing the online questionnaire was 172 students; therefore, a response rate of 20%. The 20% response rate was 92% from group 1 and 8% from group 2.

## 5. Results and analysis

The questionnaire, [Annexure](#), was developed within Respondus and made available to the students within the LMS, Blackboard. The purpose of the questionnaire was to provide the students an opportunity to give feedback during the pilot study of how they experienced this course. The questionnaire looked at the following.

### 5.1 Q1: Age of students

The results for the 172 students can be seen in [Table 5](#).

The age group most represented was in the category of 20–22 years (49%) and the second largest category of 26+ years (26%), the reason for the second largest group could be that the one programme was in a distant learning format, therefore drawing more mature students that study while working.

### 5.2 Q2: Level/study year

The level/study year of students were measured as seen in [Table 6](#).

The results showed that 78 (45%) students were enrolled for the “1st year” and 90 (52%) were enrolled for the “2nd year”.

**Table 5.**  
Age of students

| Age grouping             | The number of students | Percentage |
|--------------------------|------------------------|------------|
| 17–19 years              | 11                     | 6.4        |
| 20–22 years              | 84                     | 48.8       |
| 23–25 years              | 29                     | 16.9       |
| 26+ years                | 44                     | 25.6       |
| Missing (did not answer) | 4                      | 2.3        |
| Total                    | 172                    | 100        |

### 5.3 Q3: Type of accommodation

The type of accommodation students have was measured according to the categories shown in [Table 7](#).

The results showed that 37 (22%) students selected “CPUT Accommodation” and 131 (76%) selected “Private Accommodation”. It therefore indicates that the vast majority of students lived off-campus and in private accommodation. Thus, it does not guarantee that the students will have access to data or Wi-Fi when they live in private accommodation. Students living at CPUT accommodation should have Wi-Fi access most of the time.

### 5.4 Q4: Off-campus online access

This question tested the frequency of off-campus online access available to the students. The categories measured can be seen in [Table 8](#).

The results showed that 59 (34%) students selected “Always” and 87 (51%) selected “Sometimes”, while 22 (13%) selected “Never”. It therefore indicates that only 34% of students always have off-campus online access, while most of the students sometimes or never have off-campus online access. This is an important result to keep in mind when developing online learning, especially in the context of South Africa where data costs are excessive.

### 5.5 Q5: Most used devices to access course online

The most used devices to access the course online were measured according to the categories in [Table 9](#).

The results showed that 47 (27%) students selected “CPUT computer”, 24 (14%) selected “Personal computer”, 73 (42%) selected “Laptop”, 2 (1%) selected “Tablet” and 22 (13%) selected “Smartphone”. The most used device is therefore a laptop and the second most used a

| Year of study            | The number of students | Percentage | <b>Table 6.</b><br>Level/year of study |
|--------------------------|------------------------|------------|----------------------------------------|
| First year               | 78                     | 45.3       |                                        |
| Second year              | 90                     | 52.3       |                                        |
| Missing (did not answer) | 4                      | 2.3        |                                        |
| Total                    | 172                    | 100        |                                        |

| Type of accommodation    | The number of students | Percentage | <b>Table 7.</b><br>Type of<br>accommodation of<br>students |
|--------------------------|------------------------|------------|------------------------------------------------------------|
| CPUT accommodation       | 37                     | 22         |                                                            |
| Private accommodation    | 131                    | 78         |                                                            |
| Missing (did not answer) | 4                      | 2.3        |                                                            |
| Total                    | 172                    | 100        |                                                            |

| Category                 | Selected by students | Percentage | <b>Table 8.</b><br>Off-campus online<br>access available to the<br>students |
|--------------------------|----------------------|------------|-----------------------------------------------------------------------------|
| Always                   | 59                   | 34.3       |                                                                             |
| Sometimes                | 87                   | 50.6       |                                                                             |
| Never                    | 22                   | 12.8       |                                                                             |
| Missing (did not answer) | 4                    | 2.3        |                                                                             |
| Total                    | 172                  | 100        |                                                                             |

LM  
42,6/7

CPUT computer; interestingly, the smart phone usage was lower than expected. There is a large focus on mobile technologies development at universities, but these results indicated that students prefer to do learning on a laptop or computer rather than a smartphone. It is noted that the distance learning group would not make use of a CPUT computer.

386

5.6 Q6: Did the students access the course while on-campus?

This question measured how many students accessed the course while on-campus. The categories can be seen in Table 10.

The results showed that 118 (69%) students selected “Yes” and 50 (29%) selected “no”. The vast majority therefore accessed the course while on-campus. It is noted that the distance learning group would not access the course on-campus.

5.7 Q7: Did the students access the course while off-campus?

This question measured how many students access the course while off-campus. The categories can be seen in Table 11.

The results showed that 127 (74%) selected “Yes” and 40 (23%) selected “No”. It therefore indicates that the vast majority of students accessed the course while off-campus.

5.8 Q8: Did students download learning material (eBook/infographic/video) while on-campus?

This question measured how many students downloaded the learning material while on-campus to study or work on while off-campus. The categories can be seen in Table 12.

Table 9.  
Most used device to  
access course online

| Type of device           | Selected by students | Percentage |
|--------------------------|----------------------|------------|
| CPUT computer            | 47                   | 27.3       |
| Personal computer        | 24                   | 14.0       |
| Laptop                   | 73                   | 42.4       |
| Tablet                   | 2                    | 1.2        |
| Smartphone               | 22                   | 12.8       |
| Missing (did not answer) | 4                    | 2.3        |
| Total                    | 172                  | 100        |

Table 10.  
Did students access the  
course while on-  
campus?

| Categories               | Selected by students | Percentage |
|--------------------------|----------------------|------------|
| Yes                      | 118                  | 68.6       |
| No                       | 50                   | 29.1       |
| Missing (did not answer) | 4                    | 2.3        |
| Total                    | 172                  | 100        |

Table 11.  
Did the students access  
the course while off-  
campus?

| Categories               | Selected by students | Percentage |
|--------------------------|----------------------|------------|
| Yes                      | 127                  | 73.8       |
| No                       | 40                   | 23.3       |
| Missing (did not answer) | 5                    | 2.9        |
| Total                    | 172                  | 100        |

The results showed that 107 (62%) students selected “Yes” and 60 (35%) selected “No”. The majority of students indicated that they downloaded the course material while on-campus. It is noted that the distance learning group would only download the learning material off-campus.

*5.9 Q9: Did they experience any technical difficulties?*

This question was an open-ended question and measured whether the students experienced any technical difficulties while accessing this course and 95 (55%) responses were received. In this question, 44 students (46%) indicated that they did not experience any technical difficulties, while 18 students (19%) listed technical difficulties that included Internet access, LMS (Blackboard) being down or Wi-Fi access on- and off-campus was problematic, and eight students (8%) indicated that they did not have off-campus access.

*5.10 Q10: The helpfulness of the course material to do assignments*

This question measured how many students found the course material helpful to do assignments. The categories can be seen in [Table 13](#).

The results showed that 29 (17%) students selected “Strongly Agree” and 116 (67%) students selected “Agree”. The vast majority (84%) of the students therefore agreed or strongly agreed that the course materials helped them to do their assignments. This is a positive outcome and encouraging to note.

*5.11 Q11: Did the students learn a great deal by doing this course?*

This question measured how many students felt that they learned a great deal by doing this course. The categories can be seen in [Table 14](#).

The results showed that 32 (19%) students selected “Strongly Agree” and 112 (65%) students selected “Agree”. The vast majority (84%) of the students agreed or strongly agreed that they learned a great deal by doing this course. This result is indicating that we are on the right track, that students felt they learned a great deal and therefore, we should continue to develop this online course further.

**Table 12.**  
Did students download  
learning material while  
on-campus?

| Categories               | Selected by students | Percentage |
|--------------------------|----------------------|------------|
| Yes                      | 107                  | 62.2       |
| No                       | 60                   | 34.9       |
| Missing (did not answer) | 5                    | 2.9        |
| Total                    | 172                  | 100        |

**Table 13.**  
Helpfulness of the  
course material to do  
assignments

| Categories               | Selected by students | Percentage |
|--------------------------|----------------------|------------|
| Strongly agree           | 29                   | 16.9       |
| Agree                    | 116                  | 67.4       |
| Disagree                 | 20                   | 11.6       |
| Strongly disagree        | 1                    | 0.6        |
| Missing (did not answer) | 6                    | 3.5        |
| Total                    | 172                  | 100        |

5.12 Q12: Overall course content

This question measured how students rated the overall course content. The categories can be seen in [Table 15](#).

The results showed that 12 (7%) students selected “Outstanding”, 91 (53%) students selected “Very good” and 56 (33%) students selected “Average”. The majority (60%) of students agreed that the overall course content was very good to outstanding. Although most students gave a very positive overall rating for the course content, it is noted that the content needs to be further developed for the course.

5.13 Q13: Course content made available in various formats

The course content was made available in various formats (eBook/infographic/video) for the pilot. It needs to be noted that the “Audio format” was not available at the time of the pilot and added at a later stage to enhance the different formats available. This question measured the preferences of students in terms of the various formats that were available at the time and the students could use the same rating more than once, see [Table 16](#).

EBooks was rated the most preferred format (strongly prefer and prefer by 82.9% of students). Infographics was rated as the second most preferred format (strongly prefer and prefer by 62.6% of students), and videos were rated as the least preferred format (46.8% of students). It was surprising to note that the most preferred format was eBooks. This could be attributed to the way the eBooks was designed in terms of the clean and simple layout, larger text with graphics and only a few pages per eBook. To fully understand the reasons for these preferences, it will be necessary to do a further study.

**Table 14.**  
Did the students learn a great deal by doing this course?

| Categories               | Selected by students | Percentage |
|--------------------------|----------------------|------------|
| Strongly agree           | 32                   | 18.6       |
| Agree                    | 112                  | 65.1       |
| Disagree                 | 20                   | 11.6       |
| Strongly disagree        | 2                    | 1.2        |
| Missing (did not answer) | 6                    | 3.5        |
| Total                    | 172                  | 100        |

**Table 15.**  
Overall course content

| Categories               | Selected by students | Percentage |
|--------------------------|----------------------|------------|
| Outstanding              | 12                   | 7.0        |
| Very good                | 91                   | 52.9       |
| Average                  | 56                   | 32.6       |
| Below average            | 6                    | 3.5        |
| Far below average        | 1                    | 0.6        |
| Missing (did not answer) | 6                    | 3.5        |
| Total                    | 172                  | 100        |

**Table 16.**  
Available course content formats

| Format      | Strongly prefer | Prefer     | Do not prefer |
|-------------|-----------------|------------|---------------|
| eBook       | 94 (57%)        | 42 (25.9%) | 24 (15.2%)    |
| Infographic | 35 (21.2%)      | 67 (41.4%) | 60 (38%)      |
| Videos      | 36 (21.8%)      | 53 (32.7%) | 74 (46.8%)    |
| Total       | 165 (100%)      | 162 (100%) | 158 (100%)    |

#### 5.14 Q14: Did the course enable students to use more library resources for their assignments?

This question measured if this course enabled students to use more library resources for their assignments. The categories can be seen in [Table 17](#).

The results showed that 32 (19%) students selected “Strongly Agree” and 100 (58%) students selected “Agree”. The vast majority of students (77%) agreed or strongly agreed that the course enabled them to use more library resources for their assignments. This was encouraging to note as research ([Jantti and Cox, 2013](#), p. 170) shows that students who make use of library material outperform those who do not and this can have a positive impact on the quality of assignments and the through-put rate of students.

#### 5.15 Q15: What they liked the most about the course?

This was an open-ended question, 145 responses were received and it measured what the students liked the most about the online course. After analysing the qualitative data, the results as seen in [Table 18](#) indicate the top three areas mentioned by the students.

#### 5.16 Q16: What they liked the least about the course?

This was an open-ended question, 122 responses were received and it measured what the students liked the least about the online course. After analysing the qualitative data, the results as seen in [Table 19](#) indicate the top three areas mentioned by the students.

It is interesting to note that the connectivity and accessibility was the highest concern for the students given the fact that the course was designed with this in mind and that students

**Table 17.**  
Did the course enable  
students to use more  
library resources for  
their assignments?

| Categories               | Selected by students | Percentage |
|--------------------------|----------------------|------------|
| Strongly agree           | 32                   | 18.6       |
| Agree                    | 100                  | 58.1       |
| Disagree                 | 28                   | 16.3       |
| Strongly disagree        | 3                    | 1.7        |
| Missing (did not answer) | 9                    | 5.2        |
| Total                    | 172                  | 100        |

**Table 18.**  
What students liked  
the most about the  
course?

| Top 3                                            | Responses            | Summary of comments                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Content and format of course                  | 55 students<br>(38%) | The students indicated that they liked the information that was provided and the way/format it was presented. They indicated that the course format was user-friendly, easy to follow and understand, short and simple, not too much reading and that the explanation of various concepts was clear                                |
| 2. Accessibility                                 | 20 students<br>(14%) | The students indicated that they really liked that they could access the course anywhere and anytime, especially during the student unrest periods when students could not be on-campus for an extended period. Some also mentioned that they were able to study more and at their own pace due to the accessibility of the course |
| 3. Access to library resources and how to use it | 15 students<br>(10%) | The students indicated that they liked the online access to library resources, how to find books and learning about new resources                                                                                                                                                                                                  |

could download all of the formats on-campus to use at home, therefore not needing data or Wi-Fi once at home. It highlights that more awareness should be made to the students about this feature. Another consideration could be the timing of the pilot and the student unrest during that time at the university, some students might not have been able to download the formats from campus due to this. Question 8 measured that 62% of students indicated that they did download the material while on-campus and 35% did not.

5.17 Q17: Do the students prefer to learn by doing an online course?

This question measured whether students prefer learning by an online course or not. The categories can be seen in Table 20.

The results showed that 36 (21%) students selected “Strongly Agree” and 92 (54%) students selected “Agree”. The vast majority (75%) of students selected agreed or strongly agreed that they prefer to learn by doing an online course. It is clear that the majority of students prefer the online environment.

5.18 The IL summative assessment results

Out of the 867 enrolled students over the two groups, 217 students wrote the online IL summative assessment (25% of the total enrolled students). For those who wrote the test, the pass rate was 191 students (88%), failure rate 26 students (12%) and the average for the test was 62%.

6. Conclusion

This development and research study was important as it showed that students benefitted from this blended approach, that the flexibility (not a one size fits all) in usage was relevant

**Table 19.**  
What students liked  
the least about the  
course?

| Top 3                                                                   | Responses            | Summary of comments                                                                                                                                                                                                |
|-------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Connectivity and accessibility                                       | 23 students<br>(19%) | Students mentioned a combination of connectivity problems on-campus, off-campus, costly data or lack of data when off-campus, slow Internet or the LMS being unavailable or slow                                   |
| 2. Nothing, liked everything or giving a response that was not negative | 22 students<br>(18%) | The students mentioned that there was nothing that they did not like, indicating that they liked almost everything. It was also interesting to note that some listed comments that were not negative, but positive |
| 3. Content and format of course                                         | 18 students<br>(15%) | Some students felt it was too short and others that it was too long. Some indicated that the terminology was too difficult and that with some of the topics needed more content                                    |

**Table 20.**  
Do students prefer to  
learn by doing an  
online course?

| Categories               | Selected by students | Percentage |
|--------------------------|----------------------|------------|
| Strongly agree           | 36                   | 20.9       |
| Agree                    | 92                   | 53.5       |
| Disagree                 | 31                   | 18.0       |
| Strongly disagree        | 5                    | 2.9        |
| Missing (did not answer) | 8                    | 4.7        |
| Total                    | 172                  | 100        |



and necessary to accommodate a number of student needs and socio-economic factors within a South African context. That libraries can and should explore ways of using LMSs to connect with students and faculty members to support teaching and learning. The results indicated that the students mostly did not have off-campus online access and that most students lived off-campus in private accommodation. This is an important factor to consider and support the reason for the online format that was chosen, where students can download material while on-campus when Internet access is freely available and study it when they are off-campus. This also reflects in what they indicated they liked the most about the course, content, format and accessibility. While many universities are developing mobile learning options, it was interesting to note that the students mostly used and preferred either university or private computers and laptops, not mobile devices for their learning. The most encouraging part of the results have been that a large majority (84%) of students indicated that the course material helped them a great deal to do their assignments, that the majority (60%) indicated the course material to be very good to outstanding and that a large majority (77%) agreed or strongly agreed the course helped them to make use of more library resources. It showed us that we are on the correct path with this development. What students liked least about the course was more focussed on connectivity and accessibility which related to lack of data when off-campus, slow Internet or the LMS being unavailable. Some other areas mentioned were that the course was too short or too long and more content needs to be developed to fill the gaps identified. Surprisingly, the vast majority of the students preferred the eBooks format and secondly, the infographics; however, the videos provide support for students with disabilities. The literature has shown the need and growth for online teaching and learning in higher education, which were even further highlighted during the coronavirus disease 2019 (COVID-19) pandemic during 2020 and beyond. In developing these, and based on the outcomes of this study, it is recommended that the level of student be considered (e.g. first years need more support and guidance to make the transition from school to university and face-to-face classroom teaching and/or live online class sessions is still important, but an online course like this one can be an added benefit due to the flexibility in usage) and individual learner needs be considered so that there are multiple approaches available to learners and as some literature reviews suggest that learning material are packaged with various sensory representation in mind. The way forward would be to continue to develop the online content for this course and include interactive activities to enhance the online learning experience.

## References

- Abunadi, I. (2018), "A technology-dependent information literacy model within the confines of a limited resources environment", *Information Technology and Libraries*, Vol. 37 No. 4, pp. 119-135, doi: [10.6017/ital.v37i4.9750](https://doi.org/10.6017/ital.v37i4.9750).
- An, D. and Carr, M. (2017), "Learning styles theory fails to explain learning and achievement: recommendations for alternative approaches", *Personality and Individual Differences*, Vol. 116, pp. 410-416, doi: [10.1016/j.paid.2017.04.050](https://doi.org/10.1016/j.paid.2017.04.050).
- Becker, S., Brown, M., Dahlstrom, E., Davis, A., DePaul, K., Diaz, V. and Pomerantz, J. (2018), *Horizon Report: 2018 Higher Education Edition*, EDUCAUSE, Louisville.
- Blake, J., Bowles-Terry, M., Pearson, N.S. and Szentkiralyi, Z. (2017), "Impact of information literacy instruction on student success: a multi-institutional investigation and analysis", *Greater Western Library Alliance*, Vols 12-2, p. 28.
- Chen, L.-L. (2016), "A model for effective online instructional design", *Literacy Information and Computer Education Journal*, Vol. 7 No. 2, pp. 2303-2308, doi: [10.20533/licej.2040.2589.2016.0304](https://doi.org/10.20533/licej.2040.2589.2016.0304).

- Jantti, M. and Cox, B. (2013), "Measuring the value of library resources and student academic performance through relational datasets", *Evidence Based Library an Information Practice*, Vol. 8 No. 2, pp. 163-171, doi: [10.18438/B8Q89F](https://doi.org/10.18438/B8Q89F).
- Julien, H., Gross, M. and Latham, D. (2018), "Survey of information literacy instructional practices in U.S. academic libraries", *College and Research Libraries*, Vol. 79 No. 2, pp. 179-199, doi: [10.5860/crl.79.2.179](https://doi.org/10.5860/crl.79.2.179).
- Keefe, J.W. (1985), "Assessment of learning style variables: the NASSP task force model", *Theory into Practice*, Vol. 24 No. 2, pp. 138-144.
- Kolb, D.A. and Kolb, A. (2013), *The Kolb Learning Style Inventory Version 4.0: A Comprehensive Guide to the Theory, Psychometrics, Research on Validity and Educational Applications*, Experience Based Learning Systems, Kaunakakai.
- Lockhart, J. (2014), "Using item analysis to evaluate the validity and reliability of an existing online information literacy skills assessment instrument", *South African Journal of Libraries and Information Science*, Vol. 80 No. 2, pp. 36-45, doi: [10.7553/80-2-1515](https://doi.org/10.7553/80-2-1515).
- Lockhart, J. (2015a), "Increasing library value for users by registering a short course in information literacy", in *Proceedings of the 36th IATUL Conference*, available at: <http://docs.lib.purdue.edu/iatul/2015/lil/7>.
- Lockhart, J. (2015b), "Measuring the application of information literacy skills after completion of a certificate in information literacy", *South African Journal of Libraries and Information Science*, Vol. 81 No. 2, pp. 19-25, doi: [10.7553/81-2-1567](https://doi.org/10.7553/81-2-1567).
- May, B. and LaMont, E. (2014), "Rethinking learning disabilities in the college classroom: a multicultural perspective", *Social Work Education*, Vol. 33 No. 7, pp. 959-975, doi: [10.1080/02615479.2014.895806](https://doi.org/10.1080/02615479.2014.895806).
- Mayes, T., De Freitas, S., Beetham, H., Goodyear, P., Carvalho, L., Masterman, L. and Conole, G. (2013), Beetham, H. and Sharpe, R. (Eds), *Rethinking Pedagogies for a Digital Age: Designing for 21st Century Learning*, 2nd ed., Routledge, New York.
- Mullins, K. (2016), "IDEA model from theory to practice: integrating information literacy in academic courses", *Journal of Academic Librarianship*, Vol. 42 No. 1, pp. 55-64, doi: [10.1016/j.acalib.2015.10.008](https://doi.org/10.1016/j.acalib.2015.10.008).
- Peter, J., Leichner, N., Mayer, A.-K. and Krampen, G. (2017), "Making information literacy instruction more efficient by providing individual feedback", *Studies in Higher Education*, Vol. 42 No. 6, pp. 1110-1125, doi: [10.1080/03075079.2015.1079607](https://doi.org/10.1080/03075079.2015.1079607).
- Razzouk, R. and Shute, V. (2012), "What is design thinking and why is it important?", *Review of Educational Research*, Vol. 82 No. 3, pp. 330-348, doi: [10.3102/0034654312457429](https://doi.org/10.3102/0034654312457429).
- Shao, X. and Purpur, G. (2016), "Effects of information literacy skills on student writing and course performance", *Journal of Academic Librarianship*, Vol. 42 No. 6, pp. 670-678, doi: [10.1016/j.acalib.2016.08.006](https://doi.org/10.1016/j.acalib.2016.08.006).
- Shaver, D. (2017), "The added value of conducting learning design meeting to the online course development process", *TechTrends*, Vol. 61 No. 5, pp. 438-443, doi: [10.1007/s11528-017-0205-1](https://doi.org/10.1007/s11528-017-0205-1).
- Stash, N. (2007), *Incorporating Cognitive/Learning Styles in a General-Purpose Adaptive Hypermedia System*, Technische Universiteit Eindhoven, Amsterdam.
- Tortorella, R.A.W. and Graf, S. (2017), "Considering learning styles and context-awareness for mobile adaptive learning", *Education and Information Technologies*, Vol. 22 No. 1, pp. 297-315, doi: [10.1007/s10639-015-9445-x](https://doi.org/10.1007/s10639-015-9445-x).
- Truong, H.M. (2016), "Integrating learning styles and adaptive e-learning system: current developments, problems and opportunities", *Computers in Human Behavior*, Vol. 55, pp. 1185-1193, doi: [10.1016/j.chb.2015.02.014](https://doi.org/10.1016/j.chb.2015.02.014).

**Corresponding author**

Janine Lockhart can be contacted at: [lockhartj@cput.ac.za](mailto:lockhartj@cput.ac.za)

---

## Annexure.

1. Question 1  
Select your age group

- a. 17 - 19
- b. 20 - 22
- c. 23 - 25
- d. 26+

2. Question 2  
Select your current year of studies

- a. ECP
- b. 1st year
- c. 2nd year

3. Question 3  
Where are you staying?

- a. CPUT accomodation
- b. Private accomodation

4. Question 4  
Do you have online access when you are off-campus?

- a. Always
- b. Sometimes
- c. Never

5. Question 5  
What device did you use the MOST to access this course?

- a. CPUT computer
- b. Personal computer
- c. Laptop
- d. Tablet
- e. Smartphone

6. Question 6  
Did you access this course while on-campus?

- a. Yes
- b. No

7. Question 7  
Did you access this course while off-campus?

- a. Yes
- b. No

8. Question 8  
Did you download any of the concepts in the various formats (eBook / Infographic / Video) while on-campus to use off-campus?

- a. Yes
- b. No

9. Question 9

If you experienced any technical difficulties while accessing this course, please specify those

10. Question 10

The course materials helped me to do my assingment.

- a. Strongly Agree
- b. Agree
- c. Disagree
- d. Strongly Disagree

11. Question 11

I learned a great deal by doing this course.

- a. Strongly Agree
- b. Agree
- c. Disagree
- d. Strongly Disagree

12. Question 12

Please rate the overall course content

- a. Outstanding
- b. Very Good
- c. Average
- d. Below Average
- e. Far Below Average

13. Question 13

The course content was made available in various formats. Please rate according to your preferences (you can use the same rating more than once).

- 1 - strongly prefer
- 2 - prefer
- 3 - don't prefer

- ☐ eBook
- ☐ Video/clip
- ☐ Infographic

14. Question 14

Doing the course enabled me to use more library resources for my assignment.

- a. Strongly Agree
- b. Agree
- c. Disagree
- d. Strongly Disagree

15. Question 15

What did you like the MOST about this online course?

16. Question 16

What did you like the LEAST about this online course?

17. Question 17

I prefer to learn by doing an online course

- a. Strongly Agree
- b. Agree
- c. Disagree
- d. Strongly Disagree