

# Exploring first-year engineering student perceptions of the engineering librarian as an IL instructor in multimodal teaching and learning environments

Engineering  
librarian as an  
IL instructor

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## Abstract

**Purpose** – This study aims to explore first-year engineering students' perceptions of the engineering librarian as an instructor in multimodal environments related to Information Literacy (IL) topics, teaching strategy, content evaluation, organising, planning and support.

**Design/methodology/approach** – A quantitative approach was used through a survey instrument based on an online questionnaire. Questions were adopted and modified from a lecturer evaluation survey. A simple random sampling technique was used to collect data from first-year cohorts of engineering students in 2020 and 2022.

**Findings** – Respondents perception of the engineering librarian as an instructor in multimodal learning environment was good. Findings revealed students' learning experiences were aligned with IL instruction even though the environment changed from blended to online. However, an emerging theme that continuously appeared was a lack of access to technology.

**Practical implications** – These findings may help in developing and strengthening the teaching identity of academic librarians as instructors in multimodal learning environments.

**Originality/value** – To the best of the author's knowledge, this study is novel in that it evaluates the teaching abilities of an academic librarian in multimodal environments through the lens of students.

**Keywords** Academic librarian, Teaching, Multimodal environment, Information Literacy, Teaching methods

**Paper type** Research paper

## Introduction

At the beginning of the 21st century, the internet overlapped with technology to trigger colossal changes (Bruggeman *et al.*, 2021). This steered libraries in charting a new path to support teaching, learning and research at higher education institutions. The internet and technology realigned university libraries from physical knowledge and information hubs to innovative smart digital spaces (ODonnell and Anderson, 2022). Today, the smart library is a *buzzword* used to identify university libraries. Smart libraries are interlaced with open-access publishing, data curation, research data management, maker space facilities and Information Literacy (IL) in digitally enhanced university libraries (Hamad *et al.*, 2023). Though, university libraries are fast becoming smart digital environments two decades into the 21st century, there is still a deepening concern from academics when students are using information for scholarly purposes from the internet (Boahen *et al.*, 2022).



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Students still seem to grapple when finding, accessing, evaluating and acknowledging credible information sources across the higher education spectrum (Orzeck, 2022). Hence, academics are still underscoring IL as key to scholarly development at universities (Kight, 2021). Academics are highlighting that IL helps students in improving the quality of assignments and research projects (Dawes, 2019). Additionally, when learning IL, students start developing critical, logical and responsible patterns of thinking that benefit them as global citizens. Therefore, IL stimulates students to become objective-minded global citizens. Thus, although, the internet and technology have provided a digital gateway to accessing information at our fingertips, scholarly information is only useful for research purposes when students effectively apply IL skills.

The term “Information Literacy” was first coined in 1975 (Leaning, 2019). Since then, academic librarians have debated, contextualised, framed and reframed IL. Worldwide, one of the reasons IL has been continuously reflected upon, discussed and reworked is to align itself with strategic goals at universities that are periodically shifting (Julien *et al.*, 2020). According to Head *et al.* (2022), other contributing factors to IL being regularly modified include the ever-changing learning and research landscapes at higher education institutions. Additionally, culture, society, economy, politics and technology have deeply influenced the higher education institution sector in the past two decades (Williamson *et al.*, 2020). Therefore, academic librarians must keep their *fingers on the button* in relation to global trends and how IL can align with teaching, learning and research agendas at higher education institutions. Consequently, this has shaped the teaching responsibilities, of academic librarians when supporting learning and research in 21st century universities.

### Literature review

Worldwide, researchers have explored, probed and examined the efficacy of IL in numerous studies (De Paor and Heravi, 2020; Khan and Idris, 2019; Olubiyo and Olubiyo, 2023). The value of IL has been reconnoitered through sub-topics such as topic analysis, searching for information using discovery tools or Google, evaluation of information, fake news, plagiarism and referencing. Further, since its inception, academic librarians have placed emphasis on the importance of IL in the literature (Goodsett, 2020). To the extent that IL has been saturated when discussed against the backdrop of teaching and learning at higher education institutions in the literature.

Academic librarians have also been self-critical and questioned their own foundational knowledge when teaching IL (Nichols Hess, 2020). Moreover, Library and Information Science (LIS) schools have regularly challenged academic librarians as teachers of IL (Hicks and Lloyd, 2022). This includes questioning the ability of academic librarians to underpin IL using seminal works such as Vygotsky, Piaget and Dewey’s principles (Schachter, 2020). Consequently, this has led to IL being devalued as the credibility of how academic librarians teach is constantly being debated, as it cannot be measured against teaching philosophies. Additionally, the pervasive absence of a detailed module descriptor for IL lends itself to scrutiny when compared to subject-specific course content at universities (Williams, 2022). The reality is that IL lacks key components to be recognised as a module or course with purpose. Generally, IL is not an elective or non-elective module as part of courses at universities (Beer, 2022). Attendance is not compulsory in most instances and there are no formalised IL assessment criteria, analysis or feedback to students (Zhao *et al.*, 2023). Thus, IL is not ubiquitous on a global scale, though, pockets of brilliance in IL may exist at certain higher education institutions, globally. This discussion has been covered in the extant LIS literature spanning three decades (Raju, 2017).

In recent years, the impact of technology on teaching and learning has further questioned the ability of academic librarians as teachers in multimodal environments (Rafiq *et al.*, 2021). Consequently, IL teaching methods that are integrated with technology have also come under the microscope (Rafi *et al.*, 2019). Literature has pointed out there is a dearth of knowledge on how to design, assess and use emerging technologies when teaching IL in multimodal environments (Garzon Artacho *et al.*, 2020; Varela-Ordorica and Valenzuela-González, 2020). Hence, teaching IL with technology in multimodal environments is a trending topic in the LIS field (Lewitzky, 2020). There have been a few studies from the global north to the southern hemisphere on this topic. Countries such as South Africa, America and Canada have been probing on how to teach IL with technology in multimodal environments (Omarsaib *et al.*, 2022; Martzoukou, 2021; McTavish, 2019).

However, whilst historically teaching roles, efficacy and of recent, teaching with technology have been discussed in the literature, there is certainly a scarcity related to students' perception of academic librarians as teachers of IL (Fagan *et al.*, 2021). Scholarly works have rarely focused on how students perceive academic librarians as instructors of IL in multimodal environments (Cicone and Hounslow, 2019). This is fundamental because academic librarians are focused on sharing practices related to integration into mainstream courses, as this leads to the promotion and marketability of IL on a global scale (Foster, 2020). There seems to be an ongoing concern in the literature to discuss credit-bearing initiatives and how to teach IL with technology. Juxtaposed, students' perceptions of academic librarians as teachers of IL are limited in the LIS literature (Jameson *et al.*, 2019). Discussions related to integration through credit-bearing initiatives are valuable, however, of equal importance are students' perceptions of academic librarians as instructors of IL in multimodal environments.

Students can provide valuable feedback as to whether IL teaching methods are stimulating and engaging during the learning process (Landøy *et al.*, 2020). Most importantly feedback from students can provide academic librarians with a yardstick to measure their teaching competencies as instructors (Sezer, 2020). This will allow academic librarians to self-reflect when planning, creating and delivering IL instruction. Further, teaching strategies, content evaluation, organisation and matters related to planning can be better understood through the lens of a student. Thus, this study intends to unpack how engineering students at a University of Technology (UoT) in South Africa perceived the librarian as an instructor in multimodal environments prior to and during the Covid-19 pandemic.

## Research questions

- RQ1. What are students' perceptions of the engineering librarian as an instructor of IL in a blended learning environment?
- RQ2. What are students' perceptions of the engineering librarian as an instructor of IL in an online environment?

Globally, IL is either offered as a once-off training session, through programmes such as general education and cornerstone or embedded into a first-year module for a particular course (Graves *et al.*, 2021). Within the context of this study, IL was embedded as a sub-topic in all first-year engineering courses under a module termed *Technical Literacy* (TL). The TL module consists of eight credits and two are allocated towards IL. These two credits constitute 20% of the final mark for first-year engineering students. Further, based on the TL module descriptor lesson plans, content, classes, activities and assessments were formulated.

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Key constructs of IL are underpinned in frameworks that are described with some variation and uniqueness (Heard *et al.*, 2020). However, when these constructs are simplified, they broadly refer to topic analysis, searching for information, evaluating information, fake news and referencing (Whetstone, 2023). These constructs can be further collapsed and narrowed. As an example, *searching for information* can have sub-sections such as discovery tools, databases, electronic books, electronic journals, institutional repositories and Google Scholar. In terms of the TL module, IL constructs incorporated into lessons included *searching for information* (library discovery tools, electronic books and Google), *fake news*, *evaluation of information* and *referencing*. These topics were purposely selected as students entering higher education institutions within the South African context emerge from diverse backgrounds due to historical injustices of apartheid that still exist today (Moyo and Okemwa, 2022). Consequently, this has created a barrier to social, economic and cultural affluence at South African universities. Thus, the rationale in selecting these IL constructs guaranteed first-year engineering students an equal opportunity to learn about discovery tools, electronic books, evaluation of information, fake news, referencing and plagiarism despite their prior socio-cultural context.

### **Community of inquiry framework**

The demands of teaching and learning in the 21st century are driven by Information and Communication Technologies (ICTs) (González-Pérez and Ramírez-Montoya, 2022). Integration of ICTs within teaching can enhance the learning experience of students. However, ICT integration into teaching and learning needs to be carefully crafted within theories of teaching to suit productive learning outcomes (Graf, 2023). Primarily, ICTs must enhance the teaching and learning experiences in multimodal environments. Therefore, ICTs are support mechanisms that must be underpinned by theories of pedagogy to stimulate learning.

Within, the context of this study, ICTs are also seen as a support tool for evaluating the teaching, social and cognitive presence of the engineering librarian as a teacher in multimodal environments. The Community of Inquiry (CoI) framework clearly defines the teaching, social and cognitive constructs of facilitators in multimodal environments (Wertz, 2022). Hence, the CoI framework was selected to underpin this study. Constructs of the CoI framework are unpacked in the results and findings through themes such as teaching strategy, content evaluation, organising, planning and support – Tables 1, 2 and Figures 1, 2 and 3.

### **Research method and design**

A quantitative approach was used to explore the research questions in this study. The UoT designed a template questionnaire titled “*Lecturer Evaluation Questionnaire*” (LEQ). This LEQ is administered each semester by lecturers to ascertain if students identify with content, teaching methods, activities and learning for the modules offered within a programme. The LEQ is also used by support staff such as academic librarians when they are co-opted with lecturers in credit-bearing modules. Staff at this UoT are also allowed to modify the LEQ to ask students questions aligned with the subject matter taught as per their portfolio. Moreover, modification of the LEQ would apply to support staff since content, teaching and learning methods used differ from mainstream subject specialists. Hence, in this instance, the LEQ was modified. The LEQ contained questions on, IL content, teaching methods and activities, of the engineering librarian in multimodal environments prior to and during the Covid-19 pandemic. During the pandemic, this was further revised to include questions pertaining to technology. In both instances, prior to and during the pandemic there was one open-ended question, as it allowed students to provide feedback on matters that concerned them.

## Engineering librarian as an IL instructor

Statement	Student perception teaching methods – blended 2020 (%)	Student perception teaching methods – online 2020 (%)	Student perception teaching methods – online 2022 (%)	Combined total average percentage per statement (%)
Communicates audibly such that I can hear all that is said	99	85	98	94
Uses different teaching methods (Demonstrations, practical exercises with live feedback, class discussions)	91	79	91	87
Stimulates learning through synchronous and asynchronous activities	79	75	85	80
Uses a style of questioning that encourages me to respond	79	75	85	80
Gives students the opportunity to ask questions	93	98	99	97
Uses practical exercises when teaching	83	66	83	77
Uses student questions and answers to help everyone learn	93	90	92	92
Uses visual aids for teaching and learning (Slides, videos, games, educational learning technologies) to help me learn	97	98	98	98
Knew the content of the lesson well	91	96	94	94
Average	89	85	92	89

**Table 1.**  
Teaching strategy in multimodal environments

**Note:**  $n = 464$   
**Source:** Table by author

Statement	Content evaluation and blended teaching 2020	Content evaluation and online teaching 2020	Content evaluation and online teaching 2022
The learning outcomes for the lesson were explained to me	68 (85%)	109 (83%)	225 (89%)
Where practical exercises were conducted, the facilities and equipment were adequate	69 (86%)	70 (53%)	165 (65%)
The instructions to complete the practical exercises were clear	67 (84%)	79 (60%)	187 (74%)
Overall, I am satisfied with the quality of the Information Literacy lectures	72 (90%)	88 (67%)	196 (78%)
<i>Total number of respondents per year</i>	<i>80</i>	<i>132</i>	<i>252</i>

**Table 2.**  
Content evaluation in multimodal environments

**Note:**  $n = 464$   
**Source:** Table by author

### *Sampling and selection procedure*

In selecting the sample two important criteria had to be adhered to, as data was collected during two intervals in 2020 and once in 2022. The criteria used were determining sample size and selecting a representative sample size. In 2020, data was first collected prior to

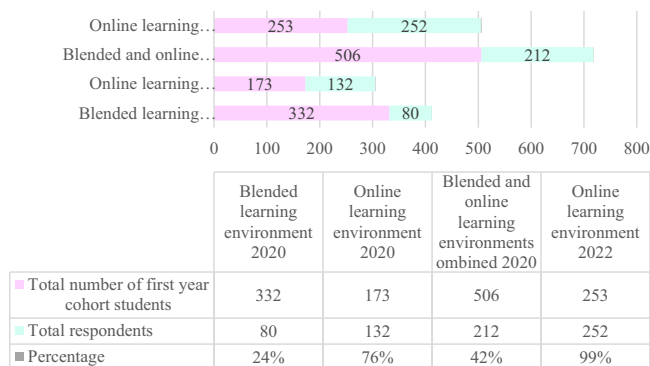
Covid-19 during blended classes and again during the second semester of the same year when IL lectures were delivered online. This process was repeated in 2022 when online lectures continued at the UoT. Hence, the population size consisted of three different first-year engineering groups. The rationale for using different cohorts of first-year students was to establish their perception of the engineering librarian as an instructor in multimodal environments. To determine the total size of first-year engineering students population size in 2020 and 2022, an enrolment list was made available from the UoT's student administration department. The accuracy of the population had a 95% confidence level and 5% margin of error as the same student lists are used for assessments, attendance and capturing of marks.

Simple random sampling was used to select a representative sample size, as this allowed every first-year engineering student an equal and fair opportunity to respond to the online questionnaire. This sampling method ensured that every engineering student had the same probability of being selected as TL was a generic module. Furthermore, simple random helps to reduce bias in comparison to other sampling methods. Thus, besides determining the sample size, representation included first-year students from various engineering departments.

#### *Data collection procedure*

The data collection process was administered through an online software "QuestionPro". Students were provided with a link via email. The link was also embedded in the engineering libguides, as this ensured access to the questionnaire from multiple platforms. Students were not obligated to complete the questionnaire and anonymity was guaranteed. This removed any form of bias or subjectivity during the data collection procedures.

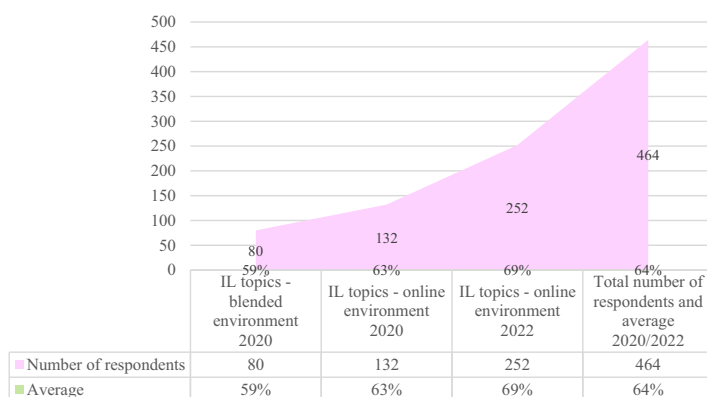
The online questionnaire was divided into four parts covering *IL topics*, *teaching strategy*, *content evaluation* and *organising, planning and support*. A two-point dichotomous Likert scale: 1 = *Agree*, 2 = *Disagree* was used to explore the constructs. The teaching strategy scale was used to measure types of teaching methods such as visual, auditory, tactile and kinaesthetic. It also included items in the scale that explored communication, interactive learning, visual aids including student and teacher-centred teaching strategies. The content evaluation scale was used to ascertain whether learning outcomes, practical exercises, instructions and the quality of the IL content met the expectation of students. In



**Figure 1.**  
Engineering students' responses 2020 and 2022

**Note:**  $n = 464$

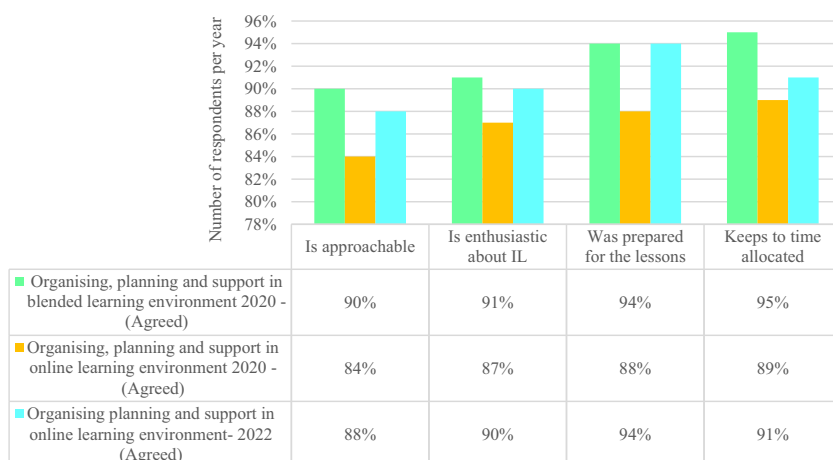
**Source:** Figure by author



**Note:**  $n = 464$

**Source:** Figure by author

**Figure 2.**  
IL topics 2020/2022



**Note:**  $n = 464$

**Source:** Figure by author

**Figure 3.**  
Organising, planning  
and support 2020/  
2022

2020 during Covid-19, the instrument was tweaked to include questions on internet connectivity, data and technology. The reason for including such questions was to explore student experiences when using technology for online learning.

Cronbach's alpha coefficient was used to establish instrument reliability. The items within the instrument had a trustworthiness of 0.81, 0.87 and 0.85, respectively. Additionally, when the overall reliability of the instrument was tested a value of 0.87 emerged. Hence, the internal consistency of items and overall reliability of the instrument was dependable and trustworthy. Besides, the reliability of the instrument, respondents had access to the engineering librarian through various online platforms to clarify any ambiguities. Gathered data were analysed using Statistical Package for Social Sciences. The one open-ended question was also interpreted, as this provided students with the

opportunity to share their lived experiences in an objective and unbiased manner through the questionnaire.

*Ethical considerations*

Staff were allowed to collect data as per the teaching and learning policy of this UoT. The policy ensures matters pertaining to ethics in collecting data when teaching is adhered to within this higher education institution. This is important as it safeguards research legalities, and it also opens a window to ascertain the veracity of instructors involved in teaching. Further, it provides teaching staff the opportunity to improve and share teaching experiences in research circles.

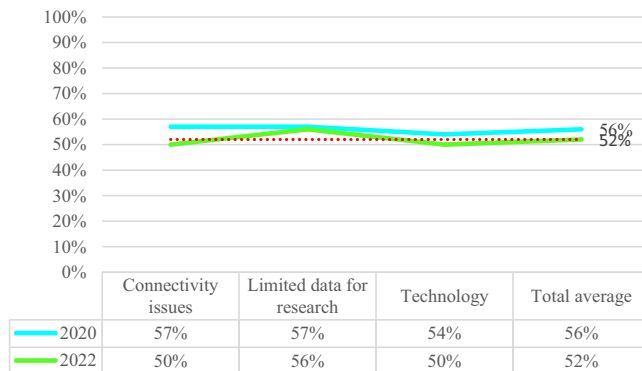
Moreover, although, the online questionnaire was a blueprint for mainstream academics as discussed earlier, it was tweaked. The reason being TL was a new module, offered first in 2019 for the faculty of engineering. Therefore, in 2020 during the second run of the TL module, it was important to explore students' perceptions of the engineering librarian as an instructor. In this instance, the teaching and learning policy underscored ethical considerations for such collaborative ingenuities within mainstream programmes as it allowed for the LEQ to be modified. Therefore, initially Covid-19 complicated matters, however, in retrospect it provided an opportunity to measure the engineering librarian as an instructor in multimodal environments at different intervals between 2020 and 2022.

**Data analysis and findings**

Descriptive statistics were used to analyse and interpret first-year students perception of the engineering librarian as an instructor in multimodal environments. However, it was important to ascertain how many students responded to the online survey – [Figure 1](#). Further, it was also imperative to understand if there were any technological challenges experienced when learning in an online environment – [Figure 4](#).

*Engineering students responses*

[Figure 1](#) measured how many first-year engineering students responded to the online questionnaire in 2020 and 2022. Learning for the first cohort of engineering students in 2020 occurred in a blended environment prior to Covid-19. Within this context, 80 (24%) out of 332 students responded to the online questionnaire. The online questionnaire was repeated



**Figure 4.** Technology and online learning environment 2020/2022

**Note:** n = 464  
**Source:** Figure by author



during the second semester of the same year for the new intake of first-year engineering students during the harsh lockdown conditions. Out of 173 students, 132 (76%) responded to the online questionnaire. In 2022 the online questionnaire was once again made available to first-year engineering students. Out of 253 students, 252 (99%) responded to the online questionnaire. Further, respondents from both blended and online environments in 2020 were combined because it was within the same academic year, although, teaching and learning occurred in different settings. In this instance, the data showed of a total combined 506 students, 212 (42%) responded in 2020 to the online questionnaire. Strangely, however, the number of responses to the online questionnaire increased steadily as students transitioned to an online from a blended learning environment as shown in [Figure 1](#).

#### *Information Literacy topics*

[Figure 2](#) illustrates whether IL topics such as topic analysis, searching for information using a discovery tool, searching for information using Google, evaluation of information, fake news, referencing and plagiarism were taught in multimodal environments by the engineering librarian during 2020 and 2022. In 2020, 59% of respondents *agreed* that these topics were taught in a blended learning environment prior to the Covid-19 pandemic. A further, 63% also *agreed* that these topics were taught in 2020 when higher education institutions transitioned to an online learning environment during the lockdown because of the pandemic. In 2022, 64% of first-year engineering students *agreed* that these IL topics were taught online for the TL module.

#### *Teaching strategy in multimodal environments*

[Table 1](#) presents feedback from first-year engineering students on their perceptions of teaching strategies implemented by the librarian. Teaching strategies in [Table 1](#) are categorised according to statements such as communication, stimulation of learning through synchronous/asynchronous activities, formative assessments (exercises) and visual aids, to establish whether students understood the engineering librarian as an instructor in multimodal environments. A total combined 89% (average) of students indicated that the teaching strategies implemented by the engineering librarian in a face-to-face, blended and online environment in 2020 and 2022 made a significant contribution to the IL learning outcomes. Students were also questioned whether the engineering librarian stimulated learning synchronously and asynchronously in multimodal environments. A combined 80% of engineering students indicated that activities were structured such that learning occurred either in or outside the classroom in 2020 and 2022. It was noteworthy to discover, that 87% of students recognised various teaching strategies such as active learning, problem-solving and practical exercises with live demonstrations used by the engineering librarian in multimodal environments when teaching IL. A total of 97% of students also indicated there were opportunities to ask questions in both blended and online environments. A total of 98% of students revealed that there was use of visual aids in the form of slideshows, games and the use of learning technologies for IL. A total of 80% of engineering students indicated that learning was encouraged through a style of questioning that encouraged participation in multimodal learning environments. Within the context of CoI constructs – (*teaching presence and cognitive presence*), themes such as content design, facilitation and activities to stimulate cognitive thinking patterns are critical to learning outcomes ([Maranna et al., 2022](#)). Teaching and cognitive presence were established as engineering students affirmed that teaching strategies stimulated learning in multimodal environments. Ultimately student feedback is critical, as it enhances teaching strategies, however, learning must be measured using assessments.

*Content evaluation*

**Table 2** Reflects the perceptions of students related to IL content in multimodal environments. In a blended learning environment during the first semester of 2020, 85% of students *agreed* that learning outcomes were explained at the onset of classes. Similar patterns recurred in an online learning environment during 2020 and 2022 as 83% and 89%, respectively, *agreed* that learning outcomes were explained. In terms of the adequacy of facilities and equipment for practical exercises in a blended environment during 2020, 85% *agreed* that the class setting was conducive to learning. However, there was a significant change when practical exercises were implemented in an online environment during 2020 due to Covid-19 restrictions. A total of 53% of engineering students agreed that facilities and equipment for practical exercises were adequate for online learning. [Agormedah et al. \(2020\)](#) concur that the transition to online learning during the pandemic was challenging for students, owing to internet connectivity at times and limitations in ICTs. This improved in 2022 as students seemed to settle into an online mode of learning. A total of 65% *agreed* that facilities and equipment for practical exercises were adequate for online learning. Within the context of understanding instructions to complete exercises, 84% *agreed* that in a blended learning environment during 2020 this was clear. In the same year in an online learning environment during the covid-19 pandemic, there was a decrease in comparison to the blended setting as 60% of students indicated that instructions to complete exercises were clearly understandable. At this point, students were still transitioning into an online environment, therefore, there were challenges in engagement, assessments and feedback ([Hollister, 2022](#)). However, there was an improvement in 2022 as 74% of engineering students concurred that instructions to complete exercises were clearly understandable in an online environment. In terms of students' overall perception of IL content in multimodal environments, within a blended environment in 2020, 72% of students were satisfied with the quality of IL lectures. In 2020 and 2022, 88% and 78% of students were satisfied with the quality of IL lectures.

*Organising, planning and support*

**Figure 3** illustrates students' perception of the organising, planning and support of the engineering librarian in multimodal learning environments. During 2020 prior to the Covid-19 pandemic in a blended learning environment, 90%, 91%, 94% and 95%, respectively, *agreed*, that the engineering librarian was approachable, enthusiastic, prepared and kept to allocated lecture times. As society transitioned into a hard lockdown during 2020 IL lectures for another first-year intake of engineering students continued online. In an online learning environment during 2020 – 84%, 87%, 88% and 89%, respectively, *agreed*, that the engineering librarian was approachable, enthusiastic, prepared and kept to allocated lecture times. Online IL lessons continued during 2022, students had a similar perception of organising, planning and support as in 2020. A total of 88%, 90%, 94% and 91%, respectively, *agreed*, that the engineering librarian was approachable, enthusiastic, prepared and kept to allocated lecture times. Students between 2020 and 2022 in a face-to-face, blended and online environment managed to socially engage with the engineering librarian to achieve their learning outcomes. The CoI framework alludes to the importance of social presence of the instructor that creates an environment in which students feel socially comfortable and become integrated into a community of learning ([Dilling et al., 2020](#)).

*Technology and online learning environment*

**Figure 4** shows the issues pertaining to technology and online learning for first-year engineering students in 2020 and 2022. The first-year cohorts selected were engineering

students who attended lectures in an online environment during the Covid-19 pandemic. In terms of connectivity issues, 57% of students in 2020 *agreed*, stating that connectivity was a challenge, whilst, in 2022, 50% of students shared the same sentiments. When students were questioned about data issues for research purposes, 57% in 2020 *agreed* this was a problem. A similar pattern existed in 2022, wherein, 50% of students *agreed* that limited data is an issue for research. Students were also probed about access to technology such as mobile devices, personal computers and laptops for online learning. In 2020, 54% of students *agreed* that access to technology was a challenge, whereas 50% of students in 2022 shared the same views. Further, the linear trend line illustrated in [Figure 4](#) demonstrated that technology and online learning remained a constant challenge in 2020 and 2022. Clearly, there seemed to have been a disparity in access to technology. One can assume the reason for this is that a large constituency of students emerged from previously disadvantaged backgrounds in South Africa.

#### *Feedback from open-ended question*

The feedback from the open-ended question is presented as direct quotes. Feedback was randomly selected from respondents who responded to the online questionnaire in 2020 and 2022.

“The librarian is very knowledgeable about his work and has excellent communication skills which are demonstrated very well when answering questions from us, the students, and his ability to connect with us by using relevant information that is also relatable to us as young students”.

“The librarian was patient with us since we were new to this and he never gave up on us.”

“Our librarian (Lecturer) is the best, he is dedicated to his work”.

“The Information Literacy training I received was of high quality, and I am pleased with it”.

“The lectures were quite insightful and informative. The *lecturer was well prepared* and delivered the intended information in a concise and detailed manner”.

“The lecture is clear and tries his best to explain what the topic is about. I prefer that we go back to campus as teaching and learning would be much better and I’m sure that this will also improve our performance in our tests. I think *going to campus* could also help us in knowing each other well and maybe help each other in certain modules.”

“Everything is clear to me, except that *the internet connection around my area is bad*”.

“The teaching and learning process is going smoothly so far. But I am having difficulties when it comes to attending classes because of *connection problems*.”

“I would highly recommend and appreciate if we were to go back on campus and have *face-to-face lectures*” “Online classes are giving me a hard time.”

“The *module is exciting*”.

“Sometimes I find it difficult to attend online classes (MS Teams) due to *bad network*. I would like to attend classes on campus so that I can track all my lessons without *network issues*”.

It can be ascertained from students’ responses to the open-ended question that there were issues surrounding technology and online learning. The open-ended question also affirmed responses from [Figure 4](#) wherein students were challenged in an online learning environment due to technology. At some point, students felt a sense of self-realisation that classes needed to resume on campus as technology hindered the learning process as access to the internet, data and technological devices was limited remotely. Further, within the context of a campus environment, there could be flexibility either through face-to-face or

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blended learning approaches for academics and students. Therefore, a totally online IL learning approach was not feasible at this UoT.

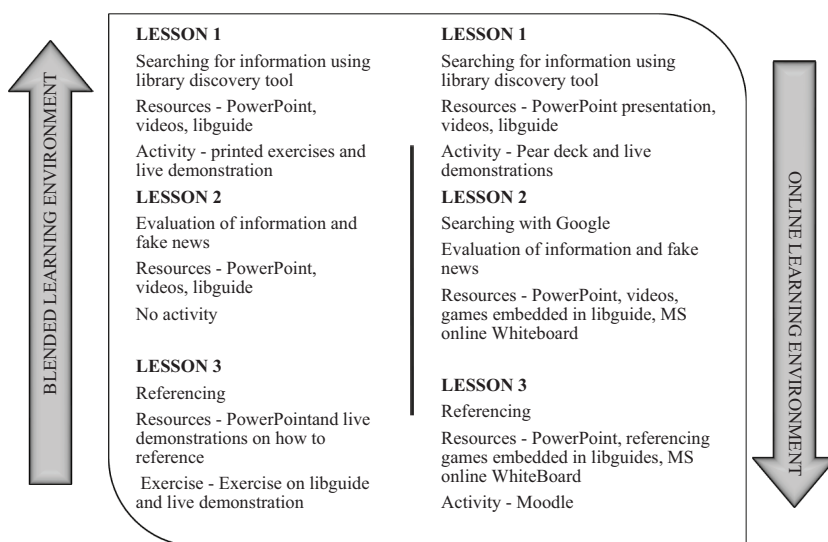
### Discussion

Generally, studies have focused on exploring the teaching skill sets of academic librarians (Williams, 2022; Beer, 2022; Hess, 2020). On the flip side, the research microscope has also constantly focused on students and their IL skills through once-off sessions, integrated lessons or collaboration with academics (Reed *et al.*, 2022). Studies that delve into students' perceptions of academic librarians as IL instructors are limited in the literature, moreover, in multimodal environments (Fagan *et al.*, 2021). This study is one in very few or maybe even the only study presently that explores students' perceptions of an academic librarian *vis-a-vis* instructor in multimodal environments. Results in this study empirically presented students' perceptions of the engineering librarian as an instructor in multimodal environments.

Constructs that unpacked teaching strategies were divided into items within each criterion – Table 2. As an example, Table 2, provided a clear indication as to how diverse teaching methods of IL in multimodal environments can stimulate learning. The engineering librarian used a blended teaching and learning approach prior to the lockdown. Engineering students learned IL skills in a blended environment through scheduled lectures. Students had access to ICTs in a physical classroom on campus. IL activities occurred in class using online engineering libguides and technologies. Activities such as searching for library resources and referencing activities were made available on the engineering libguide using Microsoft Word and PowerPoint. Students accessed and downloaded activities from their respective engineering libguides. The activities were answered on an exercise sheet which the engineering librarian marked and provided individual feedback to students. Further, class feedback was provided during IL lectures once common mistakes were identified and activities were completed.

However, when the mode of teaching and learning changed due to Covid-19, it did not compromise the engineering librarian at this UoT. Conversely, the transition into the online environment was seamless, as tools such as Moodle and libguides were being used to facilitate teaching in a blended setting prior to the pandemic. Nevertheless, there were two notable changes in the online environment. The first was synchronous lessons were facilitated through a video-conferencing tool. Secondly, IL activities had to be integrated with technology in an online teaching and learning environment, synchronously or asynchronously. To cater for learning in a digital classroom the engineering librarian used online tools such as Pear Deck, Kahoot! and Microsoft Whiteboard, MS Teams (breakaway sessions) as students engaged in interactive IL activities. Outside of the classroom activities were set on Moodle. Students engaged in discussion forums (Moodle) on how to search discovery tools or Google. Activities also took the shape of an assignment on referencing different sources of information and submitting it on Moodle. These activities were marked on Moodle and students were provided with individual feedback to improve their IL skills. Therefore, students were satisfied with the engineering librarian as an instructor in multimodal environments as learning was engaging, interactive and supportive. Therefore, students were satisfied with the engineering librarian as an instructor because learning was engaging, interactive and supportive irrespective of the environment.

A sample of IL lessons taught in multimodal environments is presented in Figure 5. The diverging arrows in Figure 5 are indicative of how IL was redesigned and positioned within multimodal environments. In terms of *lesson one*, the learning environment was redefined, and activities were modified and substituted using a digital tool – Pear Deck in an online



## Engineering librarian as an IL instructor

**Figure 5.**  
IL Lessons blended and online environment

Source: Figure by author

(MS Teams) compared to a blended learning environment. The activity changed from a printed-based exercise with learning objectives on how to find a book/e-book title, shelf location, library location and edition of a book/e-book to using a digital tool (Pear Deck). This teaching and learning tool allowed the engineering librarian as a facilitator to have “live time engagements” with students in the MS Team classroom. The digital tool allowed the engineering librarian to provide every student with individual feedback in the online classroom when searching for information – [Figure 5](#).

In terms of *lesson two*, there was no activity in the blended learning approach – [Figure 5](#). However, the design of activities for *lesson two* in an online environment was reimaged to suit the learning outcomes. The learning objectives for online *lessons one and two* were based on searching for information on different platforms as illustrated in [Figure 5](#). To measure the achievement of learning outcomes the author designed an activity using the *discussion forum* option in the Learning Management System (Moodle). The activity was shaped in the form of a dialogue that required students to provide their opinions as to which searching tools would be most suitable for academic information related to assignments, projects or research – *Discovery tool vs Google*. In this way, an online dialogue using Moodle between students assisted in measuring their understanding of searching for information.

Lesson three in a blended environment required students to access the referencing activity from the engineering libguide. The referencing activity included questions on how to reference a book, e-book, journal article, online journal article and website. Students downloaded the questions onto desktop machines in the classroom and used paper to complete the referencing activity. The engineering librarian marked these activities and provided individual feedback to students in the classroom. Further, besides providing individual feedback referencing as a topic was reinforced in the classroom during lessons. The design and shape of the referencing lesson and activity changed in the online environment as illustrated in [Figure 5](#). The lesson on referencing was recorded and played

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on MS Teams to students. Thereafter, the engineering librarian used MS Whiteboard to engage students in an activity on how to reference different sources of information in the online classroom. To ascertain if engineering students grasped how to reference, an activity was designed on Moodle using the assignment option. The assignment covered how to reference various sources of information such as books and e-books. The engineering librarian marked the referencing assignment on Moodle and provided individual feedback to engineering students.

Additionally, fun games such as crossword puzzles, matching words and quizzes were created with various freeware tools and embedded into the engineering libguides. This was done to assist students in learning concepts being taught in the online class and in preparation for the formal IL test. The games designed covered searching for information, evaluation of information, fake news, referencing and plagiarism. The online lessons were also recorded and uploaded into the Moodle classroom for students to engage with IL content learned in the classroom in their own time and space – a self-paced learning approach.

The one issue that emerged constantly is technology and online learning – [Table 2, Figure 4](#) and feedback from students. When practical exercises were modified and implemented in an online environment in 2020 most students *disagreed* that the facilities and equipment were adequate for online learning – [Table 2](#). A similar pattern existed in 2022 for online IL lessons, however, there was a slight increase compared with 2020 – [Table 2](#). However, this emerged again as students grappled with access to technology, data and connectivity issues – [Figure 4](#) and feedback from an open-ended question. Hence, although not directly aligned with the context of this topic, access to technology is an area that needs to be explored at higher education institutions as it has implications for online teaching and learning.

### **Limitations and future direction**

This study is not exempted from pitfalls and drawbacks as is the case with research. Within the context of this research, exclusivity was limited to only first-year engineering students. Hence, findings from this first-year cohort of engineering students cannot be generalised to other IL initiatives at the UoT or on a global scale. Further, the quantitative approach subscribed was limited to a two-point dichotomous Likert scale. Future studies may consider using a pragmatic approach by implementing a mixed method design. This type of approach will drill further and may find insightful conclusions related to academic librarians as teachers in multimodal environments.

It would also be within the interest of not only this UoT but rather higher education libraries, worldwide, to explore students' perception of academic librarians as instructors of IL in multimodal environments. This would allow academic librarians to enhance and improve their scope when teaching IL in multimodal environments. Academic librarians can then design content, lessons, activities and assessments as perceived through the lens of students. Further, this approach can provide academic librarians with a window of opportunity to explore peer-to-peer mentoring as IL instructors, participate in scholarship of teaching and learning programmes, workshops, short courses in pedagogy and join communities of practice for teaching and learning. Moreover, this can strengthen the teaching identity, juxtapose, instructors in multimodal environments of academic librarians.

### **Conclusion**

This study highlighted how students perceived the engineering librarian as an instructor in multimodal environments. Participants opined that the engineering librarian was equipped as an instructor for teaching in multimodal environments. Moreover, participants agreed

teaching strategies, organisation and support provided by the engineering librarian in blended and online environments were appropriate. Although, there were issues pertaining to technology, students viewed the engineering librarian as an adaptable and flexible instructor in multimodal environments.

Further, this research suggests that student perceptions are important to improve academic librarians as instructors of IL in multimodal environments. Therefore, academic librarians need to explore how students identify with them as instructors of IL in multimodal environments. Worldwide, for this to be implemented higher education institution libraries need to underscore an extensive evaluation process to unpack the teaching identities of academic librarians from a student's perspective. Literature has challenged academic librarians over the past few decades as instructors, however, there is little written on how students perceive the teaching role of academic librarians. Moreover, there has not been much research exploring this topic in multimodal environments.

This study provides four constructs and a list of items under each in the online questionnaire. Each item was used to explore the role of the engineering librarian as an instructor through the lens of students. These constructs can be modified, updated and used for similar types of studies. Worldwide, research in this area can contribute to the teaching identity of academic librarians as instructors of IL in multimodal environments. Moreover, to develop and promote the portfolio of academic librarians as instructors in multimodal environments, research is a key ingredient at 21st century higher education institutions. The potential to profile academic librarians as instructors in multimodal environments has dawned upon higher education libraries. This process brings transparency, clarity, openness and inclusivity related to IL. Should this be adopted, it can chart a path to regularly measure the skills of academic librarians as instructors of IL in multimodal environments.

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