Selecting information products and services to embed in a virtual learning environment to support Engineering undergraduates in a blended learning context

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ABSTRACT

Blended learning offers many advantages and therefore learner communities are moving, at least partially, online. Academic libraries, to meet the teaching, learning and training needs of these communities, enable information access, provide information literacy education, collect and maintain subject-specific information, and teach skills in information selection and evaluation. It then makes sense for libraries to embed products and services online, where the communities are.

Purpose: The purpose of this study was to understand what role undergraduate third and fourth year students expect librarians to play in an online learning environment and to determine what information products, training and other services the students expected librarians to embed.

Design/methodology/approach: This case study used a convergent parallel mixed methods design. Data were collected from both students and lecturers. An online questionnaire was used to collect mainly quantitative data from the undergraduates while a semi-structured interview schedule was used for in-depth discussions with lecturers.

Findings: Contrary to what was expected Engineering students regarded access to an embedded librarian as important. Lecturers prefer that a separate, mandatory module is created and embedded in the learning environment. Product and service expectations were not surprising but there are gaps to fill when it comes to training needs.

Research limitations/implications: The research sample was small and therefore generalisations are not advisable.

Originality/value: The research holds value to stakeholders involved in the teaching and learning of Engineering subjects. Librarians embarking on the process of embedding their services online should also find the results useful.

Keywords: Embedded librarians, Virtual Learning Environments, Undergraduate Engineers, Blended learning, Learning Management Systems

1. INTRODUCTION

Embedded librarianship is based on the concept of a librarian becoming a member of a user community (Shumaker, 2009; Carlson & Kneale, 2011; Zanin-Yost, 2018). When successful, the librarian becomes assimilated into, actively participating in and collaborating with the user group in a virtual (online) environment and is able to provide customised information products and services to address the needs of the user group. The intent of the paper is to share the learning gained from an initiative to embed relevant library products and services into an online learning environment that was introduced to support the university's blended learning drive.

The paper is an extract from a study that was conducted at the University of Pretoria (UP), South Africa. The University faces typical developing country challenges and is making use of blended learning to augment the learning curricula. The aim was to ensure that only those library products and information services with value to the user community were embedded into the evolving learning environment for undergraduate Engineering students. For the project to be successful it was necessary to establish:

- o *What the level of information literacy, as indicated by the respondents, was.*

- o *What the information behaviour, as reported by respondents, was.*

- o *What relevant services and products the library could add to the hybrid learning environment.*

- o *What information need variances, if any, there are between the sub-disciplines in Engineering?*

- o *What role the students and lecturers expected an embedded librarian to play.*

We believed that this knowledge would enable us to design a service that was of value to both the lecturers and the students. Fortunately, it appears that these assumptions were correct.

2. LITERATURE REVIEW/BACKGROUND

Embedded librarianship allows direct and purposeful interactions with users (Dewey, 2004) – more so than what is expected from librarians as intermediaries. Although face-to-face collaboration should not be underestimated, it is equally important to be present in the virtual learning environment if that is where the students are (Dewey, 2004; Kesselman & Watstein, 2009). Daily contact with students aids librarians in raising awareness about information products but also aids the understanding of the needs, wants and concerns that students may have in their quest to succeed (Dewey, 2004; Burke & Tumbleson, 2016; Tumbleson, 2016). With a growing number of students and often a reduction in library staff, it is no longer possible to rely only on personal interactions to share and gain the knowledge that keeps libraries relevant. This is even more difficult when the target population, in this case Engineers in training, is not known for active library use.

Shumaker (2009), more than ten years ago, alluded to the coexistence of both the physical and virtual libraries and assured readers that embedding does not mean the closure or even the neglect of physical libraries. Today, most modern academic libraries maintain both a physical and a virtual presence. Students however, associate the library with a physical building and they appear to ignore the library web site containing online information and resources (Baer & Li, 2009; Colón-Aguirre & Fleming-May, 2012; Cunningham & Tabur, 2012; Kwadzo, 2015; Khoo *et al.*, 2016).

A virtual presence is not the same as an embedded service. Technology frees librarians from physical boundaries (Shumaker, 2009) and allows them to be present where their services are truly useful. Embedding products and services should be seen as a way to venture beyond the library walls (Shumaker, 2009), to build relationships, to collaborate and partner with clients, to maintain visibility (Kesselman & Watstein, 2009; Hoffman & Ramin, 2010; Tumbleson, 2016), to actively participate in virtual classrooms, whether fully online or blended (York & Vance, 2009) and to provide customised information products and services that will address the needs of the users (Burke & Tumbleson, 2016). In addition, when embedded librarians are proactive in their interactions with their clients, they have the ability to change the dynamics of the roles of the service provider (the library) and the customer (the students) (Nargakar & Murari, 2010). Embedded librarianship also enhances traditional information literacy (IL) training. It allows the training to be available simultaneously to all: long-term, for both contact and distance learners, available at the point of need, directly from the online

learning platform (Nargakar & Murari, 2010). Briefly: A Virtual Learning Environment (VLE) – also known as a Learning Management System (LMS) is a web-based platform used to "structure, manage, communicate and deliver educational content and activities for a specific module to a defined group of students to enhance the students learning experience" (Makhafola, 2018). When a VLE such as Blackboard or Moodle is used to provide additional support to face-to-face lectures, it is known as Blended Learning (BL). In an effective VLE, the lecturers provide learning content, information on course and assignment requirements, while librarians customize IL sessions/content and integrate library resources (i.e. images, databases and electronic course reserves) specific to a course (Dewey, 2004; Paganelli & Paganelli, 2017). Thus, creating a symbiotic relationship between lecturer and librarian that further nurtures the student. Proactive posting of information (for example tutorials and tips) by the librarian is important to provide just-in-time information to students as they are more likely to read the posts if assignment deadlines are nearing (Hoffman & Ramin, 2010). It is useful to remember that relationships vary and the librarian should therefore expect that all lecturers will not be equally comfortable with their presence in the VLE. In summary: When librarians embed in VLEs they consolidate online information and learning resources by subject and act as a medium for delivering crucial information skills and IL tutorials (Kearley & Phillips, 2005; Corrall & Keates, 2011). Even when there is initial resistance there should be no doubt that embedding enhances the learning environment. It is important to note that close physical proximity is not necessary for the establishment of embedded services. However, close proximity has the benefit of providing the embedding librarian an opportunity to engage and understand the users' needs better (Drewes & Hoffman, 2010).

Figure 1 below, depicts the workflow that an embedded librarian would typically follow. The figure is based on the activities identified by Shumaker and Tyler (2007) but Makhafola (2018) is of the opinion that the activities are performed in a continuous cycle. The point needs to again be made that a good working relationship between course instructors and the librarian is imperative for effective embedding to take place.
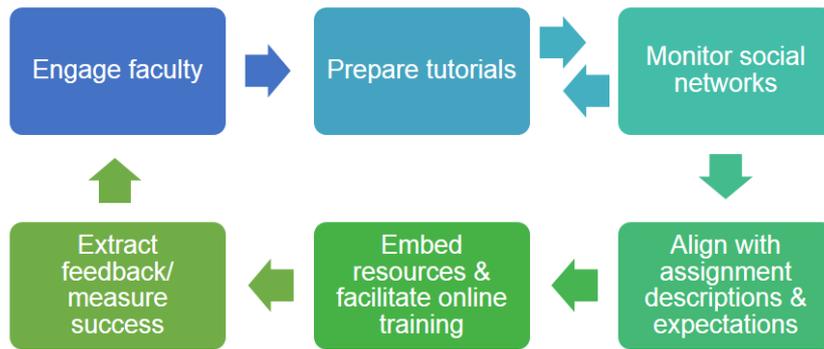
Figure 1: Continuous cycle of activities performed by the embedded librarian

Source: Makhafola, 2018, adapted from: Shumaker and Tyler (2007).

Activities start when faculty is approached and the course is discussed to provide the necessary context and a framework for the librarian's activities. The librarian prepares a tutorial for the students. The tutorial is aligned with the assignment and additional resources as well as training which is then embedded. It is possible to re-use existing tutorials as long as these are continuously enhanced with relevant content from reliable social media and published resources. The librarian evaluates success at the end of the course and uses the feedback to engage in a new round of discussions.

It is essential that librarians steer clear from mistakes made in the physical library environment by paying careful attention to the real information needs expressed by the user communities. Figure 2 was inspired by the work of York and Vance (2009), Bezet (2013) and Allen (2017). From the figure it is clear that the embedded librarian could expect any one or a combination of the following three tiers of engagement: course administrator, course instructor, and/or course designer. The typical activities associated with each of these tiers are also indicated.
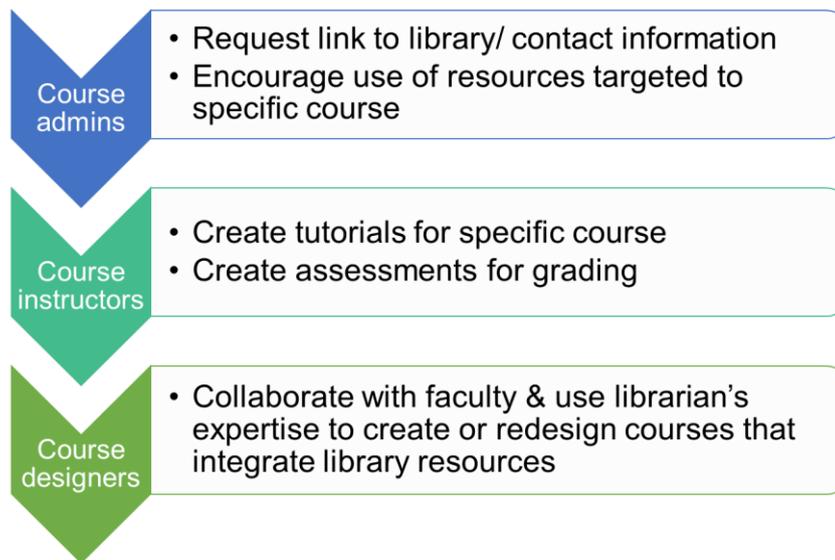
Figure 2: Tiers of embeddedness

Source: Makhafola (2018) based upon: York & Vance (2009); Bezet (2013); Allen (2017).

Many studies (Hemminger *et al.*, 2007; Baer & Li, 2009; Niu *et al.*, 2010; Engel, Robins, and Kulp, 2011; Tucci, 2011; Zhang, 2015) have assessed users' satisfaction with library resources and the quality of service provided, and explored library use patterns but few have actually covered the Engineering field.

When approaching the Engineering community, the following is known: Undergraduate Engineering students are often required to complete projects - including research and development projects. This is similar to what professional engineers would do (Kerins, Madden & Fulton, 2004). Kerins, Madden & Fulton (2004) and Jeffryes and Lafferty (2012) listed library access (at times suitable to students); electronic information sources information skills training; personal consultations with a librarian; inter-lending material; and referencing as important to Engineers. In addition, print books; technical handbooks and reports; journals (electronic and print); standards (i.e. ASTM, ISO); patents; Vapor-Liquid Equilibrium data (Chemical Engineering); material property data; subject guides; and previous student projects were also important (Kerins, Madden & Fulton, 2004; Jeffryes & Lafferty, 2012). It was difficult to find more recent information pertaining to the needs of Engineering students and it was decided to investigate the matter further.

3. CONTEXT AND SCOPE OF THE STUDY

The focus of the UP's Department of Library Services is not only on traditional library products and services but also on providing a wide range of electronic products and services to clients (University of Pretoria, 2017). Although the UP's Department of Library Services does not yet have a formal embedded librarianship program in place, there was keen support for an investigation into the products and services that were of value to Engineering students and faculty. Understanding the role that the librarian would be able to play in a VLE was seen as helping to meet the needs of the evolving student-community more effectively.

Three Engineering departments (Chemical-, Material Science & Metallurgical-, and Mining Engineering) were consulted and the staff agreed to participate in the study. It was anticipated that, at the very least, the research would assist with relationship-building between faculty, librarians and students and that, in the end, the project would ensure increased usage of readily available, subject-specific library resources. The results achieved may not necessarily be generalizable however, the findings of the study, especially the common products and services identified, could provide guidance to anyone undertaking an embedded librarianship program at an academic library.

4. RESEARCH DESIGN

Establishing the level of information literacy (IL) and the information behaviour, as reported by respondents, were regarded as essential baseline data to collect. Several questions related to products and services were identified while the role students and lecturers expect an embedding librarian to play, was also seen as an important aspect to investigate.

The research was designed as a case study and a convergent parallel mixed methods approach was followed as these allowed the researcher to focus on only the engineering disciplines and the method allowed the option to collect standardised data where the options were known and in-depth detail where it was necessary to gain a complete understanding of the issue at hand (Creswell, 2015; Creswell & Creswell, 2018).

The target population for the study were undergraduate third and fourth year Engineering students and their lecturers. The size of the target population was 447 candidates. Students were briefed and then allowed to self-select. In total 43 students (9.6%) and four lecturers participated in the research. This low response rate was ascribed to poor timing. Data

collection took place at the start of the summer (second) semester when students were settling back into campus activities and when final year projects were due.

Data were collected through an online questionnaire for students and interviews with staff members from the selected Engineering departments. Both close- and open-ended questions were included in the questionnaire. Open-ended questions provided insight into the views of the respondents which lead to a better understanding of their perceptions while the close ended questions were used to reconcile perceived and actual needs for products and services. An online questionnaire, created in Google forms, consisting of 6 sections and 20 questions was developed. A link to the form was shared with lecturers. They released the link to the target groups at the start of the semester. The link was also added to the relevant subject guides. The last four digits of the student numbers were used as a unique identifier and filter. The questionnaire, which allowed for informed consent and which also collected demographic information, was accessible for two and a half weeks with a reminder sent out again to fill out the questionnaire. No incentives were provided to students, their participation was voluntary.

Semi-structured interviews were conducted, at a venue of the interviewee's choice, with lecturers willing to volunteer. Four lecturers, all familiar with the information needs of the third and fourth year modules, agreed to be interviewed. Eight predefined questions were augmented with follow-up questions to expand on the initial responses of the respondents. These staff interviews were used as a way to evaluate what lecturers expected of the students and the library, and what students were being exposed to in terms of library products and services. The interview responses were then matched with those of the students.

Detailed notes were generated following the interviews. The notes were analysed thematically. For an analysis of the quantitative data it was decided to make use of Google forms' analytics feature. Responses to open ended questions were analysed by sorting and categorizing the responses using summarizing content analysis as well as thematic analysis. This was done to find recurring themes.

5. RESULTS AND DISCUSSION

The overarching aim of the research was to establish what needed to be done to ensure that appropriate library products and information services, which are truly of value to both students and lecturers, are embedded into the evolving learning environment for Engineering students

at UP. The results and discussions are grouped according to the sub-objectives stated in the introduction of this paper.

5.1   The level of IL among the undergraduate Engineering students

IL training was seen as a baseline requirement. A small majority of the total student respondents (51% or 22/43) admitted to previously receiving IL training. At the departmental level, it was established that for Chemical Engineering respondents who received IL training was reported to be 50%, for Material Science and Metallurgical Engineering it was 25% while none of the Mining Engineering respondents reported that they had ever received IL training.

Students were asked what they remembered and used from their previous IL training. Responses were disappointingly limited in detail. Themes that commonly recurred in their responses were: "How to use the library…", "Access to information", "How to reference", "Plagiarism", "Writing reports", and "Excel and/or MS office". Some of the additional remarks made by students were "information sessions from the Information Specialist are really helpful" and "…it has broadened my basic knowledge of available resources". To summarise: The IL knowledge and skills, that students indicated they have, included: How to use the library, how to access to information from library resources such as journals and databases, information on plagiarism and how to reference to prevent plagiarising, how to write reports, and how to use Microsoft Office.

The lecturers confirmed that the subject librarian conducts IL training for all the students. One lecturer noted that students are able to find and use relevant information and technical content when doing literature studies. A general consensus among the interviewed lecturers was that although the students know how to find useful information, they struggled with basic writing skills. Lecturers A and B suggested that the IL training be conducted at the start of the third year and that it should be integrated with requirements for the module. The motivation being that this is when students need to know what the library has to offer in terms of access to information. Lecturer B stated: "I require that the librarian makes sure that they [the students] are up to speed at the start of the third year." Lecturer C held a different view in that training should be in the fourth year first semester; Lecturer D mentioned that their students are not expected to get IL training. Such training was mentioned only as an option during the first year at orientation.

It soon became apparent that a gap exists in making sure that all the students receive some form of IL training after the first year of study. They need additional skills if they are to be successful in the use of information for their studies. One student noted that a more timely

awareness of the availability of library resources would have helped during the third or fourth year. Other remarks given by students were that they found the library resources difficult to navigate and that the resources are difficult to use. The different views of the lecturers as well as the students, in terms of when IL training should commence, imply that training should be done on demand. It became clear that embedding the IL training online could ensure that all students are provided with interactive training material (in the form of games, tutorials, and step-by-step guides) when the knowledge is needed. One student noted that online courses should be provided to improve their research skills. Search efficiency training was also necessary. It was explicitly mentioned that library training should be more interactive. Another remarked that "I believe this work will enable students to access resources at one convenient location. Lecturers mentioned that they could monitor that students do have the IL skills required for professional tasks and/or direct them to the training material when it is needed.

5.2   The information behaviour of undergraduate Engineering students

When the students were asked about the preferred resources used when searching for information to complete assignments, the most popular information resources mentioned are Google (90%), library resources (81%), YouTube (54%), and lastly, Wikipedia (28%). This was the same across all engineering departments. Google is clearly a preferred resource, even for engineers. It was clear that the library needed to market its engineering resources better.

When lecturers were asked what information resources they expected students to consult Lecturer A, a Chemical Engineer, noted that students need to consult their prescribed textbooks, journal articles, and "*whatever the library makes available. We would want these to be linked in the online modules*". YouTube videos were also mentioned. Lecturer B, a Material Science and Metallurgical Engineer, responded that students are required to conduct literature searches to find books and articles for practical application. During the fourth year of study, students have no prescribed textbook, so they are required to find and use library resources for their studies. The students may use Google. This corresponds with the students' responses. Lecturer C also a Material Science and Metallurgical Engineer, stated that a mix of information sources should be consulted, including reference works and journal articles. Lecturer D, a Mining Engineer, mentioned limited 'library information' is used in the third year as the department made prescribed textbooks, a number of journal articles and conference papers available as required by their professional body.

The library actually subscribes to a vast collection of print and electronic resources. With this in mind, the researchers identified those electronic resources that contain information in one or more of the areas of Engineering. Participants were asked to select and rank selected products that the library subscribes to in order to gauge their interactions with the electronic resources available to them. The following were included: Scopus; ScienceDirect; Ebscohost; Knovel; Scifinder; Reaxys; ACS publications; Royal Society of Chemistry (RSC); Web of Science; McGraw-Hill's Access Engineering; Proquest, SpringerLink; Taylor & Francis; Subject guides (which include subject-specific information including library training content); Library page; Library app; e-journals; e-books; and standards. The products were ranked by students in order of importance and frequency of use. Although the respondents are from different Engineering departments, and although the same products were identified, the order of importance and the frequency of use, varied. Table 1 illustrates this variance.

Chemical Engineering	Material Science and Metallurgical Engineering	Mining Engineering
Science Direct (10/30 students use this weekly)	Science Direct (4/4 use this weekly)	Electronic journals (5/9 use these once per month)
Knovel (13/30 use this once a month)	Knovel (3/4 use this weekly)	Electronic books (4/9 use this once a month)
Electronic journals (13/30 once a month)	Electronic books (3/4 weekly)	Knovel (2/9 once a month)
Electronic books (12/30 once a month)	McGraw-Hill (2/4 weekly)	Subject guides (2/9 once a month)

Table 1: Top library products used per department

An additional product identified for consideration is Engineering Toolbox. It is worth exploring the product as the library does not hold a current subscription. Additional resources used by students to complete assignments were listed as: discussions with the lecturers (21% or 9/43), textbooks (21% or 9/43), lecture notes (7% or 3/43), postgraduate students (7% or 3/43), and publications from industry and industry professionals (5% or 2/43).

From the interviews it is possible to report that lecturers are embedding links to library resources in their VLE-modules. However, their level of use and knowledge of these resources varied. Lecturer A makes links to specific resources available; the Kirk-Orthmer Dictionary and library IL training presentations were given as examples. Lecturers B and D indicated that they were not expert users of the VLE. Lecturer B alluded to 'time' being a barrier to learning how to use the VLE effectively. Lecturer C has no links to the library products available from the VLE but gives the students journal article references in their assignment briefs. This lecturer

was keen to have library products added to the fourth-year module. Lecturer D does make a link to the library page available on the module page as well as in the study guide.

The authors expected the use of the identified products as these are the products that the librarian usually includes in the IL training of the students. Students should therefore, be familiar with the products mentioned. Similarly, lecturers also expect the students to use the products when completing assignments. The variances in the products being used as well as the frequency of use could be seen as an opportunity to further promote the use of particular products. An embedded librarian could both promote use and conduct skills training at very short notice

Embedding in the VLE would be also provide an opportunity to elevate IL skills by, for instance, showing why Google Scholar should be preferred to Google; especially since the library has linked its subscribed resources to this search engine.

Lastly, building a relationship with the lecturers could assist in more easily identifying when lecturers need assistance in adding links to online resources. Gaining essential permissions to use copyrighted material, on their behalf, would reduce the associated reputational risk for them.

5.3   Library services to add to existing services for undergraduate Engineering students

Respondents indicated a preference for some services to be made available through the VLE. These services, in order of preference, are: Referencing help – citation and referencing styles (84%), 'Step-by-step guides for doing a literature search' (81%), 'Assignment writing help' (76%), online searching videos (67%), ask/ chat to a librarian (58%), and an online discussion facility (47%). It was also indicated that guidelines from other universities should be made available to them.

Some of the services requested are unfortunately only available through traditional means such as consultations and email correspondence. Individualised advisory services will in all probability not be suitable to make fully and readily available in a VLE. A VLE chatbot could be an effective way to help the librarian with responding to some of the standard or typical student questions and it is therefore, recommended that the option is investigated in more detail.

The students were asked what aspect of completing assignments they had challenges with. The research and writing aspects were highlighted as being problematic. None of the students reported having a problem selecting information to use, except for the one student who noted having a problem with "everything". When it comes to the research part of completing assignments (finding literature, knowing which sources to use, and how to select information), ten reported finding it a challenge to surface relevant information and five indicated difficulties with structuring their assignments.

When it comes to the writing of assignments, initiating the writing process is the biggest challenge as was reported by 12 of the respondents. These students reported that they had difficulty with: "Initial motivation to start", "How to start", "Finding the will to start doing it", and "Typing up the first draft, it's hard to know where to start". Referencing was reported as a challenge because "Referencing…and language use" and "I find referencing annoying more than difficult, nothing is too difficult". Five students reported synthesising information is difficult to do "connecting the literature and results to find an in-depth conclusion". Only two reported experiencing problems when writing literature reviews, one struggled with paraphrasing and another with writing introductions and abstracts "paraphrasing…writing introductions, conclusions and abstracts". One reported constraints when formatting assignments. Time management was also noted as a challenge for two of the students.

Since conducting research and writing assignments is a challenge, IL training would be best in equipping the students with the skills needed to search for and find relevant information to use for assignment completion. The librarian has to identify and recommend subject-specific resources such as books, journals and databases, for the students to use.

Lecturers are in favour of having an embedded librarian, library products and services present on the VLE but as a start they required that a separate IL module was created for the students. Some noted that the activities in the module should be mandatory and incorporated into the students' coursework or assessment. Lecturer A remarked that "*it would be wonderful…if the module were connected to what they [the students] have to pass in order to proceed…to a subsequent academic year They would be more receptive to understanding the value of what we expect of them.*". Lecturer B said "*definitely…I will make use of it and add it to the platform".* Lecturer C mentioned that it would be a "*good idea*" and that an evaluation of competence should form part of the module. Lastly, Lecturer D mentioned that "*it would be hugely beneficial to the students as such training will ensure they gain access to more current information, methods, designs and applications*".

It is apparent the librarian would need to equip students with the skills that they need to find and consume information independently. Lecturers require that an assessment of competence forms part of the module so that they could be assured that students will in future know how to gain access to current knowledge.

Lecturers interviewed identified aspects that students struggle with when completing assignments. These aspects correlated with requests from the students but some of these are not readily available from the library. The lecturers identified the following skills as problem areas:

- A lack of technical programming skills. (This currently falls outside the mandate of the library.)

- Basic writing skills.

- Reading and comprehension skills. They indicated that students fail to write in a concise and clear manner. Incorporating information found in reliable resources was seen as problematic as students tend to write too much and hope that the right answer is provided in the text somewhere.

- Poor referencing skills. Poor referencing skills, patchwork writing and poor paraphrasing often lead to accusations of plagiarism.

The students themselves identified training in citation and referencing technique as the most important service needed. The students expressed a need for step-by-step guides for doing literature reviews and for assignment writing help.

By providing access to the services mentioned above the library will definitely be contributing to the current and future success of the students. This task however, is not as easy as it may sound. To assist, building the necessary skills to: find, filter, read and reference relevant literature for assignments and problem solving, is doable. When it comes to comprehension and the process of building technical knowledge the challenge is beyond the library's current mandate.

5.4   Differences in the information needs of Engineering students

Definite variances exist in the needs of students from the three sub-disciplines of Engineering included in the study. Training requirements is one such variance. The Chemical Engineering students were more interested in receiving training on how to find the right information quickly,

how to evaluate resources for quality, and how to select relevant material for their assignments. Material Science and Metallurgical Engineering students showed very little need for such training.

Library products used by students across the different departments as shown in Table 1 in a preceding section, is also different. Respondents from Chemical Engineering use electronic journals more, Material Science and Metallurgical Engineering respondents prefer McGraw-Hill Access Engineering and subject guides above electronic journals; Mining Engineering students use electronic journals more than the library page, and electronic books more than Knovel.

It appears that the lecturers' level of awareness of resources may be a factor in the variances observed. Lecturers alluded to some of the variances when asked about the library products they make available in their online modules and in what they expected students to use to find information for assignments. Although some lecturers only provide links to the library, others recommend specific resources to use, such as the ASM handbook, the library IL presentations and the Kirk-Orthmer Dictionary, and others will make copies of the resources available in assignment briefs.

The variances may also be due to the fundamental differences in the Engineering disciplines or in the types of assignments that disciplines require. Students in Mining Engineering do practice based assignments rather than comprehension and knowledge-based assignments. Chemical Engineering has a technical aspect to their assignments where students are required to do some programming for their assignments.

There is no definite way to bridge the gap yet. The librarian can only make the lecturers and students aware of the available products and services and they should ensure that students and lecturers have the necessary access to information in both traditional and online environments. It is also the librarian's duty to ensure that all stakeholders understand the legal constraints and boundaries within which library services operate. Copyright and license requirements have to be adhered to in both the physical and the virtual service environments!

5.5   The role of the librarian (Information Specialist)

A majority of student respondents (67%) wanted assistance while searching for information for assignments and they also needed assistance when searches have to be initiated (44%).

They indicated that assistance was not required when they knew how to help themselves (12%), and when information was freely available (4%).

Librarian involvement in assignment discussions online was investigated. Forty-six percent (20/43) of the respondents want an Information Specialist to facilitate online discussions, 28% (12/43) would rather have a list of relevant resources, while 12% (5/43) preferred to have a face-to-face discussion. Seven percent (3/43) of the respondents are not sure, and 5% (2/43) are not interested. Two percent (1/43) did not wish to respond to the question. All the Engineering departments followed the same pattern with the majority showing interest in an Information Specialist facilitating online discussions; and then followed by a list of relevant resources. The results show that students mostly require assistance from a librarian when searching for information. Those who indicated they could function independently may have received IL training at an earlier stage.

6. RECOMMENDATIONS

The most important recommendation was to develop and implement an IL module, with interactive learning content, as a matter of urgency. It is crucial that a pilot project is used to test the service properly before the module is launched as a mandatory learning unit. The module will have to be reviewed and revised regularly to show continuous improvement and to also gauge the impact of the program. This means that regular feedback should be encouraged to ensure that user needs always drive the service.

It is recommended that generic products and services are avoided – that only items that are truly of value to the community are embedded. This should ensure focus and reduce information overload.

Lecturers too should be assisted so that their own learning content could remain current.

The librarian would need to develop more advanced knowledge of Engineering products (open and commercial). Gaining conversation-level subject knowledge will definitely be a prerequisite if the embedded librarian were to be of assistance in teaching comprehension and interpretation skills.

A further recommendation is that, in order to prepare future librarians for the workplace, training departments and library schools, should be encouraged to provide practical exposure to VLEs. This will assist in making the embedding experience easier for new recruits. Theory

on embedded librarianship, blended learning, as well as VLEs, could be included in the undergraduate curriculum and active embedded librarians could be invited to give lectures on case studies, share experience and provide some of the best practices for embedding in VLEs.

Finally, anyone looking for ideas for further research linked to this topic may want to look into conducting a similar study but including more Engineering disciplines (similar studies could be conducted for other faculties/ disciplines) and with more participants, over a longer period of time so that more cross-comparisons could be done. It would also be useful to pay more attention to the needs of the lecturers.

7. CONCLUSION

The research participants confirmed the importance of embedded librarianship and although this study cannot be generalised, these participants welcomed the presence of a librarian within their online learning space. It could be deduced that the library will remain crucial to the academic success of students but that it is time to take 'the library' into the learning environment of the student.

Overall, VLEs provide an opportunity for libraries to provide IL training, information products, and services timeously to students regardless of where they are located or when they need to learn. The development of IL skills for effective and optimal interaction with and use of the information resources, is a top priority for the embedding librarian. Not only will these skills be useful for the students' academic careers, but these skills will also have a positive impact on their professional careers and activities.

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