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Reading between the lines: An examination of first-year university students' perceptions of and confidence with information literacy

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Abstract

The aim of this paper is to explore how first-year university students at a regional university in Australia perceive and use Information Literacy (IL) as they transition from school to university. A survey method was used to gather data through pre- and post-intervention surveys with 1,333 first-year students enrolled in their first semester of study across all disciplines at the university. The study identified that between 25–35% of students did not enjoy reading, with many students preferring not to read. Students arrived at university with largely misguided confidence in their personal IL skills, especially the skills needed to meet the demands of university level coursework, with up to 47% of students unlikely to have experienced well-resourced libraries at school. The study concludes that implications for university teaching include gaining an early understanding of the IL skills students have when they arrive at university, and the explicit teaching of IL skills, given the identified impact of IL skills on student success and retention rates.

Keywords

Australia; first-year undergraduates; higher education; information literacy; transition to university; tertiary success

1. Introduction

A perceived diversity in undergraduate students' ability to locate and integrate information from scholarly articles in their assessment was the impetus to investigate, document, and define reasons for this phenomenon. Anecdotally it was believed that some students, even at the end of three or four years of study, lacked the skills and confidence necessary to undertake this essential academic process, and empirically it had been documented that academic success has a direct impact on student retention rates. Catalano and Phillips (2016) found that students' information literacy (IL) scores significantly correlated to their Grade Point Average (GPA), with high GPA scoring students more likely to stay at university and graduate within six years.

The potential for students to successfully complete their higher education qualification is of particular interest. In the Australian regional university where this study was undertaken, there is a high occurrence of students who are first-in-family to attend university (52% in 2018 and 51.6% in 2019). This is higher than the national average percentage of students from

underrepresented groups (such as Indigenous students, students with disability, and students from low socio-economic status families), and higher attrition rates for students than the national average, especially for commencing students (USCBI Internal Statistics, 2018/19).

The research literature discusses issues impacting on students' ability to locate and effectively use and integrate scholarly information, but to what extent do perceived problems with reading and comprehension of information apply to a regional university? Can nuanced and relevant reasons for problems in this area be identified and contribute to recommended solutions? To this end, a pilot study was undertaken to examine the impact of IL interventions and students' understanding of IL. This pilot study involved 126 first-year students enrolled in a course that taught research skills. The students participated in interventions involving IL reading strategies including, *chunking*, where scholarly articles were broken down into understandable and manageable sections; *annotations*, where students made annotations alongside scholarly articles for understanding, and *collaboration*, where students actively engaged in 'scholarship as conversation using discussion boards to participate in shared communication to increase their understanding' (Brown & Malenfant, 2017). These interventions were taught to students by the discipline librarian and continued by the course tutor in the tutorials. Results of the pilot study indicated the short series of IL interventions produced improvement in students' self-perceptions of their abilities to locate, use, and understand scholarly articles, and was viewed as a starting point to improve the IL skills of first-year university students. The findings from the pilot study were adapted to inform the basis and design of a full study involving 1,333 first-year undergraduate students enrolled in the same course across all disciplines in their first semester at the university. The survey questions used in the pilot study were reviewed and revised for inclusion in the full study.

2. Literature review

2.1 Transitioning from high school to university.

Growing evidence demonstrates that students are commencing university with low levels of IL skills (Gross & Latham, 2013; Mahmood, 2016) fuelled by a perception that the Google generation, with their computing and internet skills, are also information literate (Purcell et al., 2012). However, researchers (Oakleaf & Owen, 2010; Smith et al., 2013; Varlejs & Stec, 2014) identify a gap in students' IL abilities in the transition between high school and university. More specifically, Lanning and Mallek (2017) found that high school students, including 'good students' did not have the IL skills required for university coursework (p. 448) including digital reading skills (Lim & Toh, 2020).

There are variations in the IL instruction students receive across high schools for use at the university level. This impacts on their skills to search for information, and to understand and use information for assessment, with many students preferring to use a Google search and Wikipedia as their choice of search tools due to their accessible platforms (Wu & Chen, 2014). Additionally, students' lack of training and/or inconsistent training with library databases in school leads to the conclusion that universities need to invest time improving students' skills in this area (Cothran, 2011).

Research widely reports an overconfidence of undergraduate students in relation to their IL skills, resulting in a reluctance by many to engage with IL instruction (Clark, 2017; Mahmood, 2016; Pinto & Fernández-Pascual, 2017). These factors are problematic and are likely to impede first-year students' success and retention at university.

University students are increasingly more diverse. High school students from different cultures, languages, economic status, and abilities are widely encouraged and supported to attend university. This diversity can impact the support required for student success, specifically with reading and comprehending scholarly articles where students may lack an understanding of the

purpose, value, structure, and language (Carlozzi, 2018; MacMillan & Rosenblatt, 2015; Rosenblatt, 2010). According to Dix et al. (2020) schools with qualified teacher librarians have improved student literacy outcomes. Librarian support can assist with students' ability to create new meaning and knowledge from the world around them.

2.2 IL skills and impact on academic achievement.

Higher education courses in Australia expect students to read, comprehend, and integrate academic texts into well-sourced and well-argued assessments, involving skills that include locating, evaluating and effectively using information. These skills are widely referred to as IL skills, and their impact on student academic outcomes is widely acknowledged (Brown & Malefant, 2017), with implications for student retention and success rates (Markless & Streatfield, 2006; Shao & Purpur, 2016; Soria, 2013). However, not surprisingly, a major study involving 45,000 students in the United States found that, 'information literacy activities are positively and significantly correlated with student engagement and students' perceived gains' (Fosnacht, 2017, p. 348). According to Smith et al. (2013), the high school curriculum (in a Canadian example) is insufficient in developing these IL skills. It is important, therefore, that IL skills are purposefully taught and practiced at university.

This is especially important in our increasingly digital societies where the learning environments utilise digital forms of reading. Lim and Toh (2020) have identified that even digital reading is becoming more popular and requires skill development with active participation in meaning-making.

2.3 Reading and synthesis as an IL skill.

MacMillan and Rosenblatt (2015) define reading as a fundamental aspect of IL skills, confirming many earlier studies reporting the expected university reading level is substantially higher than high school reading level. For example, Jolliffe and Harl (2008) quoted this pertinent comment of one student involved in their research:

... what is different is not the amount of reading, but the level and wording of the text. The college text jumps to a level of reading exponentially higher than high school texts, and this is what causes the struggles for the students (p. 609).

In their research, MacMillan and Rosenblatt (2015) noted students did not read assigned readings, claiming them to be boring, and students did not value the readings, or lacked reading confidence or comprehension skills to complete the tasks. These conclusions are supported by Rosenblatt (2010) and Carlozzi (2018), who argue that competent written synthesis exceeds the abilities of many first-year students and is likely due to their low reading and comprehension skills.

Further, this digital age has led to digital reading habits such as scanning and scrolling that do not promote focused, critical and deep reading for better comprehension of texts (Proaps & Bliss, 2014). Students should also be trained to avoid multitasking or task switching that impairs their comprehension (Cho et al., 2015). Higher Education Institutions, like schools, are also in a position to teach reading strategies to assist in developing reading skills and processing of ideas that improve reading comprehension.

2.4 Reading comprehension as a factor in IL development.

University students have been found to frequently resist reading. Ryan (2006) identified that difficulty with reading comprehension contributes to reduced reading, especially when readers are confronted with substantial amounts of reading and unknown vocabulary. Other conclusions

regarding students' lack of reading are due to students underestimating the importance of the reading (Kerr & Frese, 2017; Sappington et al., 2002). In addition, Pecorari et al. (2012) found that students believed that textbook reading was optional, especially if they attended classes. These students preferred to read class notes over textbooks. It is unclear if the lack of reading is related to reading ability, however, it was clear that some students did not find reading to be important. Liu and Huang (2016) suggest the use of digital devices for reading among students has contributed to 'more selective reading, less in-depth reading and lower reading concentration' (p. 27).

To improve reading concerns, Doolittle et al. (2006) believed that explicit teaching of reading comprehension strategies in higher education would improve student success. Fisher et al. (2011) support this belief and suggest the need to include digital reading instruction. Doolittle et al. (2006) studied the impact of explicit teaching on students' ability to comprehend and complete assessment successfully. They noted explicit strategies were useful in developing students' skills, comprehension, and attitudes that develop sustainable practices for students' futures. These strategies included the following:

- comprehension strategy learned in context
- practice, practice, practice
- scaffolding with gradual release
- modelling with instructor think aloud
- teaching conditions for using the skills

Reading and comprehending in higher education can potentially influence student outcomes in all courses, and therefore, Doolittle et al. (2006) argued the need for students to be taught strategies for comprehension. Assigned readings from a range of sources is common in university courses, but the level of understanding demonstrated by students is disturbing (Doolittle, 2006). Studies suggest when instructors took the time to intentionally teach students how to read, analyse, and understand different texts, including digital texts (Baildon & Baildon, 2012), comprehension and application of the information improved significantly (Carlozzi, 2018; Manarin et al., 2015). Consequently, the increased use of digital texts at university provides impetus for digital reading instruction within courses rather than assuming students already have the necessary skills (Fisher et al., 2011).

3. Research questions

An evaluation of relevant literature highlighted a significant research gap identifying the extent of reading and comprehension problems experienced by first-year university students and the perceived impact of these problems on student success. Following a pilot study, this full study with 1,333 first-year student participants investigated the students' interest in reading, and their ability to identify and use IL skills for assessment in their first semester course work. This research was guided by the following research questions:

- How do students enrolled in a first-year course perceive their ability to read and understand what they read?
- To what extent do first-year students feel confident to use and understand journal articles for scholarly research in assessment preparation?

4. Methodology

This research project aimed to investigate first-year university students' ability to locate, read, and assimilate information from scholarly articles for assessment, and the impact of IL training intervention on their IL abilities. This full study utilised intentional teaching strategies by Doolittle

et al. (2006) during IL tutorial activities as described in the last section of the literature review. This includes the use of metalanguage to identify features of text for a particular genre (Lim, 2018).

In semester 1, students were invited to voluntarily participate in the research, according to the conditions of ethics approval (A/17990). Students were informed about the nature of the study and 1,333 students consented to participate prior to the study. The consenting students completed the pre-survey (a response rate of 51.27%/ margin of error of 1.87% at the 95% confidence level) and participated in tutorial activities that included IL learning activities during the semester. Of these consenting participants, 449 students completed the post-survey at the end of the semester (a response rate of 17.27%/margin of error of 4.21% at the 95% confidence level). The far smaller post-survey responses have been attributed to the timing and independent access of the post-surveys. Course tutors confirmed that a lack of time at the end of the semester meant the post-survey had been left for students to complete independently using a link in the course Learning Management System (LMS), rather than being completed in class like the pre-survey.

4.1 Theoretical context.

This study was conceptually underpinned by both cognitive constructivism initiated by Piaget (2003) and social constructivism developed by Vygotsky (Hausfather, 1996) that provide opportunity for participants to create meaning-making through a shared experience and build upon their prior knowledge and prior experiences. These experiences often provide opportunity for students to construct meaning by building on their pre-existing personal knowledge as they work with others to interpret and develop subjective representations (Punch & Oancea, 2014; Robson & McCartan, 2016). For example, in tutorials students shared their annotations alongside journal articles and worked collaboratively to discuss the meaning around topics prior to and after reading an article. Representations such as graphic organisers were also created to develop students' deep understanding.

4.2 Participants.

The full study involved 1,333 participating students from a cohort of 2,600 students enrolled in a compulsory first-year, semester one course taught to all students across all disciplines and at all campuses in a regional Australian university. This course was designed to introduce first-year students to generic academic skills and to support their transition from school to university. At the time, this was the only course at the university where enrolled students engaged in tutorials with students across other disciplines. According to the conditions of the ethics approval, all students were involved in the interventions as this was now embedded in the course content for reasons of equity. However, students could opt out of completing the surveys. The pre- and post-surveys for the full study were developed from the analysis of the pilot surveys and from suggestions from a collaborative team of two librarians and eight tutors teaching in the first-year course.

Student participants in first semester of undergraduate study at this regional university included representation from all university disciplines, with the largest numbers from nursing, midwifery, and paramedicine (23%).

Table 1: Programme enrolment of first-year participating students (N=1,333)

Programme	Percent of student respondents	Number of student respondents
Nursing, midwifery and paramedicine	23%	303
Business, IT, tourism and events	13%	179
Medical and health services	12%	160
Psychology and social sciences	10%	128
Education	9%	125
Other programmes*	33%	438

* This includes six university programmes that recorded less than 9% of respondents in each programme

As a small regional Australian university, the demographic statistics for this first-year group of students indicated higher than Australian average of students who were first-in-family to attend university, with a high proportion of students who were working and studying, reflecting the above national average percentage of students from low SES families (USCBI Internal Statistics, 2018/19).

Table 2: Demographics for Research Respondents (N=1333)

Students	Percent of student respondents	Number of student respondents
Under 20 years old	66%	882
Female	71%	950
First in family to attend university	41%	546
Working at least part time	85%	1125
Acknowledged the influence of high school library resources*	53%	701

* High school library resources included learning experiences with teacher librarians, access to digital texts, using library data bases, catalogues, and library guides.

4.3 Course activities/ IL intervention.

The researchers were involved in the design of the full study and were not involved with teaching the students, to reduce researcher bias, and to maintain the integrity of the course. However, the researchers and the tutors worked collaboratively on the surveys and the IL intervention activities. This allowed for consistency in the delivery of the IL interventions without hampering the teaching approaches and creativity of individual tutors. For continuity across multiple tutorials, and with an aim to improve reliability, weekly topics were planned by the team. Each week's topic was discussed, and ideas presented to further enhance the development of IL skills with a focus on locating appropriate scholarly articles, understanding the structure of journal articles, reading, and being able to integrate and synthesise these articles with other information.

During the semester, tutorial activities were undertaken by all students, and included the following content:

- analysing a task description for key words to inform reading for purpose
- locating a known scholarly article and exploring an instructional Library Guide
- developing strategies for reading and understanding scholarly articles
- developing techniques for paraphrasing - selecting and using information
- developing a research strategy - analyse; brainstorm; search
- extrapolating information from a scholarly article
- identifying reputable sources of information

The weekly tutorials aimed to develop IL skills through specific activities targeting searching strategies, selecting appropriate scholarly articles, how to read, understand and integrate scholarly information for assessment.

5. Data collection

The research design in the full study utilised a 'survey method' with a questionnaire containing closed and open-ended questions that yielded a mix of quantitative and qualitative data. The surveys were provided to 1,333 consenting students, pre- and post- IL interventions during the semester. The pre-surveys were available to students during week one tutorials. Surveys were provided to students through an online link on the university LMS. The post-surveys were similarly provided online to students via the LMS to be administered during the final week of the semester that targeted the themes of 'read and understand', 'locating and comprehending academic information', and 'student perceptions of their ability to undertake scholarly research'. Three main sections in the survey covered the following topics:

1. Reading preferences, including self-perception of ease and comprehension when reading
2. Finding and using academic/scholarly information, and
3. Ability and confidence when searching the Internet and library databases

Each section included Likert scale responses (strongly disagree to strongly agree) followed by an open question allowing students an opportunity to explain their responses.

5.1 Reliability and validity.

The survey instrument was developed on questions taken from a Library and Information Science (LIS) research text that included tried and tested instruments, 'that had been deemed valid and reliable, and were therefore standardised' (Catalano, 2016, p. xi). Face validity was established by the researchers following expert advice (Mahmood, 2017), with several questions initially in the pilot survey either deleted or revised as they were considered not necessary or had produced inconsistent data.

Reliability in the pre-and post-surveys was established as acceptable using Cronbach's alpha testing (Cronbach's alpha = .75) for the themed groups of quantitative questions in 2019. All closed question responses required Likert scale options of Strongly Agree/ Agree/ Neutral/ Disagree/ Strongly Disagree. Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. This reliability is a way to gauge how well a survey is measuring what is meant to be measured, and in social science research, a reliability coefficient of .70 or higher is considered acceptable. The open-ended questions provided students with opportunities to provide individual responses in the pre -and post surveys.

6. Data analysis

IBM SPSS Statistics was used to quantify descriptive and comparative data, and NVivo Qualitative Data Analysis Software was used to elicit themes in the extensive qualitative responses received. The qualitative analysis consisted of examining broad themes that were gradually narrowed into specific codes.

6.1 Coding

The coding used in the full study is referred to as framework analysis or concept-driven coding, rather than data-driven coding (Gibbs, 2007, pp. 44–45), and are deductive approaches that ensure structure from the start, but leave the data open to movement towards inductive coding with broad codes based on the pilot results. As the data was reviewed, inductive coding was applied. This inductive form of coding revealed several very precise and narrow codes that captured the complexity and diversity of the data (Thornberg & Charmaz, 2014) gathered from the open-ended questions.

A secondary cycle of coding and analysis was undertaken with colleagues to review, synthesise and summarise the coded qualitative data, referred to as, 'pattern coding', or 'sequential analysis' (Miles & Huberman, 1994). As Miles and Huberman (1994) point out, 'just naming or classifying what is out there is usually not enough. We need to understand the patterns, the recurrences, the plausible why' (p. 69). Therefore, the coding process has involved several stages of more refined analysis, as Gibbs (2007) discusses, to 'look for patterns and relationships in your data. Look for differences and similarities across different cases... and use attributes/variables and tables to investigate them' (p. 145).

The qualitative analysis consisted of examining broad themes that were gradually narrowed into specific codes. This approach used an initial deductive coding process based on the pilot study, leading to an inductive coding process for the full study. NVivo software was used to assist in the process, because of the considerable number of qualitative student comments, and the need to develop categorisation with specific codes. The students' comments were first grouped with the main theme of the questions in the surveys. For example, questions relating to students' ability to locate appropriate journals were grouped together. These broad groups formed the initial structure or framework of the deductive approach to coding. The next round allowed the researchers to identify other themes and to further separate comments into more specific codes including contradictory codes. Further narrowing of coding was undertaken as each broad theme was reconsidered and recoded. As the coding narrowed, the researchers intentionally remained alert and attuned to the data to maintain sensitivity and nuances in the data.

Below is an example of the Coding Structure used:

Table 3: Code Theme: Read and Understand

Negative response	Neutral response	Positive response
difficult to comprehend	About the same	Assist assignments
locating information	Already knew this	Finding value in texts
too much reading		Interest improved
prior knowledge		more confidence
		more familiar
		motivation improved

7. Results

The results were initially analysed using the themes of (1) Read and understand, (2) Location and comprehension of academic information, and (3) Student self-perception of competence to undertake scholarly research. A summary of these results follows, including a breakdown of comparative data by demographic factors such as first-in-family, working while studying, or whether students acknowledged access to their school library resources, including learning experiences with the teacher librarian, such as accessing and learning how to use digital texts, using library data bases, catalogues, and library guides.

7.1 Read and understand

Pre- and post-survey questions on the broad theme of Read and understand included the following questions:

- I enjoy reading
- reading is easy for me
- comprehension is easy for me

Paired-sample t-tests were used to compare the pre- and post-survey responses, for the theme of Read and understand. Paired samples t-tests (or dependent-means t-tests) calculate the difference within each before-and-after pair of measurements, determines the mean of these changes, and reports whether this mean of the differences is statistically significant. It is used when there are two experimental conditions, and the same participants took part in both conditions of the experiment.

For the theme of Read and understand, students reported statistically significant improvements for the questions 'I enjoy reading' and 'Comprehension is easy for me', but not for the question 'Reading is easy for me' (as detailed in Table 4 below). While there was an increased agreement to all three questions by the end of the semester, at most, 65% of students reported enjoying reading, 75% of students found reading easy, and 69% of students found comprehension easy.

Table 4: Paired-sample t-tests for the theme questions on 'Read and understand'

Read and Understand Survey Results							
Survey statement	Pre-survey		Post-survey		T value	P value	explanation
	mean	sd	mean	sd			
I enjoy Reading	2.42	.991	2.24	1.087	T(447)=2.553	.011	An increase in reading enjoyment indicated.
Reading is easy for me	2.16	.883	2.04	.978	T(441)=1.874	.062	No increase in the perceived ease of reading by students.
Comprehension is easy for me	2.36	.883	2.24	.920	T(437)=2.066	.039	An increase in the perceived ease of comprehension by students.

The post-survey responses demonstrate significant changes in students' perception of their ability to read and understand scholarly articles, after their first experiences with university coursework. Students became more aware of the amount of reading and the level of reading comprehension required, and their lack of understanding of scholarly articles and databases. This is evident in comments such as:

Comprehension

- *by learning many new terms and key words I have noticed an improvement in my comprehension*
- *my ability to read for academic purposes has increased through new knowledge of how to look at certain parts of a text to gain insight into what it contains.*

Understanding scholarly articles/databases

- *yes, I think it has improved as I know how they (the articles) read. Although some (articles) find nearly impossible to comprehend if it's too academic*
- *It has been a challenge.*

As a snapshot of students' self-perceptions when they entered tertiary studies, the influence of demographic factors on perceptions of reading produced interesting results. A chi-square test of independence was performed to examine the relation between students reporting they were first-in-family to attend university and the variables related to reading (Table 5 below). The relationship between these variables was significant for 'Comprehension is easy for me' in the pre-test only, with students who were not first-in-family reporting comprehension was easier for them. The variables, 'I enjoy reading' and 'Reading is easy for me' revealed no significant difference for students who were or were not first-in-family ($p \geq .05$).

Table 5: Students' response to questions on the theme of Read and understand and the variable of first-in-family

Survey Statement in pre- and post-survey	Chi-square test of independence applied to the variable of whether students were first-in-family to attend university	
	Pre-survey	Post-survey
I enjoy reading	$\chi^2 (8, N = 1327) = 2.103, p = .717$	$\chi^2 (4, N = 445) = 4.601, p = .331$
Reading is easy for me	$\chi^2 (8, N = 1325) = 4.516, p = .341$	$\chi^2 (4, N = 439) = 3.210, p = .523$
Comprehension is easy for me	$\chi^2 (8, N = 1311) = 16.032, p = .003$	$\chi^2 (4, N = 440) = 8.230, p = .084$

A chi-square test of independence examining the relationship between students who were employed during their university studies and the variables related to Read and understand also produced mixed results (Table 6 below). The relationship between these variables was significant for, 'I enjoy reading' in the pre-survey only, with students in employment reporting a higher level of reading enjoyment. The variables, 'Reading is easy for me' and 'Comprehension is easy for me' revealed no significant difference for students who were or were not in employment.

Table 6: Students' response to questions on the theme of 'Read and understand' and employed students during enrolment at university

Survey Statement in pre- and post-survey	Chi-square test of independence applied to the variable of whether students were employed during university studies	
	Pre-survey	Post-survey
I enjoy reading	$X^2 (8, N = 1330) = 20.593, p = .008$	$X^2 (4, N = 449) = 1.747, p = .782$
Reading is easy for me	$X^2 (8, N = 1328) = 29.427, p = .308$	$X^2 (4, N = 443) = .814, p = .937$
Comprehension is easy for me	$X^2 (8, N = 1314) = 7.675, p = .466$	$X^2 (4, N = 444) = 2.774, p = .596$

The demographic variable for access of school library resources including working with the teacher librarian, access to digital texts, learning how to use digital texts, using library data bases, catalogues and library guides was the only variable revealing significant differences in chi-square tests of independence in both the pre-and the post-tests when compared to the variables of reading (Table 7 below). In this context, the use of school resources broadly refers to support and learning experiences to assist with research in coursework. However, this was not explicit in the scaled statement.

The relationship between the variables of, 'I enjoy reading', 'Reading is easy for me' and 'Comprehension is easy for me' were all significant in the pre-survey, with prior experiences in school libraries increasing students' perceived enjoyment and competence as they transitioned from school. At the end of the semester the variable 'I enjoy reading' maintained a significant difference in a chi-square test of independence, while the variables 'Reading is easy for me' and 'Comprehension is easy for me' were not significantly different.

Table 7: Students' response to questions on the theme of 'Read and understand' and whether students reported access to school library resources

Survey Statement in pre- and post-survey	Chi-square test of independence applied to the variable of whether students reported access of school library resources	
	Pre-survey	Post-survey
I enjoy reading	$X^2 (8, N = 1331) = 20.900, p = .007$	$X^2 (8, N = 449) = 18.376, p = .019$
Reading is easy for me	$X^2 (8, N = 1329) = 29.456, p = .001$	$X^2 (8, N = 443) = 7.361, p = .498$
Comprehension is easy for me	$X^2 (8, N = 1315) = 18.064, p = .021$	$X^2 (8, N = 444) = 10.510, p = .231$

In Australia, schools determine areas of student learning and student outcomes to invest their funding. There has been a general focus on funding to accommodate the shift from paper-based learning materials to digital materials and providing staff and students with digital access and reading strategies for digital reading. However, it is understood that library support and training for research is inconsistent across schools. With this in mind, we acknowledge some students confirmed previous school library experience as reasons for increased confidence and knowledge with comments like:

- *I already had the knowledge of how to search*
- *I feel as if it's the same as high school*

In addition, students commented on the university library and course instruction as beneficial to their learning, as demonstrated by these comments:

- *the drop-in sessions in the library, as well as the workshops have assisted me greatly*
- *learning to use the uni (university) library has become easier, and I feel as though I've improved in searching for tasks*
- *once taught how to use the data base, I have got the hang of it, still could do a lot of learning for improvement, perhaps having after-hours drop-in sessions for those who work full time*

7.2 Location, comprehension, and integration of academic information.

Pre- and post-survey questions on the theme of 'location, comprehension and integration of academic information' included the following scaled statements:

- *I am confident in my ability to find and use academic information, such as suitable journal articles, for assignments.*
- *when using academic/scholarly articles I find the information easy to read and understand.*
- *when using academic/scholarly articles I can integrate new ideas with my own or other ideas easily*

Pre- and post-survey questions on the theme of, 'Location and comprehension of academic information' reveal improvements over the semester (Table 8 below). There were reported increases in the pre-and post-text surveys for confidence in ability to find and use academic information, in finding and using academic/scholarly journal articles, finding the academic/scholarly information easy to read and understand, easily noting the main arguments in academic/scholarly articles, and students being able to integrate new ideas from academic/scholarly articles using their own or other ideas.

Table 8: Pre- and post-survey questions on the theme of 'Location and comprehension of academic information' reveal improvements over the semester.

Survey statement	Pre-Survey	Post-Survey
Ability to find and use academic information	57%	78%
Finding and using academic/scholarly journal articles	57%	80%
Finding academic/scholarly information easy to read and understand	44%	55%
Ability to note the main arguments in academic/scholarly articles	56%	69%
Able to integrate new ideas from academic/scholarly articles with own or other ideas	48%	60%

Paired sample t-tests were used to compare the pre-and post-survey responses from student surveys, with statistically significant improvements recorded for all questions on this theme, an indication of an effective IL intervention over the course of the semester. However, there is a

substantial percentage of students who, at the end of the semester, reported that they either disagreed or strongly disagreed with these statements, as detailed in Table 9.

Table 9: students' confidence in their ability to locate, comprehend and integrate academic information

Survey Statement – Post-survey (Likert scale responses ranging from Strongly Agree to Strongly Disagree)	Percentage of students who disagreed or strongly disagreed with the statement
I am confident in my ability to find and use academic information, such as suitable journal articles, for assignments.	7.8%
I have had experience in finding and using academic/scholarly journal articles.	9.8%
When using academic/scholarly articles I find the information easy to read and understand.	18.1%
When using academic/scholarly articles I can note the main arguments and ideas easily	10.2%
When using academic/scholarly articles I can integrate new ideas with my own or other ideas easily	14.4%

Applying a chi-square test of independence to several of the demographic variables on this theme reinforced these conclusions. In the pre-test results for these questions, chi-square tests of independence that examined any relationship between this group of questions and whether students were first-in-family or were working while studying were not significant. In contrast, when a chi-square test of independence was applied to the variable of students who acknowledged their use and access of school library resources, the result was very different. In all five questions in the survey pre-test (as detailed in Table 10) there was a significant difference in the self-perceived confidence and ability of students to find, read and integrate academic information with other ideas, with prior experiences at school and school libraries increasing students' perceived competence.

By the end of the semester the post-test revealed that there was no significant difference in any of these variables.

Table 10: Students' confidence in their ability to locate and comprehend articles when they accessed their school library resources – pre- and post-surveys

Survey Statement in pre- and post-survey	Chi-square test of independence applied to the variable of whether students acknowledged access of school library resources	
	Pre-Survey	Post-Survey
I am confident in my ability to find and use academic information, such as suitable journal articles, for assignments.	$X^2(8, N = 1327) = 40.39, p = .000$	$X^2(8, N = 445) = 12.279, p = .139$
I have had experience in finding and using academic/scholarly journal articles.	$X^2(8, N = 1326) = 52.15, p = .000$	$X^2(8, N = 445) = 13.209, p = .105$

When using academic/scholarly articles I find the information easy to read and understand.	$X^2(8, N = 1322) = 67.00, p = .000$	$X^2(8, N = 442) = 10.012, p = .264$
When using academic/scholarly articles I can note the main arguments and ideas easily.	$X^2(8, N = 1317) = 65.72, p = .000$	$X^2(8, N = 441) = 6.740, p = .565$
When using academic/scholarly articles I can integrate new ideas with my own or other ideas easily.	$X^2(8, N = 1310) = 46.12, p = .000$	$X^2(8, N = 444) = 8.218, p = .412$

By the end of the semester, the perceptions of many students were moving towards the realisation that their initial knowledge was perhaps not enough for them to successfully complete their university-level assessments. Qualitative comments support the acknowledgement that students' knowledge of academic scholarly and data base searching was initially and somewhat still lacking:

- *my ability to use and understand information is improving but could still improve more. I think I have become better at finding and quickly summarising academic articles*
- *there has been a slight increase in this skill but will need to keep working on it to build the confidence around it*
- *I do what I can. I manage to finish things, but they could definitely be better. I struggle to find relevant sources and be able to access them*
- *I now know I knew nothing when I started*

Students' comments also referred to IL skills being learned while in the course, supporting the earlier conclusion that the IL intervention applied during the semester was effective:

- *I was able to practice pulling apart articles for the information I needed*
- *my ability to understand the information presented in sources has improved this semester through workshops and exposure*
- *I have learned how to paraphrase information from texts to ensure that it is in my own words, but also keeps the original message of its source. This has helped me to use and cite information from texts while avoiding accidental plagiarism due to using similar words or sentence structures*
- *it [knowledge] has increased but could use some improvement*

8. Discussion

This study examined first-year university students' perceived ability to read and understand, to independently search for scholarly articles, and to confidently understand and use scholarly articles before and after IL interventions in a first-year course. As part of the study in semester 1, 46% of students enrolled in a general compulsory course across all undergraduate programmes consented to participate in pre- and post-surveys involving standardised IL interventions integrated into the course content.

The researchers were not involved as tutors in this first-year course, as there was already an established team of tutors teaching the course. This limited the researchers' capacity to observe or have input into the way the individual tutors presented the IL intervention. Variations in tutors' teaching of the IL intervention could be considered a limitation in this study. However, regular

feedback opportunities between the researchers and tutors were scheduled throughout the semester, with the content and outcomes for each tutorial clearly identified in collaboration with the experienced tutors. The broad wording used in the survey in Read and Understand may also be a limitation to the survey design, because students were not specifically asked if they found reading scholarly articles as easy or enjoyable. In addition, students may have had types of reading in mind when answering the survey questions. The opportunity for focus group interviews for students to elaborate and gather additional data was not possible, because of the scheduling issues. However, the researchers identified the usefulness of including focus group interviews to allow students to elaborate on their experiences for future research.

The focus of the students' responses provided data on:

Q1: How do students enrolled in a first-year course perceive their ability to read and understand what they read?

Students' pre-survey responses showed high levels of confidence in reading and understanding what was read, with most students indicating that they enjoyed reading and they found reading and comprehension easy. However, by the end of the semester, there remained between 25–35% of students who did not find reading and comprehension easy or enjoyable, a significant problem identified as students are beginning their undergraduate studies.

Despite the students' initial high personal perceptions of their confidence, their responses in the post-survey suggest the students' initial perception of confidence was sometimes inflated. This is not an unusual mind set, given that students were possibly referring to their general reading and comprehension capabilities, rather than the complexity of reading and understanding of scholarly work where the structure of the writing extends beyond the narrative and persuasive text students may be familiar with, and where the vocabulary in scholarly work is contextualised and not necessarily familiar to students. However, it can be concluded from the results that students clearly benefited from their earlier school library experiences, with teacher librarians and experiences with data bases, catalogues, and library guides contributing to their confidence with reading and understanding what had been read, and with the integration of academic information into assessment work. For students who did not report accessing earlier school library experiences (47% of the cohort), their perceived abilities at university level studies were significantly reduced. This is not to say these students did not have in class teaching of IL skills. However, it appears students who reported little to no library learning experiences viewed themselves as requiring more time, assistance, and support than students who reported some library learning experiences in high school. A clear takeaway from this analysis is how important it is for educators to check the level of IL skills students arrive with in their first year of university, and to use this evidence to develop an in-depth understanding of the varied IL learning needs (traditional texts and digital texts) as a basis for developing course-based strategies that ensure all students can achieve their full academic potential.

Post-survey results on students' perceptions of reading and understanding information reflected greater understanding of the students' own perspectives. There was a marked improvement in student confidence related to the semester-long IL intervention, with some notable exceptions. These improvements reinforced the widely held perception that specific teaching of IL embedded within courses in the students' discipline area, where students are required to read, understand, synthesise, and apply the information, is likely to be the most effective model for intervention (Badke, 2008; Davis et al., 2011; Zai, 2015), as opposed to a single learning experience or full credit-bearing IL course taught by librarians. Requiring students to access scholarly articles and library resources, as was undertaken during this IL intervention, contributed to an increased student perception of IL skills and confidence in ability to undertake university-level assessments, and was therefore likely to also improve student retention at university and GPA scores, as discussed by Catalano and Phillips (2016).

Q3. To what extent do first-year students feel confident to use and understand journal articles for scholarly research in assessment preparation?

While the data indicated significant increases in student perceptions of their confidence and ability to use and integrate scholarly information in their university assessments across all factors considered, it should be noted that between 20–45% of students remained unconfident in these tasks at the end of the semester. This data reveals a large percentage of students who are unprepared to successfully manage the demands of academic research – a challenge for universities to identify and address if they are to reduce failure and attrition rates.

This lack of student confidence in using, understanding, and integrating scholarly information is affected positively by the availability of school library resources to students. In all five questions in the pre-survey relating to this topic there was a significant difference in the self-perceived confidence and ability of students to find, read and integrate academic information with other ideas, with prior experiences at school with school librarians increasing students' perceived competence. The data from this research also reveals that between 8% and 18% of the student cohort in the post-test survey continued to report substantial problems with finding, reading, and integrating academic information (disagreeing or strongly disagreeing with the five variable statements). This is especially so for the ease with which students read and understand academic information, and for their ability to integrate the academic information with other ideas. This finding supports previous research which questions the cognitive ability of first-year university students to be able to read, understand and synthesise scholarly articles, certainly without specific teaching support and experience in these complex tasks (Carlozzi, 2018; MacMillan & Rosenblatt, 2015; Rosenblatt, 2010) including digital reading and the process of extracting and understanding information (Lim & Toh, 2020). The authors believe support of this nature needs to be provided throughout several classes as students indicated the need for continued practice to improve their IL skills. Additionally, to improve student use of IL, perhaps a more structured and uniform approach to teaching IL skills could be a worthwhile consideration.

9. Conclusions

This study concludes that students arrived at university with largely misguided confidence in their personal IL skills, especially skills needed to meet the demands of university level coursework. Students affirmed improved skills and understanding after a course providing interventions regarding basic IL information, influencing a positive change in first-year students' perceived abilities to search and use academic literature, leading to the conclusion that teaching these IL skills is essential to academic success (Davis et al., 2011; Zai, 2015). IL teaching and practice during the course provided opportunities for students to understand their abilities in relation to university expectations and assessment and therefore prepared them for success. Therefore, first-year students would benefit from having university tutors who consistently and thoughtfully included the teaching of IL strategies to support student learning, research, and assessment.

This research also identified a substantial proportion of students who did not enjoy reading, and the preference of many students not to read. By the end of the semester there remained between 25–35% of students who did not find reading and comprehension easy or enjoyable, a significant problem that was identified for students commencing their undergraduate studies.

With up to 47% of students unlikely to have experienced effective teaching of IL skills in school, there is a clear need to understand the level of IL skills of students enrolling into university. University courses need to review the assumed IL skill sets required for their courses. The provision of IL interventions in first-year courses that explicitly integrate and teach research skills and understanding of scholarly literature is important for student success, as indicated by this

study. Making this common practice in all first-year courses at university would ensure a continuum of learning to develop essential IL skills for success at university and beyond. This research has concluded students felt far more confident in finding the academic information they needed, but far less capable of reading, understanding, and integrating academic texts into their own work. As MacMillan & Rosenblatt (2015) summarise, 'what good is teaching students how to find scholarly resources if they can't read them? Undergraduate students are often ill prepared for the deep reading critical to student success required for research assignments' (p. 757). Consideration for improving first-year university students' IL skills warrants further deliberation, given the identified impact of IL skills on student success and retention rates. Further research into including a streamlined focus on teaching IL skills across first-year courses, with consideration for reviewing IL skills in subsequent year level courses, is recommended to inform the development of a more effective approach to IL learning for university students.

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