Evidence Based Library and Information Practice

Engineering Students and Professionals Report Different Levels of Information Literacy Needs and Challenges

Phillips, M., Fosmire, M., Turner, L., Petersheim, K., & Lu, J. (2019). Comparing the information needs and experiences of undergraduate students and practicing engineers. The Journal of Academic Librarianship, 45(1), 39-49. https://doi.org/10.1016/j.acalib.2018.12.004

Kimberly MacKenzie

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Evidence Summary

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A Review of:
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Reviewed by:
Kimberly MacKenzie
Research Data and Scholarly Communications Librarian
University of Massachusetts Medical School
Worcester, Massachusetts, United States of America
Email: Kimberly.mackenzie@umassmed.edu

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Abstract

Objective – To compare the levels of information literacy, needs, and challenges of undergraduate engineering students with those of practising engineers.

Design – Electronic survey.

Setting – Large land grant university in the Midwestern United States and multiple locations of a global construction machinery manufacturing company (locations in Asia Pacific, Europe, North America).

Subjects – Engineering undergraduates and full-time engineers.

Methods – Two voluntary online surveys distributed to (a) students in two undergraduate engineering technology classes and one mechanical engineering class; and (b) to engineers in an online newsletter. None of the questions on the survey were mandatory. Because the call for practising engineers generated a low response rate, direct invitations were sent in batches of 100 to randomly selected engineers from a list provided by the human resources department

of the company participating in the study. The surveys were similar but not identical and included multiple choice, Likert scale, and short answer questions. Data analysis included two-sided unpaired sample t-tests (quantitative data) and deductive and inductive content analysis (qualitative data).

Main Results – There were 63 students and 134 professional engineers among the respondents. Survey response rates were relatively low (24.3% for students; approximately 4.5% for employees). Students rated themselves higher overall and significantly higher than did engineers on the questions "know where to look for information" (students M = 5.3; engineers M = 4.2) and "identifying the most needed information" (students M = 5.5; engineers M = 4.8) (mean values reported on a 7-point scale). Neither group rated themselves highly on "reflecting on how to improve their performance next time" or "having a highly effective structure for organizing information," though engineers in North America rated themselves significantly higher than those in Asia Pacific on organizing information, knowing where to look for information, and using information to make decisions.

Both students and engineers reported often using Google to find information. The library was mentioned by one-half of engineers and one-third of students. Engineers reported consulting with peers for information and making more use of propriety information from within their companies, while students reported using YouTube videos and online forums, as well as news and social media. More than half of students (57%) reported having enough access to information resources, while 67% of engineers felt that they lacked sufficient access. The most common frustration for both groups was locating the information (45% of student responses; 71% of engineer responses). Students reported more frustration with evaluating information (17%) compared to engineers (9%).

Conclusion – Engineering students and professional engineers report differences in their levels of confidence in finding information and differences in the complexity of the information landscape. Engineering librarians at the university level can incorporate this knowledge into information literacy courses to help prepare undergraduates for industry. Corporate librarians can use this information to improve methods to support the needs of engineers at all levels of employment.

Commentary

Information literacy education for undergraduate engineering students does not necessarily prepare them with the information gathering skills they will need as professional engineers because the academic environment differs from the corporate environment, particularly in terms of complexity and faster pace (Leiss & Ludwig, 2018). While academic librarians may have limited opportunities to educate engineering students in information literacy, recent research, including this study, suggests that time may be best spent focusing on literacy skills that will be needed in their post-university careers, such as accessing and evaluating a variety of information (i.e., grey literature and standards). This survey adds to the growing body of literature on this topic by analyzing information literacy skills in order to understand how students could be better prepared for professional challenges as well as to improve information and resource access at the professional level.

Boynton and Greenhalgh's (2004) critical survey appraisal tool was consulted for this review. The surveys used in this study included variations on questions from the Self-Directed Information Literacy Scale (Fosmire, Douglas, Van Epps, Purzer, & Fernandez, 2018). Respondents in the reviewed study were similarly asked to consider their responses in relation to a recent engineering project they had undertaken. Based on the Boynton and Greenhalgh (2004) criteria, the Likert scale questions were appropriately phrased (Phillips, Fosmire, Petersheim, & Turner, 2016). However, there were some differences between the two surveys that makes direct comparison for certain questions difficult. For example, both surveys included the question, "How did you go about acquiring the information, skills, or abilities you needed to complete the project?" but the choices for answers were different for the two groups studied. Only students were given a multiple choice answer including YouTube/videos and online forums, while engineers would have had to comment on them in short answers.

One potential limitation of the study, in addition to low response rates, is the ability of results to be generalized. The sampling method included student respondents attending one university and engineers employed by one corporation, albeit in various locations. Additional demographic details might be included in future studies; here, while years of employment for engineers was reported, the age of the employee, or years since finishing university, were not. Therefore, it is difficult to judge whether changes over time in technology and online information gathering were a source of challenge or frustration. For students, 97% were male. It is not clear whether these students had prior information literacy training.

Students tended overall to rate themselves higher than professional engineers on most questions, but they could be overestimating their abilities, as noted by the authors (p. 46). However, there is no direct measure of their abilities or the success of the projects they were reporting on, therefore it is unclear whether their estimations were justified. Bandyopadhyay (2013) found a similar overestimation of abilities in undergraduate biology students, but also included a measure of actual skill level (which was lower than perceived skill level).

Nevertheless, these results can be useful for any engineering librarian. At the university level, these results can help librarians consider ways to improve information literacy curricula, particularly the complexity of information needs undergraduates may experience as practising engineers. It is clear from the differences in survey responses that undergraduates may not have a clear understanding of the types of resources a professional engineer may need, such as internal documentation. Corporate engineering librarians can use these survey results when designing programs for new employees, as well as an impetus for increasing the number of tutorials and help aids in order to help users locate the information they need. Despite the shortcomings mentioned above, the survey itself could be a useful tool for librarians wishing to design a similar study to determine the needs of their users. However, particularly when surveying undergraduates, a measure of actual skill level in conjunction with self-perceptions may be more useful than the survey alone. These results have meaning beyond engineering librarians, and similar surveys could be used regardless of the nature of the corporate library or academic specialty.

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