

# Information and informatics literacies of first-year medical students

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**Purpose:** The study evaluated medical students' familiarity with information literacy and informatics during the health sciences library orientation.

**Methods:** A survey was fielded at the start of the 2013 school year.

**Results:** Seventy-two of 77 students (94%) completed the survey. Over one-half (57%) expected to use library research materials and services. About half (43%) expected to use library physical space. Students preferred accessing biomedical research on laptops and learning via online-asynchronous modes.

**Conclusions:** The library identified areas for service development and outreach to medical students and academic departments.

**Keywords:** Students, Medical; Education, Medical, Undergraduate; Information Literacy; Medical Informatics; Computational Biology

## INTRODUCTION

Recent advances in medical research, health care, and health information technology, along with changes in medical school curricula, compel the development of informatics and bioinformatics competencies, research skills, and information literacy [1, 2]. These competencies place new demands on today's medical students in terms of team-based learning, decision making, and medical practice [3–5]. Yet research indicates that literacy competencies, skills, and capabilities vary among medical students in their first and second years [6, 7]. It may, therefore, be valuable to gauge student information literacies prior to the start of their academic journeys.

Given the rapidly changing demands on this generation of medical students, librarians have vested interests in understanding students' baseline competencies, learning preferences, and interests in

applying informatics or bioinformatics technologies in health care. With that in mind, the authors set out to survey an incoming class of medical students to gauge their levels of information literacy and learning styles, as well as literacy in biomedical informatics and bioinformatics.

## METHODS

Librarians and staff at the Wood Library at Weill Cornell Medical College in New York, New York, developed and fielded a survey to a cohort of incoming medical students to gauge their self-assessed familiarity with a variety of information resources and services (Appendix, online only). The survey was fielded during the library's annual orientation for medical students, which takes place prior to medical students beginning the first-year curriculum. The Institutional Review Board at Weill Cornell Medical College (WCMC) approved this study.

We conducted a literature search to identify a validated survey guide on this topic in existing



A supplemental appendix and supplemental Figure 2 and Figure 3 are available with the online version of this journal.

literature. We were unsuccessful in finding any previously published material on this topic and thus built a novel survey.

We met in person and communicated online to develop thirty-two questions in four areas: (1) library services and materials such as accessing reference services, searching online literature, or utilizing the services of a “personal librarian” [8, 9]; (2) biomedical informatics tools such as electronic health records (EHRs); (3) bioinformatics tools such as the National Center for Biotechnology Information (NCBI) databases; and (4) satisfaction with the library orientation itself. We do not report on the results of the library orientation in this study.

The survey questions were developed on paper and designed to generate data in multiple forms: nominal, ordinal (Likert scale), and free text. After reaching internal consensus, we uploaded and formatted the questions into an online survey tool (Formstack, Indianapolis, IN). We refined questions after pilot-testing the survey questions with one librarian and three library technical staff who were not part of the survey development process.

Surveys were administered to incoming medical students via iPads in late August 2013. Students were given the survey at the library’s orientation, after they had completed activities meant to familiarize them with the library, its resources, its services, and its personnel. We fielded the survey at the orientation in order to maximize subject response rates. Students were not required to complete the survey but were given a small token of appreciation if they did so.

## RESULTS

There were 72 survey respondents, with the majority being in the medical program (89%) and the remainder in the “MD/PhD” program (11%). The ages of the students were primarily 21–25 years old (72%). Other age group breakdowns were 26–30 (21%), 30–34 (6%), and 1 respondent under 20. Eighty-two percent of students had achieved a bachelor’s as their terminal degree (50% BS, 32% BA, total), with 13% possessing a master’s and 6% a PhD.

To gauge general library interest, students were asked to state their expected or anticipated library usage during their time at WCMC, with respondents selecting the 3 resources they were

likely to use the most (Figure 1). The most popular resources were our library’s online journal collection (24%) and the newly renovated 24-hour study space (18%). If grouping resources into 2 categories—research services and materials (consisting of online journals and books, reference services, and librarian consultations) and physical spaces (consisting of study areas, computer rooms, and group collaboration spaces)—students were split as to what resources they expected they would use. Fifty-seven percent reported they expected to use research services and materials, and 43% reported they expected to use physical spaces. Students were also asked to indicate their levels of interest in using a personal librarian throughout the year, if offered (Figure 2, online only). Sixty-eight percent stated that they would be likely or very likely to use such a service.

Most respondents (72%) reported using the Internet to conduct biomedical research at least once daily, with an overwhelming majority (85%) having used PubMed to conduct the research. Other commonly reported resources included Web of Science (28%), Ovid (28%), and Scopus (12%).

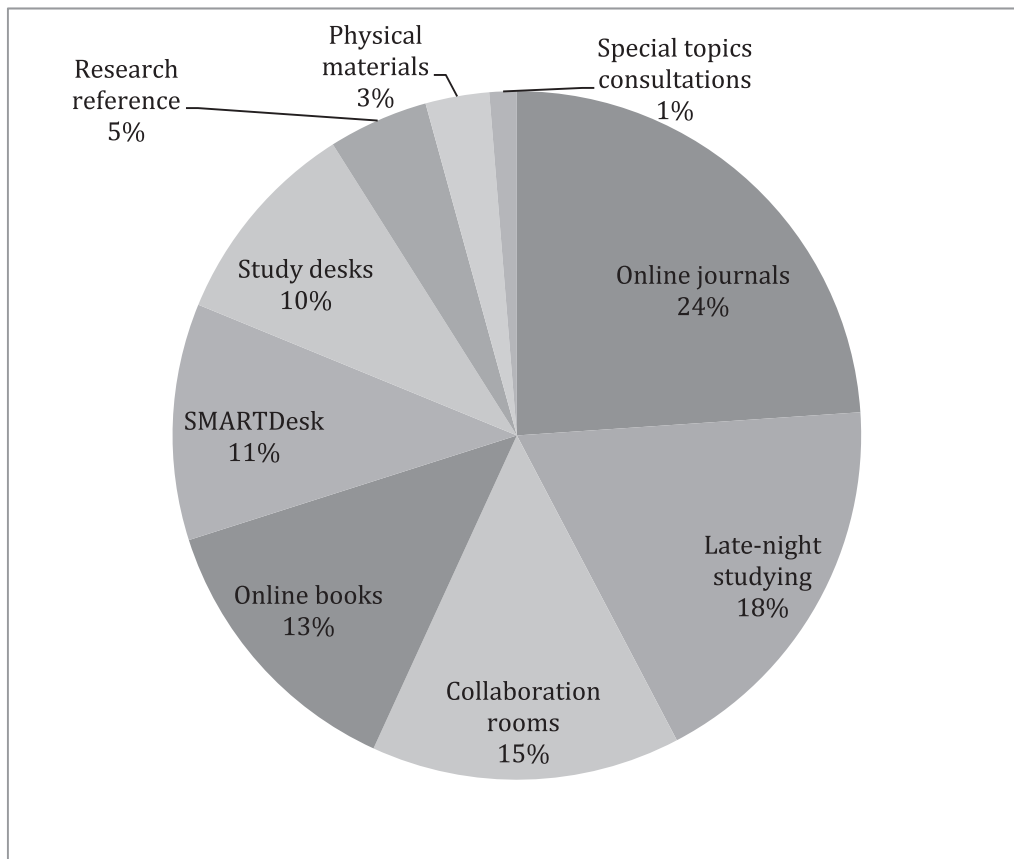
### Instruction mode

Students were also asked to state their preference for several modes of instruction. The results were split between small group (40%), online asynchronous (34%), and one-on-one (25%) instruction. Online synchronous was chosen by 1%.

### Access to biomedical information

Finally, students were asked to rank the types of technology that they preferred for accessing biomedical information (Figure 3, online only). Mobile devices such as smartphones and tablets were not as preferable as desktop and laptop computers. Laptops were the most preferred type of technology for accessing biomedical information.

Remaining questions addressed topics such as knowledge of health records and familiarity with different software packages or bioinformatics resources. Regarding health records, 46% of students reported having seen an EHR, while only 29% had seen a personal health record (PHR). Over three-quarters of the students (82%) stated that they would at least be moderately interested in learning more about EHRs and PHRs.



**Figure 1**  
Expected library usage from incoming medical students: research services and materials versus physical spaces

### Software skills

To determine basic software skills, students were asked to state their perceived proficiencies in four basic categories: spreadsheets, databases, programming languages, and statistical software. The highest level of knowledge was reported for spreadsheets, with 60% claiming to be proficient or better. In the 3 other categories, the overwhelming majority reported that they were novices in using databases, programming, or statistics. When asked to rate their interest in learning more about these programs, most interest was shown in statistical software training.

Finally, we surveyed students on their familiarity with bioinformatics databases. Over half of students (53%) reported having used any NCBI bioinformatics database. Students reported being most familiar with the BLAST resource (a tool used for calculating gene sequence similarity) (42%). Students reported using the following NCBI databases: Genbank (22%), Refseq (16%), and Gene (7%). Only 6% of students

rated themselves as being at least an intermediate user of the NCBI Entrez database. For all listed resources, approximately 60% of students reported at least moderate interest in learning more about using the tools.

### DISCUSSION

This is, to our knowledge, the first published survey that attempts to gauge self-reported information, medical informatics, and bioinformatics literacies of an incoming class of medical students. Notable findings were that incoming students preferred to use laptops rather than tablets for accessing online information. The results also offered interesting insights into whether students found it amenable to use what could be considered “traditional” services and resources, such as a “personal librarian” or physical space in the library.

These findings have immediate impact in two primary ways. First, our medical students have been given iPads with which to access online materials

and engage in class. Our results demonstrate that students may require training to integrate iPads into the curriculum and that there may be opportunities to learn if and how student preferences for accessing online information may change in a future survey.

Second, over two-thirds of respondents were somewhat or very likely to use a “personal librarian” service during their first year, and over half (56%) were interested in using what could be considered physical resources and in-person services. These findings highlight the importance of providing in-person services rather than online services only.

The findings provide our librarians, and associated library stakeholders, insights into the ways new medical students think about information services and tools, as well as help us focus limited resources that can help them develop as they progress through the curriculum. The findings also highlight the value of surveying students about resources that perhaps extend beyond traditional library resources. For example, the findings show that students were interested in statistics but self-reported being novices with statistical software. With this knowledge, librarians can prioritize services for statistical training (as well as training in statistics for librarians themselves). A survey of this type can be used to demonstrate the importance of developing skills that support work in data-intensive biomedical environments.

We intend to administer a version of this survey to this same cohort of students at a future time to learn how their perceptions about information and informatics literacies have changed. A future revision could ask questions that more clearly distinguish between database skills (e.g., SQL) and the use of databases for searching literature like PubMed; ask students’ opinions about the importance of learning how to effectively work with and manage EHR, PHR, and research data; and inquire about ways that the library can best integrate bioinformatics instruction into library services.

### Limitations

The results cannot be generalized given that we recruited a convenience sample of students who attended a library orientation at a single site at one time and who had access to iPads. Although the survey took advantage of students’ availability to increase the response rate, we did not survey non-attendees. Therefore, the results might represent

students who were more motivated to use library resources than those who did not attend the orientation. Furthermore, we may have introduced response bias into the survey by asking students’ opinions about using library services and resources while they were in the presence of librarians. Students were also asked about their preferences for accessing materials while they were using iPads, and though unlikely, it was possible that the devices could have influenced their answers.

We conducted a survey to understand the familiarity and experience with a variety of information resources and services among a cohort of new medical students. Our findings revealed that the students already had considerable familiarity with biomedical literature databases and might prefer accessing those resources on more traditional technologies such as laptops than on mobile devices. The participants also reported preferring education formats that are asynchronous online or in small groups and that they appreciated access to physical library resources and access to librarian-based services.

These findings and others are helping our library understand the needs of our newest customers and consider how we prioritize limited resources to best support students as they progress through the curriculum. We believe that other libraries should carry out similar efforts to identify their own customers’ needs. The findings will help them determine ways that the libraries can impact their institutions and identify areas for future research.

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