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Research Readiness Self-Assessment: Assessing Students' Research Skills and Attitudes

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Abstract

Librarians and learning researchers at Central Michigan University collaboratively developed an online tool that assesses how student research attitudes and perceptions correlate to their actual research skills in order to educate them about state-of-the-art library resources and prepare them to write high-quality research papers. This article describes the reasons for developing the assessment as well as the design process and technical characteristics.

Introduction

Access to information quickly and easily has become a fact of life for most people in developed countries today through the Internet. The ease and speed with which we can find information on the latest prescription drug; buy birthday presents; conduct research for a school project; or make travel plans has led to the belief, held by many, that all information is available at the end of a keyboard or mouse.

This attitude among the general population to the information superhighway has developed a generation of students who bypass libraries, both real and virtual, in the belief that Google or Yahoo will reveal all they ever need to know. In spite of the fact that students are often required to participate in library instruction sessions where information literacy skills and the location of electronic peer-reviewed or scholarly materials are taught, many students seem to perform very simple research on the World Wide Web (WWW). When reference librarians instruct students in research techniques that are more advanced and assist them to find scholarly materials in licensed electronic databases, students often show surprise at the amount and complexity of research available to them.

John Lenger, a professor of journalism at the Harvard University Extension School, described an interesting experience with a class assignment (Lenger, 2002). He assigned a project designed to teach students to report in teams. He warned the students that almost no information on the subject would be found on the Internet. Yet, at the next class, he learned that most of the students had spent their time researching the subject on the Internet. He also learned that, "the youngest students had difficulty imagining a pre-Internet world... Researching what Harvard was like in the 1730's, for example, members of a small group had typed variations of "Harvard in the 1730's" into a search engine, found nothing, and concluded that no records existed." (Lenger, 2002, p.2).

During the 2000-2001 academic year a survey was administered to 180 students at Wellesley College to measure how they react to information on the Internet. The authors of the survey wrote:

> The findings were remarkable. Regarding students' reliance on the Internet, it became apparent that students are very eager to use the Internet – and only the Internet – in conducting research. Though the survey was not in any way limited to Internet resources, less than 2% of students' responses to all questions included non-Internet sources. (Graham and Metaxis, 2003, p.72)

Historically, term paper banks and services have been available to students who chose to plagiarize for class assignments (Moore, 1988), but the ability to cut and paste information from documents on the Internet into the body of a student's research project is so easy that many students plagiarize without

truly understanding what they are doing or with the idea that they won't be caught. McMurtry (2001) sums the situation up well in the following:

> No longer must a student retype an entire paper just to add in a paragraph or even a footnote. No longer must a student visit a library to use a card catalog for research. But also, no longer must a student retype a paper that someone else has written in order to put their name on it. The student can just copy the text from the Web, paste it into their word processing program, type their name at the top, print it out and hand it in; or in some classes, submit it digitally to the professor online or by e-mail. (p.1)

Twenty-five years ago, a middle school student could carry basic research skills, such as finding books through a card catalog and locating articles through indices of periodical literature, into high school, college and lifelong research because the methods remained static for so long. This is clearly no longer the case.

In the last ten years the Internet has made a wealth of information available to anyone at the end of a mouse or keyboard. Many people believe that all of the information they need is available quickly on the Internet. Yet no search engine or combination of search engines provides access to all Web pages on the Internet. In addition, most search engines have somewhat different searching protocols, vary in what they consider relevant, and do not provide access to copyrighted material that is housed behind password-protected screens (Garnsey, 2002). Several students in the Harvard journalism class admitted during a discussion about their choice to use the Internet for research, despite the professor's warnings, that, "...they were not sure how to use archives,... [and] that using actual libraries was burdensome." (Lenger, 2002, p.1).

In a 2000 article on the changes that the Web is making on our work and educational lives, John Seely Brown, stated:

> The new literacy, beyond text and image, is one of information navigation. The real literacy of tomorrow entails the ability to be your own personal reference librarian – to know how to navigate through the confusing, complex information spaces and feel comfortable doing so. (p.14)

In the 21st century, the real challenge for academic librarians and everyone involved in information literacy is to educate our students to understand and be familiar with the research process. This involves teaching students and other lifelong learners how to navigate through the information spaces, as Mr. Brown terms it, so that they know when the best answer is at the end of a search engine and when it is in a database that is password protected by their libraries and when it is in the microforms collection or at the fingertips of the librarian in the reference area of the library.

In distance learning programs this lack of understanding of the research process and dependence on the Internet in the isolated situations in which many distance students find themselves can be magnified. Students researching from remote locations may have fewer opportunities for reference consultations, in which they may learn better research skills. In addition, a significant number of distance learners are older than the traditional college age and feel anxiety about asking for reference assistance since they believe they should already know how to conduct research efficiently.

At Central Michigan University (CMU), students enrolled in off-campus and distance learning courses through the College of Extended Learning (CEL) receive library services from a special unit dedicated to their needs, Off-Campus Library Services (OCLS). OCLS librarians incorporate a library instruction session into the required research classes of the Master of Arts in Education (MAE) and Masters of Science in Administration (MSA) programs, as well as into a variety of other undergraduate and graduate classes with research projects. With the exception of the Web-based courses where instruction is done via an online synchronous discussion, using chat software, all instruction is done face-to-face in the classrooms where the students take classes or in nearby computer labs. Librarians also provide reference assistance by phone, email, and chat. The OCLS Document Delivery Office (DDO) loans books and provides copies of articles by mail, fax, and electronically to students enrolled in CEL courses.

The OCLS librarians had experienced a 25% drop in reference statistics over a three-year period ending in June 2000. Anecdotal evidence from professors was revealing that more students seemed to be using only Internet search engines for research purposes. Since all master's degree students and a majority of undergraduate students received at least one library instruction session in their programs, the OCLS librarians were searching for other ways to instruct students. Often librarians were learning from students in reference interviews that they had turned to OCLS as a last resort after all of the Internet searches had failed to yield the research materials that professors were requiring. A significant number of students, who had participated in a library instruction session that was geared to learning how to complete a specific class assignment, expressed a complete lack of understanding of the assignment during reference interviews conducted less than a week after the library instruction presentation. The impression that the librarians were receiving was that students thought they knew how to conduct research but often lacked basic information literacy skills. Because students' perceptions of their own information-seeking skills were often inflated, they apparently did not see the need to pay close attention to librarians in instruction sessions or to avail themselves of reference services.

In preliminary discussions about constructing a survey to determine students' library instruction needs, the OCLS librarians hoped to find an assessment tool that would measure areas where skills were lacking rather than measure only whether students knew how to use a library. In a cursory review of the literature, many of the sample library instruction pretests and posttests that we examined appeared to measure objective outcomes such as understanding how to use an online catalog or how to locate a periodical article. Although measuring these skill levels was important, the OCLS librarians also wanted to assess students' perceptions of their abilities to effectively use library resources and their understanding of the research process. Many of us believed that a significant number of students tuned us out during our instruction sessions because they perceived that they knew all there was to know about an effective research process using library resources. We thought that if we could devise an assessment tool that would help students to understand areas in which their skills were lacking, they would be motivated to pay attention in library instruction classes and to use reference services more effectively.

In the summer of 2000, OCLS approached the Center for Adult Learning (CRAL) in CEL to discuss creating an assessment tool that would measure students' information seeking skills and perceptions of their own abilities. CEL, which was established in 1971, delivers degree programs and courses to students off-campus in over 60 centers throughout North America as well as through Web-based courses. CRAL oversees all research activities in the College, including the creation of assessment tools.

In the initial discussions between staff in OCLS and CRAL, the groups decided to develop an online Research Readiness Self-Assessment tool (RRSA). This tool would be designed to help students assess their skills based on the *Information Literacy Competency Standards for Higher Education* (ACRL, 2000). Students would be asked to complete several problems and respond to questions that would reveal research skills in which they were strong and others in which they were weak. The results of the assessment would be delivered to the students within a short time of completion. In addition, when specific skill deficiencies were identified, students would be directed to explanations and places to go for further instruction. The ultimate outcome of this assessment tool would be to alert students to areas in which they needed to improve their research readiness skills in order to successfully complete a degree program and to be lifelong learners as well as to direct students to Web-based instruction and to OCLS for help in the areas in which they showed lack of skills.

Initial Stages of RRSA Design and an Overview of RRSA Content

The RRSA instrument was designed in multiple stages, beginning with a comprehensive literature review of information literacy competencies and conceptual models that provide a framework for the development of information skills. At the same time, we conducted a focus group to gather input from the OCLS librarians. The librarians shared information regarding specific skills that differentiated advanced information users from novices and provided critical incidents that illustrated particularly effective and ineffective strategies for finding and evaluating information resources.

The literature review, combined with the findings from a focus group, led to the formulation of key skills and attitudes that were targeted by the assessment. Over the next several months, we designed three classes of assessment items: (1) multiple choice questions, (2) skill-based problems, and (3) measures of students' attitudes (e.g., attitudes toward the use of the general Internet and attitudes related to requesting help from reference librarians). For a complete list of measures included in RRSA see Table 1.

The multiple-choice questions included in RRSA represented several knowledge domains, ranging from research-related terminology to identification of plagiarized sentences. For example, students are asked to select correct definitions of commonly used concepts, such as a bibliography or an abstract. In addition, the students are provided with a direct quote and asked to identify its plagiarized versions—passages that make use of the same idea without the proper acknowledgement of its source.

The skill-based problems require a test taker to demonstrate information skills by manipulating databases, evaluating the quality of multiple published documents, and conducting database searches that require them to employ multiple search strategies.

In addition to multiple-choice questions and skill-based problems, RRSA incorporates attitudinal measures. An attitude is defined as a state of mind or feeling with regard to the use of the general Internet or a disposition to seek librarians' assistance. The decision to measure attitudes was motivated by the following characteristics of attitudes:

1. *Attitudes are demonstrated through behaviors.* For instance, students who hold strong attitudes regarding the usefulness of information found on the Internet may refer to the general Internet for all of their research needs.
2. *Attitudes are learned through experience and, once formed, may not change easily.* For example, a learner who has recently discovered the vast amount of documents available via the Internet may accept a position that "the Internet is the most sophisticated library that offers quality information at one's fingertips," leading him or her to be a reluctant user of traditional or virtual libraries.
3. *Negative attitudes can be changed through new experiences or when one encounters evidence that conflicts his or her mental position.* RRSA can be used as a diagnostic tool to detect attitudes that have negative implications and to provide students with corrective feedback.

Next, the initial draft of an online assessment was reviewed by Subject Matter Experts (SMEs), represented by experienced librarians and university professors who taught research intensive classes. Following a review of SMEs' comments and a small-scale pilot test, RRSA was revised to address specific concerns related to item wording and to resolve some technical issues. At the same time, an online feedback function was added that provided immediate, individualized information on assessment takers' skills in a variety of areas, such as knowledge of information resources, understanding of plagiarism, database search skills, evaluation of information, and self-reported reliance on the Internet search engines (see Table 2 for sample feedback given upon completion of RRSA).

Multidisciplinary and Health Professions Versions of RRSA

Because there was a need to test students in a variety of disciplines, two versions of RRSA were created, one for the Health Professions students and one for a diverse group of students most of whom specialized in Administration or Education. In the summer of 2003, an *RRSA-Health Professions* version was administered to a group of 26 students entering a Doctoral program in Health Administration at CMU and an *RRSA-Multidisciplinary* version was administered to 95 individuals. The majority of these students were enrolled in the required research class of the MSA program at CMU off-campus centers in suburban Detroit and Flint, Michigan, Ohio, Hawaii, and California. The remainder consisted of a small group of undergraduate library student employees who participated in two stress tests and one entry level undergraduate class at a CMU off-campus center in suburban Detroit. Most of the students participated in a library instruction class after taking the RRSA so were able to discuss their results with OCLS librarians and provide feedback. Individual responses were recorded in a database and subjected to statistical analyses. Based on the findings, two items were eliminated and 14 other items were revised in order to ensure clarity, to provide an exhaustive list of responses, and to increase item difficulty. Analyses of

descriptive statistics resulted in the fine-tuning of written feedback messages displayed upon the completion of RRSA. In particular, we were able to establish preliminary norms and create personalized feedback, corresponding to three levels of performance (top third, middle third and bottom third).

Validation of RRSA

Validation is an evaluation of the accuracy or appropriateness of drawing inferences from RRSA scores. Although a thorough evaluation of RRSA will not be complete until a large number of students will have taken the assessment, we conducted several preliminary evaluations of RRSA.

First, we examined content validity of the instrument. Content validity is the degree to which RRSA covers all of the competencies essential to research readiness and information literacy. For the purposes of RRSA development and evaluation, we adopted the American Library Association's definition of information literacy. The Presidential Committee on Information Literacy of the American Library Association defined information literacy as the ability to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association, 1989, p. 1). The concept of research readiness encompasses information literacy within a specific knowledge domain (e.g., an academic discipline) deemed essential for locating, evaluating, and using that discipline's body of research. Throughout RRSA development, care was taken to ensure that the assessment contained a representative sample of questions or problems covering all information literacy competency standards, as outlined by ACRL (2000). Judgments by two independent evaluators were used to determine if RRSA had a mix of items covering each standard within the context of a specific discipline. Additional items were written for underrepresented competency standards.

Concurrent criterion-related validity was investigated by correlating student scores on the assessment with proxy measures of library use and information skills. For example, we expected RRSA items that measured knowledge of information resources and database search skills would correlate *positively* with exposure to library instructional services. On the other hand, these items should correlate *negatively* with self-ratings of the extent to which the Internet Search engines (e.g., Yahoo and Google) provided everything one needs for writing scholarly research reviews. The obtained correlations were statistically significant and in the expected direction. Our preliminary validity studies led to generally positive conclusions regarding the instrument's ability to discriminate between advanced users of scholarly resources and novices who generally rely on the Web search engines. It would be important, however, to replicate these initial findings on a larger and more diverse group of assessment takers.

One of the outcomes of the validation was a redesign of the individualized feedback. In its present form, the written feedback on one's performance in several categories is referenced against the performance of the 95 people who completed this assessment in the past.

In sum, the complex and rigorous design of the RRSA tool led to the creation of an online application that provides students with an opportunity to check their skill level by completing an assessment that combines a survey and a skill test, to receive immediate feedback on areas of strength and weakness, and to obtain a list of resources for self-study.

RRSA Technical Overview

The original construction of the RRSA Web-based assessment began in 2001. During the planning phases, it was decided that RRSA needed to meet three criteria:

1. The program must have real world adaptability
2. Have an easy to use administrative interface for modifying users, questions, and score measuring scales
3. Be portable enough so that it could work on various server operating systems without large modifications.

In order to achieve these goals, it was decided that RRSA should be programmed in PERL/CGI. CGI is one of the most widely used scripting languages on the Internet. It is very platform-neutral, meaning platforms such as Windows, Linux, MacOS, Solaris, and many more, have no problem interpreting the language. Best of all, CGI is very easy to learn. PERL is used for creating the dynamic web pages and works hand-in-hand with CGI. PERL also excels in tasks like database interaction, form field validation, and text parsing.

After choosing the programming language, the next logical step was selecting the operating system for the server. There are a variety of OS choices available, all with distinct advantages and disadvantages, including Windows 2000, Windows XP, Linux, and Solaris. In the end, Linux won out. Linux is a free, open-source, and very powerful OS that has a wide range of capabilities. The system requirements for Linux are also considerably less than other operating systems like Windows or Solaris so Linux can run fine on an older machine which saves money when compared to upgrading a server or purchasing a brand new one. Because Linux is open source, it has an abundance of documentation and support via the Web, making it easier to troubleshoot and fix any problems with little effort. The Linux commands are very similar to any of the other UNIX-like operating systems, so chances are if a person is familiar with the commands to a UNIX-like operating system, the same or similar commands can be applied on Linux.

Once we had our programming language and OS in mind, we needed a database program to store all of the information for RRSA and serve as the backbone for the program. Like OSs, there are a number of database servers available. Since we decided on Linux, Microsoft's SQL Server was immediately ruled out. Oracle also had prohibitively high costs associated with it. Oracle and MS-SQL server are both very powerful database servers that would have easily handled our needs, but also are very expensive. Instead, we choose to use MySQL as our database server. Also a free, open source program, MySQL is able to run on a variety of platforms such as Windows, IBM AIX, Linux, Solaris, HP-UX, and many others. MySQL also has the security conscious administrator in mind, giving the administrator tight control over users and various database table permissions. Documentation is also excellent and can be viewed via the web, as well as user forum with solutions to common problems and questions.

With everything else in place, we needed just one final piece to put it all together, a Web server. Again, since we were dealing with a Linux box, Microsoft's IIS was not a viable option. The Apache HTTP server was the only logical choice. Like all of the other pieces of software used so far, Apache is open source and free to download. Currently, Apache is the most widely used web server, accounting for over 63% of all web servers. It also runs on various platforms such as Linux, IRIX, Windows, and IBM AIX. Documentation and support for Apache are also excellent, making it easy to solve most problems that arise.

The RRSA project has had several programmers over its long history. Sherzod Ruzmetov did the original programming for the RRSA project in 2000, which included the design of the administrative interface, implementation of the scales, and interfacing the Web pages with the MySQL database. The main challenge at this point was the creation of a simple, but user friendly administrative interface that would allow someone with limited programming knowledge to make changes and maintain the RRSA assessment. The result was a menu driven interface that gave the administrator control of almost every aspect of the RRSA assessment, including questions, e-mail responses, and even how the scores were calculated. It also allowed the user to view the overall results for each person that took the test and to download an Excel file of the results for later analysis.

Kedar Apsangikar picked up where Sherzod left off in the summer of 2002. He worked on ways to download the user results from the survey and also fixed the many bugs that still plagued the program after Sherzod left. Xinxin Wu and Ryan Laus took over the main programming duties in February 2003. They were able to successfully create a downloadable Excel file that could be plugged into SPSS to analyze the results of the survey. They also implemented a security system for the administrative module so that only specified people could perform administration functions to the assessment. They also fixed numerous bugs that cropped up during live testing with the students.

Our current environment for the RRSA assessment is as follows:

OS: AIX 4.3.3
PERL 5.6.0
MySQL 4.0.15
Apache 2.0.47
Server: IBM RISC 6000, 43P Model

The RRSA program itself is fairly small, only requiring about 10 MB of hard drive space. Like any database, as more users and data are added, the greater the space requirements of RRSA. Still, even with a large amount of data in the database, the RRSA program will probably never grow to more than 50 – 100 MB. With everything in place, RRSA should be able to handle at least 30 simultaneous users on a moderately powerful system.

In order to ensure the smooth operation of RRSA, the systems administrator should have several key skills to help him solve some of the various problems that may creep up from time to time. First, the administrator needs to be familiar with programming in PERL/CGI. Sometimes a change might need to be made to the way the program functions, so not knowing at least a small amount of PERL/CGI could lead to inefficiencies. Second, the administrator should be familiar with using SQL commands. This will come in handy if data somehow becomes corrupted in the database and the administrator needs to manually delete records or even whole tables from within the database. Lastly, the administrator needs to make sure that the database information is backed up on a regular basis. In our current setup at CMU, our database files are backed up on a daily basis. If this is done properly, the administrator should be able to tackle many of the problems that could occur from RRSA.

Uses for Research Readiness Self Assessment (RRSA)

The RRSA can be used in a variety of ways to enhance the education process. In its initial conception, the tool was developed as a means to help off-campus graduate students measure their information seeking skills and attitudes in an attempt to guide them to available library services when they were needed. To some degree this proved successful in the trials conducted in CEL classes in the summer of 2003. All of the OCLS librarians who offered library instruction sessions to students who were required to take the RRSA reported that at least one student in each class discussed being surprised at a lower than expected level of knowledge, which motivated them to pay attention to the library instruction session (M. C. Craig, personal communication , July 23, 2003, D. P. Gall, personal communication, June 16, 2003, and P. B. Mahoney, personal communication, June 30, 2003 and July 16, 2003).

The RRSA is a versatile tool that can easily be adapted to specific disciplines and to different levels of students. Since it measures skills and attitudes, it can be readily used as a pretest and posttest. Students receive feedback on their achievement in a number of areas that are made up of a combination of questions. They do not receive the answers to individual questions so there is very little chance that the memorization of correct answers from the pretest will skew the results of the posttest.

Although the focus of the first two versions of the RRSA has been to measure information seeking skills in order to encourage students to take better advantage of available library services in order to increase their research abilities, the assessment has wider applications. As higher education embraces the concepts of outcome assessment more thoroughly, a tool such as RRSA can offer a valuable way to measure the teaching outcome of any research oriented class. It is very simple to administer because the student takes it in his or her own time and receives immediate feedback.

Conclusion

The RRSA is a versatile tool that can be adapted easily in many educational assessment situations. The RRSA program can also be ported to a number of different operating systems such as Unix, Linux, or

AIX, making it technologically feasible for most academic institutions to implement. Since RRSA does not have steep hardware requirements and uses open source software, the startup costs of RRSA will be minimal. Within the libraries at CMU, we have begun discussion with the acting Instruction Librarian to adapt a version of the RRSA to be used as a pretest and posttest for LIB 197, the one-credit library instruction class offered on campus. In addition, OCLS librarians plan to expand the use of RRSA into other research classes and have begun conversations with colleagues in CEL about using the RRSA more broadly to assess academic outcomes. As many new students complete RRSA, we continue to fine-tune the assessment and gather evidence regarding its validity.

Table 1. *Research Readiness Components: Skills and Attitudes Measured by RRSA*

Skill or attitude	Definition
Online research skills	Ability to use online library catalogue, online library databases (e.g., First Search) and their Boolean operators.
Knowledge of information resources	Ability to identify and use best scholarly resources, knowledge of terminology (e.g., abstract and bibliography) and citation rules.
Understanding of plagiarism and copyright issues	Ability to identify plagiarism and copyright violations.
Attitudes toward Internet research	Measures the extent to which a student relies on the Internet and search engines (e.g., Yahoo and Google) to obtain scholarly resources for class research projects (e.g., papers, research assignments).
Evaluation of information	Ability to evaluate the quality of full-text articles from scholarly journals.
Motivation to supplement readings	Motivation to supplement instructor-assigned readings with additional materials
Frequency of library use	Contacts with librarians, access to OCLS web site, use of document delivery services, and general use of libraries.
Likelihood of contacting a librarian	Likelihood of contacting a reference librarian.
Research experience	Writing papers, citing sources, using bibliographies, encyclopedias, periodical indexes and subject headings, summarizing ideas and other research behaviors.

Table 2. *An Example of Immediate Feedback Provided Upon RRSA Completion*

Skill or attitude	Example of feedback (is determined by the level of performance)
Online research skills	Your score has indicated that your online research skills may not be as strong as you need in order to successfully conduct research in college. Understanding some of the techniques for efficient searching, such as how to choose the right databases for a particular topic and how to find out which terms are used in a particular database will help you to find more precise information more quickly.
Knowledge of information resources	Congratulations! You have demonstrated knowledge of information sources. You are able to identify and use the best scholarly resources, understand terminology and cite information correctly. This knowledge will help you to find information more efficiently, identify the research that is being published on your topic, and cite your references professionally.
Understanding of plagiarism and copyright issues	Your score has indicated that you may not thoroughly understand what constitutes plagiarism or a violation of copyright law. These are serious issues. Plagiarism can be anything from incorrectly citing a reference to turning in a paper that someone else has written. It can be intentional or unintentional. Many people do not understand how much information is protected under copyright law. Making multiple copies of pages from books or articles or copies of music or videos to give to others is an infringement of the copyright law. Plagiarizing or breaking copyright law, whether or not it is done intentionally, may subject you to some serious consequences, such as losing credit for the course in which you are enrolled or paying legal fines.
Attitudes toward Internet research	Congratulations! You have shown that you understand that there are a wide range of resources available on the Internet to help with your research. You are able to distinguish between general search engines on the WWW and password protected databases that offer you access to scholarly and research articles. This will help you find appropriate articles from the many online databases that are licensed by CMU for your use.
Evaluation of information	Your score has indicated that you have some knowledge about the evaluation of information gathered in the research process. You may know that peer-reviewed journals are generally a good source of accurate research findings and the opinions of experts in the field. You may know it is important to verify the accuracy of the information you have found or establish the authority of the author, but you probably do not routinely evaluate the material by all of the criteria necessary to consistently find the most accurate resources for your research project. It is important to know if the author of the piece you are using is someone with experience in the field and to find out how the information was developed. Some of the questions you can ask when evaluating the literature you find on a topic are: Is there information on the author that sets out his/her expertise in the field? Are the sources for factual information listed clearly so they can be verified in other sources? Is the material up-to-date? If you are using an article, is it from a peer-reviewed journal? It may take a little more time to be sure that the information you are using has been written based on research or by someone with known expertise in the field. It is worthwhile to do this because the quality of your research projects will be better.
Motivation to supplement readings	Your score indicates that you may do some supplemental readings but do not do them for all of the classes in which they are recommended. Supplemental readings often can provide a more thorough background on the subjects taught in the class. By reading extra material, you may gain a more solid knowledge of the subject matter by the end the class.

Frequency of library use	Your score indicates that you do not use libraries or virtual libraries often. You may tend to rely on free Internet search engines for much of your research. Libraries purchase or license print and electronic books, journals, and other sources of information that support the curricula of their institutions. Much of what you need to research is generally available freely and more easily through your library.
Likelihood of contacting a librarian	Your score shows that you are not likely to contact a reference librarian whenever you have questions on your research projects. Many students assume that they know how to conduct research effectively and efficiently on their own. This is probably true in some cases and not in others. Students also hesitate to contact librarians for fear of being perceived as ignorant. Resources in libraries, especially online resources, change at a dramatically quick pace. Reference librarians are information professionals who as part of their jobs, learn about these changes and are able to teach them to researchers. Reference librarians also have ready information on the correct terminology to use in setting up the most effective search strategies and are able to assist students to find the exact information they need quickly. Please consider consulting your reference librarian for help on future research assignments. They will help you to conduct your research efficiently and save you much time and aggravation.
Research experience	Your score indicates that you do not have extensive research experience. The more practice you have in using any research resource, the more accomplished you will be. Your research experience will help you to be more effective in your coursework.

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