

# **AC 2008-1220: GLOBAL PROJECTS PREPARATION: INFUSING INFORMATION LITERACY INTO PROJECT-BASED CURRICULA**

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# **Global Projects Preparation: Infusing Information Literacy into Project-Based Curricula**

## **Abstract**

This paper describes how librarians at Worcester Polytechnic Institute (WPI) work with administrators and faculty of the Interdisciplinary & Global Studies Division (IGSD) to ensure that students are prepared for real-world off-site projects.

Information literacy (IL) skills carry over from the academic setting to professional and personal life. According to a recent report by American Association of Colleges and Universities information literacy is listed as an essential learning outcome in the area of Intellectual and Practical Skills.<sup>1</sup> At WPI these skills become practice with the real-world projects undergraduate students perform as part of their degree requirements. Librarians partner with faculty to infuse these important skills for future engineers and scientists into the curriculum through a project experience completed during their junior year.

All WPI undergraduates are required to complete a team-based project that examines the impact of science and technology on society. The majority of students choose to complete their projects off-site in a wide variety of Project Centers around the world. Prior to going abroad students are enrolled in a seven-week Research Methods course. Librarians work with IGSD faculty to embed tutorials and team consultations into the course requirements. In 2006-2007 librarians met with 101 project teams and the program is part of all Research Methods courses. Student evaluations indicate that librarian involvement enhances their development of information literacy skills.

## **The Interactive Qualifying Project**

All WPI undergraduates are required to complete two significant project experiences, an Interactive Qualifying Project (IQP), and a Major Qualifying Project (MQP), both equivalent in credit to three courses. The IQP is an interdisciplinary team project that helps students understand how science and technology impact society. The majority of students choose to complete their projects at a wide variety of Project Centers around the United States and the world at locations such as Washington, D.C., Namibia, Thailand, and Australia. Two-thirds of WPI students perform off-campus projects and over half travel outside the United States at least once. Off-site projects are fulfilled through a full time research project experience over a seven-week period, equivalent to one academic term. Global projects are coordinated by the Interdisciplinary & Global Studies Division (IGSD). Faculty from all academic departments on campus participate and serve as advisors at one of WPI's 25 project centers in 14 countries on five continents. Project sponsors include not-for-profit organizations, NGOs, and government agencies. Students and faculty work to provide these sponsors with sustainable solutions to local challenges. For example, in Thailand students have worked with the Bangkok Refugee Center, the Duang Prateep Foundation, the Office of Her Royal Highness Princess Sirindhorn, and the local office of UNESCO.

WPI emphasizes an outcome-based education. WPI Undergraduate Learning Outcomes<sup>2</sup> include ten specific items, two related to IL:

Graduates of WPI will:

- *be able to make connections between disciplines and to integrate information from multiple sources.*
- *have the skills, diligence, and commitment to excellence needed to engage in lifelong learning.*

The IQP has been in place for almost 40 years; specific Interactive Qualifying Project outcomes were adopted by faculty in 2004. The numbers in parentheses correspond with WPI curriculum-wide undergraduate outcomes.<sup>3</sup> Students who complete an Interactive Qualifying Project will:

- *Demonstrate an understanding of the project's technical, social and humanistic context. (1, 7, 8)*
- *Define clear, achievable goals and objectives for the project. (6)*
- *Critically identify, utilize, and properly cite information sources, and integrate information from multiple sources to identify appropriate approaches to addressing the project goals (7, 10)*
- *Select and implement a sound approach to solving an interdisciplinary problem. (7, 10)*
- *Analyze and synthesize results from social, ethical, humanistic, technical or other perspectives, as appropriate. (8, 9)*
- *Maintain effective working relationships within the project team and with the project advisor(s), recognizing and resolving problems that may arise. (5)*
- *Demonstrate the ability to write clearly, critically and persuasively. (4)*
- *Demonstrate strong oral communication skills, using appropriate, effective visual aids. (4)*
- *Demonstrate an awareness of the ethical dimensions of their project work. (9)*

### **Research Methods Course and Library Integration**

Prior to the global project teams' off-site experiences, students enroll in a seven-week Research Methods course (ID2050) during which librarians teach students information literacy skills and meet with individual teams. Librarians partner with IGSD faculty to embed online tutorials and in-person team consultations into the course requirements.

The library's vision for information literacy at WPI outlines the University's integrated incremental program.<sup>4</sup> Librarians at WPI base their program on *Information Literacy Competency Standards for Higher Education*, and standards developed for *Science, Engineering, and Technology* by the Association of College & Research Libraries.<sup>5</sup> Emphasis of the IL vision for WPI is directed towards addressing specific accreditation standards for engineering and science disciplines as well as sections 4.6 and 4.18 of the *Standards on General Education*

reviewed by the New England Association of Schools and Colleges Commission on Institutions of Higher Education.<sup>6</sup>

- 4.6 The institution ensures that students use information resources and information technology as an integral part of their education. The institution provides appropriate orientation and training for use of these resources, as well as instruction and support in information literacy and information technology appropriate to the degree level and field of study.
- 4.18 Graduates successfully completing an undergraduate program demonstrate competence in written and oral communication in English; the ability for scientific and quantitative reasoning, for critical analysis and logical thinking; and the capability for continuing learning, including the skills of information literacy. They also demonstrate knowledge and appreciation of the aesthetic and ethical dimensions of humankind.

The Library's IL program focuses heavily upon integration within the ID2050 Research Methods course. This is the only course in the WPI curriculum within which librarians can infuse IL skills. In this effort, librarians meet with more than one-half of WPI students. . The library's goal is to partner with faculty to enable student achievement of the specific IQP outcomes related to information literacy outlined above. Although librarians meet with few on-campus project teams, they meet with all off-campus project groups due to the Research Methods preparation course. No course equivalent to ID2050 is offered for on-campus teams; however, the library was involved in a pilot on-campus iteration of the course offered September/October 2007.

### **Structure of Partnership**

Librarians communicate with ID2050 faculty prior to the academic term in order to learn about the project topics and sponsors. Research Methods courses typically include twenty-five students broken into project teams of three to five students each. In 2006-2007, fifteen ID2050 courses were offered. Prepared with information about projects, with topics ranging from Noise Monitoring in San Juan, Puerto Rico to Assessing Prepay Water Metering in the Informal Settlements of Windhoek, Namibia, librarians begin to formulate a research plan to guide the project teams. To assure continuity, as some projects are continuations of prior student work or sponsor assignments, librarians are assigned to specific project centers. Certain faculty serve as Project Center Directors even though instructors of ID2050 courses vary each year. This means that librarians have the opportunity to work with different faculty each term, even though they are assigned to a specific Project Center. Over 30% of the WPI faculty are involved in these activities at some point in their careers. Interactions involve integration of information literacy skills instruction into the online course site as well as face-to-face consultations. Within each Blackboard course site, librarians add a Library Assignments section with information for students on how to complete the tutorials, quizzes, and a preliminary research plan questionnaire. Consultations with librarians take place during the first three weeks of the term during each academic quarter.

## **Online Tutorials**

Students gain a basic overview of library resources available for research by reviewing online tutorials. Tutorial content is based upon Searchpath, created by the Board of Trustees of Western Michigan University, which incorporates material from TILT (Texas Information Literacy Tutorial). Librarians at WPI have modified this tutorial to suit the needs of project students in order to assure a baseline skill level. Students are assessed on tutorial content with two 16-question quizzes embedded into their Blackboard course site. Grades tracked in the online grade book are used by faculty in various ways. Some count quizzes toward final course grades, while others use them towards course participation credit. Librarians, with Teaching Assistant status in the online course site, can view the grades and use this information to plan the face-to-face consultation.

## **Preliminary Research Plan**

Student teams are charged to work together to submit an online form titled “Planning Your Research”<sup>7</sup> at least 48 hours prior to their scheduled consultation. The questionnaire includes questions about key topics and concepts of their project, prior research found (requires student copy and paste actual searches performed), electronic resources consulted, and a request for the library to address questions from the teams. Librarians customize the consultation based on this preliminary research plan and by viewing quiz results in order to understand the baseline of information literacy of each group.

## **Research Consultation**

Once the tutorials have been completed, project teams schedule a one hour meeting with their Project Center research librarian. Seven librarians now participate in project team instruction, up from three in 2004. In 2006-2007 librarians met with 101 project teams, an increase from 83 teams the prior academic year. In order to accommodate all sections of ID2050, librarians outside of the Reference and Instruction departments were enlisted. As new Project Centers are developed and the enrollment at WPI increases, the Library expects the need to expand. A pilot is underway to train library student employees to staff the reference desk which may allow librarians more time to respond to more difficult research questions and consultation requests.

During the team consultation, librarians are encouraged to address specific IL outcomes which suggest students learn to:

- choose and evaluate appropriate information resources for their project
- search effectively utilizing Boolean and appropriate keywords or subject headings within Internet search engines and specialized databases
- find and obtain a wide range of information sources as appropriate, such as books, academic papers, review articles, handbooks, case studies, technical reports, and government information
- identify experts and pertinent organizations in order to track down specialized information
- use information ethically by appropriate documentation and begin to understand when copyright permission is needed, and how to obtain it.

Although a brief demonstration of citation management is offered by the Project Center librarian, students are encouraged to attend more in-depth workshops on either RefWorks™ or EndNote Web™. Teams are provided with an informational brochure on the electronic project submission system (pilot 2003-2007, electronic project submission became required by the University as of A Term 2007-2008).<sup>8</sup> In addition, students are introduced to using the Library Catalog to search past projects, archived in the library in print and online. The electronic project submission enables many of the final undergraduate project reports to be accessible worldwide. This recent development makes copyright compliance a more prominent lesson for undergraduates working with off-site sponsors.

After the meeting, librarians follow up with a detailed research plan for teams which is often more thoroughly completed during the consultation. Teams are encouraged to request follow up appointments or visit the reference desk for additional assistance with their projects.

### **Assessment of Student Information Literacy Skills**

Student self-evaluations indicate that librarian involvement enhanced their development of information literacy skills. In 2006-2007 ninety-five students responded to a poll added as a Blackboard survey near the end of the ID2050 course term, a response rate of 38%. These anonymous responses were collected, collated, and summarized by the librarians who work with the IQP students.

Since 37% of the Gordon Library's instruction related offerings were IQP research consultations, it is important to understand the impact of these interactions with students. Librarians poll only students who attend research consultations *required* by the ID2050 professor. Many students or entire project teams return for follow up consultations or initiate reference inquiries which are not included in this analysis. It is estimated that at least 50% of the teams follow up with reference inquiries and many request second consultations. One faculty member requires a second meeting for project teams with the librarian and another requires a follow up in-class workshop held in a computer lab. The latter example allows students to explore cited and citing references in greater detail for sources the students have discovered during the research process and have deemed important. For this session, each student is required to bring two relevant papers.

When surveyed, 96% of the students agreed or strongly agreed that the research consultation with the librarian improved their ability to perform research for this project. Sixty-three percent agreed or strongly agreed that the Research Circuit online tutorial improved their ability to perform research for the IQP project; however, 13% did not feel that the online tutorial helped them improve their skills. It is evident that library interactions with IQP teams have a positive impact on student confidence in their own information literacy skills. It is possible that during the junior year, some of the students who responded have moved beyond the information literacy "basics" covered in the online library tutorial due to other research projects or workshops they may have attended in prior years.

As students move on from their IQP experience to a Major Qualifying Project (MQP) experience in the senior year, information literacy skills are further developed in the discipline. Librarians work with the MQP teams if they request meetings or upon faculty recommendation. No formal program has been established for MQP teams but librarians met with at least eighteen teams last year. Many were MQP students who had worked with a librarian the prior year during the IQP Research Methods course.

### **Faculty Feedback and Perceptions of Student Performance**

ID2050 faculty were asked to provide feedback to the library using an online anonymous survey. Of eight instructors who taught ID2050 in the past few years, five responded. All agreed or strongly agreed that due to instruction by the librarians their students were able to find more academic or scholarly information. As well, all agreed that the library's online tutorial and consultation with the research librarian helped the students produce higher quality work. Most felt that the students were more competent creating bibliographies due to working with the librarians; one neither agreed nor disagreed.

When asked, "In what ways do you feel that the exposure to librarians improves project reports?" one responded: "In the age of wikipedia, the project librarian can help students understand that they need to read a variety of sources and read critically." Another commented that "students are exposed to resources that they probably wouldn't find on their own, or at least not as fast, and to ways of developing bibliographies that make it easier for them, e.g. RefWorks, etc."

When responding to the question "What information literacy skills do you feel your students are still lacking after completing their projects?" faculty commented that improvements could be made in creating better annotated bibliographies (not just copying the existing abstract), preparing more accurate APA citations, and better integration of multiple types of resources into their bibliographies. One felt that students had difficulty in thinking more broadly about their project topic which "may influence their search strategies." Another mentioned that the "hardest thing is for them to truly synthesize literature" but that "this is somewhat a function of time ... as well as conceptual challenge."

Another question related to future directions of the library collaboration with IGSD faculty. Librarians wondered whether or not it would be useful to work with IGSD to create a rubric for analyzing IQP bibliographies. All agreed and the library will pursue this idea with faculty in the coming year.

### **Future Directions**

Interactions with IQP teams are labor-intensive during the first few weeks of each academic term but librarians feel strongly that the experience helps students achieve IL outcomes, based on student and faculty feedback. However, more research needs to be done, perhaps with indirect assessment methods to better understand achievement. Some faculty are working in this area (DiBiasio and Jiusto<sup>9</sup> among others) and it is possible that librarians could partner to develop and implement new assessment methods.

Currently, a multi-year review of IQP projects is performed by faculty. The latest campus-wide assessment of IQP projects occurred in 2007 with results forthcoming. For the 2004 assessment, a random sample of projects were reviewed by seven faculty. Sixty-three percent of the on-campus projects were rated below acceptable, compared to 13% for the off-campus reports.<sup>10</sup> One obvious hypothesis to explain the disparity is the preparation that off-campus students receive, including development of IL skills. The background chapter containing the literature review is one area of projects that the review suggests could be improved. It is possible that a new rubric for assessing the IQP project could be developed collaboratively for use during the actual IQP process to better assess background chapters. Librarians are also working with some on-campus project advisors but more outreach in this area could connect their students with important skills to improve their project work and level of information literacy.

## References

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<sup>1</sup> Association of American Colleges and Universities. (2007) *College Learning and the New Global Century: a Report from the National Leadership Council for Liberal Education and America's Promise*. Washington, DC. [http://www.aacu.org/advocacy/leap/documents/GlobalCentury\\_final.pdf](http://www.aacu.org/advocacy/leap/documents/GlobalCentury_final.pdf)

<sup>2</sup> Worcester Polytechnic Institute. (2007) *Undergraduate Learning Outcomes*. <http://www.wpi.edu/Pubs/Catalogs/Ugrad/Current/outcomes.html>

<sup>3</sup> --. (2004) *Learning Outcomes of the Interactive Qualifying Project*. <http://www.wpi.edu/Academics/Depts/IGSD/outcomes.html>

<sup>4</sup> Worcester Polytechnic Institute. Gordon Library. (2008) *WPI Gordon Library's Information Literacy & Instruction: 2007-2008*. <http://www.wpi.edu/+Library/Faculty/ilvision.pdf>

<sup>5</sup> Association of College and Research Libraries. (2000) *Information Literacy Competency Standards for Higher Education*. <http://www.ala.org/ala/acrl/acrlstandards/informationliteracycompetency.cfm>

Association of College and Research Libraries (ACRL), ALA/ACRL/STS Task Force on Information Literacy for Science and Technology. (2006 June) *Information Literacy Standards for Science and Engineering/Technology*. <http://www.ala.org/ala/acrl/acrlstandards/infolitsscitech.cfm>

<sup>6</sup> New England Association of Schools and Colleges. *Standards on General Education by the Commission on Institutions of Higher Education*. (2005) <http://www.neasc.org/cihe/stancihe.htm>

<sup>7</sup> Worcester Polytechnic Institute. Gordon Library. (2007) "Planning your IQP Research." <http://www.wpi.edu/+Library/Help/researchplan.html>

<sup>8</sup> --. (2007) "Submitting Electronic IQP and MQP Projects." <http://www.wpi.edu/+Library/Help/PDF/Brochures/eprojects.pdf>

<sup>9</sup> DiBiasio, David, and Scott Justo. (2005) "Nontraditional Learning Environments: Do They Prepare Our Students for Life-Long Learning?" *Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition* Copyright 2005, American Society for Engineering Education. <http://www.wpi.edu/Academics/Outcomes/ntle.pdf>

<sup>10</sup> DiBiasio, David. (2005 July 26) *Results of Summer 2004 IQP Review*. <http://www.wpi.edu/Academics/Outcomes/iqpreview2004.pdf>