Concordia College defines undergraduate research as an investigation or inquiry conducted by a student under the mentorship of a faculty member, which contributes to a high-level intellectual or creative outcome. The Council on Undergraduate Research (CUR) views undergraduate research as a collaborative, integrative learning experience that combines teaching and learning and accomplishes four characteristics: mentorship, originality, acceptability and dissemination (Malachowski, 2012). According to this view, under the mentorship of faculty, students work on original scholarly products, which employ the techniques and methodology appropriate to the area of study and which are disseminated by the student.

Engaging in a high-level scholarly or creative project as an undergraduate produces both intellectual and personal gains. Students experience gains in learning such as improvements in making use of primary literature, interpreting data, and communicating results. They also experience personal gains such as an increased ability to work independently, enhanced self-confidence and self-reliance, and greater tolerance for obstacles (Laursen, Hunter, Seymour, Thiry, & Melton, 2010; Lopatto, 2004; Lopatto, 2009). Students also cite meaningful student-faculty relationships and greater career clarification and preparation as benefits of undergraduate research (Lopatto, 2004). Kuh (2008) argues that undergraduate research is one of a number of high impact educational practices, which are effective because students devote time and effort to purposeful tasks, interact with faculty and peers on substantive matters, receive feedback on their work, and integrate, synthesize, and apply knowledge.

Given the numerous benefits of undergraduate research, many institutions are working to develop and enhance their undergraduate research opportunities, making them accessible to as many students as possible. In some cases, the high student enrollment in undergraduate programs and consequent student-to-faculty ratios produce a significant challenge to providing experiences with undergraduate research to all or even most students. Departments are responding by integrating undergraduate research into the curriculum (e.g., Karukstis & Elgren, 2007; Shanahan, 2012).

Course-embedded undergraduate research experiences may provide some of the same benefits to students (E.g., Basu, Lee, & Chapdelaine, 2011; Harrison, Dunbar, Ratmansky, Boyd & Lopatto, 2011) although less assessment of learning outcomes has been completed on curricular integration of undergraduate research, compared to independent student-faculty research. Additionally, course-embedded research experiences, while valuable, might not meet a definition of undergraduate research. They do.
not always produce an original contribution to the discipline; students are exposed to the tools of the discipline and produce scholarly products, but they may not achieve an outcome that can be disseminated in professional settings. However, done well, course-embedded undergraduate research will achieve many of the aims of independent student-faculty collaborative research and may lead to further, more substantive research. This paper will describe one such example – a course-embedded undergraduate research experience that was furthered by the student under the guidance of faculty members, disseminated at regional conferences and on-campus symposia, and published in the campus institutional repository. The student researcher, Anna Ingebretson, will provide a student perspective on her research experience – from Research Methods to the Institutional Repository. Faculty commentary will be provided by Susan Larson, instructor of the Research Methods course and co-mentor of Anna as she continued to work on this project, and the college archivist, Lisa Sjoberg, who maintains the institutional repository wherein Anna’s paper has been disseminated.

**Research Methods In Psychology: Faculty Perspective, Susan Larson**

In psychology, research is often integrated into curricula through a required research methods course. Data from a recent national survey shows that 98% of Psychology Departments require a research methods course as part of the major curriculum (Stoloff, et al, 2010). This requirement is in alignment with the American Psychological Association’s Guidelines for the Undergraduate Psychology Major (APA, 2013). This Guideline outlines five learning goals for the psychology major, one of which is focused on scientific inquiry and critical thinking. This learning goal states that students should “interpret, design and conduct basic psychological research.” The importance of research skills and experiences to undergraduate psychology education is confirmed by Stoloff et al. (2010) who recommend expansion of experiential learning, including research opportunities, provided to undergraduate students of psychology. Dunn, McCarthy, Baker, Halonen, and Hill (2007) similarly suggest that departments should provide a strong science foundation for their students and work to develop student competencies such as writing, speaking, research skills, and information literacy, all of which are skills developed by research experiences.

I have argued previously (Larson, 2011) that psychology programs are particularly well suited to integrate undergraduate research into the curriculum because of the discipline’s commitment to a research methods course and because this course can serve as a model for other disciplines wishing to integrate research into the curriculum (Larson, 2010). Integrating more experiences into required courses in the major, such as a research methods course, may be one way to expose more undergraduates to research experiences. Through such courses, departments can scaffold undergraduate research into the curriculum (Shanahan, 2012) and achieve many of the learning outcomes experienced by students who engage in independent, faculty-mentored undergraduate research.

**Research Methods at Concordia College**

Psychology Research Methods at Concordia College is a process-based course that is required for the major and meets the expectation set forth by the APA that baccalaureate students “design and conduct complex studies to confirm a hypothesis based on operational definitions” (APA, 2013). Importantly, this course achieves institutional goals of scaling up undergraduate research by offering research experiences to all of our psychology majors.

During the course, students work with a partner to complete a research project of their choosing in which they are expected to propose a study, get IRB approval, collect data, and complete the data analyses. Each student is expected to write-up these projects in APA style and to present them during the departmental “Methods Mini-Convention” at the end of the semester. The project accounts for approximately 50% of the student’s grade,
with points coming from: i) research proposal, ii) initial draft of the IRB, iii) in-class presentation of project proposal, iv) draft of introduction & methods, v) discussion with instructor and draft of results & discussion, vi) final empirical paper of the entire project, and vii) mini-convention presentation. While students work with their partner on the ideas for their project, data collection and analysis, and oral presentations of their work, the majority of the students’ grade is based on individually produced draft and final versions of their paper. My challenge as an instructor is to convey enthusiasm to students about the research process, to help them come to a deeper understanding of the scientific basis of psychology, and to guide them through a major research project.

**Strengths and Weaknesses of Research Methods**
Faculty note many strengths of the course in its current form, strengths that are likely evidenced in other research-based courses. First, by providing an introduction to research, students are equipped to complete higher-level scholarship in other courses and significantly contribute to faculty-mentored research. Forty percent of psychology majors require a capstone experience (Stoloff, et al., 2010), and in many of these capstone courses, empirical research is required or encouraged. Methods courses prepare students for future capstone experiences and also provide students with skills that transfer to student-faculty collaborative research. Secondly, by teaching *Research Methods* as a process approach with a student-designed project, students are given ownership of their work, something students cite as a positive of the course. Third, methods courses allow institutions to “scale up” their undergraduate research efforts so that more students are exposed to a research experience during their undergraduate studies.

Finally, and perhaps most importantly, the strength of this course is in the learning gains achieved. A focus group conducted with former *Research Methods* students revealed that students report many positive outcomes of undertaking the project, including learning to do research (and in particular statistical analyses), presenting research, asking questions, and working with other students. Students also indicated that the course met the following departmental student learning outcomes: demonstrate knowledge of the scientific methodology employed in the field of psychology, demonstrate the ability to communicate within the discipline, and demonstrate the ethics and inclusiveness associated with psychology. In particular, students felt that learning about the IRB and data collection confidentiality was the strongest evidence for this goal being met.

Despite these strengths, students and the instructor also note weaknesses of embedding research into this course. In some cases, students wish for more monitoring of their project by their professor and desire more feedback on their writing. Although I work to make myself available to students, I do not always feel I have enough time to devote to each pair of students. How effective instructors are at providing timely feedback will depend on class size. My course is capped at 15 students, so timely feedback is possible; larger class size makes it even more difficult to monitor student progress and less possible to provide timely, or detailed, feedback to students.

Because the students select their projects in my course and topics can be in any area of psychology, I may not be able to provide truly expert advice and insight into the project topic. This means that students might end up doing a lower quality project because I do not have sufficient expertise to push them to develop their ideas at a higher level. In some cases, as was the situation for Anna and her partner, a departmental colleague is able to assist them with their methodology. However, he did this on top of his own teaching and research supervision load. Finally, a recurring challenge for teaching this course, and any required research-based course, is the differing capabilities and motivations of students. Many students come into the course less than enthusiastic about having to take a research methods course; but, in most cases, students do find the project to be fun and
Enjoyable, though at times challenging and frustrating. Despite the challenges, I find Research Methods to be one of the most rewarding and energizing courses to teach. I learn a great deal each semester from the projects my students complete; I love to share with them the joys (and challenges) of doing research and help them learn to be creators, and not just consumers, of knowledge. Course-embedded research experiences serve as an efficient and rewarding way to mentor student researchers, especially those students who might not be able to engage in independent student-faculty collaborative research.

Psychology Research Methods: Student Perspective, Anna Ingebretson

Research Methods was my first opportunity to design and complete a major research project. An important aspect of this experience was being able to undertake a project of my interest that could contribute meaningfully to the field of psychology. With a mutual interest in psycholinguistics and foreign language study, my research partner and I designed a project investigating the cognitive impact of bilingualism in college-aged adults (Bialystok, Luk, & Craik, 2008; Bialystok, 2009). The purpose of our study was to evaluate cognitive function by assessing working memory in both monolingual and bilingual college students. By focusing on an issue in psychology that needed additional research and clarification, I felt that I was making an original and worthwhile contribution to the field that would extend beyond the limits of a class exercise or project.

A valuable aspect of the research experience was experiencing the typical challenges that occur during the investigative process in a setting where I could receive guidance and support. One of my first challenges was navigating a wealth of primary literature on my topic of interest in order to focus my research question—an experience that initially left me feeling overwhelmed by the sheer volume of sources. It was helpful to have class time devoted to discussing how to conduct a thorough literature review, evaluate sources, take good notes, and stay organized, and focus in on a logical, well-informed research hypothesis. By the end of the project, I was skilled at navigating literature and critically evaluating information and had become to a degree an “expert” on that specific area of the literature pertaining to my project. Another challenge was finding appropriate methods to study our research question. While I learned quite a bit through my literature review on how psychologists study a complex construct like human memory, this is where class information was very valuable. Discussing how to design and set up experiments, avoid confounds, devise good measures, and analyze and present results provided me with the foundational knowledge I needed to carry out my experiments. Class exercises helped me grow as an experimentalist and improved the quality of the project I was designing. With these essential “how-to” tools for doing research, my partner and I were then able to recruit subjects, carry out our experiments, and analyze our data in a timely manner.

A critical research skill that I inevitably had the opportunity to develop over the course of the project was problem-solving. As I discovered, things do not always go as planned in research, so it is important to develop skills in adapting and working out problems, which can often lead to new insights or directions. One of the best aspects about the course was that it allowed me the flexibility and independence to problem-solve and think creatively. For example, one challenge in our project was devising a non-verbal measure for working memory since most bilingual participants did not speak...
English as their first language. To overcome this problem, we proposed and designed a visual working memory test to assess cognitive function separate from verbal abilities. This problem led us in a new direction toward considering how different language backgrounds (character-based versus alphabetic writing systems) might impact visual-spatial processing abilities. While more reading and a revision of our hypothesis was necessary, it was rewarding to follow natural questions that emerged from our research and led us toward new opportunities. Through trial, error, and persistence, our project evolved into a well-developed and creative study of the impact of language background on cognitive abilities.

I believe that the most beneficial aspect of learning how to conduct research in a class setting was the mentorship I received. The instruction, guidance, and encouragement helped ensure that I gained a solid foundation in the skills needed to conduct good research early in the project. As my knowledge and expertise grew, I moved on to a more independent role. Early in the course, the instruction I received helped me focus in on the main research questions and define my goals and provided a solid foundation in the skills needed to conduct research. Dr. Larson then essentially stepped back and allowed us to take responsibility for the project, while being available for feedback and assistance. Throughout the research methods experience, I learned about how to be a good experimentalist just as much outside the classroom as inside, interacting with Dr. Larson and developing skills in thinking critically, applying concepts in research methodology, troubleshooting when problems arose, analyzing and interpreting results, and communicating my findings. At the end of the class, I took away not just textbook knowledge but also the accomplishment of carrying out a research study. As a result of this experience, I realized how much I enjoy the process of scientific research and was eager to pursue research further in my studies and career.

Moving on from Methods - The Continuation of the Research: Faculty Perspective, Susan Larson

The learning gains Anna achieved as a result of her Research Methods project – independence, problem solving skills, skills in reading and interpreting primary literature, understanding research design, and clarification of career goals – align with previously cited assessments of student research. Although there are many benefits to the Research Methods experiences, students have a very abbreviated timeline in which to complete their scholarly work, and while they can end the semester with a quality scholarly piece completed, within the class they are not able to follow up their work by tweaking the methods, adding more subjects, or preparing their paper for professional dissemination. Some students, typically those interested in pursuing graduate study and seeking further research experience, take the initiative to follow up on their class project in a subsequent semester or in the summer following their classroom experience. In some cases, students further their Research Methods project in our department’s senior seminar course. In other cases, they do so independent of a class experience.

Concordia offers the opportunity for students to apply for internally funded grants that facilitate students’ engagement in undergraduate research. One such award, the undergraduate research student scholar award, provides a stipend to support undergraduate students carrying out research, scholarship, and creative activities. This award provides students funding that can permit them to work fewer hours at part-time employment and devote more time to scholarly work. Receiving funding through a competitive grant process also enhances the student’s resume.

Anna applied for and obtained a student scholar award, which assisted in funding her to independently continue her research project. Although she took this on independently, for each research project of substantial magnitude, mentorship plays a key role. As Hakim (2000) wrote in CUR’s How To Guide on How to Develop and Administer Undergraduate Research Programs, students need faculty mentors to “help them enter the conversation of the discipline” in a meaningful
Moving on from Methods - Continuation of the Research: Student Perspective, Anna Ingebritson

Completing my research methods class project left me not only with a sense of accomplishment but also a number of new questions to explore. Because my experience with class-based research was very rewarding, I wanted to continue my research out of the classroom. I was interested in further researching the contribution of a linguistic background to visual-spatial abilities in bilinguals by adding an additional variable, visual working memory, to our investigation. In addition, I identified weaknesses and areas in the previous study that I thought could be more thoroughly evaluated or controlled. Therefore, I was eager to re-design my project and carry out a new and improved investigation. As I increased the level of complexity and detail of my project, it was very helpful to have mentors available along the way to discuss the theoretical background of my project with me, help troubleshoot problems, and provide useful feedback. With the guidance of Concordia’s cognitive psychologist, my study evolved into a much more thorough evaluation of a specific question in cognitive psychology, yielding some interesting findings. The result of following up with my original Research Methods project was a more in-depth and complete study that I was well prepared to present to a larger audience for further dialogue.

Dissemination of the Research, Faculty Perspective, Susan Larson

One defining criterion of research and scholarship is the dissemination of the work to a professional audience, and providing students with these opportunities is one characteristic of excellence of undergraduate research (Rowlett, Blockus & Larson, 2012). Students who are given the opportunity to share their scholarship develop important communication skills. Although the Research Methods course at Concordia gives students the experience presenting their work to their peers, it does not require a public dissemination of the project. This is by design. Not all work completed in this course is of the level that the instructor would recommend to a research conference. Additionally, not all students are interested in fine-tuning their work after the course is over in order to get the product to the level that would be appropriate for such venues. Some of the work completed in Research Methods, however, does meet the criteria for public dissemination, and Anna’s class project and the follow up work she did was one such example. Her work was disseminated at three very different venues: on-campus symposia and lecture series, a regional psychology undergraduate conference, and the Concordia College institutional repository.

A very effective tool for dissemination of student scholarly work is at regional disciplinary conferences (as outlined in the CUR Quarterly devoted to regional conferences, McConnaughay (ed.), 2012). Most disciplines have access to regional meetings that welcome student presenters. In some cases, regional conferences are designed solely for undergraduate presentation and Concordia is co-host to one such conference. Conference presentations are important resume/vita builders for students, and a regional undergraduate conference increases the chances that students in their sophomore or junior year will be able to present their findings. Our regional conference provides a readily accessible and inexpensive opportunity for students to present their work, an important consideration if institutions do not have travel budgets to support significant student travel, and students are themselves not able to fund their own travel. The limitation of our regional conference is that undergraduates do not get a chance to see graduates students and professionals give presentations and learn from those at a more advanced level. For this
reason, it would be desirable for students to present at other professional meetings.

On-campus student presentations are another valuable venue for disseminating research findings. The audience at these symposia and lecture series come from all disciplines, so students have to learn how to talk about their research to an educated audience, but not one that knows or understands their topic or methodology. Institutions that provide on-campus symposia for students help to build valuable communication skills and create a culture of undergraduate research (Rowlett, et al., 2012). In addition, a culture of undergraduate research is supported by offering students the opportunity to publish their work in school journals or holdings, such as institutional repositories.

Anna will reflect on her experiences sharing her scholarship with a general audience at Concordia’s Celebration of Student Scholarship and Student Lecture Series, but first Lisa Sjoberg will describe our institutional repository in which Anna’s final paper was shared.

**Concordia’s Scholars: Undergraduate Research Collection: Faculty Perspective, Lisa Sjoberg**

One option for students to disseminate their work at Concordia is to submit their finished manuscript to *Concordia’s Scholars: Undergraduate Research Collection*. The goal of this institutional repository (IR) collection is to gather, disseminate, and preserve examples of exemplary research of Concordia College students. In so doing, the repository accomplishes three important objectives: i) provides an elite outlet for students to strive for academic excellence and publication; ii) serves as a historical snapshot of student academic life and output; and iii) demonstrates the quality of Concordia academics thereby serving as a recruitment tool for student, faculty, and staff prospects. Student knowledge of the IR may also serve to motivate them to undertake quality work that may ultimately be shared in this venue.

The IR solicits content that has already been vetted, such as on-campus lectures, conference papers, departmental honors papers, and the like. Because we do not have a review process in place and maintain the IR with limited resources, we notify all submitters that papers will not be proofed nor edited for grammar, spelling, or proper citation formats. Because Anna had presented her work at a conference, she was invited to submit her paper to the IR, which served to be a culminating dissemination opportunity for her.

Making use of advice from Nabe’s (2010) book, *Starting, Strengthening, and Managing Institutional Repositories: A how-to-do-it manual*, we developed an institutional repository with the following submission guidelines: i) Content in the IR will be available in perpetuity and will not be withdrawn from the repository unless legal concerns, such as copyright, libelous content, or privacy issues, arise. ii) One of the primary goals of the IR is the long-term preservation of content. Submitting material to a repository guarantees that the material will be backed up and migrated, which is not the case for materials housed on individual computers or web pages. iii) The material in Concordia College’s institutional repository may be viewed, printed, and downloaded for personal use. iv) Users are responsible for providing proper attribution and citation. v) All other uses of content must be approved by the repository’s staff. vi) Because the goal of an institutional repository is to provide open access to quality research, material is not restricted. Access will only be restricted if demanded by a publisher or to protect the future publication or patent registration of content.

Concordia Scholars: An Undergraduate Research Collection has been a worthwhile endeavor for the institution and its students, primarily because we have found a way to celebrate the scholarship our students produce. By submitting to *Concordia’s Scholars*, Anna’s paper will become a permanent part of Concordia’s collections and available for other researchers. It may be accessed by those with similar scholarly interests, but also by students in other sections of psychology Research Methods who might wish to see the level of work possible for students in that course.

Dissemination of the Research: Student Perspective, Anna Ingebretson
Throughout my research experience in class and afterward in my independent project, I gained a considerable amount of knowledge and experience in designing and conducting research, which in itself was very rewarding and motivating to me. However, it was even more satisfying after completing a project to present my findings to an interested audience. I presented my research at a number of talks and poster sessions on campus as well as at a local psychology conference, experiences that helped to build my CV and graduate school applications. I enjoyed presenting to students and faculty in psychology, hearing their opinions and feedback about my research, and entering into a dialogue with them about my findings—communication skills that I know will be useful in the future as well.

A challenge, however, was presenting my research to people outside of psychology. While I had spent a great amount of time reading, discussing, and becoming very familiar with technical terms and ideas in a narrow area of cognitive psychology, I had to learn to step back and present the big picture of why my research was important and what other people (not necessarily psychologists) could take away from my findings. I had the opportunity to present my research at Concordia College’s Student Lecture series, where I was able to discuss the broader implications of bilingualism and foreign language study with others in the college community. As I prepared these presentations, I was reminded that the main reason why I had undertaken this research in the first place was because of my interest in diverse languages and cultures. I hoped that my audience might take away a new interest and appreciation for diversity and how it impacts mental and cognitive abilities. The questions I received during the Student Lecture made me think further about the purposes of my research and how it can benefit others. It has also been rewarding to hear back from students who participated in my research or attended one of my presentations and have since chosen to study a foreign language or travel abroad as a result of my research. These dissemination experiences have been important for helping me express my research interests equally to scientific and non-scientific communities.

In addition to presenting posters and talks about my research project, I had the opportunity to publish my research paper in Concordia College’s institutional repository as part of the Undergraduate Research Collection. It was an honor for me to submit my work along with other undergraduate researchers who did excellent work in their respective fields. By being invited to submit my research paper, I felt that the college recognized and appreciated the contribution I had made to the academic community during the course of my studies.

Conclusion

Anna’s research experiences demonstrate the value of integrating undergraduate research into the curriculum. Through her Research Methods experience, Anna achieved numerous learning gains, including skills in independence and problem-solving and understanding how to conduct and communicate scientific research. Anna’s experience also points to the value of having an institutionalized undergraduate research framework. By offering funding for her to continue this project, providing on-campus dissemination opportunities, coordinating a regional conference at which she presented, and supporting an institutional repository of undergraduate research, Concordia College created a culture of research that provided transformative learning experiences. In order to facilitate a high percentage of collegiate students achieving the learning outcomes resulting from undergraduate research, institutions would be wise to provide course experiences that integrate undergraduate research and to provide a framework for those student researchers to leverage their classroom experience by furthering and disseminating their scholarship.
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