

The Critical Role of Research in Adventist Education

At all academic levels, educators are recognizing the value of teaching techniques that involve more hands-on interaction and less rote memorization. When students are actively engaged, they are better able to remember facts, integrate ideas with already-existing knowledge, and think critically about the sources of information and how the information might be applied. At the college or university level, this type of active learning may—and we would argue, should—include research experience in the student's primary areas of study. Undergraduate research, defined as "an inquiry or investigation conducted by an undergraduate that makes an original intellectual or creative contribution to the discipline,"¹ is important for a variety of reasons.

Benefits of Research

Research benefits the undergraduate student in two important ways:

1. It provides the kind of interactive environment that best promotes learning. Students who engage in research develop a solid grounding in the pertinent literature as well as the ability to ask appropriate questions. They learn to create proper hypotheses and question statements for testing, and to use their creativity to discover answers to problems. This frequently involves learning discipline-specific techniques for data collection and analysis, such as growing tissue culture cells in an

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immunology laboratory or conducting a content analysis of media events for a research project in communication. In the research process, students also practice applying what they have learned and receive instruction on how to avoid the pitfalls of improper use of the data. When students become part of a research group, they not only gain concrete knowledge, but also learn to collaborate and eventually have the opportunity to mentor less-experienced students. Thus, they learn to be players on the larger, scientific "team" of their discipline.

2. Research provides students with a "jump on the competition" when preparing for graduate or professional studies. Entry into these programs is competitive, with most applicants presenting résumés replete with high levels of

academic achievement and an impressive list of extracurricular activities. Many students do not begin to do original research until they are in graduate school, however, so an applicant with research experience is likely to be particularly attractive to a graduate institution.

Undergraduate research also benefits the professors who supervise the studies, as well as the colleges and universities where it is conducted. The primary rewards for professors are twofold: (1) an enriched learning environment for their students, and (2) assistance in conducting studies that are important for their own academic advancement and tenure. The school benefits because its students graduate with a wide range of skills and experiences, which enhances its reputation. It gains further accolades if student

research contributes to a discipline, ei-

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ther through conference presentations or publications. Thus, a strong undergraduate research program can become a valuable recruitment tool for a college or university.

How to Create and Support Undergraduate Research

The *value* of undergraduate research is clear, but the “*how to*” of creating and maintaining an active undergraduate research program at a small college or university with a limited budget presents a more complex problem. Read on for a summary of the broad types of research in which students may become involved, suggestions for supporting such research at different levels of the academic hierarchy, and examples of successful undergraduate research promotion. We will also identify some funding sources for undergraduate research and address ethical issues that are of particular concern in such research.

The first thing that comes to mind when people think of “research” is probably a white-coated individual surrounded by test tubes and a microscope. Although the traditional laboratory sciences such as biology and chemistry certainly provide many opportunities for undergraduate research, there are numerous other ways for students to become actively involved in the scholarship of their varied disciplines. Thus, our definition of research includes, but is not limited to, carefully controlled laboratory studies. Research, whether or not it is laboratory-oriented, can and must be encouraged and supported. In the physical and social sciences, research means conducting empirical studies, either in the laboratory or the field, that quantitatively test carefully defined hypotheses and describe the probability that the conclusions drawn from the study are correct. In other disciplines, such as the fine arts, research may involve the exploration of historical icons and works, or a more creative process as an artist develops his or her own eclectic voice and style. Other disciplines, such as the humanities, fall somewhere in between; their methods may involve quali-

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tative or quantitative techniques.

Depending on the student’s interests and the types of research programs available, he or she will need to either join an ongoing project or design an individual investigation. For beginning researchers, the former is usually preferable because the structure that ensures appropriate

investigative methods is already in place. Thus, the student does not become entangled in false starts and time-consuming errors that he or she might encounter with a completely novel project. A more comprehensive learning process may be gained by more advanced students, however, if they conduct an independent project that begins with an evaluation of the current state of the literature and includes study design, data collection, and synthesis of findings.

Academic support for student research is crucial. All teachers should emphasize the importance of research in their lectures and encourage students to do class projects that explore novel concepts or include original research. Professors can actively recruit students to work with them on their projects

and offer support for independent student projects. Departments can incorporate academic requirements that acquaint students with the process of research (for example, a senior thesis). In addition, many colleges and universities have some form of honors program, either within certain departments or as part of the general-studies curriculum. Such programs provide an outstanding opportunity to promote undergraduate research, since many already require some type of thesis or senior research paper.

Even if only a few faculty members in a college are doing active research, the school can develop a curriculum that supports it. As more hands-on opportunities are developed, departments can encourage students to attend professional meetings, either as part of a course offering or as the guest of a professor attending the meeting. Being immersed in the culture of research for a couple of

An LSU sophomore psycho-biology major identifies areas of a sheep brain in preparation for dissection.

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Undergraduate LSU psychology majors attend a conference at UCLA in southern California.

students and faculty members that it has now expanded to an entire week. During this time, the art gallery features outstanding student artists, research posters go on display, a campus-wide assembly is devoted to paper presentations (several venues are available concurrently so students can choose which presentations to attend), junior and senior honors presentations are scheduled in the afternoons and evenings, and an elegant evening reception is

followed by a keynote address and awards presentations for outstanding student work. Such celebrations of student accomplishment provide a forum for the exchange of new ideas and may serve to motivate further study.

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LSU undergraduate students participate in a weekly paper discussion with their mentor, Dr. Kim.

days can be a heady and inspiring experience for students and teachers alike. Conference attendance also provides networking opportunities that may facilitate future academic pursuits.

Regular department-sponsored colloquia may also spark students' research interests and enhance the general academic environment. This can be efficiently accomplished by recruiting speakers who already live or work in the area and by investigating who will be visiting the area. For example, it may be impossible to provide airline tickets, housing, and food, along with an honorarium for that "big name" person you'd like to invite, but if she or he is *already* in town on business, you can probably arrange a brief visit to your institution for just an honorarium.

The college administration can support student research by ensuring official recognition of outstanding student accomplishments by giving research awards or providing a forum for the dissemination of students' research findings. This does not require a large financial commitment. For example, Research Recognition Day has become an annual event at La Sierra University in Riverside, California. It began as a one-day celebration, with students displaying posters highlighting their research (both independent and from class projects), a simple reception, and small cash prizes for the most outstanding posters. It became so popular with both

Supporting Research

All researchers, including students, often struggle with issues related to the support (financial and other) of their work. Many types of assistance can help to further scholarly pursuits. For example, the Council on Undergraduate Research (CUR) uses a multi-pronged approach to provide information on funding agencies, assist the development of faculty research programs in undergraduate institutions, and aid administrators as they seek to enrich the research environments at their schools. A booklet, *How to Develop and Administer Undergraduate Research Programs*, can be ordered from their Web site (<http://www.cur.org/>). Another good resource, tailored to the sciences, is Project Kaleidoscope at <http://www.pkal.org/>. La Sierra University's Office of Sponsored Research maintains a Web site with a page devoted to undergraduate research (<http://www.lasierra.edu/departments/osr/undergrad-rsrch.html/>). Here students (and faculty members) can read student research profiles, learn how to get involved in research, and get information about both internal and external funding opportunities. Money is often available from private funding sources for very specific types of projects or groups of researchers. It is worthwhile to seek these out—if you find one that matches your research plans, this can be a straightforward and relatively simple way to obtain funding.

Of course, funding is not the only issue to be addressed. Institution-specific criteria for evaluating the success of undergraduate research programs must be established. These will depend on an institution's specific goals for its graduates. Student research projects must be well-defined, and students need regular feedback in order to stay focused.² Criteria for guiding and evaluating student research must be clear and firm. It is useful to create a set of guidelines and a contract, which both student and supervisor sign, to ensure that the expectations of each are addressed.³

Ethical Considerations

Student researchers must also be made aware of the impor-

tance of following ethical guidelines when doing research, particularly if the research involves humans or animals. Every undergraduate student, before beginning any project or performing any project-related duties, should become familiar with the requirements of his or her school's Institutional Review Board (IRB, which governs research involving humans) and Institutional Animal Care and Use Committee (IACUC, which governs research involving animals). These requirements should be reviewed and updated regularly, according to federal and international protocols.

Faculty members who conduct research or supervise student research must also be knowledgeable about the requirements for ethical conduct. Since experiments may have the potential for causing physical or emotional distress, students need to be fully briefed on the Christian principles applicable to such research, as well as the legal ramifications. The failure of even one person to comply with federal guidelines jeopardizes the institution's ability to receive research funding and may bring other sanctions as well.

Adventist institutions of higher learning are typically smaller than their secular counterparts. Although there are some disadvantages to being small, one clear advantage is the opportunity for students to have one-on-one contact with their professors and the close, family-like atmosphere that this fosters. The chance to work closely with professors in a research environment is an added bonus to the individualized attention that Adventist institutions already provide. A rigorous and research-oriented academic curriculum, coupled with a faculty genuinely concerned for the mental, physical, and spiritual health of its students, is something we owe to each of our students. ✍

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LSU undergraduate students, with mentor James Wilson, present their work at a regional cellular and molecular biology conference.

Dr. James R. Wilson is currently a Professor of Biology at La Sierra University. He received his Ph.D. in developmental biology from the University of Cincinnati, Ohio. He has taught biology at LSU for nine years and has been instrumental in promoting discovery-based laboratories for biology majors and in instituting the university-wide Research Recognition Day at LSU.

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LSU undergraduate biology majors attend a meeting of the American Society for Cell Biology.

LSU psychology major Kristina Jahng corresponds with one of the co-authors of her research project, a physician at the University of North Carolina.