

Teaching Matters

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Why involve undergraduates in research?

The 2001 KU committee on general education identified the first program goal as this: "Enhance the skills and knowledge needed to research, organize, evaluate, and apply new information and develop a spirit of critical inquiry and intellectual integrity." One of the most effective ways to help undergraduates reach this goal is through research experiences.

A major force in the University's emphasis on undergraduate research was the Initiative 2001 strategic planning process, specifically the task force on building a premier learning community. This group developed a statement of the value, attributes and distinction of a KU degree (www.ur.ku.edu/Admin/2001/2001reports/PremierLaw/attrib.html).

But *why* involve undergraduates in research? Lee Haugen (2002) identifies four reasons:

1. **Society needs citizens who have developed investigative and analytical skills and can critically evaluate information.** As the National Science Foundation Strategic Plan (1994) notes, "The integration of research and education holds the promise of enriching student learning while enhancing public understanding."
2. **Colleges and universities need to retain students.** A

report on an undergraduate research program at the University of Michigan by Nagda, et al. (1998) found that underrepresented minority research participants had an attrition rate of 11.4% compared to 23.5% for nonparticipants. White research participants' attrition rate was 3.2% versus 9.8% for nonparticipants.

3. Abrash, et al. (1998) found that "**students are more likely to go to graduate school if they have done undergraduate research.**" This is most true when undergraduate research is encouraged early in a student's career and where the research experience is not limited to honors students."
4. **Involving undergraduate students in research can energize you and renew your enthusiasm for teaching.**

Like others, Haugen recognizes that the community of scholars at research universities can provide undergraduates with important learning experiences by involving them in facets of research. Haugen believes "Research: It's not just for faculty anymore."

—JE

References

Haugen, L. (2002). Research: It's not just for faculty anymore. *Tomorrow's Professor*, 413. <http://ctl.stanford.edu/Tomprof/postings/413.html>
Other references provided upon request.

Undergraduate research experience complements general education

Dan Bernstein, CTE

The undergraduate experience at KU is distinguished by a number of opportunities, including global participation, service connected with learning, and research participation. While not every faculty member is connected with the global and service programs, we are all involved in ongoing research and inquiry in our fields. Just as we grow intellectually from our continued participation in research, undergraduates' experience with research generates in them both a richer understanding of the field they study and a more personal motivation for learning. An intensive exploration into the process of gaining knowledge in a concentrated area is an excellent complement to the benefits of a general and broad education provided in conventional classes.

It could be argued that successfully educated college graduates rely less on authority per se as a source for understanding. Educated people critically evaluate multiple sources of evidence and information, and they are also practiced at bringing various frames of reference to the analysis of what has been found. Lifelong learning will depend upon establishing patterns of intellectual inquiry that are well represented in the various forms of research that KU faculty do. While it is good that we share with students the products of our inquiry through lectures and writing, there is a complementary form of learning that comes only from

engaging directly and personally in the search for understanding.

A wide range of activities are part of the research enterprise, ranging from mundane and rote tasks to complex forms of design and interpretation. Some research skills are practical and manual, while others involve only the manipulation of symbols, and yet another kind of skill largely involves creative and conceptual thinking. Students working on research can engage in all those

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activities, and the best undergraduate research participation program would include that full range. Students should experience the insights that can be an inherent product of many hours of apparent drudgery, while at the same time learning that research success is not easy or free, but is achieved with the investment of substantial effort and time.

To make sure that KU undergraduates have the best possible educational experience, there needs to be an integrative intellectual product that students produce through their work. This product would be our institution-

al signature attesting to our commitment to the program. The details of such a product have been considered by a recent committee, the Task Force on Undergraduate Research at KU, chaired by Craig Martin. The committee's charges included considering certification for and centralization of undergraduate research experiences. A proposed vehicle for presenting this work is described by Linda Luckey and Beth Warner on page 5 of this newsletter. Whatever form it finally takes, the work will be a reflective account of the full range of the experience. It will report on the careful and painstaking work of gathering evidence, and there will be analysis and interpretation of what the evidence tells us. In an important sense, these projects will often be less about findings and more about the nature of students' inquiry and thinking in the context of the field being studied.

When we recruit students to KU, we point out that research is a distinctive strength. As we move forward with expanding the scope and visibility of student research work, we can make it clear to all that this is not a shortcut to finding volunteer help. Students are significantly engaged in the work that we call research. They will be framing a way of knowing grounded in the perspective of an intellectual field, and they will be gathering motivation for a life of informed but skeptical inquiry beyond their time at KU.

CTE offers three forums this spring for faculty and instructional staff

During the spring semester, the Center for Teaching Excellence will offer three forums for faculty and instructional staff, including GTAs. No registration is necessary. CTE will provide beverages and treats. All sessions will be held at CTE in 135 Budig.

For more information, contact CTE at 785-864-4199 or cte@ku.edu.

Essential Teaching Practices

Essential Teaching Practices workshops will be held during the lunch hour, from 12 to 1 p.m. Three sessions will be offered:

Using Active Learning to Improve Student Learning—
Tuesday, February 1

Practical ways to use active learning with your students to help them engage in course material. With Delores Ringer, theatre and film.

Leading Discussions: Practical Models for Your Classroom—
Wednesday, February 16

How to make discussions an effective tool for you and your students; several models that you can use will be demonstrated. With James Grobe, psychology.

How to Evaluate Creative, Complex Student Work—
Wednesday, March 2

Ways to make your grading standards clear to students and less subjective for you. Particularly helpful for teachers who evaluate creative student work. With Andi Witczak, design.

Lunch & Conversation

L&Cs are also held from 12 to 1 p.m. This spring, we'll offer these three sessions:

Best Practices in Teaching Large Classes—
Tuesday, February 8

Bring your questions and answers to this forum on meeting the challenges of teaching large classes. We'll cover the spectrum, from handling e-mail from all those students to encouraging academic integrity during exam periods. With Tracy Russo, communication studies.

Dealing with the Drag: Sustaining a Course at the End of the Semester—
Monday, March 7

Join faculty members who are searching for ways to minimize "Spring Fever" among their students. We'll discuss ways to keep our courses (and ourselves) vibrant until the last day of class. With Sarah Ferguson, speech-language-hearing, and Megan Greene, history.

Evaluating Teaching Beyond the Student Survey—
Tuesday, March 29

A discussion and demonstration of options for representing your teaching for reviews at the department, school, and university level, beyond the C&I survey. With Dan Bernstein, CTE/psychology, and Chris Haufler, ecology and evolutionary biology.

Teaching Teas

Teaching Teas are held from 3:30 to 4:30 p.m. Join us for these sessions focused on the scholarship of teaching:

Designing Assignments for Group/Collaborative Learning—
Thursday, February 3

How do you create a problem or design a group project so that everyone has to be involved? What team building support has to be there to prevent meltdown if someone fails to produce her or his interdependent piece? With Dan Bernstein, CTE/psychology, and Dan Spencer, business.

Finding Your Teaching Voice—
Wednesday, February 23

An exploration of how we see ourselves as teachers, and the impact that has on us and our students. With Sharon Bass, journalism, and Reva Friedman-Nimz, teaching and leadership.

Using Visuals to Promote Learning in Large Classes—
Monday, February 28

Use visuals to capture students' attention and improve understanding in a large class setting. With Chris Brown, geography, and Liz MacGonagle, history.

Analyzing and Revising Courses to Improve Student Learning—
Wednesday, March 9

Reflect on evidence of learning and find ways to revise instruction. With Holly Storkel, speech-language-hearing, and Andi Witczak, design.

Developing students' understanding of the facets of research: Undergraduate research exposure

Rachel Thompson & Greg Hanley, Applied Behavioral Science

Students in the Department of Applied Behavioral Science (ABS) choose a specialty area that provides concentrated study relevant to a population of interest. Within the early childhood education specialty area, students have the option of selecting a research sub-specialty. Majors who choose this area complete two research practica following a methods course in which students learn important scientific concepts and research strategies as they are applied to the assessment and remediation of diverse social problems (e.g., developmental delays, juvenile delinquency, substance abuse).

Students enrolled in the research methods course who choose to participate in ongoing research and those enrolled in the early childhood research practica work directly with department faculty and masters and doctoral students on one or more research projects. Students first become familiar with the research questions, measurement strategies, study rationale, and systems for analysis and data depiction through initial meetings and reviews of written research protocols. Next, students are given the opportunity to practice observing and collecting data until reliability criteria have been met. Students then learn additional skills including how to summarize, analyze, and graphically depict data, as well as how to conduct sessions as the experimenter, teacher, or therapist. All students are active mem-

bers of their respective research teams such that they have input into decisions regarding the ongoing progress of the project. Some students present projects and the resultant data to the research group, and a subset of students receive co-authorship on presentations at local, national, and international conferences.

Students' understanding of research tactics, strategies, processes, and communities is evident in two ways: products of their work and direct observation of their skills. Work products, such

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as observer agreement percentages, accuracy of analyzed data, working and finished graphs are evaluated (and often celebrated) at least weekly. Students in the research methods course also generate two products that display a synthesis of research knowledge: a written research proposal which addresses a socially and personally important problem, and a poster presentation of that proposal. However, some of the most important measures of understanding are only apparent by directly observing the students engaged in the actual conduct of research. Therefore, a list of

approximately 40 skills has been identified, and the graduate and undergraduate students work as teams to develop each skill throughout the semester. Feedback is provided daily, and ratings are provided for each skill at least every four weeks. In essence, students' understanding of the many facets of research are evident in their ability to generate accurate research products, apply the tactics and strategies to an area that is important to them, and display competency in a set of agreed-upon skills of successful behavioral researchers.

Undergraduate students participating in these courses often develop research skills and understanding that meet or exceed expectations for many graduate students. Students seem to benefit from and enjoy the opportunity to observe systematic behavior change with our participants and to have frequent, positive, educational interactions with graduate students and faculty members. In the past three years, several undergraduates who experienced this program have sought additional clinical and research experience by gaining employment with some of the premier university-affiliated programs, including the Kennedy Krieger Institute and the Marcus Institute. Several others entered graduate programs that will help them continue their preparation as contributing members of the behavioral science community.

(continued page 5)

What? So What? Now What?: Student e-portfolios enhance undergraduate research experiences

Linda Luckey, Provost's Office, & Beth Warner, Information Services

Students participating in research experiences at schools such as Purdue and Indiana University have a tool to enhance the development, assessment, and display of their research skills—the digital research portfolio. A digital or e-portfolio is a record of students' accomplishments during their academic careers and may be used for reflection, communication with instructors, or documentation of credentials. e-Portfolios lend themselves particularly well to documenting and featuring research experiences and can even be used to document their completion for a student's transcript.

Students who participate in substantial research experiences, like the ones Rachel Thompson and Greg Hanley offer in Applied Behavioral Sciences, could potentially use an e-portfolio to display their work through a web site available to prospective students, potential employers, peers, and graduate schools. In particular, the poster presentation Thompson and Hanley mention could easily be the cornerstone of a student's e-portfolio page on research.

Learning is an active process through which knowledge is constructed, and reflection is necessary to truly learn from that process. Looking at KU's first two General Education Goals,

1. Enhance the skills and knowledge needed to research, organize, evaluate, and apply new information, and develop a spirit of critical inquiry and intellectual integrity; and

2. Acquire knowledge in the fine arts, the humanities, and the social, natural, and mathematical sciences and be able to integrate knowledge across disciplines

it is easy to see how an e-portfolio that includes reflection could encourage students to take the research experience beyond simply answering *What?* to thinking more broadly about *So What?* and *Now What?* By integrating the research experience through critical reflection into the entire liberal arts experience, the role of faculty and student is fundamentally changed. The student is no longer simply the recipient of information and the cataloger of skills, but is actively involved in con-

structing meaning by integrating and reflecting on issues raised in a course or across a program of study. By fostering a reflective approach to learning, the process of e-portfolio development encourages students to become actively involved in planning, and more responsible for achieving, their own educational goals.

Imagine the resource an e-portfolio would be when it represents the best of a student's work in academic, service-learning, international, and research experiences during his or her university career! Employers and admissions committees could see more than cryptic reflections in a transcript. As an added benefit, e-portfolios could demonstrate the value of undergraduate research beyond our campus. When students' best work is displayed publicly, potential students, donors, and legislators can easily see the real work of our faculty and students and gain a better understanding of why our enterprise is valuable, not only to students, but to the state and to society as a whole.

Developing students' understanding of research

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Thus, our students are exposed to philosophical foundations of a behavioral science and the existing knowledge in the field; however, interested students also may

choose to become intricately involved in creating new knowledge by participating as active members of a research team. This experience provides students with

an understanding of the scientific process and puts them in direct contact with some of the important outcomes that can be achieved through applied research.

Students' electronic portfolios showcase achievements and support lifelong learning

Craig Gerdes, IDS

Portfolios have been around for many years. Artists have maintained portfolios demonstrating their drawings, and people have kept financial portfolios containing a comprehensive record of their fiscal transactions and investment holdings to demonstrate their monetary worth.

Student portfolios, however, are a relatively new trend. A portfolio is defined as a systematic and organized collection of exemplary work. In this case, it contains work that a student has collected to show personal growth and change over time (i.e. course, semester, college career, lifetime). A critical component of a student portfolio is the learner's reflection on the individual pieces of work (often called artifacts), as well as an overall reflection of learning.

Portfolios are highly motivating because they emphasize and illustrate a student's accomplishments. They also promote self-evaluation and evidence of a relationship between instruction and learning, which helps students see personal growth.

Electronic portfolios have recently become popular, as new technologies have been developed. An e-portfolio uses various technologies and media types (audio, video, graphics, text, etc.) to create and publish a portfolio viewable on a computer. The e-portfolio development process is comprised of five stages: collection, selection, reflection, projection, and presentation.

- **Collection:** In the collection stage, students save artifacts that represent achievement of course goals, program objectives, or learning outcomes. This is the primary activity of a "working" portfolio.
- **Selection:** Students examine their collection and decide what to include and what to exclude. This process allows students to choose artifacts that demonstrate their best work and successes.
- **Reflection:** Students articulate their thoughts about each item and the portfolio overall. This activity increases awareness of their learning processes and growth in skills and knowledge over a period of time.
- **Projection:** Students review their reflections and identify gaps in their development. This process helps students to set future learning goals and supports lifelong learning.
- **Presentation:** Finally, students share their portfolios with their peers. This activity provides a unique opportunity for students to collaborate and gather feedback for improvement. It also presents a commitment to quality and continued professional development.

The only required equipment needed to create an electronic portfolio is a computer. Optional equipment includes a scanner, digital camera, video camera, microphone, and CD recorder. The simplest software needed to

start includes Microsoft PowerPoint or Word. Adobe Acrobat and a web-authoring program such as Dreamweaver are also possibilities. Specialized programs specifically produced for electronic portfolio development are also available.

In the end, a student's electronic portfolio should be well organized and complete, as well as creative and visually appealing. It should demonstrate quality and diversity in artifact selection and an insightfulness and a commitment to the learning process past, present, and future.

The value added in creating an e-portfolio by far exceeds the efforts expended, but students should approach their use of technology conservatively. They should keep the process simple by using familiar software as they get started. Above all else, the electronic portfolio should showcase student achievements and a commitment to lifelong learning.

Additional information about electronic portfolios can be found at these web sites:

<http://webcenter1.aahc.org/electronicportfolios/index.html>
<http://electronicportfolios.com>

A rubric for evaluating student portfolios is available at:
<http://www.uvm.edu/~jmorris/rubricep.html>

Examples, templates, resources, and assistance are also available at Instructional Development and Support, as well as CTE.

Storkel, Witczak to present at Carnegie colloquium

Holly Storkel, assistant professor of speech-language-hearing, and Andrea Witczak, assistant professor of design, will co-present a session on reflective practice at the Carnegie 2005 Colloquium on the Scholarship of Teaching and Learning: Evidence of Student Learning, in Atlanta on March 16 and 17. Dan Bernstein, CTE/psychology, will also co-present. Storkel, Witczak, and Bernstein's presentation will be based on their research on reflective evaluation of learning, summarized below.

Comprehensive consideration of student performance is central to reflective practice at many different stages of the development of an effective course. Good design begins with careful construction of the opportunities for students to demonstrate understanding, along with well-specified procedures for providing feedback and evaluation. Once students' performances are measured, the next step is serious reflection on the evidence of learning from a course offering and revision of instructional design for future offerings. The final stage of analy-

sis involves examining learning across several course offerings, noting how well instructional design changes have succeeded in enhancing student performance.

Witczak's work has been on addressing the challenge of evaluating a complex and authentic project by advanced undergraduate students in a graphic design course (Visual Identity Design and Branding Strategy). The project is broken up into component parts, and students have sketches or research due every class period. Learning takes place through the doing/making, and class time is spent in constructive critique through which students discover the project goals. These interactions are based on a rubric devised for the course, and they make the final evaluation criteria transparent to the students.

Storkel has focused on retroactive reflection on a completed course to identify areas that may require further inquiry and revision. She has used both quantitative and qualitative data from an undergraduate course (Phonetics and Phonological Development)

to study how course grades and examples of student work can be used to explore effectiveness in promoting student learning.

Bernstein has tracked changes in a single course across four offerings. Based on an established set of complex performances and using non-experimental analysis, he has found the cumulative impact of these enhancements on student understanding.

On March 9 at 3:30 to 4:30 p.m, the three faculty members will present a version of their session at one of CTE's Teaching Teas in 135 Budig. They will demonstrate how these forms of inquiry can be readily shared by colleagues, resulting in an informal and robust community of discourse centered on student learning. The three presenters will also facilitate a conversation among participants about any features of their individual work and about the collaboration they experience in the KU teaching community. For more information about the session, see page 3.

Faculty invited to join problem-based learning group

Problem-based learning (PBL) is attracting attention as a useful method for preparing students to apply important concepts and test skills in realistic ways. With PBL, students work in groups to find solutions to real-world problems. Barbara Duch, a leading PBL

researcher, believes that it prepares students to think critically and analytically, and to find and use appropriate learning resources.

However, the ways in which we define and use PBL differ considerably across disciplines and contexts. Reva Friedman-Nimz,

teaching and leadership, is inviting faculty who use PBL to begin a conversation and idea exchange about ways to use it in liberal arts and professional school contexts. If you are interested in participating in this group, contact Friedman-Nimz at revacf@ku.edu.

Sixteen ways to promote undergraduate research

In a recent issue of *New Directions for Teaching and Learning*, David F. Lancy described how he promotes undergraduate research among his students. He does so based upon his belief that “a primary responsibility is for a teacher to introduce students to the nature, history, and methods of a discipline” (89–90). He offers a checklist for those seeking ways to stimulate undergraduate research, which includes these questions:

How does the course design lay the groundwork for undergraduate research?

1. In assigned readings, are there original works from research journals, as opposed to textbooks exclusively?
2. Is attention paid to the structure, peer-review process, and semantics of the discipline used in the articles?
3. In addition to “results,” is there discussion of the research process itself?
4. Are students given analytical tools to critique pieces of scholarship? Are ethical issues highlighted?
5. Do course assignments include systematic library research, an annotated bibliography, or literature review?
6. Are class periods structured so that students can “co-construct” their understanding of the readings?
7. Can students participate in an original research project in which data are collected and analyzed?
8. Do students have an opportunity to design a research project? Carry it to completion?
9. Will original student scholarship be “published” (class Web site, e.g.) or presented as part of the course?

How can undergraduates be involved in faculty research?

10. Are undergraduates involved in the faculty member’s research? Is the work treated as an apprenticeship, with tasks graded in level of responsibility?
11. Are graduate and undergraduate students brought together in a collaborative atmosphere where the entire research enterprise is the focus of guided discussion? Is the undergraduate given increasingly complex tasks beyond washing test tubes?
12. In writing grants, are undergraduate research assistants written into the budget?
13. Do students participate in data analysis, write-up, presentation, and publication?

As a university citizen, what can a faculty member do to support undergraduate research?

14. Are there opportunities to participate in campus-wide curricular reform efforts that promote active engagement, interdisciplinary perspectives, freshman seminars, senior theses, or capstone experiences?
15. Are there opportunities to support or participate in the development of undergraduate research programs, as well as recognition and display of student work?
16. Is there scope for the faculty member to lobby to strengthen requirements for the major to include research methods and research experience components?

Lancy, D. F. “What one faculty member does to promote undergraduate research.” *New Directions for Teaching and Learning*, Spring 2003, 93, 87–92.

Teaching Matters is published by the Center for Teaching Excellence and distributed to KU faculty at no charge. Its purpose is to disseminate information to faculty about teaching, learning, and faculty enrichment opportunities.

The staff welcomes your comments and suggestions. We will upon occasion invite the submission of articles of special interest to the academic community.

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