

**Final Report of
Undergraduate Research Committee (URC)
to Susan Henrichs, Provost, University of Alaska Fairbanks**

December 2010

Denise Thorsen (Chair), Sarah Hardy, Anita Hartmann, Sue Hills,
Pat Holloway, Paul McCarthy, Channon Price, Todd Radenbaugh,
Stephen Sparrow, Barbara Taylor, Jenn Wagaman, Craig Wisen

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This report presents the results of an assessment of current status of Undergraduate Research at the University of Alaska Fairbanks and provides recommendations for the promotion and development of Undergraduate Research at UAF.

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EXECUTIVE SUMMARY

The Undergraduate Research Committee (URC) was charged with providing recommendations for the promotion and development of undergraduate research at UAF, a recommendation of the recent MacTaggart report. The Undergraduate Research Committee was specifically charged to respond to four questions:

1. How is undergraduate research at UAF to be defined?
2. How is success in undergraduate research programs to be assessed?
3. How should undergraduate research be promoted and developed at UAF?
4. How can we better gather and disseminate information about undergraduate research at UAF?

Over the past year, the Undergraduate Research Committee has investigated the meaning, application, feasibility, development, promotion, and assessment of undergraduate research in its various implementations at UAF, at peer institutions, and nationally. We have surveyed UAF deans, faculty, and students. We have reviewed current UAF undergraduate research programs, both curricular and extra-curricular. We have reviewed the public face of undergraduate research at peer institutions. Some committee members have attended CUR, NCUR, and AAC&U (American Association of Colleges and Universities) conferences. These meetings yielded valuable references and contacts, as well as the knowledge that UAF is at the same stage as many other institutions seeking to give form and support to its existing *ad hoc* undergraduate research efforts. Finally, we obtained an institution evaluation from the national Council of Undergraduate Research (see Appendix D – CUR Report). Here we summarize the results of these investigations and provide responses to the above four questions.

Definition of Undergraduate Research:

Based on discussions/surveys with deans, faculty, and students it is clear that the preconceived definition of “Undergraduate Research” is not uniformly agreed on nor understood across the university. Often the perception is that undergraduate research is only conducted in the physical sciences. This Undergraduate Research Committee takes a more inclusive view, one that is aligned with the definition provided by the national Council of Undergraduate Research (CUR).

Undergraduate research and scholarly activity refers to collaboration in original research and/or creative activity between an undergraduate student and a faculty member, leading to work that is published or presentable to scholars in the field. Projects could be an element of the faculty's work or could be initiated by the student. Undergraduate research and scholarly activity is primarily an educational activity, which enriches the student's academic experience.

This definition is inclusive of all disciplines in which scholarly and creative activities occur. The key elements here are the *ownership* of the research and/or creative activity by the undergraduate student, that the activity leads to *deliverable work published or presentable* to scholars in the field, and that it is an

academic activity. In order to facilitate understanding of the breadth of potential activities across the university, this report will refer to Undergraduate Research and Scholarly Activity (URSA)

Assessing Success in Undergraduate Research and Scholarly Activities:

The methods used to assess success in undergraduate research and scholarly activity programs depend strongly on the specifics of implementation. However, UAF need not reinvent the wheel. Long-standing programs such as Undergraduate Research Opportunity Program at the University of Michigan (15+ years) have developed many of the necessary assessment tools. In the next phase of the development of URSA at UAF, decisions need to be made about the mission, goals, and at least some of the programmatic elements so that the appropriate evaluation tools may be used from the beginning. A review of the literature can be found in: *Assessing the impact of undergraduate research experiences: a review of the literature*, by Mary Crowe and David Brakke.

The Climate for Undergraduate Research and Scholarly Activity at UAF

Taken together, the three surveys of students, faculty and deans indicates that UAF has a positive climate for undergraduate research with ample numbers of faculty who are ready and willing to collaborate with undergraduate students in research and scholarly activity, a cadre of students who are interested and understand the value of participating in scholarly activity, and college and school administrators who are supportive of this activity.

Recommendations for Promotion and Development of URSA at UAF

Provost's questions 3 (promotion and development) and 4 (gathering and disseminating information) are best discussed through the committee's recommendations. The following recommendations are given in order of priority.

1. Create an Office of Undergraduate Research and Scholarly Activity (URSA)

The creation of an Office of Undergraduate Research and Scholarly Activity (URSA) is the single most cost-effective action which can be undertaken. Doing so immediately addresses issues related to promotion and development of undergraduate research and scholarly activity (Provost's question 3) and can support gathering and disseminating information about undergraduate research and scholarly activity at UAF (Provost's question 4). This office can also facilitate student participation in undergraduate research and scholarly activity by removing perceived obstacles cited in the student surveys. We note that pieces of what we are recommending presently exist through the Center for Research Services (CRS), which office reports to the Vice-Chancellor for Research. While we think that these activities at CRS are laudable, they are underfunded and under-staffed. The Dean/Faculty/Student Surveys have shown that undergraduate research and scholarly activity is viewed as a part of UAF's academic mission, and therefore it is more appropriate that those charged with promoting and developing undergraduate research and scholarly activity report to the Provost. This recommendation is supported by the findings of the national Council on Undergraduate Research evaluation team (see Appendix D – CUR Report).

2. Recognize and Compensate Faculty Mentors

Based on both the Deans and Faculty Surveys, in order to increase participation, undergraduate research and scholarly activity at UAF must be an expected and valued component of faculty workloads, annual activity reports, and all forms of faculty evaluations including those that lead to tenure and promotion. Explicitly reporting URSA activities in faculty annual activity reports will also facilitate of data gathering on levels of participation (Provost's question 4).

3. Develop Curriculum Enhancements Emphasizing Research and Scholarly Activity

At the very minimum, there must be systematic usage of the specific course numbering relevant to undergraduate research and scholarly activity. Consistent course designators used across the university will facilitate data collection pertaining to number of students engaged in undergraduate research and scholarly activity (Provost's question 4).

INTRODUCTION

The Undergraduate Research Committee (URC) was charged with providing recommendations for the promotion and development of undergraduate research at the University of Alaska Fairbanks (UAF) in response to the 2009 MacTaggart report. The Undergraduate Research Committee was specifically asked to address four questions:

1. How is undergraduate research at UAF to be defined?
2. How is success in undergraduate research programs to be assessed?
3. How should undergraduate research be promoted and developed at UAF?
4. How can we better gather and disseminate information about undergraduate research at UAF?

The Undergraduate Research Committee is made up of a faculty representative from each school and college at UAF (excluding the School of Education) including a representative from Alaska Space Grant Program (ASGP), IDeA Network of Biomedical Research Excellence (INBRE), Honors Program, and Center for Research Services (CRS). In preliminary internal discussion we recognized that undergraduate research is conducted at the University of Alaska Fairbanks in a variety of forms: curricular and extra-curricular; formal and informal.

The term “undergraduate research” comes with preconceived understandings about its meaning, application, and feasibility. Some common misunderstandings about undergraduate research at UAF include: (i) undergraduate research is only applicable to physical sciences; (ii) undergraduate research is an oxymoron; (iii) support of undergraduate research diminishes support of graduate research. In fact all of these misunderstandings are very far from the truth as evidenced by the numbers of faculty and students who are successfully engaged in undergraduate research at UAF across all disciplines.

Over the past year, the committee has investigated the meaning, application, feasibility, development, promotion, and assessment of undergraduate research in its various implementations at UAF, at peer institutions, and nationally. We have surveyed UAF deans, faculty, and students. We have reviewed current UAF undergraduate research programs, both curricular and extra-curricular. We have reviewed the public face of undergraduate research at peer institutions. Some committee members have attended CUR, NCUR, and AAC&U (American Association of Colleges and Universities) conferences. They brought back references, contacts, and the knowledge that we are at the same stage as many other institutions as we seek to give form and support to the various *ad hoc* undergraduate research efforts that already exist. Finally, we obtained an institution evaluation from the national Council of Undergraduate Research (see Appendix D – CUR Report).

This final report presents results of these investigations, recommendations on how to address the four questions posed by the Provost, and beginnings of an implementation plan to help institutionalize UAF undergraduate research. The committee is encouraged that UAF is moving to solidify support for undergraduate research and scholarly activity, especially given the recent US House of Representatives resolution naming the second week in April as Undergraduate Research Week. Current research shows the positive impact of undergraduate scholarly activity on retention, and undergraduate research is now a factor in accreditation.

WHAT IS UNDERGRADUATE RESEARCH?

Based on discussions/surveys with deans, faculty, and students it is clear that the preconceived definition of “Undergraduate Research” is not uniformly agreed on nor understood across the university. Often the perception is that undergraduate research is only conducted in the physical sciences. This Undergraduate Research Committee takes a more inclusive view, one that is aligned with the definition provided by the national Council of Undergraduate Research (CUR).

Undergraduate research refers to a collaboration in original research and/or creative activity between an undergraduate student and a faculty member, leading to work that is published or presentable to scholars in the field. Projects could be an element of the faculty's work or could be initiated by the student. Undergraduate research and scholarly activity is primarily an educational activity, which enriches the student's academic experience.

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The primary goal of undergraduate research is student learning at a depth not accommodated in traditional course formats. These experiential learning opportunities provide a unique way for students to gain self-confidence in preparation for careers. It does not replace the standard curriculum, but supplements it by providing an enhanced college experience for the student. The key elements, as outlined in the CUR booklet “How to Develop and Administer Institutional Undergraduate Research Programs”, are

- (i) Originality – work is partially or totally new, enriching the field;
- (ii) Mentorship – collaboration between undergraduate student and a faculty;
- (iii) Communication – work is presented by the student to peers, professionals, and/or researchers in the field.

In contrast, undergraduate research is not (i) paid internships and/or research assistantships involving performance of routine tasks rather than production of a scholarly deliverable, (ii) capstone senior projects involving prescribed projects, (iii) experiential or service learning with a primary focus on application of skills, and (iv) topical term papers required for courses or accepted for extra credit. These are examples of transitional activities, which could lead to undergraduate research and scholarly activity.

It is instructive to review the breadth of undergraduate research already being conducted at UAF in every school and college. These include senior theses, senior projects, creation and delivery of professional materials, conference presentations, peer reviewed publications, and engineering competitions, to name a few. The following are highlights of recent undergraduate research activities:

College of Engineering and Mines (vignettes taken from CEM webpage)

Civil Engineering student, Charles 'Cutter' Degerlund took second place in the 2009 technical paper competition at the American Society of Civil Engineers (ASCE), Pacific Northwest Student Conference in Helena, Montana. His paper, *Engineering Education Ethics and Legality*, addressed environmental and professional ethics issues relative to sustainability.

In April 2010, an Electrical Engineering student team won the IEEE NW and NE Area MicroMouse contest for the third year in a row. This contest requires students to design/build/operate a small robot that autonomously navigates a previously unseen maze. Successful robots require research into multiple navigation schemes, sensor issues, power concerns, hardware/software tradeoffs/compatibilities, and mechanical knowledge.

A Mechanical Engineering student team won the endurance competition and placed second overall in the SAE Clean Snowmachine Challenge 2009. This SAE competition was designed to challenge students to create lower pollution snow machines that also explored the concept of alternative propulsion methods.

Kasper Kowalewski (a Petroleum Engineering senior) took the first place at the AADE (American Association of Drilling Engineers) National Student Poster competition. His project was titled "Arctic Well Design Sequence and Failure Prognosis: A Case Study".

College of Liberal Arts (CLA)

For her Honors capstone project, Taya Kitaysky, a senior in English, translated into English the contemporary works of a influential modern Russian poet, Akhmatova, and gave public readings; one translation, "Willow" was published in *Poetry International*.

A senior thesis in History, "An economic interpretation for the settlement of Iceland", resulted from travel to University of Wisconsin's Memorial Library to conduct historical research with primary source material; his faculty mentor facilitated his access to non-circulating materials.

Sikura Koritsuna's Art BFA thesis exhibit "Vanishing Points", selected from among more than 40 paintings and numerous sculptures for public presentation. She made two public presentations on the works, and the thesis exhibit was widely covered in local media.

Social/Behavioral Sciences student John Scanlin's psychology research "Earth Speaks: Identifying common themes in interstellar messages proposed from around the world" resulted in an invited national presentation and a publication.

College of Natural Science and Mathematics (CNSM)

Over the last two years, Biology student Carla Cartagena DeJesus has pursued collaborative research in neuroscience, with funding from INBRE, to investigate the role of GABA receptors in the control of breathing. Carla has presented her work at national meetings in Anaheim and Puerto Rico and has co-authored two peer-reviewed publications.

Rose LaMesjerant is an undergraduate researcher at the Museum of the North and has investigated difference in seed micromorphology within *Oxytropis* species (loco-weed, Fabaceae) with the support of an NSF EPSCoR undergraduate research fellowship. The taxonomic utility of micromorphological and anatomical characters in Alaskan *Oxytropis* seeds is demonstrated. Rose presented the results at Botany 2008 in Vancouver, Canada.

A team of three Physics majors recently earned a Bronze medal in the 48-hour 2010 University Physics Competition, developing a solution to the problem of aerobraking a satellite into Neptune's atmosphere and writing a paper describing their results.

As an Honors Thesis project, Celia Miller is working with lichenologists from Europe and within Alaska to develop a lichen checklist. Lichens are one of the defining features of boreal plant communities. Celia is also involved in a biogeographic study, investigating *Ramalina dilacerata*, a lichen found only on the bark of trees. Her work, which has already discovered a previously unknown lichen, will culminate in a co-authored monograph on Alaskan lichens.

Mindy Krzykowski, a senior Physics student, is continuing work supported by ASGP, which she began last summer at NASA's Goddard Spaceflight Center identifying VxB events in Apollo 14 data towards improving our understanding of lunar volatiles, plasma, and dust. Mindy was invited to present her results at the 2010 Women in Physics conference, where she was selected for a Best Poster award.

College of Rural and Community Development (CRCDD)

Undergraduates Tina Carr and Jaclyn Christensen completed directed individual projects, a requirement for the Environmental Studies Certificate. In this program they learned many techniques and skills that they now use in their jobs as environmental tribal coordinators in western Alaska. Tina's project investigated the potential use of tidal energy in Nusahgak Bay while Jaclyn studied mussel beds in Meshik Bay. Both students presented their research findings at scientific conferences (ACUNS in Saskatoon SK and WAISC in Unalaska), an endeavor that improved their confidence and bolstered their careers.

School of Education (SOE)

An undergraduate student team from the SOE, Rebecca Missler and Lena Krutikow, designed a professional development workshop for STEM K12 teachers and presented this workshop at the Alaska Science and Math Conference in Juneau, 2009, and at a Fairbanks North Star Borough teacher professional development workshop.

School of Fisheries and Ocean Sciences (SFOS)

In SFOS, undergraduate research is often conducted as part of a student's senior thesis project, with mentorship from Fisheries or Marine Science faculty. For example, Fisheries students Joel Hunt and James Mills, respectively, examined long-term temperature changes and trends in ice break-up and freeze-up patterns in different locations along the main stem Yukon River, in an effort to better understand salmon habitat utilization. Both of these students presented their results at multiple symposia, including the NSF EPSCoR conference.

Many Fisheries undergraduates fulfill their experiential learning requirements by conducting research internships under faculty supervision. For example Shelley Woods developed laboratory protocols and conducted a histological study of reproductive periodicity in Antarctic sea stars under the supervision of SFOS faculty member.

School of Management (SOM)

Experiential learning is a crucial component of the Alaska Permanent Fund summer internship program. Typically three to four students from the School of Management are placed with the Fund's asset managers and perform independent research projects. At the end of the internship program they present their results to managers and professionals. The most recent example was a student who completed an industry analysis of cloud computing and equity valuations of primary software and hardware providers.

School of Natural Resources and Agricultural Sciences (SNRAS)

Kirsten Woodard, a natural resources management student, studied the effects of temperature on bending capabilities of willow in Alaska for her senior thesis project. Her work will help explain how woody shrubs in high latitudes have adapted to dealing with snow loads and winter browsing. We expect her research to lead to a publication in a peer reviewed journal.

Emily Sousa, a recent graduate in Geography, completed a research project on spruce tree patterns in the Bristol Bay area of Alaska. Her work resulted in a paper presented at The Western Alaska Interdisciplinary Science Conference and the Pacific Coast Geographers' Conference and led her to continue similar work as part of her thesis for a M.S. degree in natural resources management.

James Ward, a Natural Resources Management major, recently completed a senior thesis project in which he developed a model for determining the economics of various methods for heating greenhouses in Alaska. We expect his model to be used by people in rural Alaska wishing to extend their greenhouse crop production growing season.

Natural Resources Management student, Jace Bures, studied the effects of day length and light quality on leaf health, flower initiation, and fruit yield of greenhouse-grown tomatoes. He found that long-days and sometimes poor light quality in summer in Alaska negatively impact tomato growth and yield. His work will likely lead Alaskan greenhouse tomato producers to use methods to block light from their tomato plants during parts of the day during summer months.

Robin Garber-Slaght, an NSF EPSCOR funded Engineering undergraduate student working with faculty in SNRAS, completed a study on woody biomass cropping for Interior Alaska. Her work resulted in a publication entitled *Opportunities for Woody Biomass Fuel Crops in Interior Alaska* (SNRAS Misc. Pub. # 2009-09).

ATTITUDES AND OBSTACLES

With a view towards discovering what works and what doesn't work, the committee surveyed deans, faculty, and students at UAF. These surveys sought to determine why faculty and students did or did not participate in undergraduate research and scholarly activity, whether they did or did not value an undergraduate research and scholarly activity experience, and if there were or were not any obstacles to participation. The results of each of those surveys are summarized below. The survey instruments themselves, and their detailed results, are given in Appendix A – Deans Survey through Appendix C – Student Survey.

Deans Survey

In late summer 2010, the chair of the Undergraduate Research Committee conducted individual interviews with the dean of each college and school in the University of Alaska Fairbanks (see Appendix A – Deans Survey). It was the intention of the Undergraduate Research Committee that the director of each research institute at the university also be interviewed. This was not accomplished.

All deans indicated that faculty and students in their college/school participate in undergraduate research and scholarly activity to some extent. In fact, most deans described a culture definitely in favor of undergraduate research and scholarly activity, especially among recently hired faculty. Unfortunately the perceived value of undergraduate research and scholarly activity has not led to institutionalized support in each college and school. No college or school designates base funding specifically for undergraduate research and scholarly activity outside the standard curriculum. However, all deans indicate a willingness to support undergraduate research and scholarly activity in a variety of ways, some financial. This discrepancy has perhaps more to do with the constraints on college and school budgets than a lack of willingness among deans.

About half the colleges and schools have a college-wide policy to enumerate mentoring undergraduate research and scholarly activity in faculty workloads. These same colleges/schools also include language in their unit criteria for promotion and tenure that recognizes mentorship in undergraduate research and scholarly activity. Even without specific language, the deans of all colleges and schools indicated that documentation of participation in undergraduate research and scholarly activity in faculty annual activities reports and in promotion and tenure files were viewed somewhat favorably. However, a required balance with all aspects of a faculty's workload was indicated. In fact, when asked what incentives would be appropriate for faculty to encourage them to participate in undergraduate research and scholarly activity, workload credit and recognition was the most frequent response. For most colleges and schools the difficulty in institutionalizing undergraduate research and scholarly activity has a lot to do with the need to balance faculty workloads with the needs of their departments to cover required courses.

Faculty Survey

The Faculty Survey on Undergraduate Research (see Appendix B – Faculty Survey) had 74 respondents, which represents about 13% of the UAF faculty. Most respondents (97-99%) consider undergraduate

research compatible with a mission emphasizing student learning and see it as a useful teaching tool. However, fewer respondents (80%) envision undergraduate research as an important formal part of their department's activity. Thus, virtually all respondents see merit in research experiences for undergraduates and most see it as an important academic endeavor for their department. Fewer (75%) have involved undergraduates in research. Lack of time or staff or lack of credit/compensation for the labor-intensive task of involving undergraduates in research were significant obstacles for faculty members; 68% of respondents saw a need for "more credit for student supervision in teaching loads" to enhance support for undergraduate research. Notably, more respondents (73%) identified "student research grants" as an important need. As a whole, the faculty survey indicates that UAF has a positive climate for undergraduate research with ample numbers of faculty who are ready and willing to collaborate with undergraduate students in research and scholarly activity, but who also advocate for an institutional demonstration of commitment in the form of funding for undergraduate researchers and teaching load credit for their faculty mentors.

Student Attitudes

The committee surveyed undergraduate students (see Appendix C – Student Survey) concerning attitudes about and knowledge of undergraduate research and scholarly activity at UAF. There were 152 respondents, representing 3.7% of the full-time degree-seeking undergraduate students at UAF. Of the respondents, 15% were freshman, 22% were sophomores, 21% were juniors and 39% were seniors. Fewer than a quarter (21%) of respondents stated that they are currently involved in a research and scholarly activity project at UAF. The majority of participatory respondents stated that they participate in research and scholarly activity for education and enjoyment. Most find out about research opportunities through word of mouth or current professors, but 28% of respondents said they seek opportunities through UAKJobs. Students listed time as their biggest barrier to conducting research and scholarly activity, followed by finding opportunities, thinking up good projects, and lastly, finding mentors.

Survey comments indicated that many of the students believe that it is difficult to find opportunities and make connections. Many students stated that they would like to have a central clearinghouse for such opportunities so that all students would have equitable access.

EXISTING UNDERGRADUATE RESEARCH AND SCHOLARLY ACTIVITY

Undergraduate research and scholarly activity is conducted across the university as both curricular and extracurricular activity. The advantage of institutionalizing undergraduate research and scholarly activity within the curriculum is that issues of workload and credit hour production are accounted for in a standardized way. However, not all curricula that claim to include undergraduate research and scholarly activity truly meet the definition given earlier in this report.

Programs with Existing Undergraduate Research and Scholarly Activity

College of Engineering and Mines – ABET (Accreditation Board for Engineering and Technology) accreditation requires that all engineering and computer science programs contain a capstone course during the senior year. These capstone courses, when well executed, provide excellent undergraduate engineering research opportunities. Not all capstone courses in CEM can be considered undergraduate research courses because they lack the key elements of originality and communication.

College of Liberal Arts – Completing a senior thesis is a degree requirement for several programs in the liberal arts. The BFA degree program requires a thesis, conducted through a one-semester course. The requirements for the BA in History include a thesis, which is supported by an initial course in historical research methods followed by a thesis course. The BA in Philosophy requires a thesis, conducted through a one semester course. Students in the social and behavioral sciences such as anthropology, political

science, psychology and sociology can gain academic credit for research and scholarly activity in elective 498 (research/project) and 499 (thesis) courses.

College of Natural Science and Mathematics – The Chemistry Department requires all students who receive an American Chemical Society certified degree to have completed a one semester research course (without which students can still earn a BS in Chemistry.) No other undergraduate degree programs in this college have an academic research requirement.

College of Rural and Community Development – Programs in this college are being built that include undergraduate research. Two certificate programs, Environmental Science (ENVI) and High Latitude Range Management (HLRM), have intensive research based courses and internships. These two programs require enrolled students to take a two course sequence that covers research methods, data analysis, and report writing. Further, ENVI requires students to complete a capstone research project and to present their work at a scientific conference.

School of Fisheries and Ocean Sciences – Both the BA and BS in Fisheries (the only undergraduate program in this school) require students to take a senior-level experiential learning course. Internships might be summer jobs or part-time positions during the year and may take place in another city or state. The focus of an internship is often the employment experience, although some students conduct original research. Students can earn additional credit by adding an individual study or senior thesis to the internship workload.

School of Natural Resources and Agricultural Sciences – All Natural Resources Management undergraduates are required to take a two-course sequence leading to a senior thesis. Students must write and present a proposal, conduct a research project with guidance from a faculty committee, and write and present a thesis.

School of Management – The finance concentration within the School of Management BA program requires practical experience with the Student Investment Fund, usually for two semesters. The courses require that students perform independent research to collect data and apply equity valuation models, resulting in purchases or sales on behalf of a dedicated UAF endowment. The courses rely heavily on experiential learning, and the research results are presented to faculty and students.

Honors Program – The UAF Honors Program admits highly qualified students from all majors. A major goal of the program is to develop very well-rounded students who have learned and practiced the skills involved in the scholarly activity that contribute to the advancement of knowledge. The program encourages its students to an early involvement in research and scholarly activity, and explicitly requires completion of an Honors capstone project involving independent research or scholarly activity as appropriate for their area.

Existing Courses Supporting Undergraduate Research and Scholarly Activity:

The Undergraduate Research Committee asked the following questions:

- (i) Do designated Undergraduate Research and Scholarly Activity courses exist at UAF that are similar and yet separate from the designated Thesis (499) and Project (498) courses?
- (ii) Is it obvious to students and faculty that the Undergraduate Research and Scholarly Activity courses exist?
- (iii) Are these Undergraduate Research and Scholarly Activity courses used?

To answer these questions the committee surveyed all courses with number designation from 487-499. Course designators 497 [Individual Study], 498 [Research/Project] and 499 [Thesis/Dissertation] are defined as such across the university for every program. There are five courses listed in the catalog that

specifically indicate in their title that they are Undergraduate Research courses (ATM488, CHEM488, EE488, GEOS488, PHYS488). These five courses each use the course designator 488. The use of this designator specifically for Undergraduate Research courses is not uniformly used for every program across the university. In fact eleven other 488 courses are listed in the 2010-2011 UAF catalog that may or may not be viewed as Undergraduate Research, and other courses without the 488 designator are considered to be Undergraduate Research courses. Of the five courses that specifically identify themselves in their title as Undergraduate Research courses, only CHEM488 runs consistently, with an average enrollment of 17 students per year over the last five years.

In programs in which some form of Undergraduate Research is an integral part of the curriculum, faculty and students can usually identify the associated courses, although persons outside the program (administrators, other faculty and students) frequently cannot. For instance, Art uses 499 and 497 (thesis and individual study, average 6.2 and 19 students per year, respectively), Honors and Psychology use 498 (project, average 5.4 and 7.8 students per year, respectively), Biology, Fisheries, Geosciences, Natural Resources Management all use 497 (individual study, 19, 18.6, 5.4, 7.6, 7.4, students per year, respectively). Other programs use designators unique to their programs and courses. Even within the College of Engineering and Mines, which requires a capstone course for all programs, these capstone courses do not carry similar course designators.

Existing Extracurricular Undergraduate Research and Scholarly Activity

Many students participate in undergraduate research informally through faculty-funded research projects and through student-selected projects that are sometimes funded through formal undergraduate research solicitations. Additionally students participate in professional society paper competitions and contests which may or may not be formally funded.

There are over 100 active UAF student organizations, and a subset of these groups incorporate undergraduate research as a significant component of their activities. Students Involved in Free Enterprise (SIFE) is one example. SIFE students develop outreach projects that improve the quality of life and standard of living for people in need. This entails data collection and analysis, project development, and presentations in regional, national and international competitions. A partial list of additional organizations includes Ice Box (which produces a student literary magazine), the Student Drama Association (which produces theater performances), and Institute of Electrical and Electronics Engineers (which sponsors a student research paper competition and the MicroMouse competition.)

Alaska Space Grant sponsors a Space Systems Engineering Program in the College of Engineering and Mines. This program provides undergraduate (and graduate) students with opportunities for hands-on experience with design, construction, testing and launch of large-scale space systems. Students participate in interdisciplinary research collaboratively with scientists and engineers at NASA, UAF, and around the world.

Existing Funding Sources for Undergraduate Research and Scholarly Activity

A number of programs at UAF fund undergraduate research and scholarly activity, including IDEA Network of Biological Research Excellence (INBRE), Alaska Space Grant Program (ASGP), NSF EPSCoR, Center for Research Services (CRS), Center for Global Change (CGC) and the Honors Program.

INBRE is an infrastructure-building program supported through the National Institutes of Health that funds 6-8 undergraduate research awards during the school year and 5-6 in summer, for a total of \$44,000 - \$54,000 annually. The academic year awards of \$1000 to the student and \$500 for supplies, require a proposal from the student, a letter of recommendation from their faculty mentor, an estimated budget and transcripts. The summer awards are \$4500 to the student and \$2500 for supplies and require a similar

application process. Many of the INBRE-funded and affiliated faculty have additional undergraduates working and researching in their labs supported by other grant funds. For example, in spring 2010, 27 undergraduates were in INBRE-associated labs. Students are encouraged to attend regional, national and international meetings to present their work and can compete for INBRE travel funds to do so.

NSF EPSCoR supports undergraduate research primarily through competitively awarding stipends to UA undergrads conducting research projects in biology, physical science and social science. Students propose research projects in collaboration with UA faculty and are required to provide a summary report upon conclusion of the research. Stipends cover the spring and/or summer semesters and have varied in size from \$3,000 - \$8,000. EPSCoR awarded 11 stipends in FY08, 8 in FY09 and 16 in FY10 and is in the process of making FY11 awards. Additionally, EPSCoR travel grant programs are open to undergraduate applicants.

The Center for Research Services is provided with \$50,000 annually to support undergraduate research and scholarly activity. Currently, this money is used to provide \$25,000 in funding for year-long undergraduate research projects through the undergraduate research competition. The remainder of the funds are used to sponsor an undergraduate research fair each fall, which advertises research opportunities, and to support a campus research day each spring. The research day includes an undergraduate research symposium and poster session as well as public events on campus and a graduate poster session.

In 2010, the Center for Global Change Student Grant Competition awarded approximately \$200,000 in research awards to 18 graduate and undergraduate students at UAF and UAA from a total of 71 proposals submitted. Three undergraduate students from a field of 6, who were judged separately from graduate students, received a total of \$24,675. Student proposals may request up to \$10,000 per year for research-related expenses, including a student stipend. In 2010, two of the successful undergraduate students were from UAF and one from UAA. Students are encouraged to present their research results locally and nationally, and travel expenses are allowed in award budgets.

Over the last two years, the Honors Program has provided small Chancellor's Scholarships (\$500 or less) to support Honors capstone projects. Students must have submitted a capstone project proposal and be committed to completing the project and graduating in Honors.

The Alaska Space Grant Program awarded over \$100,000 in research fellowships across the state of Alaska in 2010. The majority of those fellowships went to undergraduate students at UAF. Students proposed research projects in collaboration with faculty and/or NASA scientists. Students receive \$5000 for the academic year or the summer and are expected to present their work in a public forum, either locally or nationally. Frequently these research projects lead to published papers and/or national conference presentations.

RECOMMENDATIONS AND SUGGESTIONS FOR AN IMPLEMENTATION PLAN

The following recommendations are given in order of priority.

1. Create an Office of Undergraduate Research and Scholarly Activity (URSA)

The creation of an Office of Undergraduate Research and Scholarly Activity (URSA) is the single most cost-effective action which can be undertaken. Doing so immediately addresses issues related to promotion and development of undergraduate research and scholarly activity (Provost's question 3) and can support gathering and disseminating information about undergraduate research and scholarly activity at UAF (Provost's question 4). This office can also facilitate student participation in undergraduate research and scholarly activity by removing perceived obstacles cited in the student surveys. We note that pieces of what we are recommending presently exist through the Center for Research Services (CRS),

which office reports to the Vice-Chancellor for Research. While we think that these activities at CRS are laudable, they are underfunded and under-staffed. The Dean/Faculty/Student Surveys have shown that undergraduate research and scholarly activity is viewed as a part of UAF's academic mission, and therefore it is more appropriate that those charged with promoting and developing undergraduate research and scholarly activity report to the Provost. This recommendation is supported by the findings of the national Council on Undergraduate Research evaluation team (see Appendix D – CUR Report).

We concur with the recommendation from the CUR Report which suggests that the URSA office be centrally located. Locating the office in the Wood Center would maximize visibility to students. The CUR Report also suggests that “to ensure the undergraduate research enterprise has sufficient credibility with faculty and deans, the office should be led by a faculty director and include adequate professional and student staff”. We recommend at the minimum a half-time faculty director with full-time program coordinator. The URSA Office should be adequately funded beyond the director and program coordinator in order to provide student research and travel awards and to facilitate faculty professional development with regards to undergraduate research and scholarly activity.

UAF already has considerable undergraduate research and scholarly activity. Thus, the URSA Office will be first and foremost an umbrella organization for these activities, coordinating the cooperative efforts of all stakeholders who are or will become involved in promoting or supporting UAF undergraduate research and scholarly activities. To cement the cooperative nature of the URSA Office, it will take guidance from an advisory board whose members represent all stakeholders involved in promoting and supporting UAF undergraduate research and scholarly activity. The director will be responsible for coordination with and bridging to the numerous UAF organizations that support undergraduate research and scholarly activity, recruiting students and faculty participation, facilitating development of mentors (faculty, postdocs and graduate students), facilitating curriculum development, proposing and developing external support, coordinating with admissions and marketing, and management activities. The director will oversee the other activities of the office, including being a clearinghouse for information to and about undergraduate students interested in participating in research and scholarly activity; collecting and reporting relevant information, in summary and in detail; coordinating the process by which undergraduate students at UAF propose to conduct research and scholarly activity, including promoting, reviewing, and assessing such proposals; promoting, producing, documenting, and assessing an annual undergraduate research and scholarly activity symposium; editing and publishing (at least electronically) an annual journal devoted to UAF's undergraduate research and scholarly activity; archiving the tangible products resulting from undergraduate research and scholarly activity at UAF; coordinating with the Office of Admissions; being a resource for students seeking to write proposals, and being a resource for faculty who are writing external proposals that specifically request funding to support undergraduate research and scholarly activity. The committee notes that many successful models exist for such offices (e.g., see CUR report, CUR literature on various aspects of developing and institutionalizing undergraduate research). The committee suggests that an important initial step would be to constitute the URSA advisory group to be charged with the development of a more detailed implementation plan, which is beyond the scope of this present report and outside this committee's charge. The committee recommends that group and others involved should take advantage of the resources and expertise of national organizations such as CUR and AAC&U.

As should be clear from the cooperative and collaborative language above, the committee emphatically recommends that the URSA Office should not subsume the undergraduate research and scholarly activities of any existing program. Programs such as the Honors Program, INBRE, ASGP, NSF EPSCoR, and CGC, curricula such as NRM, Art, and History that require a senior thesis, and discipline-specific programs such as the Fisheries undergraduate program should not be replaced or in any way diminished by the establishment and growth of URSA. To the contrary, URSA should serve and enhance these programs and their existing missions. The mission of URSA is to provide all undergraduate students with

opportunities to collaborate with mentors in meaningful scholarly activities that create publishable, discipline-specific knowledge. URSA will promote and support the assimilation of undergraduate students into active research endeavors and allow the students to pursue varying levels of engagement. At all levels the URSA Office aims to improve skills in critical thinking and communication and to engender a culture of life-long learning among all students as well as enhance preparation and training of students who aspire to graduate and professional schools. This mission does not include preparation or service-learning for any one specific career type, is not allied with any one specific national or international undergraduate research program, and does not directly aim to enhance civic responsibility or leadership tendencies in URSA students. These elements are the purview of other types of undergraduate programs at UAF.

2. Recognize and Compensate Faculty Mentors

Based on both the Deans and Faculty surveys, in order to increase participation in undergraduate research and scholarly activity at UAF, faculty members must receive recognition in their workload assignments and in their promotion and tenure applications for such activity. Further, faculty must receive public recognition both on and off campus for participation and excellence. For most faculty, this means making undergraduate research an expected component of faculty workloads, faculty annual activity reports, and all forms of faculty evaluations including those which lead to tenure and promotion. A collateral result of explicitly reporting participation in undergraduate research and scholarly activity in faculty annual activity reports is the facilitation of data gathering pertaining to undergraduate research and scholarly activity (Provost's question 4).

A highly effective way to immediately promote undergraduate research and scholarly activity would be to identify faculty who currently successfully engage students in their research, and to reward them by providing them with additional resources. Additionally, the creation of URSA Faculty Mentor Awards will give tangible recognition to superior faculty mentors.

3. Develop Curriculum Enhancements Emphasizing Research and Scholarly Activity

UAF should strive to engage undergraduates at several academic levels. First, every student who earns a baccalaureate degree at UAF should understand the value of knowledge creation, and the role of the research university in the creation of knowledge. Second, every student who earns a baccalaureate degree at UAF should have familiarity with the tools and methods by which research and scholarly activity is conducted in their field of study, and in particular should develop critical thinking skills. Finally, each student at UAF should have the opportunity to participate in research and scholarly activity, and to receive credit for their participation. The recently initiated First-Year Seminar courses are ideally situated to achieve the first goal, and we recommend that offerings of such courses expand to admit all incoming students. The second goal can be accommodated in several ways. One possibility is the creation of an upper division "R" designator within the core curriculum for courses which introduce the methods and tools of scholarly activity within the field, including as appropriate safety and ethical training. Another possibility is the creation of the "URSA" course designator; curriculum offered under the URSA designator will be largely self-supporting through the tuition revenue sharing model.

Such an URSA curriculum might initially comprise the following courses:

- URSA 292 seminars and performances for and by undergraduates involved in research and scholarly activity, which will promote these undergraduate experiences and serve as a clearinghouse of opportunities for students
- URSA 398 first-time student involvement in research and scholarly activity, to include all necessary orientation to undergraduate involvement in these activities (safety practices, appropriate studio and laboratory practices, appropriate ethical issues, etc.)
- URSA 498 subsequent student involvement in research and scholarly activity, intended for experienced undergraduate researchers

URSA 692 graduate seminar on undergraduate mentoring, to provide training for graduate students in this important skill to both prepare them for future professions and also to ready them to step into that role and thus create more opportunities for undergraduate students to engage in scholarly activity

URSA 696 graduate practicum in undergraduate mentoring, to provide practical training and academic credit for graduate students who serve as mentors

Honors students who complete URSA courses should receive Honors credit towards graduation in Honors. This recommendation recognizes the natural synergy between the URSA Office and the Honors Program, while also acknowledging that they are not and should not be synonymous. Students at all levels of academic achievement must have the option of partaking in URSA. While participation in undergraduate scholarly activity is required to graduate in Honors, it is critical that all of UAF be aware that participation in undergraduate research and scholarly activity is not limited to students in the Honors Program.

The committee recognizes that offering additional curriculum will necessitate some flexibility in determining course-load equivalences, and that even so the faculty in some departments are already overloaded and/or are fully committed to core courses or courses required for programs. At the very minimum, there must be systematic usage of the specific course numbering relevant to undergraduate research and scholarly activity. Consistent course designators used across the university would facilitate data collection pertaining to number of students engaged in undergraduate research and scholarly activity (Provost's question 4).

EVALUATION AND ASSESSMENT OF SUCCESS

As with other aspects of undergraduate research and scholarly activity, many successful models exist depending on the institution, the mission of the office or program charged with promoting undergraduate research and scholarly activity, and the other resources available to the office or program. For example, evaluation and assessment was one of the major conference strands at the November 2010 AAC&U meeting. UAF does not need to reinvent the wheel. Long-standing programs such as the UROP program at the University of Michigan (15+ years) have developed many of the tools needed here. In the next phase of the development of undergraduate research and scholarly activity at UAF, decisions need to be made about the mission, goals, and at least some of the programmatic elements so that the appropriate evaluation tools may be used from the beginning. For example, undergraduate research and scholarly activity could be a student centered process, outcome/project centered, student initiated, faculty initiated, for all students, for some subset of students, a one-on-one apprentice model, or class-based. Different disciplines are likely to choose several different models, each with appropriate assessment methods. One size does not fit all for assessment as well as for research.

In general the URC finds that at least four levels of involvement in undergraduate research and scholarly activity are reasonable, with different levels of participation expected:

- i. Understand the value of research/scholarly activity to the larger community; the function of research university: goal of 100% participation
- ii. Acquire and practice tools, skills; critical thinking activities leading to ability to engage in research, to interpret results; to formulate questions -- shaped at disciplinary level : long-term goal of 100% participation
- iii. Participate in research/scholarly activity -- one-on-one mentoring; with a deliverable result [poster, performance, exhibit] : encouraged but optional for all undergraduates
- iv. Independent researcher; being a mentor, investigator, proposer

Several levels of evaluation are needed to document the many aspects and effects of undergrad research. Traditional measures of effects include:

- i. Number of independently (external to UAF) reviewed undergraduate student research and creative products (including articles and other publications, and juried shows and performances).
- ii. Number of student credit hours generated from research-designated courses (e.g, -98 non-thesis project, and -99 undergraduate thesis).
- iii. Number of undergraduates supported on sponsored projects.
- iv. Number of faculty participating in undergraduate research and scholarly activity undergraduate research and scholarly activity
- v. Number of external proposals, external grants requesting funding for undergraduate research and scholarly activity
- vi. Amount of curriculum development -- creation and revision
- vii. Increased retention, especially under-represented minorities, first-generation college, etc. are accreditation indicators

Effects on students that could be assessed include: student retention, content knowledge, attitude, application of higher order thinking skills, personal and professional gains, thinking and working like a scholar, preparedness for career and/or professional or graduate school, clarification and confirmation of career and educational goals.

Effects on faculty are important too. The national Faculty Survey of Student Engagement (FSSE) includes measures such as: effect on proposal success when undergraduate research elements are included (important for some agencies such as NSF), faculty time apportionment, effects on teaching practices, learning technology, participation in the scholarship of teaching and learning.

Undergraduate research and scholarly activity may have other benefits as well. The CUR report (Appendix D) notes that "In our experience, undergraduate research is a powerful marketing tool. Donors, legislators, alumni, and the public respond instantly to stories of undergraduates making discoveries. Furthermore, undergraduate research can improve retention and graduation rates. George Kuh says that undergraduate research is one of the high-impact practices that increase student engagement and raise retention and graduation rates....others have demonstrated that undergraduate research is particularly effective in engaging high-risk students, including minorities, low-income, and first-generation college students."

Many specific instruments exist for evaluating different aspects of undergraduate research, scholarly and creative activities. For example, for classical faculty mentored summer STEM research, the well-known Undergraduate Research Student Self-Assessment (URSSA) draws on over a decade of research and on the "nature and outcomes of undergraduate research and scholarly activity as practiced in the sciences...identify[ing] the benefits to students in the short and longer terms and address[ing] the extent to which these benefits are uniquely derived from research experiences." The URSSA instrument will be part of the suite of assessment tools used by the Mountain West Consortium (seven western INBRE states) to evaluate their cohort-based summer STEM research programs, beginning in summer 2011.

Both summative and formative assessments are integral parts of information gathering. Summative assessments in the form of standardized tests (such as the ETS Proficiency Profile and the GRE) may be useful in assessing content knowledge. The ETS Proficiency Profile can be administered when students enter and exit the URSA program to quantify the learning benefits of their URSA experience with respect to general cognitive skills including critical thinking. The GRE (including its discipline-focused components) could be administered to exiting students to quantify scholarly achievement through completion of UAF baccalaureate degrees. Comparing the various ETS Proficiency Profile and GRE

scores of URSA students to those of non-participating UAF students will quantify the educational value of the URSA experience.

Formative assessment involving students as assessors of their own learning and as resources to other students will benefit the program beyond providing metrics. Involvement in and ownership of the learning process increases students' motivation to learn. Research- and action-oriented formative assessment will be conducted during development and improvement of the URSA experience, especially over the first five years. External evaluation by coordinators and directors of other honors and undergraduate research programs outside of UAF will allow us to review URSA and compare it to other programs.

Results of assessments will be summarized and reported annually to all faculty members (those participating as mentors and those who might do so in the future). An URSA annual report will summarize the formative and summative assessments for a given academic year as well as quantify faculty and department participation. The report will be made available to all UAF faculty members, department Chairs and Deans as well as the Provost and Chancellor. UAF faculty and administration members who write grant proposals for funds supporting undergraduate research will be encouraged to use excerpts of the report in their proposals.

APPENDIX A: DEANS SURVEY

The following survey instrument was conducted through individual interviews by the chair of the Undergraduate Research Committee and the Deans of each College and School in the University of Alaska Fairbanks in late summer 2010. It was the intention of the Undergraduate Research Committee that the Directors of each Research Institution at the University also be interviewed. This was not accomplished.

Questions:

1. Do faculty/students in your unit participate in undergraduate research?
2. In what way?
3. In your (institute) college is there a culture for or against undergraduate research?
4. What does your (institute) college do to support undergraduate research?
5. Is there base funding in your (institute) college specially for undergraduate research?
6. How do your (research) faculty perceive or value undergraduate research?
7. Is there a (unit) college wide policy to account for mentoring undergraduate research on faculty workloads?
8. Is there any advantage or disadvantage to faculty to participate in undergraduate research mentorship (i.e., annual, P/T reviews)
9. Is there language in the unit criteria that recognizes mentorship in undergraduate research
10. Are there institutionalized limits to how many undergraduate students a single faculty can provide research mentorship.
11. Is there a means by which faculty who provide research mentorship of large numbers of undergraduate students can be released from course requirements
12. Do your faculty perceive that undergraduate research is valuable in obtaining research dollars?
13. What incentives, do you feel, are appropriate for faculty to encourage them to participate in undergraduate research?
14. Where does undergraduate research fit in tripartite workload?

Summary of Responses

1. Do faculty/students in your unit participate in undergraduate research?
 - CEM *yes*
 - CLA *yes, not all but some*
 - CNSM *yes, always part of business but not publicized.*
 - CRCD *yes*
 - SFOS *yes, institutionalized in Fisheries, informal in other programs.*
 - SNRAS *yes, institutionalized BSNRM 100%*
 - SOE *minimally, SOE tripartite faculty teach graduate programs, 1 undergraduate program is a licensure program taught primarily by adjuncts.*
 - SOM *no, professional school, active in experiential learning*

2. In what way?
 - CEM *capstone senior design courses, student based projects, contesting (snow machine, steel bridge, micromouse), Alaska Space Grant Program, student-faculty connection sometimes difficult.*
 - CLA *varies by departments, English grant to do translation, UG working with faculty, senior thesis research in honors, trying to make this across college, capstone senior seminar*
 - CNSM *lots of different models, work study, biology 50% participation, chem. requirement senior research course, geo informal GEO488, can enroll for credit, writing papers culture already exists, some activities get more press than others*

CRCO Directors of campus hire more PhD faculty to grow STEM areas, science camp, biology research techniques, experiential learning, ethno botony, rural development community based research course.

SFOS Occupational experiences, FISH490 can take repeatedly, often participating in research as tech, can complet independent study, FISH290 fresh/soph

SNRAS Senior thesis is a requirement for NRM, for credit, committee of three, 2cr 405 proposal and present, 2cr write thesis, geography not so much but still yes.

SOE N/A

SOM internships, student organizations, very active experiential learning, really professional development rather than UR

3. In your (institute) college is there a culture for or against undergraduate research?

CEM for, faculty actively look for students, but opportunity sometimes is limited.

CLA not against, for but not very loudly, some do it, new concept to talk about it in that way.

CNSM for in curriculum, newer faculty engage more than old guard

CRCO definitely for! IAC science fair, science camp, variety of camps

SFOS for in areas where we have access to undergrads (i.e. Fisheries), ambivalent in other programs, not institutionalized, some, huge effort

SNRAS for!

SOE not against, neutral really, faculty would be receptive if campus priority

SOM culture for professional development way beyond classroom, not UR that results in publications.

4. What does your (institute) college do to support undergraduate research?

CEM help from development, received \$60,000 BP to support needs of student projects, annual announcement for support

CLA last year we set aside funds to support students, students apply for awards

CNSM not much financial support, no ICR so no large discretionary funds, some student travel funds (mostly grad but also UG), workload adjustments, various departments offer courses, help support summer UG research experiences, research labs support UG through grants, working w/institutes

CRCO support Directors to go after federal funds

SFOS curriculum in place that facilitates, UG required to do this, students then make themselves available, faculty have found independent funding for UG

SNRAS require it in the curriculum, where possible UG work with grad and comp w/ research funds, pay for travel, small amount, NRM internship

SOE any faculty interested could find funds, had a meeting, concern was didn't know how to get there.

SOM support student organization, faculty time

5. Is there base funding in your (institute) college especially for undergraduate research?

CEM no

CLA no

CNSM no

CRCO no

SFOS curriculum, Rasmussen project supports program for now

SNRAS no, in curriculum, funding through institute

SOE no

SOM a little, NA business leaders, workload, raise funds outreach/development

6. How do your (research) faculty perceive or value undergraduate research?
- CEM* mixed bag, some are very focused (few), majority don't think about it one way or another, perceive UR as service, depends on nature of work, undergrad can't do it
- CLA* no one doesn't value it, not a strong tradition of UR in workload, viewed as outside/extra typical work
- CNSM* value yes, goal to build up foundation account, fund raising, travel fund
- CRCD* they support it, part of strategic plan
- SFOS* varies, some faculty do some don't, no faculty is unwilling
- SNRAS* like it, as undergrads increase might be difficult
- SOE* ambivalent, show me the way, undergrad program has hands full, gap disconnects between two (undergrad/graduate) program areas
- SOM* no value traditional research, hard enough fund graduate
7. Is there a (unit) college wide policy to account for mentoring undergraduate research on faculty workloads?
- CEM* no formal policy, accounted for under teaching/service/research, senior design project
- CLA* no set policy, can be listed
- CNSM* yes, 0.2/student guideline, in discussion w/dean and director, other teaching
- CRCD* no
- SFOS* yes, section on workload units
- SNRAS* yes, 0.5 on committee
- SOE* no, non-tenure teaching, tenure option
- SOM* yes, negotiated on individual basis
8. Is there any advantage or disadvantage to faculty to participate in undergraduate research mentorship (i.e., annual, P/T reviews)
- CEM* generally viewed positively, made a note
- CLA* yes, slight advantage, way of creating unique value to department, not codified, teaching/workload
- CNSM* yes, it's in the unit criteria, these are new, current culture is to count graduate students, undergraduates extra
- CRCD* advantage for tripartite faculty
- SFOS* for faculty where that is a part of the job then yes, other faculty not so much, no particular advantage, depends on workload
- SNRAS* advantage, senior thesis counted
- SOE* advantage to tenure faculty, would respond to positively, adjunct no mechanism
- SOM* yes in annual report, P/T not really, publish good, detrimental not published.
9. Is there language in the unit criteria that recognizes mentorship in undergraduate research?
- CEM* no
- CLA* not really familiar with all unit criteria, no in English
- CNSM* yes
- CRCD* may be in rural development
- SFOS* four different unit criteria: 3 no, 1 yes, Fish unit criteria up for renewal probably will change
- SNRAS* yes
- SOE* no
- SOM* yes under teaching

10. Are there institutionalized limits to how many undergraduate students a single faculty can provide research mentorship.

CEM no, but we haven't met any critical limit

CLA no, personal preference, find time

CNSM no

CRCD no

SFOS no, by negotiated workforce balance for faculty and division that you are in

SNRAS no, individuals choose by workload

SOE no, faculty decision

SOM no, organization mentor

11. Is there a means by which faculty who provide research mentorship of large numbers of undergraduate students can be released from course requirements

CEM potentially but would have to be accounted for under teaching, needed to really document in consultation with chair and teaching needs of department, fudge of 4-6 workload outside actual class

CLA yes, but straight forward individually negotiated, no policy

CNSM it is a course in some disciplines (chemistry), need to balance teaching load with needs of teaching requirements of department, individually assessed

CRCD yes, in negotiation

SFOS negotiated each time, needs of division

SNRAS no, balanced with teaching load, no room to release faculty

SOE yes hypothetically, would have to have space in program

SOM no

12. Do your faculty perceive that undergraduate research is valuable in obtaining research dollars?

CEM they are aware NSF, other agencies do not stress

CLA depends heavily on department, most departments do obtain little research dollars, not primary driver of job

CNSM in some instances, bigger tradition in Biosciences, bigger group, NSF wants to see it, way of addressing broader impacts, new faculty

CRCD United Academic faculty do

SFOS REU obvious, when we write grant proposals UR highlighted, but whether or not UR is helpful in actually getting dollars (NSF yes, other agencies not so much), academic program helps make this real. ANSEP

SNRAS depends on granting agency. UG do slow you down (learning experience), USDA+

SOE no, not a world they participate in

SOM no

13. What incentives, do you feel, are appropriate for faculty to encourage them to participate in undergraduate research?

CEM workload credit, annual evaluations, establish a culture of UR support influence peer review, monetary support of project

CLA course release (would need criteria for doing that), summer pay

CNSM money (part) but question is who gets the money, would be nice to compensate student, for faculty part of doing business, recognition, funds for stuff, workloads, support faculty training, research experience, training experiential learning

CRCD additional workload assignment (overload), merit increases

SFOS workload and unit criteria, give them credit for it, needs to be institutionalized, recognition at campus in P/T, must be an option not requirement

SNRAS *N/A already do it, recognized at campus wide P/T level, showcase appropriate with award to student is award to faculty*
SOE *like to believe incentives to reach goals, more effective w/ classroom support, workload for large commitments, equipment, software*
SOM *AACSB – student org (faculty advisor), workload recognition*

14. Where does undergraduate research fit in tripartite workload?

CEM *teaching not research, not convinced undergraduate research feed well into “real” research, course release*
CLA *not a lot of room, potentially teaching (extra workload units beyond courses, if high research workload then this works*
CNSM *mentoring: teaching, research: research, both really, when you are in a box hard to report, 4th category mentorship students, informal teaching service/research, training for faculty give students real experience not made up, leads to something, recognition to students and faculty, senior thesis is another approach but we don’t require this, Honors college, one size does not fit all.*
CRCD *outcomes based assessment: credit hour production, head count, ICR; faculty teaching heavy, experiential learning model*
SFOS *average faculty 40/40/20:T/R/S, ranges largely, generally in teaching in workload, activities report teaching/research, formula for workload places it in teaching, crosses line T/R, we would like to merge that line, UG benefit is the experience*
SNRAS *we individualize, one size does not fit all, depends on person, UR highly valued, not everyone is appropriate to participate, inappropriate to teach on course and heavy UG, balance matters*
SOE *summer research/service, we are a teaching unit*
SOM *teaching/service, professional development, does not fit if for publication*

APPENDIX B: FACULTY SURVEY

The following survey instrument was conducted via the web in early fall 2010. A request for participation in the survey was sent from the Provost's office. There were 74 respondents, which represents about 13% of the UAF faculty.

Faculty Survey on Undergraduate Research

The Undergraduate Research Committee has been charged with making recommendations to the Provost on how to define and promote undergraduate research, which is a key component in fulfilling the recent MacTaggart report recommendation to make UAF a "student focused research university". Your responses to this survey will help the committee understand faculty understanding of and opinions about undergraduate research. This survey has 10 questions and should take you less than 10 minutes to complete.

Please specify the Academic Department, Research Institute, or Rural Campus where you primarily work.

1. How long have you been at UAF?
 - Less than 4 years?
 - Between 4 and 10 years inclusive?
 - More than 10 years?

2. To what extent do you consider yourself involved in research?
 - Very active
 - Active
 - Inactive

3. Do you use research topics (methods, results) in any of your class curriculum?
 - Regularly
 - Occasionally
 - Rarely

Undergraduate research refers to a collaboration in original research and/or creative activity between an undergraduate student and a faculty member, leading to work which can be published or presented to scholars in the field. Projects could be an element of the faculty's work or could be initiated by the student.

4. Do you consider undergraduate research compatible with a mission emphasizing student learning?
 - Yes
 - No

If not, please give a short reason why:

5. Do you see undergraduate research as a useful teaching tool?
- Yes
 - No

If not, please give a short reason why:

6. Do you envision undergraduate research as an important, formal part of your department's activity?
- Yes
 - No

If not, please give a short reason why:

7. In your view, when is the earliest that students can be involved in research under your supervision?
- Freshman year
 - Sophomore year
 - Junior year
 - Senior year
 - Not as an undergraduate

8. What do you consider is most needed to enhance support for undergraduate research?

You may select more than one item from the list

- Student research grants
- More time for research
- More campus-wide encouragement for undergraduate research
- More funding for equipment
- More credit for student supervision in teaching loads
- Change in college curricular structure
- Change in campus curricular structure

Other?

9. Do you regularly teach a research methods course?
- Yes
 - No
 - There is no such course in my department's curriculum
10. Have you involved undergraduates in your research?
- Yes
 - No

Please respond to the following questions only if you answered yes to question 10.

10a. How many undergraduate research students have you worked with in the past 3 years?

10b. How many of them made presentations about their research?

10c. What type of presentations were they?

Select as many as apply

- On campus
- At regional meetings
- At national meetings

10d. Are you currently working with undergraduates on one or more research projects?

- Yes
- No

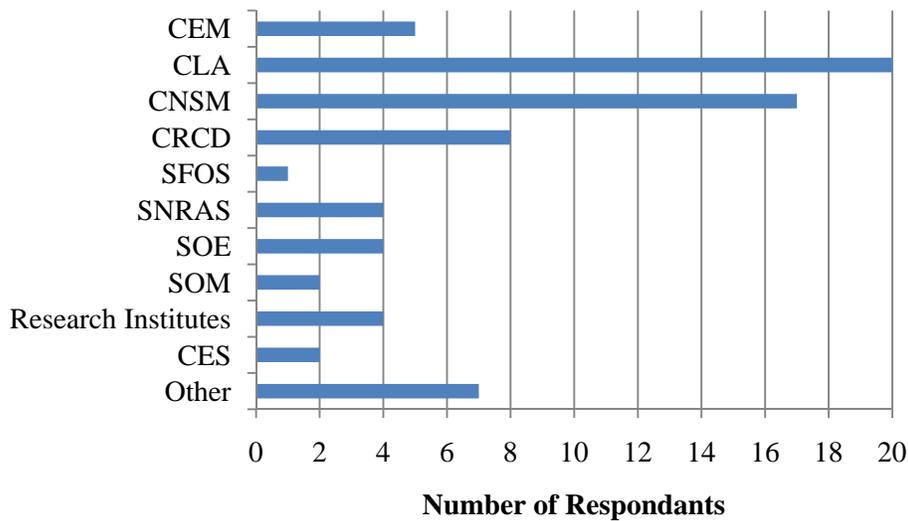
Thank you for your time in helping us with this survey. Could we call you for further questions or to ask for more specific answers?

- Yes
- No

If Yes, please supply your name and email address. Thanks again.

Summary of Responses:

Please specify the Academic Department, Research Institute, or Rural Campus where you primarily work.



1. How long have you been at UAF?

| | | |
|------------|----|-----|
| < 4 years | 21 | 28% |
| 4-10 years | 25 | 34% |
| >10 years | 28 | 38% |

2. To what extent do you consider yourself involved in research?

| | | |
|-------------|----|-----|
| Very Active | 36 | 49% |
| Active | 29 | 39% |
| Inactive | 9 | 12% |

3. Do you use research topics (methods, results) in any of your class curriculum?

| | | |
|--------------|----|-----|
| Regularly | 50 | 67% |
| Occasionally | 22 | 30% |
| Rarely | 2 | 3% |

4. Do you consider undergraduate research compatible with a mission emphasizing student learning?

| | | |
|-----|----|-----|
| Yes | 73 | 99% |
| No | 1 | 1% |

If not, please give a short reason why:

Undergraduate students at UAF are not ready to collaborate with me in my research. They simply do not have the expertise to know what to look for when they collect the data, nor do they have the skills to do a meaningful analysis within the frames of reference that I employ, nor do they have the skills to write a publishable paper.

Engagement in independent or guided scientific research is the best way to learn the process of science as well as gain content knowledge.

5. Do you see undergraduate research as a useful teaching tool?

| | | |
|-----|----|-----|
| Yes | 72 | 97% |
| No | 2 | 3% |

If not, please give a short reason why:

Engagement in independent or guided scientific research is the best way to learn the process of science as well as gain content knowledge. Student can definitely engage in inquiry (research) learning in science laboratories.

Under current workload conditions undergrad research won't work. There would need to be an adequate workload credit to make it worth the monumental time requirement to provide a meaningful experience for the student. Explain how that will happen given that CLA now has a hiring freeze and there is a shortage of tenure track faculty and a decrease in our adjunct budget.

However there are limitations to undergraduate research - especially in terms of making it compatible with the reality of many of our students' lives. Additional time spent on a research project is often time taken away from a full-time job or caring for family members. As such, unless there is sufficient funding or academic credit (counting towards graduation) attached to such research opportunities, there are many of our students for whom it is not an option.

If supported by the department.

6. Do you envision undergraduate research as an important, formal part of your department's activity?

| | | |
|-----|----|-----|
| Yes | 59 | 80% |
| No | 15 | 20% |

If not, please give a short reason why:

Yes, but we need a formal mechanism for students to obtain a research experience.

Under current workload conditions undergrad research won't work. There would need to be an adequate workload credit to make it worth the monumental time requirement to provide a meaningful experience for the student. Explain how that will happen given that CLA now has a hiring freeze and there is a shortage of tenure track faculty and a decrease in our adjunct budget.

It has been a formal part of the undergraduate major for more than 15 years.

Research is not part of my workload.

I teach remedial writing classes. In one of them, they are assigned an annotated bibliography, which requires them to use the library and databases to find scholarly articles, read them, cite them, and summarize them. Research, as in performing lab experiments, does not apply to English classes.

My answer is actually "maybe": it is not a formal part of the department's activity now. It certainly could be, but we have graduate students doing research who are likely to take up the research-mentoring time; in mathematics, research is very much a one-on-one-or-two activity. It would be

great if we could manage to have undergraduate research be a part of the department's activities, though.

I can't answer this question., not enough experience. But I assume this is a practice for a few faculty.

Undergraduate research receives no emphasis in my department. If undergraduates work with professors, it is on an individual, unadvertised basis.

We don't have the manpower to conduct student research projects outside of a classroom setting at this time.

In Mathematics, it is very difficult to incorporate undergrads into a faculty member's research program. That means undergrad research, no matter how valuable to the student, requires a significant amount of teaching time from the faculty member.

My formal teaching duties involve classroom instruction and graduate student research supervision, and I do not have the time available to add another major focus without cutting something.

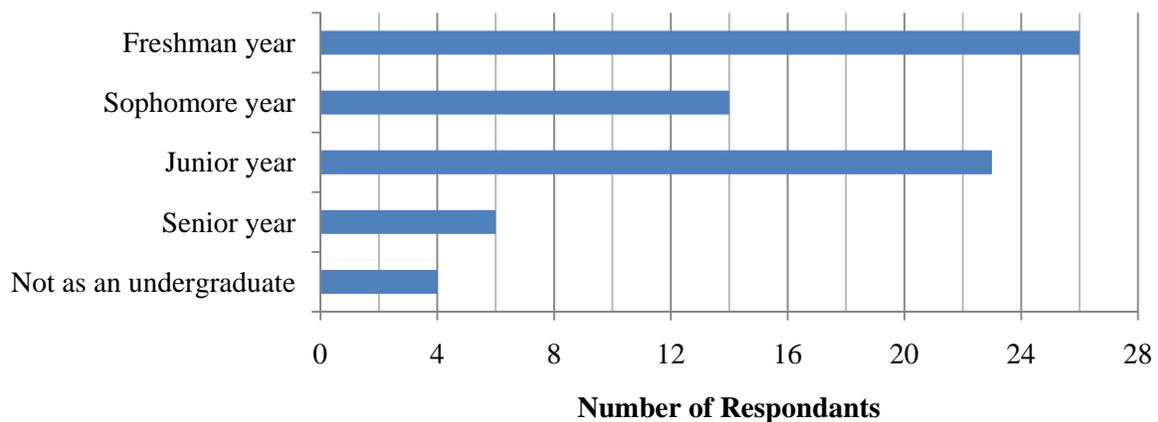
Our teaching load is quite high and this seems like a lot of extra work for no credit. Also, there is no "undergraduate" research in mathematics. Students can do expository reading to augment learning, but research is not possible at this level in my field.

I can't tell this point for sure, because I, myself, haven't seen undergraduate students collaborate with a faculty in the school. Students must learn the skills, theory, and substantive material before they can undertake research. By the time they have accrued enough theory, methods, skills, and substantive material, they graduate.

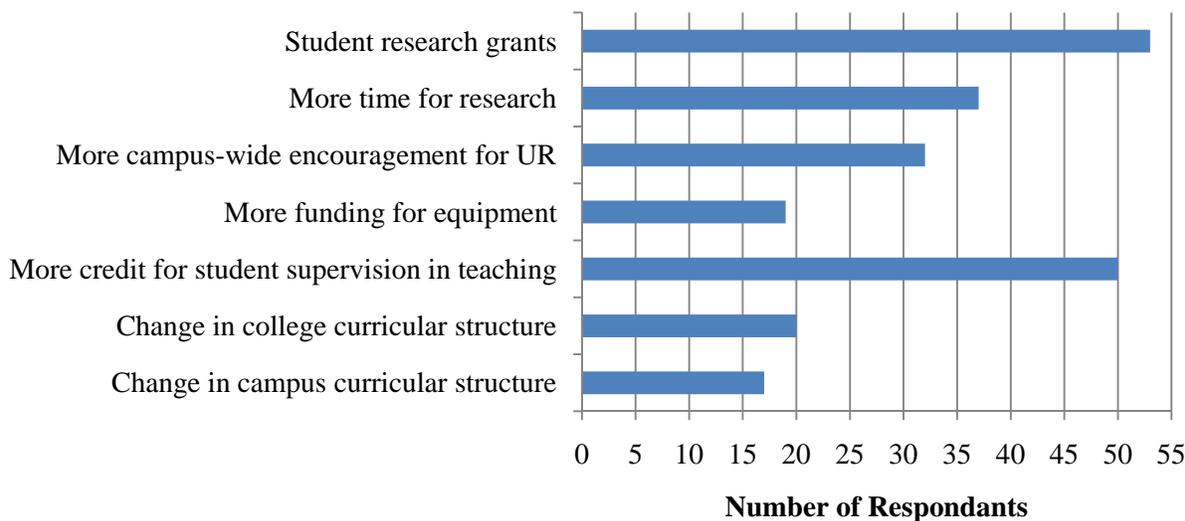
There was no support in the past for it.

Most of our students lack the skills (e.g. mathematics) and motivation for undergraduate research.

7. In your view, when is the earliest that students can be involved in research under your supervision?



8. What do you consider is most needed to enhance support for undergraduate research?
You may select more than one item from the list



Other:

Promotion of undergraduate research so students can more easily find their opportunities.

Admissions requirements that will weed out the marginal students and attract higher-caliber students.

Students having to pay tuition to get credit for doing non-curricular research (ie through a x98 or Practicum course) seems to inhibit our efforts.

Many of the faculty need to view students as more than they are. When done properly students can accomplish almost anything if they have the proper faculty support in place. Too many faculty don't encourage this belief. They sit around and complain and want a lot handed to them.

We must recognize that there are disciplinary differences that determine when students are adequately prepared to do research.

Real answer to #7- it depends on the student. There are some students who come to college with many years of science fairs and science symposium experience. They are ready as freshmen. For the majority though, jr-sr is more realistic. We need to be ready for anyone, any age.

What is most needed? A huge change in faculty attitude toward research. The science-oriented faculty in our school have no problem fostering research project. The social science faculty consider it a huge burden and time-eater.

Funding for student travel

Credit for supervision is the BIG one!! Decrease in bureaucratic process to get involved (paperwork, proposals, justifications, multiple layers of signatures, etc)

It would be great to see EPSCOR or other NSF support for undergraduate research through course buy-outs. I would be very interested in involving students directly in research. Additionally, it would be helpful to hold a workshop on models for involving students in various fields. Most undergrad. research models

I've heard of are geared towards natural/physical sciences (e.g., in a lab or field setting). Social science research in our department would be more likely to take place through close mentorship or perhaps fieldwork.

UG research students need lots of advice and supervision, in particular if we consider not just the best ones. I don't see that UAF at all levels would be open to UG research as the primary assessment measures for faculty are # of papers and research grants. so these measures would need to be changed drastically to make doing UG research projects attractive to a faculty member (although i enjoy doing UG research).

I think the honors program should be project based, not course based. Separate honors courses are often not practical, and instead often students register in the regular courses (under a different course number) and instead have some additional out of class assignments to pursue. This also means that a student can get a C (or lower) in a course, but get honors credit for it. If we are going to stick with a course based honors system, it seems like it would make more sense for the honors credit to be contingent upon achieving a certain performance level in the course, in addition to the extra work.

More support for reflection about the power dynamics of this activity. How we are making sure IRB protocol reflects the power differences between undergraduates and Faculty, in terms of compensation and work load.

Greatest difficulty is securing faculty mentors for those students already interested in research and who want to apply for the existing student grants.. money goes unused (have students, no faculty mentors).

Enforced the existent standardize course numbers! THESIS is 499 (period) not all these other permutations that exist. Non-thesis research is 498 (period), capstones are important and should include research elements but, by design, they must include broadly synthetic elements.

The Core Curriculum needs serious revision. UAF is RU/H university, why does the core contain no expectation of BA/BS student exposure to research? No "R" (research intensive) designators...? we have a lot of work to do.

The campus needs a structured undergraduate research program that starts in a student's first year. Inquiry should be a large portion of all science laboratories for courses.

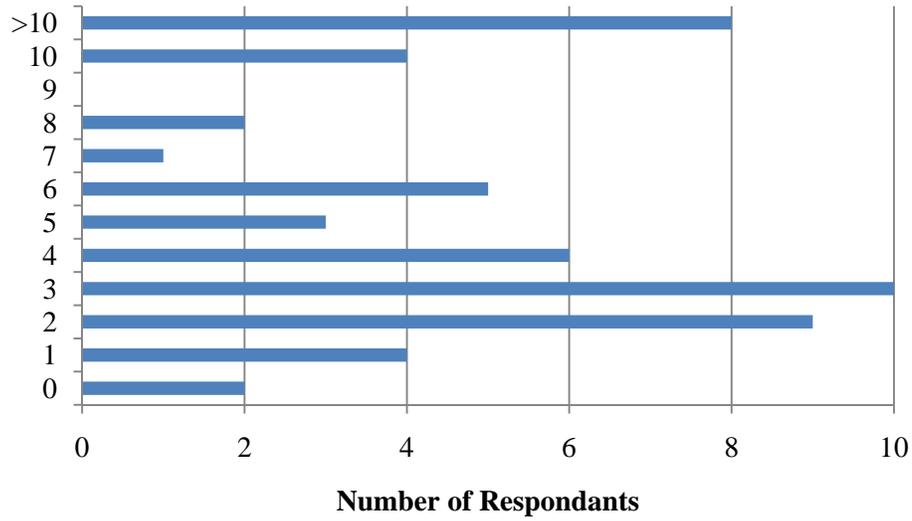
9. Do you regularly teach a research methods course?

| | | |
|---------------------------------|----|-----|
| Yes | 18 | 24% |
| No | 37 | 50% |
| No such course in my department | 18 | 24% |

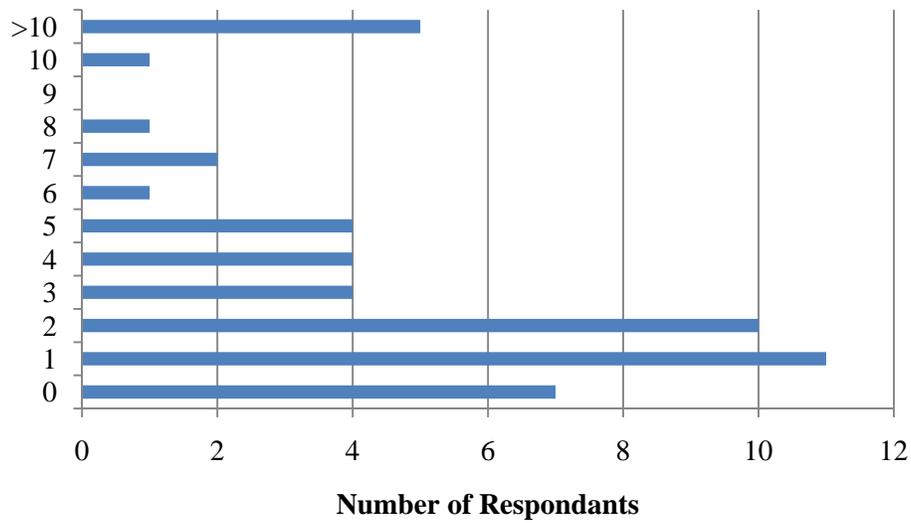
10. Have you involved undergraduates in your research?

| | | |
|-----|----|-----|
| Yes | 55 | 74% |
| No | 18 | 24% |

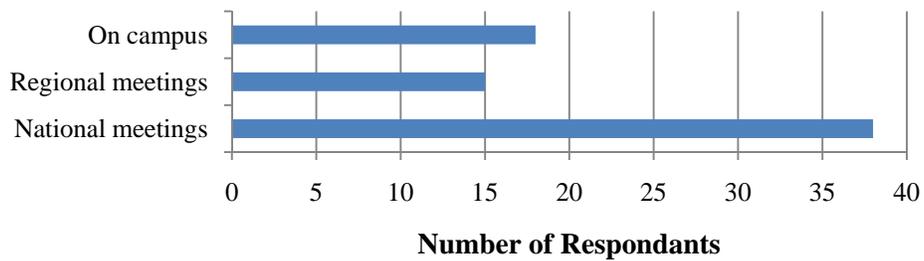
a. How many undergraduate research students have you worked with in the past 3 years?



b. How many of them made presentations about their research?



c. What type of presentations were they?
Select as many as apply



d. Are you currently working with undergraduates on one or more research projects?

| | | |
|-----|----|-----|
| Yes | 31 | 42% |
| No | 24 | 32% |

Thank you for your time in helping us with this survey. Could we call you for further questions or to ask for more specific answers?

| | | |
|-----|----|-----|
| Yes | 40 | 54% |
| No | 32 | 43% |

If Yes, please supply your name and email address. Thanks again.

| | |
|-------------------|---|
| Alex Oliveira | (907) 942-5559 (cel) |
| Andrea Bersamin | abersamin@alaska.edu |
| Brien Ashdown | betaylor@alaska.edu |
| Carol Gold | bashdown@alaska.edu |
| Carrie Baker | cgbaker@alaska.edu 474-7754 |
| Chanda Meek | clmeek@alaska.edu |
| David Newman | dnewman@alaska.edu |
| Denise Thorsen | dlthorsen@alaska.edu |
| Ellen D. S. Lopez | dvfazzino@alaska.edu |
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| Roger Ruess | rbarundale@alaska.edu |
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| | sdsparrow@alaska.edu |
| | tpclausen@alaska.edu |
| | talower@alaska.edu |

This survey could have used a place for general comments. Seeing none: I think that the possibility for undergraduate research is really exciting, but it is extremely time-consuming, and faculty members don't typically get much out of it in terms of actual research (at least this has been my experience in mathematics): in order to have a project suitable for an undergraduate, it needs to be highly focussed, and not very hard. And even then, it will take the student a really long time to figure out where to start. It can be valuable for the student, but at least half of the experience for the faculty member is teaching, not research. (I have been lucky that I have been able to publish two papers with undergraduate students, but this is not typically the case. And I work in an especially accessible area of mathematics.) So there would need to be some significant incentives for faculty to participate in an undergraduate research program to make it a worthwhile use of time.

I am bipartite, of course, so don't do my own research. However, I also run a program that is designed to get freshman and sophomore rural, mostly Alaska Native, students in STEM degrees and careers and we are trying to integrate research into our curriculum and program as a way to make it more relevant and keep students interested. We could use some support from others who believe in expanding opportunities instead of putting up roadblocks for non-traditional students.

I am bipartite and don't do research but I advise psychology majors. I know they need research opportunities to be competitive for graduate school in psychology. So I am completely behind this initiative.

APPENDIX C: STUDENT SURVEY

The following survey instrument was conducted via the web in early fall 2010. There were 152 undergraduate respondents, which represents about 3.8% of the full-time undergraduate degree seeking students at UAF.

Undergraduate Research at UAF

The purpose of this survey is to gather information from UAF students on involvement and interest in undergraduate research. The survey consists of 9 questions and should take less than 10 minutes to complete. Your input will help us improve undergraduate research at UAF. Thank you for your time.

1. What is your class standing?
 - Freshman
 - Sophomore
 - Junior
 - Senior

2. Are you currently participating in a UAF research project?
 - Yes
 - No

3. If you have participated/are participating in research, why did/do you do so?
check all that apply
 - money
 - credits
 - education
 - enjoyment
 - resume
 - other

4. Where do you currently seek out research opportunities?
check all that apply
 - current professors
 - UAKJobs
 - word of mouth
 - other

5. Following are several common barriers to students participating in research. Please rank each on the scale.

Finding opportunities

1 2 3 4 5

not a barrier major barrier

Thinking up good projects

1 2 3 4 5

not a barrier major barrier

Finding mentors

1 2 3 4 5

not a barrier major barrier

Getting funding

1 2 3 4 5

not a barrier major barrier

Time

1 2 3 4 5

not a barrier major barrier

Are there additional barriers to UAF research not listed here?

Summary of Responses:

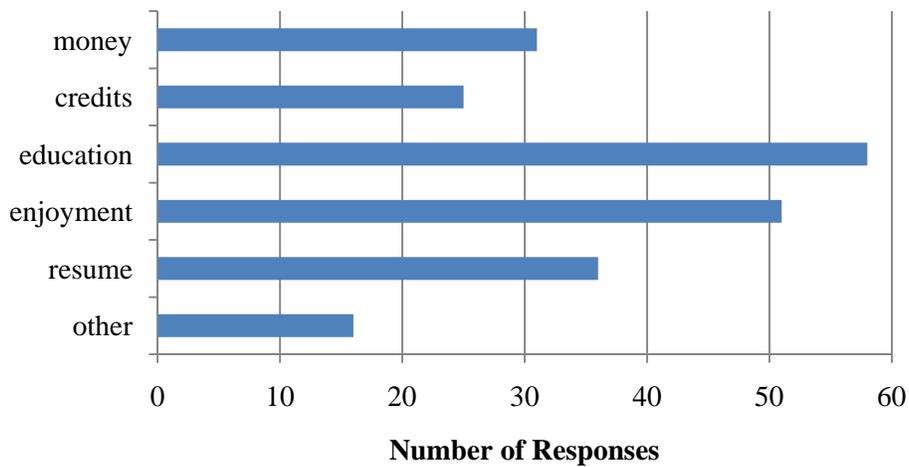
1. What is your class standing?

| | | |
|-----------|----|-----|
| Freshman | 23 | 15% |
| Sophomore | 34 | 22% |
| Junior | 32 | 21% |
| Senior | 61 | 39% |

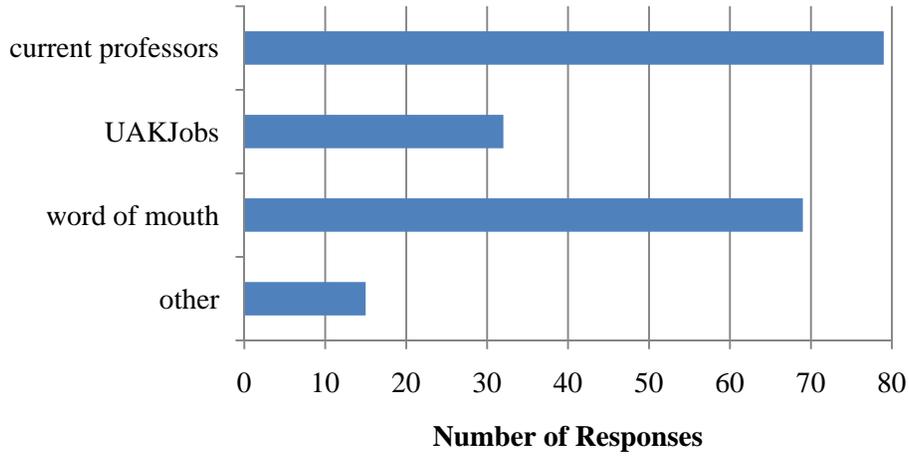
2. Are you currently participating in a UAF research project?

| | | |
|-----|-----|-----|
| Yes | 33 | 21% |
| No | 118 | 76% |

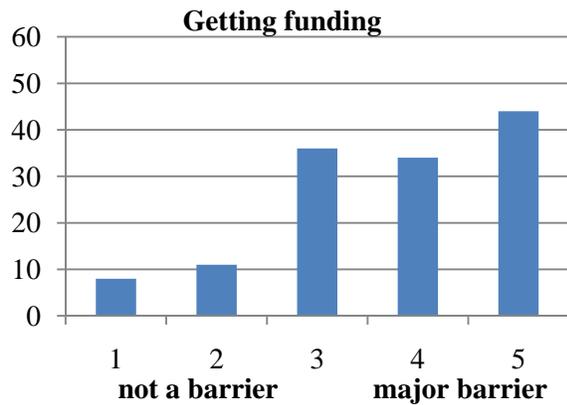
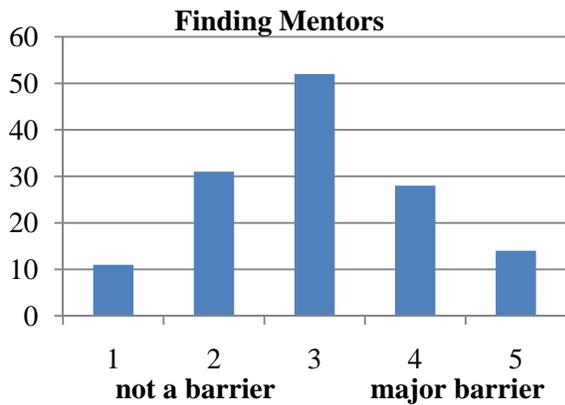
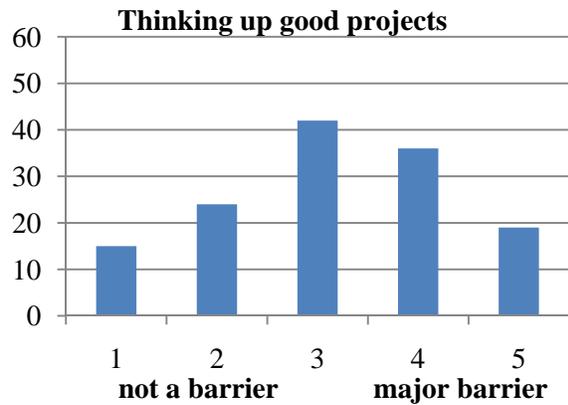
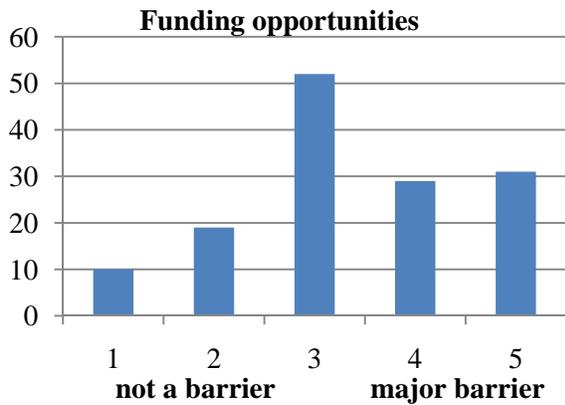
3. If you have participated/are participating in research, why did/do you do so?
check all that apply

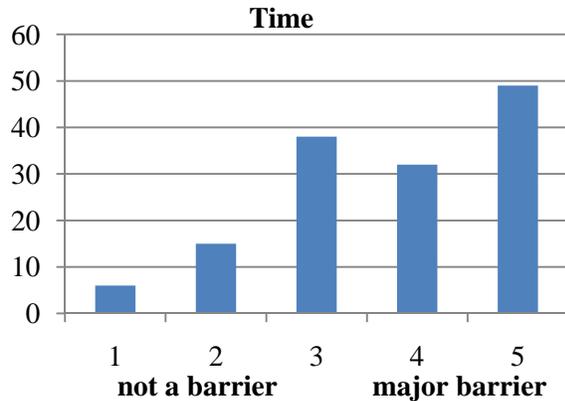


4. Where do you currently seek out research opportunities?
check all that apply



5. Following are several common barriers to students participating in research. Please rank each on the scale.





Are there additional barriers to UAF research not listed here?

Resources would be another key. My particular field, a lot of research are done in clean, climate controlled rooms, removing the environmental element from the equation. UAF doesn't have those types of facilities, which makes doing that kind of work impossible.

This campus understandably so is geared toward conventional students. But what about the students that work all day? I am very interested in research but more research requires a large amount of the time during the day. I know this varies per professor.

I would also like see a resource or a one stop shop for research at UAF. I found that I had to spend months emailing professors or asked around to find a niche that worked for me. It would be great if it could highlight information like what credit they can get for it, etc.

I started on a behavioral health project just for the experience in the Fall and had I have known I could of done it for credit I would of signed up. But the caveat to that was the professor requires that you work for them sometimes for a whole year before you can get credit for it.

Also, a resource that streamlines all the research going on, on campus would be great too. There are so many interesting projects and you never hear about it. Give me a place that does!

UAF does not have any research going on in Foreign languages, only research in native languages.

Wages - research on campus does not pay as well as jobs off campus.

This does not pertain to me as I am not interested in research even though I am a student.

Research at UAF seems disorganized and on a word of mouth opportunity system. You have to know the professors and get on their good side to get the chance

UAF doesn't have a comprehensive plan for academic competitions.

Opportunities in CLA much harder to find than in hard sciences.

Their are not enough opportunities in my major, electrical engineering.

resources

Some students like myself would like to try research, but can't afford to not get credit or not be paid for our time. I've tried to find opportunities through word of mouth and no one is willing to give credit or pay for your time. I think more students would be interested if they were receiving something in return and not just the experience.

Finding how to talk to and were to go.

I do not know anything about undergraduate research.

Finding out how to start is the hardest part.

The credits for the research which will be counted as the major department credits are limited.

I came in as a transfer student and was hoping to get as much help as possible in order to gain a great deal of experience while here. I sent out e-mails to all the professors and went to career services and I have yet to find anything. I only have three semesters left and have yet to get any experience in my field of study. I just wish more was available and the professors would be more involved in getting students those opportunities.

Specific subject within the field of study. At the UAF there's a lot of physics, but most are Atmospheric, and volcanology. Need more student thought up research

It would help if there was an area where folks could free-form brainstorm to list ideas for research topics. I have thought about it, but do not know who is doing

Trying to coordinate things between very busy people.

Disabilities that one may have limiting opportunities.

I am not an undergraduate student, but I would like to mention an idea that I've had recently. I am a Ph.D. student on campus and one way that the university could support undergraduate research and graduate research projects would be to provide funding opportunities for graduate students to apply for which would provide funds to hire undergraduates in research projects. This would give mentoring and supervisory experience to graduate students, while providing opportunities for undergraduates that include mentoring from the academic advisor of the graduate student and from the graduate student as well. It would be a win:win:win situation for both students and the graduate college.

I must work in order to afford a full time course load. Research opportunities are everywhere, but it is difficult to find funding that allows for a labor stipend.

Getting the word out and explaining the significance or importance to the research in terms of benefits or opportunities and recognition as a result.

I don't hear much about research I could be a part of and I don't feel there are many resources I could look into to find out.

I don't hear of UAF research.

APPENDIX D: CUR REPORT

Opportunities Missed Undergraduate Research at University of Alaska Fairbanks

Background. In September, 2010, University of Alaska Fairbanks (UAF) asked the Council on Undergraduate Research (CUR) to send a consulting team to Fairbanks to ‘assess the current culture of undergraduate research at UAF and help [the university] prioritize a list of most important next steps to institutionalize UAF undergraduate research.’ UAF’s provost had appointed an ad hoc Committee on Undergraduate Research in January, 2010, to promote the future of UAF as a ‘student-centered research university’ pursuant to a recommendation by Terry MacTaggart, whom UAF had engaged as consultant. CUR appointed Janice DeCosmo and William Campbell as consultants. UAF sent them the MacTaggart report, the provost’s charge to the Undergraduate Research Committee, the committee’s interim report, and links to other relevant documents (such as the list of institutions UAF considers equivalent and aspirational peers and the university’s 2007 Vision Statement); and scheduled a two-day visit.

We reviewed those documents, spoke on the telephone with a member of the committee, and spent October 6 and 7 at UAF. We met with the Committee on Undergraduate Research (Chair Denise Thorsen, Anita Hartman, Barbara Taylor, Channon Price, Craig Wisen, Paul McCarthy, Sarah Hardy, Sue Hills, and Todd Radenbaugh) and interviewed additional administrators, faculty, staff and students individually and in small groups including:

| | |
|----------------|-----------------|
| Rich Boone | Bridget Burke |
| Jenny Carroll | Richard Collins |
| Burns Cooper | Kelly Drew |
| Larry Duffy | Gwen Holdman |
| Naomi Horn | Carol Lewis |
| Jeff May | Scott McKay |
| Christa Mulder | Kevin Sanger |
| Bill Simpson | Katy Straub |
| Susan Sugai | Barbara Taylor |
| Alexei Urpkin | Pips Veazey |
| 12 students | |

At the end of our visit, we met with the committee and Provost Susan Henrichs to summarize what we had learned and deliver our preliminary recommendations. We interviewed Jennifer Wagaman by conference call on October 11.

Findings. The university is clearly committed to increasing the number of research opportunities available to undergraduate students. UAF’s Strategic Vision sets an ambitious objective: to ‘increase the number of undergraduates engaged in research by 10% per year to double the number between 2010 and 2017.’

The MacTaggart Report, 2009, said that ‘UAF enjoys a great opportunity to emerge as one of the nation’s most important student-centered research universities.’ (p. 1) To do so, he makes several recommendations, including leveraging UAF’s considerable research achievements and world-wide research reputation to enhance the university’s educational mission by engaging undergraduates in research. MacTaggart argues that

The potential for advancing this university based on existing strengths is especially acute at this time in history. UAF’s location and the work of its teaching and research faculty will be ‘hot’ for some time as a consequence of media attention to climate change. Melting glaciers, rising sea

levels, drilling in pristine environments, changing cultures due to the melting of the permafrost and mounting fuel costs in remote villages, as well as volcanic activity are of immense interest and concern to people across the globe. (p. 3)

The Undergraduate Research Committee's Interim Report to the Provost agreed with MacTaggart about UAF's potential. The committee found that UAF regards undergraduate research as a training exercise for students, not as holding inherent value to the teaching mission of the university; that UAF lacks the capacity to coordinate, promote, facilitate, fund, assess, communicate, and document undergraduate research; and that UAF faculty are minimally credited for mentoring undergraduate researchers.

The Committee on Undergraduate Research told us that:

- They estimate that 25% of UAF's graduating seniors have completed a research project as part of a course, but no one knows exactly. And no one can even guess how many students are engaged in research outside of coursework.
- Accounting for undergraduate research has become a hot topic for the administration, and some faculty are pushing back because of workload issues.
- UA-Anchorage is UAF's prime competition for undergraduates; they have an undergraduate research office. UAS (Juneau) competes in environmental sciences.
- Many programs on the rural campuses require undergraduate research at varying levels of sophistication, e.g. in environmental studies, resource management, and veterinary technology.
- UAF's research institutes are quite autonomous and do not always coordinate well with the colleges or with each other. The largest federal grants go to the institutes, giving them considerable budgetary strength. Allocation of recovered indirect costs is an ongoing issue.
- Undergraduate research is the best way for UAF to provide an experiential learning environment ('get students out of lectures and doing something real'). It also has the potential to give UAF a publicity boost and increase graduate school applications.
- The young faculty currently being hired believe that supervising undergraduate research is part of their jobs. However, senior faculty who have been at UAF for a long time think of it as an extra responsibility and expect to be rewarded for it.

Faculty and administrators told us that:

- Assertive students tend to seek and find research projects, but shy and reticent students do not. UAF attracts large numbers of first-generation and low-income students who are not very assertive.
- Chemistry requires students to complete four credits of research as a capstone course for all students earning ACS certification. But many students withdraw from chemistry before reaching the capstone. An earlier research experience would help maintain and stimulate their interest.
- Faculty and graduate students need help in learning how to supervise undergraduate researchers.
- Administrative policies for rewarding faculty for supervising independent study courses vary significantly from college to college.
- The split between lower and upper campuses poses problems for expanding undergraduate research in the sciences. Students take their introductory science courses on lower campus, but laboratories and faculty offices are on upper campus. Thus first and second-year students have little out-of-class contact with their instructors, restricting the opportunities for faculty to recruit younger students into research projects or students to volunteer in laboratories.
- Supervising undergraduate research is unevenly credited in promotion and tenure decisions; some departments take it seriously and track it as part of faculty annual reporting, while others do not.
- Students need help in learning how to write proposals and abstracts, how to conduct research responsibly, and how to apply for graduate school.

- Research Day, UAF's undergraduate research symposium, has few participants and is poorly attended. In spring, 2009, Research Day attracted only 14 posters—four winners of Undergraduate Research grants and ten graduate students.
- UAF needs a centralized office to coordinate and promote undergraduate research. That office should be run by someone tasked with undergraduate research who can be UAF's go-to person.

We interviewed approximately twelve students at the Honors House. Most were Honors Program participants; some were working on Space Grant projects. All were either engaged in undergraduate research, intended to do so, or were considering it. Several had received Undergraduate Research Grants from the Vice Chancellor for Research, several had received Honors Program grants or support from Alaska Space Grant. Two intend to pursue doctorates, eight plan to earn Master's degrees. None had heard the phrase 'student-centered research university.' They told us that:

- Undergraduate research helps students develop critical thinking skills that are not normally required in the classroom.
- Funding for research projects is a huge incentive. One said, 'who wouldn't want to replace a boring job with an interesting research project that contributes to the major or career?'
- Undergraduate research is not encouraged in the humanities.
- UAF should not require all undergraduates to engage in research, but should make it available to all who wish to participate.
- The spring Research Day drew presenters' friends and faculty, but no one else. However, it was a great event for seeing other researchers' work.
- A centralized undergraduate research office would draw a more diverse group of students into research; attract students to research earlier in their careers; help ease the obstacles students now face (e.g. scheduling, fitting research into curricula, earning credits); and help students access funding. Such an office could provide students with advice about research and help them make connections with potential research supervisors and funding sources.

We learned that considerable funding is available to support extracurricular undergraduate research projects. The Vice Chancellor for Research offers a campus-wide competition for Undergraduate Research Grants of up to \$2,500. Last year, they received 10-12 applications and funded all of them. The College of Liberal Arts gave \$15,000 in research awards to undergraduates last year. The Honors Program funds approximately 10 research grants of \$500 each year. The Vice Chancellor for Research awarded three tuition prizes (\$1,000, \$500, and \$250) for undergraduate posters at Research Day. External grant funds support undergraduate researchers working in the Space Grant Program, NSF EPSCoR, NIH INBRE, and others.

We also learned that UAF's first-to-second year retention of 64% and six-year graduation rate of 25% is embarrassing to some faculty and administrators. They were quick to point out that UAF is an open admissions institution with a high enrollment of first-generation, low-income students, and that Alaska's economy fosters a drop-in, drop-out enrollment pattern.

Conclusions. It is clear that UAF faculty and staff have been providing undergraduates with opportunities for research for many years. Many major and certificate programs provide research experiences as part of credit-yielding capstone courses and the Honors program requires a thesis of all participants. A variety of grants and grant-funded programs support extracurricular undergraduate research projects. Both internal and external documents identify undergraduate research as one of UAF's strengths and argue that undergraduate research opportunities should be increased and leveraged in aid of institutional growth. Becoming a 'student-centered research university' is a worthwhile and achievable goal for UAF, and undergraduate research is an excellent way to reach it. But UAF lacks the structures required to achieve that growth.

We found that faculty and staff know of the undergraduate research opportunities within their own institutes or departments, but few know of the broad range of opportunities available in other units. Worse, students are even more ignorant. Most of the students we spoke with were engaged in undergraduate research, but they all learned of the opportunities directly from their faculty supervisors or the Director of the Honors Program. Few students knew of research opportunities in other units; few knew of the range of possible funding sources.

Specifically:

- Approximately one quarter of UAF undergraduates take a credit-yielding course including a research project, and an indeterminate number of students complete non-credited research experiences. Many of the non-credited experiences are funded through small internal grants or external funds held in individual departments or institutes.
- Neither faculty nor students understand the full range of undergraduate research opportunities at UAF.
- No one knows how many research opportunities are available to students, how much funding is available, how many undergraduates are currently engaged in research, or what impact that research has on their retention and success at UAF and beyond.
- ‘Research’ is defined quite narrowly at UAF. Most interviewees spoke of research as occurring in laboratory and social sciences, a few spoke of research in the humanities, but none mentioned creative activities such as music, theater, and graphic arts.
- Research Day, the springtime symposium for student research, is somewhat more open than in previous years, but is severely underutilized. At other institutions, symposia like this one draw hundreds of posters, oral presentations, and performances, and thousands of viewers. Those campuses make the symposium a major educational, public relations, and marketing event.

UAF is not starting from scratch. Many opportunities are available to students, with considerable funding. Students who actively seek research opportunities can find them, and can usually find financial support for them as well. However, some departments, colleges, and institutes discourage (actively or passively) faculty and students from engaging in research. Remuneration policies vary widely from unit to unit; many faculty feel unable to supervise research due to workload concerns. Furthermore, ignorance is rampant. No one knows how many research opportunities there are, how much funding is available, how many undergraduates engage in research, or what affect it has on students, faculty, or the institution. UAF has a poor system of communication, to be sure, but the university’s major deficiency is lack of a central structure to support undergraduate research.

The net result: many students who are extremely capable do not do research or do not receive funding. With its wealth of research programs and rich funding sources, UAF is poised to realize MacTaggart’s vision: one of the nation’s premier student-centered research universities. But, as MacTaggart argues, the institution is missing wonderful publicity and marketing opportunities. In our experience, undergraduate research is a powerful marketing tool. Donors, legislators, alumni, and the public respond instantly to stories of undergraduates making discoveries.

Furthermore, undergraduate research can improve retention and graduation rates. George Kuh says that undergraduate research is one of the high-impact practices that increase student engagement and raise retention and graduation rates.¹² David Lopatto³, Nagda et al.⁴, and others have demonstrated that undergraduate research is particularly effective in engaging high-risk students, including minorities, low-income, and first-generation college students.

¹Kuh, George and associates, *Student Success in College: Creating Conditions that Matter*, 2005, Jossey-Bass.

²Kuh, G. 2008. *High-impact educational practices: What they are, who has access to them, and why they matter*. Washington, DC: Association of American Colleges and Universities.

³Lopatto, D. 2010. Undergraduate Research Experience as a High-Impact Student Experience. *Peer Review* 12(2): 27-30.

⁴Nagda, B.A., S.R. Gregerman, J. Jonides, W. von Hippel, and J.S. Lerner, 1998. Undergraduate student-faculty research partnerships affect student retention. *The Review of Higher Education* 22 (1): 55-72.

Recommendations:

1. ***Create an Office of Undergraduate Research.*** A well-supported, centralized Office of Undergraduate Research will help UAF to realize the goal of making student participation in research a hallmark of its undergraduate program. Since undergraduate research is part of UAF's academic mission, the Office of Undergraduate Research should report to the provost. The office should be located in a central building on lower campus with high visibility and access to students. In order to ensure the undergraduate research enterprise has sufficient credibility with faculty and deans, the office should be led by a faculty director and include adequate professional and student staff in order to achieve the following goals.

- Provide a centralized clearinghouse for undergraduate research opportunities on UAF campuses by coordinating with existing undergraduate research initiatives and funded programs, tracking curricular-based options and creating a database of individual opportunities for research with faculty;
- Advise students on planning for a research experience and assist them to connect with potential research mentors (teaching faculty as well as research/field site personnel and librarians);
- Provide instruction to students on responsible conduct of research, seeking funding for their research, and presenting their findings at local and national conferences and other venues;
- Produce a campus research days/symposium (see additional detail below regarding how to realize the research symposium's full potential at UAF);
- Coordinate campus-based summer research initiatives designed to raise visibility, realize efficiencies, and create a cohort experience (see additional details below);
- Create and maintain a website for undergraduate research resources and opportunities;
- Serve as a resource for faculty writing grants who wish to include undergraduate research as a part of the grant proposal;
- Devise and implement a mechanism for collecting data regarding undergraduate participation in research across campus;
- Work with departments and faculty to create additional research opportunities for undergraduates;
- Raise funds through grant writing and advancement activities to provide support for undergraduate research.

While centrally-based offices that support undergraduate research employ a variety of staffing models, because support and facilitation of faculty efforts are so important at UAF, we recommend a faculty director with at least a 50% appointment (preferably 50-75%). A part-time faculty director will retain some teaching and research responsibilities in her/his academic department or institute—essential to maintaining faculty credentials, and important in modeling scholarship for students.

Some universities have combined the Undergraduate Research Office with the Honors Program, e.g. the University of South Florida. However, this combination brings a threat: if students and faculty perceive undergraduate research as part of the honors program, its appeal will be very limited. At UAF this limitation would be compounded by the small number of students doing honors; we caution that the university could face great difficulty in growing undergraduate research participation. Although links between undergraduate research and honors may be strategic at UAF, we recommend that separate offices and missions be established. At the University of South Florida, for example, the Director of Undergraduate Research is, in fact, an associate dean of the Honors College, but she maintains a completely separate website and presence (<http://www.ur.usf.edu/content/index.html>).

UAF's undergraduate research director should be assisted by a professional staff member who has the capacity to provide student advising, instruction on research practice, and event management. This staff position is critical to growing the initiative, as the director will be fully occupied with making connections across campus with faculty and institute researchers, writing proposals, teaching research courses or workshops, overseeing student research award processes and advising students on research placements.

The staff position will take the lead on outreach to students, creating and delivering information sessions and workshops, producing and planning the research symposium and related events, managing the website and other resources of the program as well as advising students interested in research. This assistant director or adviser may also draw on a student assistant for website maintenance, clerical and other types of support.

The university should assign raising funds for undergraduate research to an advancement officer to enable the university to take full advantage of the research symposium and other events that lend themselves to fundraising. As students rely so heavily on internet-based resources, we recommend that start-up funds for the office include support for the initial design and implementation of an undergraduate research website. (See, for example, undergraduate research websites for UAF's aspirational peers the University of Missouri: <http://undergradresearch.missouri.edu/> and Georgia Institute of Technology <http://www.undergradresearch.gatech.edu/>, as well as the University of Washington: www.washington.edu/research/urp).

Since there is substantial undergraduate research activity in externally funded programs at UAF, the director will have to take extra care to create an office that will be seen as a partner for those programs, and not as a competitor. The director must be someone who has a passion for undergraduate research and is willing to collaborate with other colleges and schools to coordinate and expand activities. The director should be strategic about engaging UAF's research institutes in providing opportunities for undergraduates, working with institute faculty to leverage undergraduate research for graduate school recruitment, and recognizing the effort institute personnel will contribute toward mentoring students by developing policies with institute directors and academic deans that recognize and reward their efforts. See, for example, the work that UC Berkeley has done to leverage its research infrastructure to make faculty-designed undergraduate research apprenticeships available to students (<http://research.berkeley.edu/>).

Finally, we caution against relying solely on a faculty director for the undergraduate research office; an additional staff person is necessary to accomplish all of the goals laid out above without burning out the faculty director, and for UAF to make substantial progress toward coordination and expansion of undergraduate research. Ideas for how to run such an office efficiently may be found in Snow, et al.⁵

2. *Expand Research Day.* UAF's Research Day has grown somewhat under the direction of Jenn Wagaman in the office of the Vice Chancellor for Research. In previous years, only Undergraduate Research Grant awardees were invited to participate. Last year the event was more broadly publicized than before and posters were invited from all UAF undergraduates, prizes were awarded, and an evening research open house was scheduled for the community. Nonetheless, only 14 posters were on display, and only four of them were by undergraduates. Based on participant comments, the audience for the event seems to have been limited to faculty mentors and the participants themselves.

We have found that research symposia for undergraduates can serve as powerful catalysts for growing the undergraduate research endeavor. Since they draw participants from across campus, they stimulate conversations about research that would not otherwise occur between students, faculty, administrators, and members of the community. We have seen those conversations lead to new research collaborations, expanded funding and marketing opportunities, and curricular innovations. Furthermore, they tend to grow without a great deal of fertilization, once a critical mass of presenters has been achieved. Peer pressure is a powerful force on campuses; when faculty from one department or research institute see the impressive work students in other units are completing, they vow to have their own students present their even more impressive work next year.

⁵Snow, A., J. DeCosmo and S.M.Shokair, Low-Cost Strategies for Promoting Undergraduate Research at Research Universities. *Peer Review* 12(2): 16-19.

We recommend a few initial steps to help UAF reach critical mass in spring, 2011:

- Advertise it widely, with a very short submission form: name, email address, faculty supervisor/mentor's name, abstract of the project and a preliminary deadline a month before the event—but exercise flexibility in stretching the deadline to maximize participation.
- Recruit faculty champions in departments and institutes, starting with the members of the Undergraduate Research Committee; ask those champions to sponsor at least one student submission each and to talk up the event with colleagues. Request that faculty announce the opportunity in their courses, and contact other funded projects (Alaska Space Grant, INBRE, for example) to request their research students to participate.
- Schedule the event for a day and time when many students and faculty might be able to participate; combining with another campus-wide academic event can be advantageous. (One of us once coordinated the symposium with the visit of an accrediting team; they were most impressed with our students' work.) House the event in a public space on lower campus. Wood Center will be ideal, but will soon be too small.
- If space and planning resources allow, include oral presentations, performances, and art. If not, posters will suffice.
- Invite everyone on campus, and make sure the event is on the calendars of the Chancellor and Vice Chancellors. Ask the Chancellor or Provost to say a few words to open the event, and announce in the invitation that s/he will make remarks—that will bring most deans and department chairs. Also invite legislators, the mayor, major donors, and campus and Fairbanks newspapers.
- Provide a printed brochure with names of presenters and titles, and abstracts if possible. Print copies for each presenter and faculty mentor, each attendee, and save a supply for future distribution. As your event grows, various offices will use them as recruiting tools for students and faculty.
- Take photographs/videos of the event and presenters. Send press releases with photographs to hometown newspapers, your public relations office, your alumni office, and anyone else who might provide you some publicity after the fact. The wider your publicity, the more faculty will participate next year.

We recommend against offering prizes. We think that the basic idea of these events is to give undergraduates the opportunity to present their work to the world. Besides, picking the best poster or presentation from diverse disciplines is very difficult. On the other hand, many institutions award student prizes with great success.

UAF might consider offering any student participant the opportunity to apply for a research conference travel award, if their work is subsequently accepted for presentation at a regional or national meeting. Or UAF could invite symposium participants to nominate their faculty and graduate student mentors for recognition for Excellence in Undergraduate Research Mentoring, and those awards could be announced at the event.

For an example of a successful undergraduate research symposia, look at the video from University of Washington's 2010 Research Symposium at <http://www.washington.edu/research/urp/>. An online symposium Proceedings is also available at the same page, just below the video link. For other examples, see University of Missouri (<http://undergradresearch.missouri.edu/forums-conferences/forum/index.php>); Georgia Tech University (<http://www.undergradresearch.gatech.edu/SpringSymposium.php>); Montana State University (<http://www.montana.edu/usp/pages/conference.html>) or University of California Irvine (<http://www.urop.uci.edu/symposium.html>).

3. ***Create a coherent summer undergraduate research program***, building on the considerable number of summer research opportunities that currently exist. Today, those opportunities are scattered across campus with no coordination or even communication. Most students undertaking summer research projects must complete training in the responsible conduct of research; coordinating a training program would ensure that all students are adequately trained, an absolute requirement of federal funding agencies. Most summer researchers are beginning to think about graduate school; coordinating some grad school preparation would be a boon to those students.

There are also great benefits to be gained from bringing summer researchers together into a loose cohort. For instance, some programs provide occasional social gatherings; others require all summer researchers to attend Friday afternoon colloquia. Undergraduate researchers profit greatly from discussing their research with other students. Teams of students working under a single faculty mentor currently experience some of those benefits—discussing thorny questions, sharing techniques, airing complaints. Students profit even more from regular conversations with students working under different faculty, in different departments, in different institutes or colleges. They explain their research to each other in non-specialist terms, they justify the basic assumptions underlying their research, they answer naïve but sometimes profound questions, and they learn from one another. These conversations not only enrich their summer experiences, they prepare these students for graduate school or careers.

UAF need not create the summer program from scratch. Current funding programs will provide the core. For example, the Vice Chancellor for Research currently gives approximately 10 Undergraduate Research awards of up to \$2,500 and several institutes provide significant amounts of funding for summer research. The principal investigators of several federal grants currently train their undergraduate researchers in the responsible conduct of research.

The new Office of Undergraduate Research could turn those various funding and training programs into a coherent summer research program in 2011 simply by publicizing the funding opportunities widely and encouraging students to apply, coordinating workshops for applicants in how to write proposals and the responsible conduct of research, and organizing a few social events during the summer. In future years, UAF could add additional components, e.g. visiting speakers, colloquia, common housing for summer researchers, additional funding.

For examples of thriving summer research programs, look at Carnegie Mellon University's SURF (Summer Undergraduate Research Fellowships, <http://www.cmu.edu/uro/SURF/>) or the University of Delaware's Summer Scholars (<http://urp.udel.edu/scholars/Default.aspx>).

4. ***Use the Council on Undergraduate Research***. CUR offers conferences, workshops, and institutes that would greatly benefit UAF. CUR's National Conference, offered in even-yearly summers, offers faculty and administrators the opportunity to learn best practices from presenters and each other. (One member of the Undergraduate Research Committee attended the CUR Conference at Utah State University last summer and was inspired to bring CUR consultants to campus, hence our visit.) CUR Dialogues, held each winter or spring in Washington, DC, offers presentations by program officers and funding agencies.

CUR institutes provide faculty and administrators opportunities to write strategic plans or grant proposals with the help of experienced facilitators. For instance, *Initiating Undergraduate Research Programs* helps participants plan new programs; *Institutionalizing Undergraduate Research* shows them how to grow existing programs and build them into the fabric of the institution. The *Proposal Writing Institute* helps faculty write grant proposals on the spot. The *Mentorship, Collaboration, and Undergraduate Research in the Social Sciences and Humanities Institute* helps faculty in those areas develop undergraduate research programs. Travel to these institutes will be expensive, but CUR could schedule any of these institutes in Fairbanks specifically for UAF, or for all of Alaska.

UAF is an institutional member of CUR, so all of its various services are available. Participation in CUR events and activities brings another benefit: connections to more than 600 other institutional members and thousands of individual members, all of whom are deeply interested in undergraduate research and eager to share what they know.

5. *Broaden the definition of ‘research.’* Many of the individuals we spoke with believe that ‘undergraduate research’ should include non-scientific disciplines. In our experience, however, the term ‘research’ by itself is all too frequently taken to mean the laboratory sciences. The result is that many faculty and students believe that they are excluded from undergraduate research opportunities and events. UAF might replace ‘research’ with a more inclusive phrase (e.g. ‘Research, Scholarly, and Creative Activity’, RSCA for short), or you might specify the context, as in ‘Research and Discovery Across the Curriculum’⁶. In any case, advocates for undergraduate research will have to explain often that ‘research’ in this context means ‘scholarly or creative activity appropriate to the academic discipline.’

These recommendations address the most pressing issues UAF faces as it turns itself into a premier student-centered research university. Many other issues remain: faculty workload; allocating indirect costs to support undergraduate research; encouraging and training research faculty, graduate students, and advanced undergraduates to supervise undergraduate researchers; building funds for undergraduate research into grant proposals; supporting undergraduate research during a strategic pause and flat funding; and so on. We have opinions on some of those issues, of course, but do not know enough about institutional structures and cultures to offer more than very general advice. UAF faculty and staff are much better equipped to design solutions that fit the institution. However, we would be happy to speak with you in future about these issues or any others that might arise.

Bill Campbell
Campbell Grants & Research
President-elect, Council on Undergraduate Research

Janice DeCosmo
Associate Dean, Undergraduate Academic Affairs
University of Washington

⁶Elrod, S., D. Husic and J. Kinzie, 2010. Research and Discovery Across the Curriculum. *Peer Review* 12 (2): 4-8.

APPENDIX E: INTERIM REPORT

Memorandum

To: Susan Henrichs, Provost

From: Undergraduate Research Committee
Denise Thorsen (chair), Sarah Hardy, Anita Hartmann, Sue Hills, Pat Holloway, Paul McCarthy, Channon Price, Todd Radenbaugh, Barbara Taylor, Jenn Wagaman, Craig Wisen

Date: June 17, 2010

Subject: Interim Report

Charge to Committee

The Undergraduate Research Committee (URC) was charged with providing recommendations for the promotion and development of undergraduate research at UAF, a recommendation of the recent MacTaggart report.

The Undergraduate Research Committee was asked to address four specific questions:

1. How is undergraduate research at UAF to be defined?
2. How is success in undergraduate research programs to be assessed?
3. How should undergraduate research be promoted and developed at UAF?
4. How can we better gather and disseminate information about undergraduate research at UAF?

Thus far the committee has developed a working definition for undergraduate research (question 1) and is working on the remaining three questions. Specifically, the committee has met approximately eight times and has accomplished the following:

1. The committee first surveyed the question of what constitutes undergraduate research, with the primary concern being a description that encompasses all areas of scholarly endeavor. With that identification, the twin questions of how to encourage and how to assess undergraduate research were discussed. It became clear that, with a broad definition, there is considerable undergraduate research carried out at UAF, and this underscored the need to properly capture and highlight what is being done, to raise the visibility of these efforts for all stakeholders. Specific actions to support these goals were:
 - a. Quick survey of faculty to assess opinions, perceptions and state of undergraduate research at UAF.
 - b. Quick survey of equivalent peer institutions (as listed in PAIR) to assess structure, participation and support of undergraduate research at their institutions.
2. The committee supported Vice-Provost Dana Thomas' Freshman Year Experience (FYE) solicitation by providing review and recommendations of submitted proposals.

Definition of Undergraduate Research

The committee has developed the following working definition:

Undergraduate research is scholarly activity conducted by an undergraduate student that creates meaningful, generalizable discipline-specific knowledge.

The committee specifically views the undergraduate research mission of UAF to be an *academic mission*, one of developing the undergraduate student through increasingly complex research and experiential learning opportunities to promote the understanding of the generation of knowledge in their field, an appreciation of the research enterprise, and critical thinking. We see this as a continuum from career awareness and the basics of data-driven decision making at the pre-college and early freshman level, through stages of instruction in critical thinking, inquiry-based class exercises, and asking answerable questions. Depending on the student's program and interests, this process may lead to independent research and/or to a capstone project.

Current Status of Undergraduate Research at UAF

Undergraduate research activities currently exist at UAF in a variety of guises: for credit, for pay, and voluntary. Current promotion of undergraduate research is ad-hoc and typically relies on individual faculty encouraging individual students to participate in research activities. There are exceptions to this, specifically disciplines in which undergraduate research is a core element of the program and programs whose mission is to promote and support undergraduate research. Coordination across the university is minimal.

Administrative Promotion: The Center for Research Services (CRS) supports undergraduate research through one part time staff that maintains a web presence, conducts the annual Undergraduate Research Grant Competition, and this past year organized and sponsored an Undergraduate Research Fair (fall 2009) and a Campus Research Day (spring 2010).

Research Institutes: Although individual research faculty supervise undergraduate research in all of the research institutes, there appears to be no organized support for undergraduate research activities at the institute level beyond PI driven research grants.

Extracurricular Examples: Various organizations across campus support or promote undergraduate research through fellowships, student grants, and extracurricular activities. Specifically, the Center for Research Services provides student grants, Alaska Space Grant Program, INBRE, and NSF EPSCoR, provide student research fellowships. Alaska Space Grant Program also supports undergraduate research through the Space Systems Engineering Program at UAF that provides interdisciplinary design/build/operate mission opportunities (currently a small satellite) to interested students. SIFE, ANSEP, and AISES also feature some undergraduate research activities.

Academic Examples: Certain majors offer for-credit research opportunities (*ex* ATM 488, CHEM 488, CE 498, EE 488, EE 498, FREN 488, GEOG 488, GEOS 488, PSY 488, PSY 498, SPAN 488, STAT 498) although it is unknown at this time whether those classes are utilized. Certain disciplines have undergraduate research built into their required coursework, e.g., engineering capstone courses (major requirement), Computer Science senior design course (major requirement), BFA thesis (major requirement), History thesis (major requirement), Philosophy senior thesis (major requirement), Natural Resources thesis (major requirement), Honors Capstone project (supported by HONR 498 Research and HONR 499 Thesis), Political Science thesis. School of Management requires significant undergraduate research through the Student Investment Fund (BA F454 & F455) for which coursework is required in the Finance option of the BBA degree.

The UAF rural campuses conduct undergraduate research in programs that require data collection and analysis as part of certificates and degrees. For example, Environmental Studies requires a capstone research report on data collected during a summer field course and a Fall reporting methods class (ENVI 260, ENVI 265). The ENVI students are encouraged to present their findings at a scientific conference

such as the annual Western Alaska Interdisciplinary Science Conference. High Latitude Range Management also requires two research-based field courses (HLRM 130, HLRM 201).

Working Considerations

Undergraduate research is currently performed throughout the university at the main and several branch campuses. UAF has the potential to be a national leader among student-centered research universities; however, this potential is not yet realized because the general academic value of research participation and the efforts of faculty mentors are not adequately recognized, and because UAF has no centralized hierarchical organization of undergraduate research. Certain perceived problems are (in no particular order):

- (i) Recognizing the efforts of many dedicated faculty and students.
- (ii) Making undergraduate research more visible to students, faculty, the university, and the state.
- (iii) Supporting the *academic growth* of an undergraduate student in a way that would lead to better appreciation of the value of research and learning of critical thinking skills necessary for more productive work force. UAF undergraduate research is seen solely as an exercise in training students to perform specialized techniques.

Undergraduate research has inherent academic value independent of the subject of research. Undergraduate research is a means to train students in critical thinking—in assessing the logic and organization of their own thinking as they pursue and create knowledge. Undergraduate research training can lead to more productive research both at the undergraduate and post-graduate level. This fact is not appreciated at UAF.

- (iv) Providing an umbrella structure to help promote and connect undergraduate students with research opportunities. UAF has no centralized coordinating structure to promote, facilitate and fund, assess, communicate, and document undergraduate research. (*CRS attempts to fill this mission, however, insufficient resources are provided. The tentative recommendation is that a full-time coordinator be dedicated to the undergraduate research mission. The office will be directed by a campus-wide board of directors drawn from the faculty, and with representation from sponsoring programs, reporting to the chief academic officer.*) Such a centralized structure should:

Promote: make students and faculty aware of opportunities for and support of undergraduate research.

Facilitate: introduce would-be student researchers to potential mentors, and ensure that the students possess requisite certifications (safety, *etc.*).

Fund: provide money for research supplies, services, and incentives.

Assess: evaluate the outcomes of student research and propose adjustments to programs to enhance outcomes.

Communicate: provide venues for dissemination of information and to produce web- and print-based materials.

Document: archive student projects, benefits to all participants, and track student progress after UAF

- (v) Providing appropriate structure and incentives for faculty workloads to facilitate faculty engagement. UAF faculty who mentor undergraduate researchers are minimally credited at best for their efforts.

In the College of Natural Sciences and Mathematics, mentoring an undergraduate researcher is assigned 0.2 workload units; however, specifying exact workload unit components that contribute to the total units under teaching, research, and service is discouraged. In effect, no workload credit is assigned to mentoring undergraduate student researchers.

Supporting Documents:

MacTaggart, T., *Report of an Administrative Review of the University of Alaska Fairbanks*, August 3, 2009

Boyer Commission, *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*, 1998, <http://naples.cc.sunysb.edu/Pres/boyernst>

Rogers, B., *Vision 2017 Plan*, April 2010

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