

**Dee Family Technology Awards  
Proposal for Funding**

Due Friday, April 1, 2005

**Project Title: Researching Reflective Learning Across the Curriculum**

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**Project Director: Adam Johnston**

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**Department(s): Physics**

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**College(s): Science**

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**E-Mail: [ajohnston@weber.edu](mailto:ajohnston@weber.edu)**

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**Extension: 7711**

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**Other Members of the Project Team: Eric Amsel, Psychology**

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**Instructions:**

1. Please complete each section in the space provided. The justification section should not exceed two single-spaced typed pages.
2. You are required to obtain the signature of an ARCC representative for your college, indicating that she/he is familiar with the proposal, and can speak to it during funding deliberations.
3. Your department chair's signature is also required, indicating that she/he supports the proposal, and that the proposal is in keeping with departmental goals related to information technology and its applications to the academic mission of the institution. Your Chair's signature also indicates her/his commitment to help support the project financially if so indicated on the budget page.
4. The form below must be emailed (without signatures) and mailed to the ARCC chair, David Ferro, [dferro@weber.edu](mailto:dferro@weber.edu) and MC 2401 by April 1, 2005.

**ARCC Representative:**

I have read the proposal and discussed it with the Project Director.

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ARCC Representative

Comments:

**Department Chair:**

The Department has reviewed this project within the context of overall information technology planning within the Department. If the budget page indicates financial support from the Department, I agree to commit those funds to this project.

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Department Chair

Comments:

**College Dean:**

I have reviewed this project. If the budget page indicates financial support from the College, I agree to commit those funds to this project.

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College Dean

Comments:

## **Justification**

Your proposed project should be described as clearly and succinctly as possible in the spaces provided below. Be sure to review the “Criteria for Funding” document. *The entire justification section should not exceed two single-spaced pages.*

### **Abstract (project summary):**

Our research looks to characterize reflective learning practices throughout different levels (developmental coursework, general education coursework, upper division coursework, and undergraduate research) of the university. One specific project within this grander context will investigate the reflective learning practices of science students and researchers. In order to conduct much of this research, qualitative measures (interviews, questionnaires, etc.) must be conducted, and in order to amass the huge amount of information required, some organization is required. This proposal seeks to fund recording and computing equipment to facilitate the gathering of interview data, collection of field notes, and organizing all data.

### **Objectives and goals of this project:**

This proposal is embedded within a larger project in which “reflective learning” (Bourner, 2003; Kolb, 1983) is being studied across the university. (This work has sought funding from FIPSE, WSU-Hemingway, and will seek funding from other agencies in the near future.) “Reflective learning” refers to the ability to reflect upon an experience (a lab experience, a reading passage, a solved algebra problem, etc.) and deliberately consider the experience in such a way that the learner creates new knowledge. For example, a student can experience a lecture and take notes from it and even memorize the notes, but if he does not actively reflect upon what the lecture meant, how it incorporated other ideas from the course, and how it applies to new situations, the learner will not learn anything other than words copied from a blackboard.

For this subset of the project, learners in the sciences, from general education students to undergraduate researchers, will be assessed for how they conceptualize the learning process within the science arena, and how this relates to their conceptions of science itself. The collection of this data (which has met with IRB approval) has already been modeled in previous work (Johnston, 2004). This stage of the research expands upon the original pilot in order to seek out the details of how students reflect upon their learning in the sciences (and to later compare this level and type of reflection to students in other domains; e.g., English, Psychology, etc.). Previous research has suggested that, although undergraduate researchers and upper division students become more sophisticated in terms of the scientific concepts they consider, their level of reflection upon the nature of scientific work is similar to their peers in general education coursework (Johnston, 2004; Kardash, 2000; Roehrig et al., 2004; Ryder et al., 1998).

The nature of this research requires a great deal of qualitative data to be collected and analyzed. For the most part, this comes in the form of interviews that are audiotaped, transcribed, and later coded for data analysis. Due to the large amount of data being sought (qualitative data from at least twenty undergraduate researchers and twenty general education students, in addition to other quantitative data), the use of digital recording is vastly superior to analog microcassettes, due to recording clarity, ease of use in importing, transcribing, and organizing data, ability to securely archive data, and the reliability of “solid state” devices over cassette tapes that can break. In the process of conducting interviews and observing students in undergraduate research settings, detailed field notes need to be collected, and this is most effectively done via a reliable and portable notebook computer. Such a computer is also instrumental in storing all digitized recordings and transcripts securely, and can also be used for data analysis (e.g., transcribing and coding of transcripts). The 15” PowerBook (see budget) was selected due to its compatibility with the P.I.’s home and lab computers, its particular level of portability and

durability, and its ability to simultaneously process large audio files and transcribing/note taking applications. The recording equipment proposed for this project is compatible with this computer, and provides a good compromise between audio quality, recording time, and expense. The external hard drive proposed in the budget would allow for recordings to be archived and secured, as required in research involving human subjects whose identities are protected.

**Identify specific courses and/or programs that will directly benefit from this project:**

As described above, this research is a subset of a grander set of projects headed by Johnston and Amsel. The overall impact of all of these studies will be used to inform methods of teaching and program design across campus. For this particular subset of studies, the direct impact will be felt on science coursework. In particular, because this is an analysis of general education science learners, upper division science learners, and undergraduate research learners, there will be impact throughout the science curriculum. Due to the fact that the P.I. is presently involved with the assessment of science general education, information from this study will be used to help with this assessment and in the discussion of the future of science general education. Also, this research seeks to investigate what makes an especially effective undergraduate research program in the sciences. As a result, this work will be used to inform individual research mentors, proposed research programs (e.g., REU programs sponsored by NSF), as well as general program goals for undergraduate research at Weber State.

**If applicable, describe how this project will help to increase faculty productivity or enhance competency in some area of information technology.**

This particular research pursuit is the *primary* research interest of the P.I. This funding will allow his research program to proceed in a productive manner. Additionally, because this is a part of a larger project, this will allow for data on reflective learning to be correlated between various disciplines (e.g., mathematics, English, and psychology learning).

**Describe how the success of this project will be evaluated.**

One measure of success will be the presentation and publication of this work in national forums. This research will be presentable at national conferences, such as the National Association for Research in Science Teaching; and we will seek publication in journals such as *Science Education*, *Journal for Research in Science Teaching*, and/or *Journal of College Science Teaching*.

Additionally, the research should have direct impact upon initiatives here at Weber State. It should provide useful data to inform undergraduate research and general education initiatives. Because the P.I. is involved in both of these pursuits, we will follow through with a presentation of this research to the appropriate entities on campus (e.g., Office for Undergraduate Research, Science General Education Assessment Committee) and will work to develop initiatives resulting from this research.

**Timeline:**

To begin during the Summer of 2005 and continue through the Fall of 2006. Preliminary results from the initial data set should be presentable during the Fall of 2005, but a more thorough data set will be available after the Summer of 2006.

### Budget

Note: Please be as specific as possible regarding requested hardware, software, or other resources. If funds are being committed from other resources, please so indicate.

Item/Source	Description	Cost/contribution
Apple PowerBook	15.2-inch TFT Display	1799
(Education discount)	1.5GHz PowerPC G4	
	512MB DDR333 SDRAM	
	80GB Hard Drive	
	Analog audio in/out	
Iomega® Portable Hard Drive	40GB Hi-Speed USB 2.0	120
Olympus DM-10 Digital Voice Recorder	Digital recorder with USB connection and software for computer storage and transcription	180
Total budget		2099
College of Science contribution	Dean Ostlie has committed funding for this project's computing needs.	(1200)
<b>Total request from ARCC/Dee:</b>		<b>899</b>