

## ***Just Be: Making IT Real***

### **Enhancing *Just Be* with Hands-On Activities**

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#### **Project Description**

*Just Be* is an interactive road show where undergraduate and graduate students travel to Indiana K-12 schools to deliver a highly interactive and educational presentation aimed at dispelling gender and race-based myths on careers in information technology [1-2]. Over the last three years, *Just Be* has reached more than 1,500 school-age children and 250 college students in a freshman-level course. Of these, over 60% have been underrepresented (women, low income, first generation and ethnic minority).

*Just Be* was created by students in the Women in Computing group at Indiana University in 2004 and has evolved over time to meet the needs of the target audience. A recent assessment pointed to the need for hands-on activities in order to increase the self-efficacy of the children: not only inspire them to *want* to work with technology, but show them that they are *capable* of working with technology. Thus, the goal of this proposal is to enhance *Just Be* with hands-on activities to better engage K-12 children.

This proposal will fund the development and evaluation of three to five team-based activities for high school students, incorporating basic computing concepts in a fun way. By having children work with partners on the activity, we counter the idea that technology is a solitary and socially-isolating field. Mobile computing (i.e. PDAs), pervasive computing (i.e. sensors, simple I/O devices and RFID tags) and robots (i.e. the scribbler) will be used as the activity platforms to demonstrate the vast potential of computing.

Activities will be developed under the guidance of Professors Ottenbreit-Leftwich (Education) and Connelly (Computer Science), who have already identified possible topics. The book “Computer Science Unplugged” contains several examples of activities that could be implemented on a PDA (<http://www.unplugged.canterbury.ac.nz>). For example, *The poor cartographer – Graph coloring* could be implemented as a computer-game on a touch-screen device to demonstrate problem solving, logical reasoning and algorithmic procedures and complexity. PicoCricket (<http://www.picocricket.com/>), a sensor and I/O toolkit, can be used to focus on physical interactions, such as constructing a pet that makes sounds in response to being touched. This would expose the children to ideas in design and human-computer interaction and would be especially appealing to those who have computer phobias. Finally, a simple robot called the Scribbler ([http://wiki.roboteducation.org/Myro\\_Development/](http://wiki.roboteducation.org/Myro_Development/)) can teach the basics behind sequential programming without children realizing they are programming.

To develop the activities, we will introduce a service-learning component to an existing undergraduate course “B490: Mobile and Pervasive Computing”. B490 is a junior and senior computer science elective that delivers a unique set of skills, ranging from the very technical to abstract, high-level design experience. This course has been taught for two years (by Kay Connelly) and is organized around group projects where students work together in teams to design and implement a mobile or pervasive application. The projects are high quality; one project was a semi-finalist at Microsoft’s Imagine Competition.

Instead of having the undergraduate students pick any pervasive computing project, they will develop different activities for the *Just Be* program as their semester-long projects. Professor Ottenbreit-Leftwich will provide guidance about learning goals and techniques for high school students, while the *Just Be* student chair and faculty advisor (Jamie McAtee and Suzanne Menzel) will be the “project clients” for which the students have to design.

## Assessment

As a first step in assessment, the students in B490 will be required to lead their activities with a several groups of high school students as part of their project grades. Faculty in the School of Education (Cathy Brown, Catherine Gray and Claire King) are planning a “Technology Day” on the Bloomington campus at the end of April, 2008. The entire Freshman class of Indiana’s technology high schools<sup>1</sup>, approximately 300 students, will participate. Professor Ottenbreit-Leftwich will oversee a group of education students in the evaluation of the activities during the technology day. Assessment methods will include surveys (pre-, post-, and 6 month post-), focus groups and interviews with both children and teachers. Based on this evaluation, the most promising activities will be further refined by the *Just Be* presenters and integrated into the *Just Be* program for the 2008-2009 school year.

Data is currently being collected about *Just Be* by a graduate student in the School of Education to measure the impact on dispelling stereotypes and interesting students in technology careers. This assessment will be complete by the May of 2008. We will perform an identical assessment during the 2008-2009 school year with the inclusion of the hands-on activities. Thus, we will be able to compare the program with and without the hands-on activities to determine if the children are further engaged by their inclusion.

## Sustainability

The School of Informatics at Indiana University commits to continuing financial support of the *Just Be* program. We are actively pursuing program sponsors, and have already has success with Hewlett-Packard, as reflected in the matching funds provided by them in the budget. In addition, Dean Schnabel is pursuing other sources of funding, and the school is currently working with Spelman College to propose an Alliance for NSF’s Broadening Participation in Computing program in 2008. The alliance centers on developing technology curricula for K-12. This seed funding will provide us with the resources to pursue example activities that will strengthen our BPC proposal, situating us for sustaining and expanding this effort in the future.

## Budget

We request funding at the \$15,000 level to be spent over two years. Equipment will be purchased in the first year of the grant for development of the activities, including 14 Pocket PCs (with HP match, \$200 each = \$2800), 14 scribbler robots (@ \$230 = \$3220) and 14 PicoCrickets kits (@ \$250 = \$3500)<sup>2</sup>. Disposable construction materials to be used in conjunction with the PicoCrickets will be purchased in the first and second year of the grant (300 and 1000 children @ \$2 each = \$600 + \$2000 = \$2600). All of the development and initial assessment during the technology day will be done by students for credit, and thus is not reflected in the budget. *Just Be* presenters will be paid to refine the activities and integrate them into the *Just Be* program (50 hours @ \$12/hour = \$600). A work-study student will be used to schedule the assessments with the schools in 2007-2008 (30 hours @ \$12/hour = \$360), while another student will be paid to perform the assessment after the activities have been refined and integrated into the *Just Be* program (140 hours @ \$12/hour = \$1680). This leaves around \$250 for unexpected expenses.

[1] *Just Be: Bridging the Gender Divide in CS*, Katie A. Siek, Kay Connelly, Amanda Stephano, Suzanne Menzel, Jacki Bauer and Beth Plale. In *Learning and Leading with Technology*, Vol. 33, No. 07, April 2006.

[2] *Just Be: An Interactive Experience for K-12 Students*, Diane Cessna, Kay Connelly, Beth Plale, Katie Siek, and Amanda Stephano. In the *Proceedings of Frontiers in Education*, Indianapolis, Indiana, 2005.

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<sup>1</sup> Note that technology high school *use* technology such as computers, but do not necessarily *teach* technology in the curriculum.

<sup>2</sup> 12 units should cover up to a 24-child class where children partner for activities. We budget for two extra of everything to cover failing parts.