YIDDISH

Vol 12 Issue 03,July 2022
ISSN NO: 0364-4308

Increasing Student Retention in Computer Sciencethrough Research Programs for Undergraduates

Dr.N.Srinivas Rao[1],Dr. K.Spoorthy[2],S.Saritha[3],Dr.G.Merlin Linda[4],K.Sindhu[5],
Associate Professor[1], Assistant Professor,[2,3,4,5,]
Mail Id : srinivas.nune@gmail.com,Mail Id :kolluspoorthy03@gmail.com,
Mail id : sarithanune@gmail.com, Mail Id : merlin.linda@gmail.com :karlapudisindhu516@gmail.com,
Department of CSE,
Swarna Bharati Institute of Science and Technology (SBIT),
Pakabanda Street,Khammam TS, India-507002.

ABSTRACT We have developed a program to expose students to research in computer graphics, art, and new media in an effort to reverse the worrisome decline in enrollment in Rhode Island's CS departments and the underrepresentation of women and minorities. The curriculum combines effective mentoring techniques with modern teaching methods including problem-based education. Students are encouraged to form a study group that meets regularly to discuss research-related ethical and social concerns. Every student initiates, plans, develops, and finally presents a mini-project they've worked on from start to finish. The first two years of the program are analyzed and reported on.

Classifications and Topical Characterizations
Basic Information Technology Education (Computer Science) K.3.2

Clauses Defined Defined TermChangesKeywordsClausesGraduate-level study, classroom instruction, and computer animation. Affiliations
First, the University of Rhode Island's Computer Science and Statistics Department, Box 2881, Kingston, RI 02881
Providence, Rhode Island 02903: IMEDIA, 400 Westminster Street

1. INTRODUCTION

The decline in enrollments in postsecondary computer science programs and the narrowing of the pipeline to graduate school in the US are often attributed to publicity over the loss of IT employment due to the bursting of the dot com bubble and the outsourcing of jobs. Researchers are now expecting a scarcity of IT specialists over the next several years, despite the fact that the US Department of Commerce [10] predicts increase in the number of job vacancies for computer scientists through 2012.

Convention 2004 (January-February), Place, Country. In 2004, ACM issued copyright 1-58113-000-0/00/0004...$5.00.

Figure 1□ : Clifford Manzanillo (URI CS student) inspects the Virtual Aquarium project at IMEDIA.

An innovation-reliant economy like the United States is particularly vulnerable to a scarcity of talent in today's more competitive global marketplace. The comparatively low proportion of US nationals enrolling in computer science schools [3] is of particular concern to firms working

on US government initiatives. It is unacceptable that so few students are women, members of minority groups, or people with impairments [3]. This provides supporting evidence for targeting underserved communities in the United States to boost college attendance.

For the last two years, we have organized an undergraduate research program in 3D and interactive computer graphics and new media at the University of Rhode Island (URI) and IMEDIA in Providence, Rhode Island. Our main focus is on encouraging more students to pursue scientific and computer jobs at the graduate level, especially in research. Students from underrepresented groups and those who do not have access to a research program at their schools are our primary focus. We improve the overall retention rates in computing and prepare a stronger academic and industrial workforce that is better at thinking creatively, working effectively in teams, collaborating across disciplines and cultures, and solving the computing problems of the next decades for both those who go on to graduate school and those who don't.

We have a comprehensive mentoring approach that integrates problem-based learning. Students gain valuable skills from this multidisciplinary research experience, such as learning to work in teams, gaining insight into the research process, and interacting with a wide range of researcher mentors. In order to do this, we provide courses in cooperation, ethics, problem solving, technical writing, presenting, and sharing results. Students at IMEDIA may get international work experience by spending time at another institution in the INI-GraphicsNet (http://www.ini-graphics.net). This institute is located in Darmstadt, Germany.

Students from various backgrounds are more likely to be interested in and invested in a course that takes an integrated rather than a specialized approach to addressing problems. Women and underrepresented minorities are more likely to stay in the STEM fields if they can work on challenges that have real-world implications [8]. Our research opportunities address important scientific issues that cut across fields and have broad societal implications.
Like traditional research methods, problem-based learning introduces students to a problem and then guides them through the process of developing the knowledge and abilities necessary to solve it. This method has been adopted by several universities for their first-year students; one such school is the University of Delaware (http://www.udel.edu/pbl/; founded in 1999; last updated on February 16, 2006). It is hoped that through encouraging critical thinking, rather than mindless memorization, kids would benefit. Involving students in research projects too early or in a way that contradicts sound teaching is increasingly considered as a natural extension of the research process. This provides supporting evidence for including students in research.

1. OUTLINE OF THE PROGRAM

1.1 Recruitment In contrast to other prizes, we do not actively seek out students from all across the country for the REU site's summer program. Since there is a concentration of colleges in the nearby vicinity that do not provide large computer research programs, we initially aim to recruit students locally who can do the program over the summer and autumn. A number of art and design colleges, most notably the Rhode Island School of Design (RISD), have students that are a good match for our curriculum because of its multidisciplinary focus. Students benefit from more time to investigate and disseminate their findings when they are able to recruit from within their own communities. After beginning their study in the summer, most students stay in the area and participate in the program part-time (9-12 hours per week), giving them the opportunity for more sustained supervision.
The REU students were recruited via a variety of channels. Reach out to a contact at any of the nearby schools; this includes URI and Rhode Island College.
The Rhode Island College (RIC), Providence College (PC), Johnson & Wales University (JWU), the Community College of Rhode Island (CCRI), and the Rhode Island School of Design (RISD) were all utilized to enlist prospective students. We also used internet mediums like Craigslist and university websites to spread the word. In addition, we got significant help from alumni who promoted the program to their classmates. To learn more about the projects and submit an application, interested parties were referred to our website (http://reu.imedia.edu). Only US citizens and green card holders are eligible to participate in the program. Students from underrepresented groups in computers and information technology are another category that we actively seek to recruit. If you are a student at a university that does not have a robust computing research department, particularly in computer graphics, you will be given priority. Study SchemeEach student who was accepted into the program was given the opportunity to choose a research topic to participate in. They were paired with an expert researcher who oversaw the study and provided guidance. Each project was developed to allow the student to take it through the whole research process, from defining the topic and preparing a proposal with an anticipated budget to peer reviewing their classmates' work, carrying out the project itself, making any necessary technical presentations, and writing up any necessary reports, posters, or papers. To provide them with the knowledge and abilities necessary to carry out the project and produce real outcomes, a seminar series was established consisting of lectures, discussions, and hands-on experience: The First Seminar: A Brief Overview of Scientific Research and the Research Process Conducting a literature review, defining the issue, developing a scalable solution, conducting experiments to test the hypothesis, and reporting the findings Technical writing, includes the structural distinctions between proposals, literature reviews, journals, conference and workshop papers (including posters, abstracts, short papers, technical papers, application papers, surveys, and tutorials), and other types of technical writing (such as books and websites). Focusing on the reader while writing is stressed. Methods of problem resolution will be examined in depth at Seminar 3. The features, qualities, and behavior of a spinning top are constructed and analyzed in a group learning exercise. Seminar 4 includes a group discussion regarding teams, collaboration, and mentorship, as well as an exercise that highlights the tension between individual and collective gain via collaborative effort. Reviewing procedures and an exercise in emotive critique are the topics of Seminar No. 5. Students submit written proposals and get feedback from the group's many members. Meeting No. 6: A Meeting About Meetings. We begin with a horrible presentation to illustrate what not to do, then go on to the many kinds of presentations and how they're structured, the good and bad habits of public speakers, the need of rehearsal, and finally, how to understand and address one's audience. Seminar 7 is led by Vice Provost and renowned ethics scholar Lynn Pasquarella of the Philosophy Department at the University of Rhode Island. Eighth seminar: a chat on thriving in the global workforce. Participants share their perspectives on what they've learned from and what they want to gain from working in multiethnic teams. Students also prepared comprehensive reports on their projects for potential publication in places like the Journal for Young Investigators (http://www.jyi.org) and international conferences and publications like the Consortium for Computing Sciences in Colleges

Northeastern Region (CCSCNE). Exposure to Foreign CulturesStudents gaining expertise in research at IMEDIA may also take part in international research at an INI-GraphicsNet (http://www.ini-graphics.net) member university. In the first two courses, all four students spent four weeks at either the Center for Computer Graphics (ZGDV) or the Fraunhofer Institute for Computer Graphics (IGD) (http://www.igd.fhg.de). IMEDIA's work was bolstered and expanded upon by its German counterparts and their mentors. The interns were considered full members of their assigned departments, participated fully in all activities, visited other divisions, and presented their work at a seminar.

TYPES OF PROJECTS, PART 2 Past efforts have included: • Visualization of protein structures • Volumetric reconstruction of a rat brain

Information quality visualization via illustrative rendering Ray-based volume rendering in a CAVE
The use of laser pointers for interacting with project media; Dual coding theory for interactive computer science instruction; Visualizing the deformation of knee articular cartilage under stress
We include the IMEDIA Interactive Aquarium and the University of Rhode Island Pedestrian Evacuation projects, both of which have hosted several REU students.

An Aquarium with an Interactive Display

Interactive displays are a staple of today's science museums. However, interacting with specimens is not something that can be done at a zoo or aquarium. New methods of encouraging public participation and intellectual development are investigated in the Interactive Aquarium project [11]. Vicarious engagement with the specimens and interactive activities or games are two of its primary features. Visitors may learn more about the fish and coral in the live video by touching the fish and coral in the panel's interface. Sara Czyzewicz, B.S. (Computer Science), RIC, is the author of "The Interactive Aquarium: Personalizing the Visitor Experience."

More than 2.3 million individuals of varying ages, educational backgrounds, motivations, interests, and physical capacities interact with one every day, another one. and ethnicities attend museums in the United States. Sara designed a technique for tailoring the presentation of the interactive individuals using information systems (refer to Figure 2) [2]. The level of detail and complexity, the text size, the topics discussed, and the information gathered may all be adjusted based on the individual user. Sara developed an adaptable XML framework to accommodate data files in several languages for use in the Flash-based user interface.

Figure 2: The personalized interface of the Interactive Aquariuminformation system.

The Game-Based Interface of the Interactive Aquarium by Stephen Lecrenski (Bachelor of Science in Computer Science and Finance) (Personal Computer)

Public aquariums have a hard time reproducing the harsh conditions found deep in the ocean for live displays. The anatomy of deep-sea organisms prevents them from surviving at atmospheric pressures. Visitors to exhibits seldom get to witness the specimens' natural behaviors and interactions with their surroundings since the specimens are usually conserved and accompanied with information about their behaviors and interactions. Stephen created a virtual display so that people may learn more about the ocean floor and work toward a solution [7]. Using a game-like interface, players explore the area surrounding a hydrothermal vent in search of the vent's inhabitants and geological features, such as animated tubeworms, anglerfish (cf. Figure 3), fang tooth fish, deep-sea crabs, and vampire squids. By touching an object on the screen, the visitor may learn more about that critter or geographical area

Project Evacuation Level 1. Group behavior of pedestrians during both routine (non-emergency) and evacuation (emergency) activities is analyzed and simulated in the interdisciplinary pedestrian evacuation project [9]. The goal is to create a micro-simulation tool for pedestrian flow dynamics that uses three-dimensional models of the pedestrians and surroundings to simulate evacuation behavior, locate evacuation flow bottlenecks, predict average and maximum evacuation times, and the pedestrian volume, and aid safety experts in the design and maintenance of safer buildings.

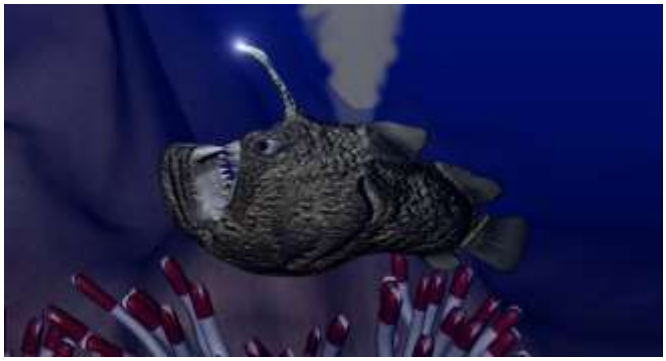

Figure 3: The Anglerfish from DeepSea displayed in front of thehydrothermal vent and above a bed of tubeworms.

Behavior-based Simulation of Pedestrian Movements; Elizete Fernandes; B.S. (Computer Engineering); URI

Elizete built a Java application that simulates the actions of pedestrians in both regular and emergency situations. It was her responsibility to ensure a proper mapping between the behavioral model's components and the corresponding software components, classes, and objects. The behavioral model differentiates between the high-level agenda that ranks a series of goals and the low-level route plan required to achieve the present goal.

Katharine Wray, B.F.A. (Industrial Design), RISD, "Development of a Library of 3D Models of Human,"

There is a wide range of body types among humans. Figure 4 shows the result of Katharine's work creating a parametrically specified model in Maya to facilitate the creation of 3D pedestrian models. She compiled a database of generic physiques classified by sex, age, height, and weight (short, average, tall, thin, average, overweight, obese). Examples of kinematic models for various body kinds include walking, jogging, jumping, and crawling.

An Elizete pedestrian chronology file was automatically translated by Angel's 3D visualization module using Katharine's human models into a motion script for a "non- playing character" so that it could be visualized in the Unreal game

FIVE. RESULTSSeventeen people participated in the program between 2004 and 2005 and completed it. Three women and five males made up the student body in 2004, while three members of underrepresented groups did the same in 2005. Students have come from a wide variety of backgrounds and majors, including computer science (12), computer engineering (1), the visual arts (1), the performing arts (1), the literary arts (1), the performing arts (1), graphic design (1), and industrial design (1).

Students were polled at the beginning of the program and again at the end to gauge their prior exposure to and feelings toward scientific study. We utilized a four-point Likert scale: 0 for strongly disagree, 1 for disagree, 2 for have no opinion, 3 for agree, and 4 for strongly agree. With the exception of one student, our program retention rate was 100%. The queries were as follows:

1. Have you thought about pursuing a graduate degree in research?

Do you want to do your study at an actual factory?

Third, provide your thoughts on the research experience as a whole.

If given the chance, how likely are you to take part in another study experience?

With such a limited sample size, definitive conclusions cannot be drawn. However, the following patterns emerged:

• After finishing the program, an average of 1.67 (exit) students felt as passionately as or more strongly about 1) - pursuing a graduate research degree.

• On average, students had a somewhat less enthusiastic outlook on 2) - post-graduation intentions to do research in an industrial context.

14 out of 16 students gave a score of 3 or above on the question, "Overall impression of the research experience," with the average being 3.56.

12 out of 16 students (or 80%) rated their chance of participating in future study at a 3 or above, with an average of 3.50.

After that, we asked free-form qualitative questions like: Share how you developed a new appreciation for research as a result of your involvement in this study. This, according to their comments, has taught them: •

Vol 12 Issue 03,July 2022
ISSN NO: 0364-4308

The nuances of research. I was surprised by how many regulations and restrictions there were for researchers. To better understand the work of others, I have... Learned more about what makes people tick.

• I had no idea that studying a "new" subject could be so fascinating. Using cutting-edge equipment may be thrilling, and I've learned that research is far more challenging than I had anticipated—but also that it's quite interesting.

Three of the 2004 cohort's students pursued doctoral degrees in science, two continued their education in a technical field, and three went straight into the scientific workforce.

The vast majority of students showcased their poster presentations at CCSCNE (Consortium for Computing Sciences in Colleges, N.E. Region) conferences. Katherine Wray also presented a paper at the R&D Partnerships for Homeland Security conference based on her work with Information Visualization. Sara Czyzewicz [2] and Stephen Lecrenski [7] both presented technical papers at a global conference. For the 2005 SIGGRAPH Educators Forum [11], Sara and Stephen co-authored a paper. Peter

Papers presented at international conferences were written by Firth [1], Angel Castro [2], Elizete Fernandes [3], and Katherine Wray [9].

1. DISCUSSION We were pleasantly surprised by how well the REU students did in the curriculum. They've been quite supportive, and they've kept up with their other computer research initiatives. Most have published their findings in the form of conference posters and publications. One art student continued her education in computers after the REU program, while many others found work in the field as a result of her exposure to the field during the REU. Researchers participating in the program generally found their time there to be rewarding.

The survey data clearly demonstrate the need to tailor strategies specifically for students. When students' regular common workspace had to be temporarily relocated due to laboratory renovations, for instance, they voiced more complaints in the second year. Undergraduates who are new to research in this age of ubiquitous "anywhere, anytime" computing need to convene frequently in a common place to work and socialize. The presence of coworkers and mentors seems to have a major favorable impact on the experience of working on diverse projects and to lead to greater research findings.

The students' realization that research is really a team effort that requires effective communication throughout and after the project is also noteworthy.

1. job in question. Teachers often take it for granted that their students would be able to work well in a team and adapt to new situations quickly. Students entering graduate school or the workforce may be nervous about working alongside their peers who are much more experienced and mature than themselves, according to anecdotal evidence. Therefore, "face time" with professors and postgraduates is crucial.

2. While most NSF REU money goes for stipends for students, running the program with students from the surrounding area may be done for free or at a low cost. This REU program was based on our internship experiences at URI. Our recommendations for attracting students are as follows: 1) The experience must be integrated into the student's curriculum as a credit bearing requirement or major elective; 2) Mentoring should be divided among multiple professors, and they should be awarded credit for such responsibilities; 3)

3. It is recommended that students do at least two semesters of part-time study or one full-semester of study followed by one semester of part-time study to provide enough time for writing and presenting their research. Four) Cohort building and mentorship should be prioritized; students should be encouraged to work, train, and play together, and instructors should be recognized for their role in monitoring these activities. References such as [5,12] may provide other components necessary for a functional program.

6. ACKNOWLEDGMENTS The NSF's Research Experiences for Undergraduates (REU) program, grant number 0353786, the 3-D Graphics Partnership laboratory at the University of Rhode Island, and the direct sponsorship of the Technical University of Darmstadt all contribute to the success of this endeavor. The National Science Foundation (NSF) has provided funding for the Building Evacuation project at the University of Rhode Island. count of 0331984. The Ocean State Technology Corporation funded a portion of a variety of initiatives at IMEDIA under the CARUSO project (contract number OS-05-2221). The International Experience component of the program would not have been possible without the help of the INI-GraphicsNet, and in particular the Fraunhofer IGD and the ZGDV.

4. REFERENCES

To cite this section: Branco, P., P. Firth, L. M. Encarnaço, and P. Bonato, Faces of Emotion in Human-Computer Interaction. Extended Abstracts of the ACM SIGCHI Conference on Human-Computer Interaction (Portland, Oregon, April 2-7, 2005), 1236-1239.

The authors are L. M Encarnaço, J. Jorge, L. M Czyzewicz, and P. Stephenson. Using Real-Time Data to Customize the Tourist Experience. Maastricht, The Netherlands, March 22-24, 2005, Proceedings of the International Conference on Training, Education, and Simulation, paper 5C.2.

Common Ground: How Diversity in the Computer Science Community Benefits Everyone, by Paul A. Freeman and Jonathan Cuny, Computing Research News, Volume 17, Number 1 (May 2005).

The article "Research Experience for Undergraduates: Successes and Challenges," by Mary J. Granger, Guy-Alain Amoussou, Miguel A. Labrador, Sue Perry, and Kelly M. Van Busum, was published in the March 2006 issue of the ACM SIGCSE Bulletin (38, 1).

Sarah M. Pulimood, Deborah L. Knox, Peter J. DePasquale. In 2006, ACM published "A Model for Summer Undergraduate Research Experiences in Emerging Technologies" in the ACM SIGCSE Bulletin (38,1).

In February 2005, during the CRA Computing Leadership Summit, E. Lazowska discussed the state of computing research and human resources.

Stephenson, P., and S. Lecrenski. In the Deep Blue, We Create Engaging Content for Massive Audiences. A work presented at the International Conference on Training, Education, and Simulation (TESI 2005), Maastricht, The Netherlands, March 22-24, 2005.

Unlocking the Clubhouse: Women in Computing by Jennifer Margolis and Amy Fisher. The MIT Press, Cambridge, MA, 2002.
Authors: Peckham, J.; Aguirre, B.; Thomas, N.; Hervé, J-Y.; Hutt, R.; Castro, A.; Fernandes, E.; Santos, K.; Wray, K.; et al. A Design Pattern for Coordinating Conceptual Models across Disciplines in Software Development. Cancun, Mexico, July 13-15, 2005: Proceedings of the 2005 International Conference on Computing in Civil Engineering.

□□□□□. Jobs in Professional Information Technology: A Look Back and Forward, Sargent, J., Computing Research News, 16, 3 (May 2004), 1-21.

□□□□□. S. Czyzewicz, S. Lorenski, L. M. Encarnaço, L. M. Stephenson, P. Branco, P. Horvatic, J. Jungclaus, and P. Stephenson. Innovative Tools for Informal Learning in Public Aquariums. Proceedings of the 32nd Annual ACM SIGGRAPH Conference on Graphics Processing (L.A., CA, July 31–August 4, 2005) Educators Program.