ISSN NO: 9726-001X
Volume 11 Issue 02 April 2023

JOURNAL OF CURRENT SCIENCE

Research Initiatives to Increase Undergraduate Computer Science Retention

Mr. P. Rama Krishna, Mr. M. Rafat Kumar, Mrs. P. Manasa

Assistant Professor[1,2,3]

Department of Computer Science & Engineering,

Rajamahendri Institute of Engineering & Technology, Rajamahendravaram.

Mail id: krishna.ksit@gmail.com

ABSTRACT

We have created a curriculum that introduces students to computer graphics, art, and new media research in response to the alarming trend of declining enrollment in Rhode Island's computer science departments and the underrepresentation of women and minorities in these disciplines. This curriculum combines innovative teaching methods, such problem-based learning, with time-tested mentoring strategies. Students must to establish study groups and schedule frequent meetings to talk on the moral and societal ramifications of their studies. Every student is expected to fully engage in a mini-project from beginning to completion, including initiating, planning, creating, and presenting. Gathered and analysed throughout the first two years of the programme, this report includes it all. Classification Systems and Personal Narratives Information Technology Foundational Coursework (K.3.2) in Computer ScienceIdeas Elucidated These sentences specify computer animation, classroom instruction, and graduate-level study. Group Memberships

1. **INTRODUCTION**
2. Two factors have contributed to the general drop in enrolment in computer science programs at the university level in the US: the number of IT jobs lost as a result of outsourcing and the dot-com crisis has been reported in the media. In the next years, there is expected to be a shortage of information technology (IT) workers, even though the US Department of Commerce [10] predicts a growth in computer science job openings through 2012.
3. If you want to use this work in your classroom or for personal use, you may make as many copies as you like. Just don't sell or distribute them for profit. In addition, the first page of each copy must have this notice and a complete citation. Copying, publishing, posting to servers, or redistributing to lists will need payment or authorization otherwise. From December 2003 to January 2004 (Date, Location). The ACM issued the copyright 1-58113-000-0/00/0004...$5.00 in 2004.

ISSN NO: 9726-001X
Volume 11 Issue 02 April 2023

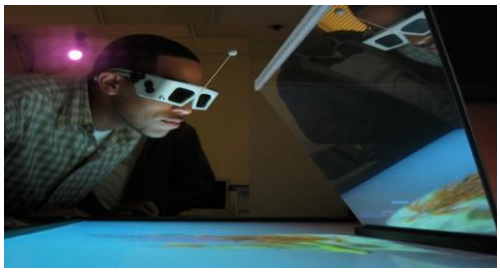

Figure 1 : Clifford Manzanillo (URI CS student) inspects the Virtual Aquarium project at IMEDIA.

In today's more competitive global economy, the skills gap is putting pressure on innovation-dependent nations like the US. The low enrollment in computer science programmes is a particular concern for private enterprises that provide services to the US government [3]. It is highly disturbing that women, minorities, and those with disabilities are grossly underrepresented in the student body [3]. This provides support for the hypothesis that initiatives to boost college enrollment can help low-income communities in the United States.

For the last two years, we have collaborated with IMEDIA in Providence, Rhode Island, and the University of Rhode Island to oversee an undergraduate research programme in new media and 3D computer graphics. Our number one objective is to raise the percentage of students who earn research-oriented master's degrees in STEM fields. Helping kids from underprivileged backgrounds and schools without research programmes is our top priority. We aim to teach a new generation of academics and professionals who will be better prepared to face the computing problems of the future, regardless of whether they choose to pursue higher degrees or not, and to increase the number of students who remain in computing after graduation.

As part of our comprehensive mentoring approach, we include problem-based learning. Students get a great deal from this multidisciplinary research experience, including the opportunity to work in teams, learn about the research process, and communicate with a range of researcher mentors. You may improve your skills in this area by taking a course in data sharing, public speaking, technical writing, ethics, problem solving, and collaboration. Thanks to the INI-GraphicsNet (http://www.ini-graphics.net), IMEDIA students may find international work study possibilities. This institute is based out of Darmstadt, a city in Germany.In order to attract and engage students from diverse backgrounds, it is better to use an interdisciplinary approach to problem-solving rather than a traditional one. It is more likely that women and minorities will stay in STEM fields if they work on challenges that have real-world implications [8]. We are focusing our research possibilities on important scientific questions that have repercussions for society and span disciplines.

In problem-based learning, students are given a problem to solve and then given the resources they need to do it, much as in traditional research methods. This method is currently used by numerous colleges, including the University of Delaware (http://www.udel.edu/pbl/; begun in 1999; updated on February 16, 2006). Instead of depending only on memorization, we want youngsters to learn to think critically. Researchers are increasingly accepting student participation in projects at an early stage or in a way that contradicts excellent teaching methods as an inherent component of the research process. The concept that having students take part in research projects is a good one is supported by this.

ISSN NO: 9726-001X
Volume 11 Issue 02 April 2023

1. OUTLINE OF THE PROGRAM

1.1 Recruitment We don't aggressively recruit students from all over the nation for the REU site's summer program, unlike other rewards. At first, we want to attract local students who can participate in the summer and fall programs since there is a concentration of surrounding universities that do not provide major computer research programs. Students from RISD and other art and design schools are a great fit for our program because of its emphasis on cross-disciplinary study. When students can locate volunteers in their local neighborhoods, they have more time to do research and share what they uncover. Since the majority of students remain in the region and attend the program part-time (9-12 hours per week) after starting their studies in the summer, they are able to benefit from more consistent supervision.

Several methods were used to enlist the REU students. You may try contacting someone at Rhode Island College or the University of Rhode Island, two of the neighboring colleges.

Recruitment efforts included reaching out to Rhode Island School of Design (RISD), Johnson & Wales University (JWU), Providence College (PC), Rhode Island College (RIC), and the Community College of Rhode Island (CCRI). Craigslist and university websites were also used as online outlets for the dissemination of information. We also received a lot of support from alums who spread the word about the program to their fellow students. People who were interested in the projects were directed to our website (http://reu.imedia.edu) so they could find out more and apply. Participation in the program is open only to citizens and green card holders of the United States. We also make an effort to attract students from underrepresented groups in the IT and computer science fields. Priority will be given to students from universities without strong computer science research departments, especially those with computer graphics programs. Academic ProgramUpon acceptance into the program, each student was given the freedom to choose their own research subject. An experienced researcher supervised and guided them while they worked in pairs. The research process was designed to be completed by each student as part of their individual project. This includes coming up with a topic, creating a proposal with an estimated budget, reviewing the work of their classmates, conducting the project, giving any required technical presentations, and writing any required reports, posters, or papers. We set up a seminar series that included lectures, discussions, and practical experience to provide them with the skills and knowledge to complete the project and achieve tangible results: The First Seminar: An Introduction to Science and the Research Method Performing a literature review, problem definition, solution development, hypothesis testing, and results reporting The structural differences between various forms of technical writing, including proposals, literature reviews, journals, conference and workshop papers (including abstracts, short papers, technical papers, application papers, surveys, and tutorials), and books and websites are all part of technical writing. Writing with the reader in mind is encouraged. During Seminar 3, we will delve deeply into several approaches to issue solving. In this group activity, we will build and examine a spinning top to learn about its characteristics, attributes, and behavior. In the fourth seminar, students engage in a group discussion on mentoring, teams, and collaboration; they also complete an experiment that shows how there is a conflict between the need for individual success and the need for the group to succeed. Seminar No. 5 covers reviewing processes and includes an emotional criticism exercise. Students work in groups of varying sizes to produce written projects and get comments. Part 6: A Meeting About Meetings. In order to set the tone, we start with a terrible presentation. From there, we cover the many types of presentations and their structures, public speaking habits (both good and poor), the need of practicing, and lastly, how to read and respond to your audience. University of Rhode Island Philosophy Department Chair and Vice Provost Lynn Pasquarella is teaching Seminar 7. Seminar number eight: how to succeed in today's global job market. Everyone talks about their experiences and goals for the future in relation to working in multiethnic teams. Journal for Young Investigators (http://www.jyi.org) and international conferences and publications like the Consortium for Computing Sciences in Colleges Northeastern Region (CCSCNE) were suitable venues for students' extensive project reports. Learning About Other CulturesIn addition to developing their research skills at IMEDIA, students have the opportunity to participate in worldwide research projects at universities that are members of INI-GraphicsNet (http://www.ini-graphics.net). Each of the two computing institutes—ZGDV and the Fraunhofer Institute for Computer Graphics—hosted the first two classes for a total of four weeks. IMEDIA's German colleagues and advisors strengthened and broadened the organization's activities. The interns were expected to actively engage in all departmental events, tour other divisions, and present their work in a seminar. They were treated as full members of the department.

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

ISSN NO: 9726-001X
Volume 11 Issue 02 April 2023

reconstruction of a rat brain
Information quality visualization via illustrative rendering Ray-based volume rendering in a CAVE

Interacting with project material with laser pointers; Interactive computer science training based on dual coding theory; Visualizing stress-induced knee articular cartilage deformation

A number of REU students have worked on pedestrian evacuation projects at the University of Rhode Island and the IMEDIA Interactive Aquarium.

An Interactive Aquarium DisplayThese days, no modern science museum is complete without an interactive exhibit. But you can't get up close and personal with the animals in a zoo or aquarium. The Interactive Aquarium project is looking for new ways to get people involved and stimulate their minds [11]. Two of its main characteristics are interactive activities or games and vicarious involvement with the specimens. on order to have a better look at the coral and fish on the live feed, guests may interact with them via the panel's interface. A graduate of the Rhode Island College Bachelor of Science program in computer science, Sara Czyzewicz wrote "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.

Interactive Aquarium Game Interface by Stephen Lecrenski (Personal Computer) with a Bachelor of Science in Computer Science and FinanceWhen it comes to live exhibits, public aquariums struggle to capture the essence of the ocean's harsh environment. Oceanic creatures can't adapt to

the pressures of the surface because of their structure. Because most specimens at museums are kept in a controlled environment and accompanied by written descriptions of their habits and interactions, visitors to these shows seldom get a glimpse of the specimens in their native habitat. Stephen built a digital model of the ocean bottom to help others understand it better and find a solution [7]. Playing via a game-like interface, users scour the region around a hydrothermal vent for geological formations and creatures, including animated tubeworms, vampire squids, fang tooth fish, deep-sea crabs, and anglerfish (see to Figure 3). The user may discover more about the animal or location shown on the screen only by touching it. First Level of Project Evacuation 2. The multidisciplinary pedestrian evacuation project investigates and models the collective actions of pedestrians under both ordinary (non-emergency) and urgent (evacuation) situations [9]. The objective is to develop a micro-simulation tool for pedestrian flow dynamics that utilizes three-dimensional models of the environment and pedestrians. This tool will help experts in safety design and maintenance create safer buildings by simulating evacuation behavior, finding bottlenecks in the flow of evacuation, predicting average and maximum evacuation times, and pedestrian volume.

ISSN NO: 9726-001X
Volume 11 Issue 02 April 2023

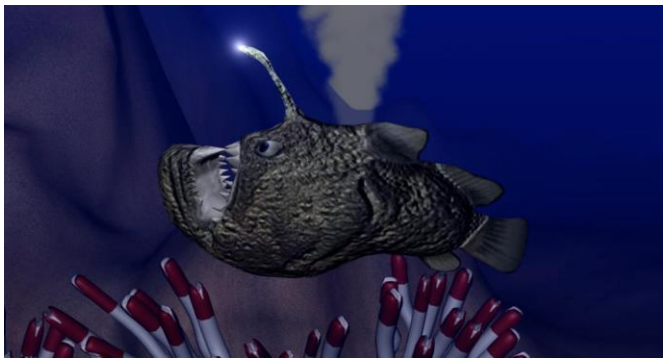

Figure 3: The Anglerfish from DeepSea displayed in front of thehydrothermal vent and above a bed of tubeworms.

Computer Engineering Bachelor's Degree Recipient Elizete Fernandes's Work on Behavior-Based Pedestrian Movement Simulation

In both normal and emergency scenarios, Elizete's Java software mimics the behavior of pedestrians. A correct mapping between the parts of the behavioral model and their respective software parts, classes, and objects was her job to make sure of. The behavioral model makes a distinction between the overarching agenda that prioritizes various objectives and the more detailed plan needed to reach the current objective.

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

People come in many shapes and sizes. In order to make it easier to create 3D pedestrian models, Katharine worked in Maya to create a parametrically described model, as seen in Figure 4. Short, average, tall, skinny, average, overweight, and obese are some of the general physiques that she created in her database, which she organized by age, sex, and height. Motions like walking, running, leaping, and crawling are examples of kinematic models for different types of bodies.

To make it work in Unreal Game 5, Angel's 3D visualization module took a file containing Elizete pedestrian chronology and automatically converted it into a motion script for a "non- playing character" using Katharine's human models. The results show that seventeen individuals were enrolled in the program and managed to finish it between 2004 and 2005. In 2004, there were three female students and five male students; in 2005, there were three students from underrepresented groups. Among the many fields represented among the students are computer science (12), computer engineering (1), visual arts (1), performing arts (1), literary arts (1), industrial design (1), and industrial design (1).

Both at the start and the finish of the program, students were asked to rate their level of familiarity with and attitude toward scientific inquiry. The following four-point Likert scale was used: 0 (strongly disagree), 1 (disagree), 2 (have no opinion), 3 (agree), and 4 (strongly agree). All but one student remained enrolled in our program. The following questions were posed:

1. Are you considering going back to school for a master's degree in research?

Is an industrial setting more your speed for your studies?

Third, provide some general reflections on your time spent researching.

Would you consider participating in another study abroad program if given the opportunity?

Conclusions cannot be formed with such a small sample size. Having said that, several trends did arise:

On average, students had a considerably less enthusiastic view on 2) - post-graduation ambitions to undertake research in an industrial environment. This was in contrast to 1) - pursuing a graduate research degree, which 1.67 (exit) students felt as passionately about or even more strongly than.

When asked to rate their "overall impression of the research experience," 14 out of 16 students (or 3.56 percent) provided a satisfactory response.

ISSN NO: 9726-001X
Volume 11 Issue 02 April 2023

With an average score of 3.50, 12 out of 16 students (or 80%) assessed their likelihood of engaging in future studies as 3 or above.
Then we moved on to more open-ended qualitative questions such as: Please describe the ways in which your participation in this study deepened your respect for the scientific process. Based on their feedback, this has educated them: • The subtleties of study. The amount of rules and limitations placed on researchers was shocking to me.
I have... in order to comprehend other people's work better. Studying a "new" topic has been really engrossing; I had no clue it could teach me so much about human nature. Using state-of-the-art technology can be an exciting experience, and I've discovered that research is both more difficult and more fascinating than I had imagined.
Out of the four students in the 2004 class, three quickly entered the scientific workforce, two went on to get doctorates in related fields, and one stayed in school to become a technical expert.
Convention for Computing Sciences in Colleges, Northeastern Region) conferences were the venues for most students' poster presentations. Katherine Wray's work with Information Visualization was the basis for a presentation she presented at the R&D Partnerships for Homeland Security conference. Stephen Lecrenski [7] and Sara Czyzewicz [2] were both presenters in a worldwide conference where they gave technical papers. Steven and Sara wrote a joint paper for the 2005 SIGGRAPH Teachers' Forum [11]. Peter Firth, Angel Castro, Elizete Fernandes, and Katherine Wray all contributed to papers given at conferences throughout the world.

1. DISCUSSION The level of academic achievement among the REU students pleasantly surprised us. Not only have they been encouraging, but they have also maintained their other computer research projects. A large number of them have disseminated their results via articles and posters at conferences. After participating in the REU program, one art student went on to get a degree in computer science, while many others got jobs related to the subject. In most cases, the program's researchers felt that their time there was worthwhile.
The survey results show how important it is to modify approaches based on each student's needs. Students were more vocal in their second year when things like laboratory renovations forced a temporary relocation of their usual communal workstation. Even though "anywhere, anytime" computing is commonplace now, undergraduates who are just starting out in research still need to meet regularly in one spot for both work and socializing. It seems that working on varied topics with mentors and colleagues present really improves the experience and results in more robust research.
It is remarkable that the students have come to understand that research is really a collaborative endeavor that requires strong communication both during and after the project.

1. the position with which one is concerned. The ability to work effectively with others and swiftly adjust to novel circumstances is something that many teachers assume their pupils naturally possess. Anecdotal data suggests that students who are just starting out in graduate school or the job may feel anxious about collaborating with classmates who are much more seasoned and skilled than they are. Hence, it is essential to get "face time" with professors and postgraduates.
Second, while most of the funding for the NSF REU goes for student stipends, it may be possible to conduct the program for free or at very little expense if local students are involved. The foundation of our REU program was laid by our internships at URI. Here are some suggestions we have for enticing students: 1) Students must be able to count this experience toward their degree or take it as an elective; 2) teachers should work together to mentor students and each should get credit for their efforts. 3. To ensure that students have enough time to write and present their research, it is advised that they conduct at least two semesters of part-time study or one full semester followed by one semester of part-time study. Four) Instructors should be acknowledged for their role in overseeing student collaboration in training, play, and work, and there should be a strong emphasis on cohort building and mentoring. For more parts that a program needs to run, you may look at references like [5,12].

6. ACKNOWLEDGMENTS The Technical University of Darmstadt is directly sponsoring this project,

while the University of Rhode Island's 3-D Graphics Partnership lab and the National Science Foundation's Research Experiences for Undergraduates (REU) program (grant number 0353786) are also instrumental in its success. The Building Evacuation project at the University of Rhode Island has been funded by the National Science Foundation (NSF). The grant number is 0331984. A number of projects at IMEDIA were partially supported by the Ocean State Technology Corporation as part of the CARUSO project (OS-05-2221). Thanks to the INI-GraphicsNet, especially the Fraunhofer IGD and the ZGDV, the program's International Experience component was able to take place.

1. REFERENCES

2. The authors of the mentioned work "Faces of Emotion in Human-Computer Interaction" are Branco, P., Firth, P., Encarnaço, L. M., and Bonato, P. (April 2–7, 2005, Portland, Oregon) Included in the proceedings of the ACM SIGCHI Human-Computer Interaction Conference, pages 1236–1239. The authors include P. Stephenson, L. M. Czyzewicz, J. Jungclaus, and L. M. Encarnaço. Making Real-Time Information More Useful for Visitors. Paper 5C.2 was presented at the 2005 International Conference on Training, Education, and Simulation in Maastricht, Netherlands, from March 22nd-30th. Computing Research News, Volume 17, Number 1, (May 2005) by Paul A. Freeman and Jonathan Cuny, Common Ground: How Diversity in the Computer Science Community Benefits Everyone.

In the March 2006 issue of the ACM SIGCSE Bulletin (38, 1), the article "Research Experience for Undergraduates: Successes and Challenges" was published by Mary J. Granger, Guy-Alain Amoussou, Miguel A. Labrador, Sue Perry, and Kelly M. Van Busum. With input from Peter J. DePasquale, Deborah L. Knox, and Sarah M. Pulimood. In 2006, the ACM SIGCSE Bulletin published "A Model for Summer Undergraduate Research Experiences in Emerging Technologies" (68.1).

E. Lazowska addressed the state of computer science education and human resources at the 2005 CRA Computing Leadership Summit in February.

Written by S. Lecrenski and P. Stephenson. Down Under, We Create Engaging Videos for Major Views. Accepted for presentation at the TESI International Conference 2005 held March 22–24, 2005 in Maastricht, Netherlands.
A Key to the Clubhouse: Women in Computing, edited by Jennifer Margolis and Amy Fisher. Publication year: 2002. Publisher: The MIT Press.
A number of individuals, including Peckham, Hervé, Hutt, Castro, Fernandes, Santos, Wray, and Aguirre, Bernardo, among others, contributed to the creation of this work. An Approach to Software Development for Harmonising Conceptual Models Across Domains. Proceedings of the 2005 Conference on Computing in Civil Engineering, Cancun, Mexico, July 13–15, 2005.
"The end" careers in information technology: looking back and forward, Computing Research News, vol. 16, no. 3, may 2004, pp. 1-21 (Sargent, J.). The following people are listed as the sentence's authors: Szyzewicz, Lecrenski, Encarnaço, Branco, Horvatic, Jungclaus, and Stephenson. Public Aquariums: Groundbreaking Tools for Unstructured Learning. The Programme for Teachers The articles were presented at the 2005 ACM SIGGRAPH Conference on Graphics Processing, which took place in Los Angeles, California, from July 31 to August 4.