The Tech. Carnival: A proposed Outreach Program for creating awareness of STEM fields in High School students

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Abstract: The purpose of this research is to develop an interactive method of promoting STEM related college programs in Puerto Rico’s public High Schools. Due to the poor promotion of STEM in Puerto Rico’s public schools, many of the students that graduate do not move on to a higher education causing low rates of admissions in Puerto Rico’s Colleges and Universities. In order to address this issue, the creation of an outreach program aimed towards this population was developed. For our initial stage, the program will focus on students who are currently attending public High Schools. The outreach program is set to consist of a series of interactive workshops that will help students build a series of arcade/carnival games as a means of providing exposure to different areas of STEM such as computing, electronics, engineering, and mathematics. To measure the success of the program, an assessment plan that exposes the level of interest and knowledge students acquired throughout the prepared activities will be developed.

Introduction

In order to keep up with the advancement of technology in society, the urge for professionals in the science, technology, engineering, and mathematics (STEM) fields has drastically increased throughout the years [1, 2]. In order to deal with the lack of student interest in these fields many universities, companies and governments from around the world have begun to implement different techniques amongst which outreach programs are the most dominant. These programs are developed in order to offer students the opportunity to get engaged in interactive activities related to STEM fields. In Puerto Rico’s case, some outreach programs have been developed in order to inform and expose students to STEM fields. However, the students that benefit from these programs are mostly students that attend private schools [3]. Even though there is a majority of public schools, the amount of students choosing to pursue college education in STEM are mainly students from private schools [5]. In order to address this situation this project aims to develop an outreach program that focuses on increasing the number of public school students who choose to study STEM.

Theoretical Background

What is an Outreach Program?

A collaboration of faculty, staff, and students with external groups in mutual beneficial partnership to enhance knowledge, creative work and community service while addressing larger societal issues [3].

Examples of Existing Outreach Programs

U.S. Program: Massachusetts Institute of Technology (MIT):

- The “GE Girls at MIT” program. [4]

P.R. Program: Puerto Rico Institute of Robotics (PRIOR) in association with NASA and the Polytechnic University of Puerto Rico:

- The “Technology Challenge” [5]

Why Outreach Programs for STEM Fields are Needed?

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE Girls at MIT</td>
<td>Mentors girls in STEM-related fields</td>
</tr>
<tr>
<td>Technology Challenge</td>
<td>Provides interactive workshops for students</td>
</tr>
</tbody>
</table>

Graph 1: The graph above represents the increase of STEM jobs projected towards 2020 [2].

Statistics: Student Admittance to University of Puerto Rico-Mayaguez and the number of Private vs Public Schools

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Public Institutions</th>
<th>Private Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Admittance Rate</td>
<td>53%</td>
<td>78%</td>
</tr>
<tr>
<td>Percentage of Students Admitted</td>
<td>74%</td>
<td>69%</td>
</tr>
</tbody>
</table>

Conclusion

- The need for STEM professionals has increased throughout the years.
- Workshops and interactive activities are amongst the most used outreach methods.
- Parent involvement in activities help increase student motivation.
- An outreach program, aimed towards high school students, that includes interactive activities will be designed.
- The goal of this program is to increase the interest students have in STEM majors.

Future Work

- Design game modules and develop corresponding prototypes.
- Create official Bill of Materials for prototype development hardware.
- Extend the program to students that are younger than the target group.
- Work on the design of more game modules.
- Create instruction manuals for the different hardware project modules (interactive games).
- Expand outreach program to other schools in Puerto Rico.

References


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