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Promoting and Retaining Minorities in Technology

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ABSTRACT

This paper presents an on-going research project which is motivated by the lack of minorities in technology fields. This shortage typically results in stereotypes amongst minority students and is likely to prevent them from effectively competing with others. The problem motivated us to encourage middle school students to dispel stereotypes and embrace technology fields by engaging them in hands-on activities that initiate them to programming and Robotics. Students are also introduced to various aspects of the IT field including HTML and Microsoft Office. Surveys are used to measure the students' attitudes and knowledge about technology before and after the program.

Categories and Subject Descriptors
K.3.2 [**Computers and Education**]

K.3.m[**Miscellaneous**]

General Terms
Measurement, Human Factors

Keywords
Computer Programming, Robotics, Diversity, Education.

1. PROBLEM AND MOTIVATION
1.1. PROBLEM STATEMENT

Stereotypes amongst minority students in relation to technology fields lead to discouragingly low numbers of minorities earning technological degrees and an inability to compete with others domestically and internationally in the academic and professional world. According to the National Science Foundation out of the fifteen thousand students who received a bachelor's degree in technology related fields in 2004, three thousand were minority students (i.e. twenty-percent). While this statistic may not seem that startling, the disparity worsened on the master's and doctorate level. Only twelve percent of master's and nine percent of doctorate degrees were earned by minority students [1]. Stereotypes about mathematics and sciences also played into the problem. An informal survey that we conducted in a 2007 Charlotte middle school class of eighth graders revealed that only twenty percent felt comfortable to admit that they enjoy mathematics. This number translates into only forty-three percent of African-American and fifty-two percent of Hispanic middle school students passing both sections of the End of Grade (EOG) tests in North Carolina in the 2006-2007 school year [2]. These statistics motivated us to encourage middle school students to understand and appreciate technology and to recognize the valuable professional opportunities that IT studies offer.

2. METHODOLOGY

2.1. TARGET POPULATION

Our project is targeted to approximately twenty students of a local middle school that was chosen based on the fact that it ranks in the bottom tenth of schools in North Carolina and has less than a forty percent proficiency rate in algebra, a skill

necessary in succeeding in technology fields. The school also has a high percentage of minority students with seventy-one percent of the school's seven hundred and seventy-eight students falling into the minority category. Eighty-three percent of the students also receive free or reduced lunch.

2.2   TECHNOLOGY INTEGRATION

A set of presentations are prepared for the students on topics ranging from Microsoft Office to HTML and robotics. Students are also engaged in an active and collaborative learning environment. They participate to hands-on activities that initiate them to programming and Robotics. The robotics component featured Lego Mindstorm® robots and software which is used to introduce students to fundamental design, logic, and programming principles. Students also exercise their critical thinking and communication skills by creating their own presentations to deliver to parents and others in the community.

2.3   MEASUREMENTS

At the beginning of the program, pre-surveys are conducted to determine the students' enthusiasm about technology and their basic knowledge of its related fields. They are also asked about stereotypes they held about these fields. Attendance is also taken at each session to determine the retention rate and interest level on the subject being presented. Post- surveys and interviews are conducted at the end of the program to determine if changes occurred in the students' attitude and knowledge in relation to technology fields.

3.   CONCLUSION

In this paper we presented an on-going work aimed at promoting minority representation in technology studies both at the undergraduate and graduate levels. The project targeted a group of middle school students to be introduced and trained in computer programming and robotics. Preliminary observations show that the program captivates students' interest and has a high retention rate.

4.   ACKNOWLEDGMENTS

5.   REFERENCES

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