I Want to be a Computer Scientist When I Grow Up: Evaluating the Skills Necessary for Computer Science

Adrienne Decker, M.S.

University at Buffalo, SUNY

adrienne@cse.buffalo.edu

February 19, 2003

Background – CS 0

- CS 0 (CSE 111) Observations
    - Students who had grown up with computers
- Many studies completed in 80's and early 90's, the students in these studies were from a different population than current students

2

Background –Discrete Structures

- Students that are "math-phobic"

- Leeper & Silver: SAT Math scores second strongest predictor of success – verbal stronger.

- Mazlack: IBM PAT (mathematical word problems, arithmetic reasoning) – not a good predictor

3

Background – CS I

- ## Exposed to Critical Thinking Test
  - Do we really want this style of Critical Thinking?
  - What about abstract reasoning ability, logical thinking ability, or spacial reasoning?

Goals & Hypotheses

- Focus has not been on the correct skills. The breadth of metrics not wide enough, and not predictive enough for the discipline.

- Identify skills and if these skills are currently possessed by "introductory" students or are the skills honed by the education.

5

Open Issues

- How do we identify the skills?
- Are there good tests out there to look at these skills in both programmers and students?

Bibliographic References

- [1] Cantwell Wilson, B., & Shrock, S. (2001). Contributing to success in an introductory computer science course: A study of twelve factors. ACM SIGCSE Bulletin, Proceedings of the thirty second SIGCSE technical symposium on Computer Science Education, 33(1), 184-188.

- [2] Ennis, R. H. and Millman, J. (1985). Cornell critical thinking test, level Z. Pacific Grove, CA: Midwest Publications.

- [3]Evans, G. E., & Simkin, M. G. (1989). What best predicts computer proficiency? Communications of the ACM, 32(11), 1322-1327.

- [4]Kurtz, B. L. (1980). Investigating the relationship between the development of abstract reasoning and performance in an introductory programming class. The papers of the eleventh SIGCSE technical symposium on Computer science education : SIGCSE bulletin, 110 - 117.

7

References - Continued

- [5] Leeper, R. R., & Silver J. L. (1982). Predicting success in a first year programming course. Paper presented at the Thirteenth SIGCSE Technical Symposium on Computer Science Education, Indianapolis, Indiana.

- [6] Mazlack, L. J. (1980). Identifying potential to acquire programming skill. Communications of the ACM, 23(1), 14-17.

- [7] Ventura, P. R. (2002). Objects-first CS1 not considered harmful: An empirical investigation of CS1. Paper presented at the SIGCSE Doctoral Consortium, Convington, Kentucky.

8