What Matters Most When Teaching CS1?

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ABSTRACT

The objective of research and proposals related to the domain of computer science and education is to offer resources and contexts that help teachers and students to increase learning effectiveness. Algorithms and Programming courses present an obstacle to an increasing number of first year students worldwide, and has become the object of study of many researchers and faculty members worried with the consequences this difficulty entails, such as high dropout and failure rates, and lack of motivation [1].

Several proposals have been made, using different programming languages and paradigms, as well as different methodologies, including the development of tools and environments that help students to develop their programming abilities. Most of these proposals are concerned with the motivational aspect of the course, and try to involve the students in the discipline, leading them to persist and not give up in spite of its natural difficulty [2].

In many cases there have been reports of success. Often the credits of success are given to the new approaches, methodologies and environments adopted in the experiment. However, an important variable is often disregarded: the teacher's quality and motivation. It should be observed that most of these experiments are undertaken by high quality teachers that are also motivated researchers in the domain of Computer Science education. Their enthusiasm and dedication to the course is undeniable. The question is: to what extent does the teacher's motivation and enthusiasm contribute to the success of the experiment? Most reports do not discuss this issue and often they are limited to the application of the new approach to groups taught by the researcher himself or by members of the research team, equally motivated.

Many reports have established that the human factor is key to the success of an educational system [3]. In all educational levels, from kindergarten to the university, there are examples of brilliant pedagogical proposals that fail. Some of them, apparently due to how they were executed [4]. More, some government and specialists are rethinking the essential factors that may influence the schooling outcome and produce more effective results in educational reforms, specially since despite the massive increases in spending, the performance of many school systems has barely improved in decades [5,6].

Experiences of top school systems suggest that three things matter most to good quality schooling: 1) getting the right people to become teachers, 2) developing them into effective instructors and, 3) ensuring that the system is able to deliver the best possible instruction for every student [6].

If this is true for schools, can't we suppose that this is also true in teaching CS1? If so, can we deduce that the teacher is determinant in the outcome of the teaching experience? And that the new methodologies, tools and environments are efficient support for these teachers?

Categories and Subject Descriptors

K.3.2 [**Computer and Education**]: Computer and Information Science Education – *Computer science education*

General Terms

Human Factors

Keywords

Programming learning, Human factors, Teacher motivation.

REFERENCES

[1] Guzdial, M. 2011. From science to engineering. *Commun. ACM* 54, 2 (Feb. 2011), pp. 37-39. DOI=10.1145/1897816. 1897831, http://doi.acm.org/10.1145/1897816.1897831

[2] Hamza, M. K., Alhalabi, B. and Marcovitz, D. M. 2000. Creative pedagogy for computer learning: eight effective tactics. *SIGCSE Bull.*, 32, 4,(Dez. 2000), pp. 70-73. DOI=10.1145/369295.369335, http://doi.acm.org/ 10.1145/369295.369335

[3] Thompson, T. G. and Barnes, R. E. (Eds.). 2009. *The Engine of Successful Education Reform: Effective Teachers and Principals.* Commission on No Child Left Behind. The Aspen Institute. Denver, (Oct. 2009).

[4] Kirschner, P. A., Sweller, J. and Clark, R. E. 2006. Why minimal guidance during instruction does not work: an analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist,* 41(2), pp. 75-86, 2006. doi:10.1207/ s15326985ep4102_1

[5] Hingel, A., Saltelli, A. and Mercy, J. (Eds.). 2008. *Progress Towards the Lisbon Objectives in Education And Training: Indicators and Benchmarks 2008*, Commission Of The European Communities, Tech. Rep. SEC (2008) 2293.

[6] McKinsey & Company. 2007. *How the World's Best-Performing School Systems Come Out on Top*. Technical Report. September 2007