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# Teaching and Learning Computer Science at Al Baha University, Saudi Arabia

## Insights from a staff development course

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**Abstract**— In this special session we meet a set of projects in computer science and engineering education at a university in Saudi Arabia. They are the product of a pedagogical development course ran in collaboration with a Swedish university during the academic year 2013/2014. The projects reflect the local situation, with its possibilities and challenges, and suggest steps to take, in the local environment, to enhance education. As such it is a unique document that brings insights from computer science and engineering education into the international literature.

**Keywords**— *staff development, Saudi Arabia, computer science education, learning and teaching*

### I. INTRODUCTION

This special session reports on results from pilot studies in computer science engineering education made at Al Baha University (ABU), Al Baha, in South-West Saudi Arabia. The results, presented as posters, are the final products of a staff development course aiming to enhance learning and teaching in computer science and engineering at ABU. The course is a part of larger initiative in the scholarship of teaching and learning at ABU *Al Baha: Optimising Teaching and Learning in Computer Science, ABoLTCS*, [1] which together with its sister project, *Accreditation at Al Baha University, AccAB*, is based on the idea that development of teaching and learning in computer science takes point of departure in the staff, their development, attitudes to their work and relationship with their students. Further, it leans on the insight that teaching and learning is situated, geographically/culturally and socially [2-4], as well as in the discipline. As a conclusion, the staff and their engagement is the core for this development project.

The two projects, ABoLTCS and AccAB are scheduled to run for four years at ABU in collaboration with the Uppsala Computing Education Research Group UpCERG, Uppsala University (UU), Sweden. The projects are explorative in their character, and the actual activities performed are thus

continuously discussed between the two partners, within the framework of the jointly agreed aims:

- In education, the students' learning should be enhanced as a result of better teaching.
- The project should contribute to better gender equality.
- In research, the academic staff should become recognized for their Computing Education Research.
- The Faculty becomes a centre for good practice of learning and teaching computer science and engineering.
- ABU emerges as leading university in the field within the GCC countries.
- The Faculty gains international visibility in research in computer science.

As a sign of the high level of ambition, ABU is bidding for arranging the LaTiCE conference 2017 in Saudi Arabia.

In this paper we will offer glimpses from the staff development course *A scholarly approach to learning and teaching computer science*, given during the academic year 2013 - 2014 in the ABoLTCS project. We will also present the projects that the course participants (in other words, the ABU computer science staff) did, and presented as posters, at the end of the course.

### II. THE COURSE "A SCHOLARLY APPROACH TO LEARNING AND TEACHING COMPUTER SCIENCE"

The course took its point of departure in research in computer science education, focusing on learning and teaching of computer science [eg. 5, 6, 7] and the interplay between the teaching and the learning processes, as well as in the Scholarship of Teaching and Learning [8, 9]. We argue that teaching is a fundamental competence in academia and that

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teaching practices and instructional design should be based in current research in the subject area and in pedagogy.

During the four meetings the facilitators, that is, the three authors from Uppsala, presented and chaired discussions on topics, to a large degree selected by the participants, based in topics that stemmed from their local environment. During the course, the facilitators encouraged the discussions to encompass some results from research in teaching and learning of computer science and engineering, as well as research in higher education. For example evidence on the importance of a good teaching, in what ways the teachers' attitudes make a difference, and that good learning always is contextualised were topics touched upon. In parallel, more theoretical concepts, such as models for analysing computer science education, research methodologies and concepts like deep and surface learning [10] were introduced and expanded upon.

As is implied above, the course was offered in a collaborative dialogue, where the UU facilitators offered a structure, contributed with their competence on research skills, principles for best practice and links to world standards for the conduct of higher education. In a similar way, the ABU participants contributed with their insights in the local and regional situation, with its challenges, strengths and needs. Particularly, the participants acted as agents of change, and ran developmental projects, with the aim of gaining insights from the course and to implement measures based on these insights in the ABU environment.

### III. THE PARTICIPANTS' PROJECTS IN THE COURSE

The projects that the participants did during the course were presented as posters on the final day of the course. In the rest of this section, we provide a systematic exposé of the projects, referring to the posters, included in this document for the details.

The first largest set of posters discusses teaching and learning of particular topics in computer science or new ways of teaching. Areej Athama (see Figure 1) tackles introductory programming for school children, and concludes that teamwork is important for a good learning outcome. The role of mathematics is stressed by Bedine Karim, Hamada Alsadoon and Abdullah Aljoufi (see **Error! Reference source not found.**). They ask what role of mathematics plays for learning computer science, and offers answers that, for example, allude to the role of mathematics as means to enhance cognitive skills among the students. Two of the projects take the need to teach research skills explicitly as their point of departure. The first in this group, by Rahmat Budiarto and Mohamed Shenify (see **Error! Reference source not found.**), takes a broad perspective, on the full curriculum, and proposes a thread through the education where the students would work with guidance from the teachers within research and development in the beginning and independently, but under supervision towards the end. The second paper in the group, by Lubna Abdel Kareim Gabralla (see **Error! Reference source not found.**), discusses a project that successfully has used artificial intelligence to promote an understanding of the value of research. Ahmed Alhabish, Ahmed Rabea, Eidah Alzahrani, and Dafer Faiz (see **Error! Reference source not found.**)

propose a system to enhance the students' learning from assignments, by offering a complete system for working with the assignment. Muhammad Qaiser Saleem (see **Error! Reference source not found.**) focused on the relevant topic of security.

The second set focus on language proficiency and culture. Based in an empirical study, Nadeem Hassan Daupota, Abdul Hannan and F. A. Mazarbhuiya (see **Error! Reference source not found.**) claim that a different set of teaching methods combined with personal engagement work for the local students, who mainly are visual learners, and who lack a good knowledge of English, Also Ismat Aldmour and Aletta Nylén (see **Error! Reference source not found.**) discuss the students' language background, but from the perspective of how approachable, or unapproachable, the terminology in computer science, based in English, is for the ABU students. Alghamdi Bader, Alzahrani Rami and Alghamdi Khalid (see **Error! Reference source not found.**) focus on how culture, and power, affects the relationships in Saudi organisations.

The third set studies ethics. Farooq Ahmad (see **Error! Reference source not found.**) argues for the importance of ethics teaching all through the curriculum. He suggests an integrated approach for relevant content on ethics to be incorporated in each course. Together with Adul Hafez (see **Error! Reference source not found.**), he proposes the design of an e-learning platform, which could support an ethical awareness among the students. As ethics education is important, Farooq Ahmad and Hamadah Shihab AlSadoon (**Error! Reference source not found.**) propose that an ethics research centre should be established at ABU.

### IV. LEARNING FROM EACH OTHER

The posters present and discuss a multitude of topics, seen from different theoretical perspectives. What unites these, seemingly disparate group of projects is the intent to tackle relevant topics in computer science education and to work for a change of teaching and learning in the ABU environment. As such it is a unique dataset, as it illuminates the specific challenges and sketches out an agenda for change in computer science education in the Saudi Arabian environment. The contributions and insights collected in this session are thus relevant even outside their local context, as they contribute, to the international community, with richer insights from a part of the world that only rarely is represented in the research literature of the international computer science education community. In this way, we conclude that the project provides an outstanding opportunity for mutual research, learning, insight and educational development.

### ACKNOWLEDGMENT

This project would not have been possible with the support from all its participants and the academic leaders involved at Al Baha University and Uppsala University. We are grateful to work in such an inspiring environment.

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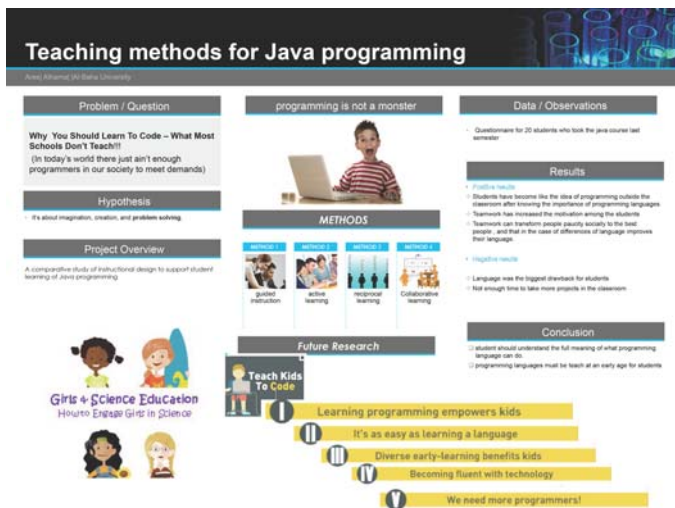


Figure 1. Poster by Areej Athama

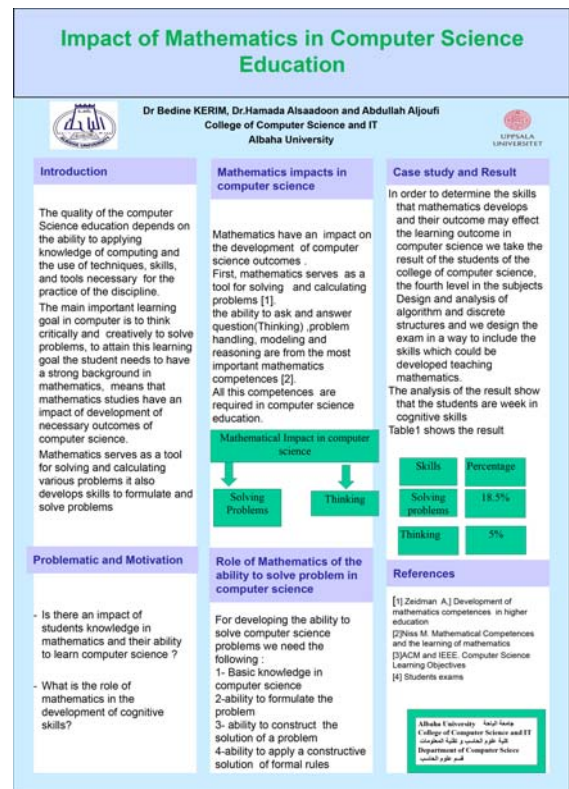


Figure 2. Poster by Bedine Karim, Hamada Alsadoon and Abdullah Aljoufi

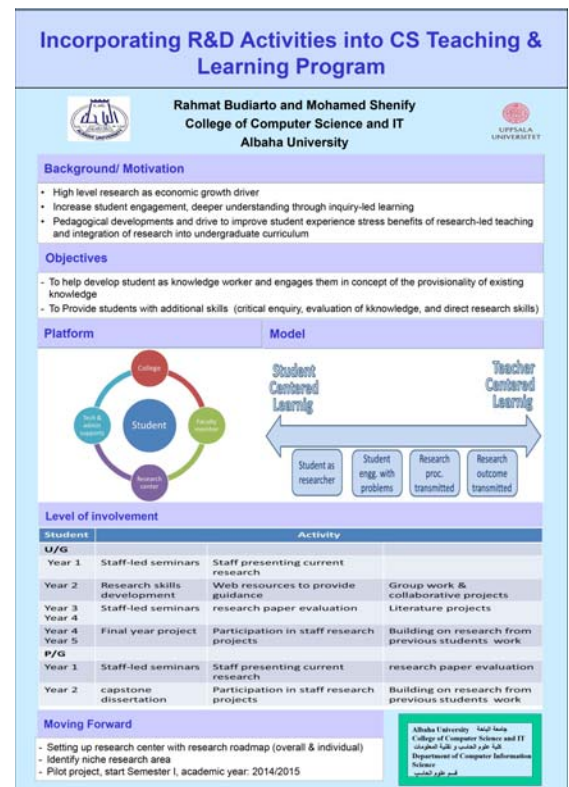


Figure 3. Poster by Rahmat Budiarto and Mohamed Shenify



Figure 4. Poster by Lubna Abdel Kareim Gabralla

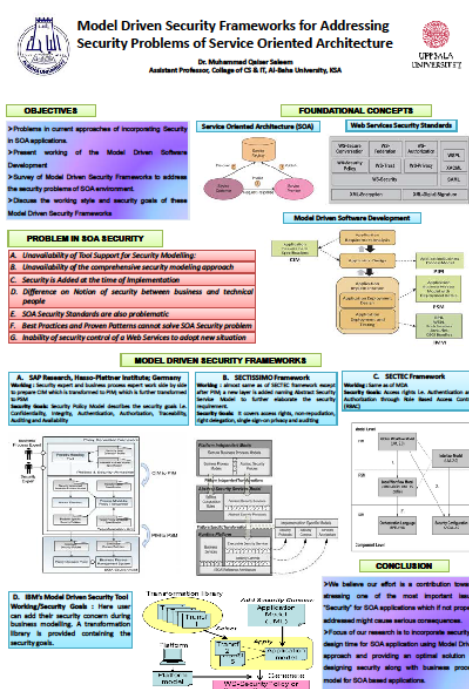


Figure 6. Poster by Muhammad Qaiser Saleem

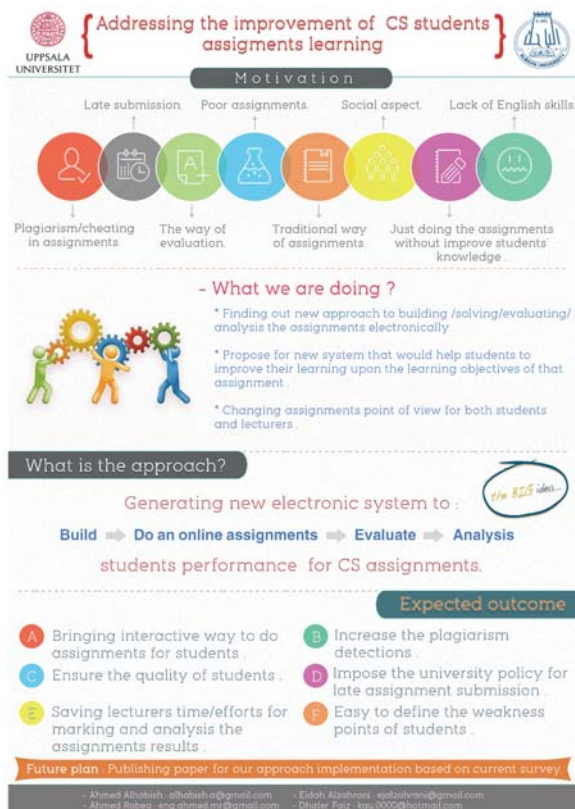


Figure 5. Poster by Ahmed Alhabish, Ahmed Rabea, Eidah Alzahrani, and Dafer Faiz



Figure 7. Poster by Nadeem Hassan Daudpota, Abdul Hannan and F. A. Mazarbhuiya



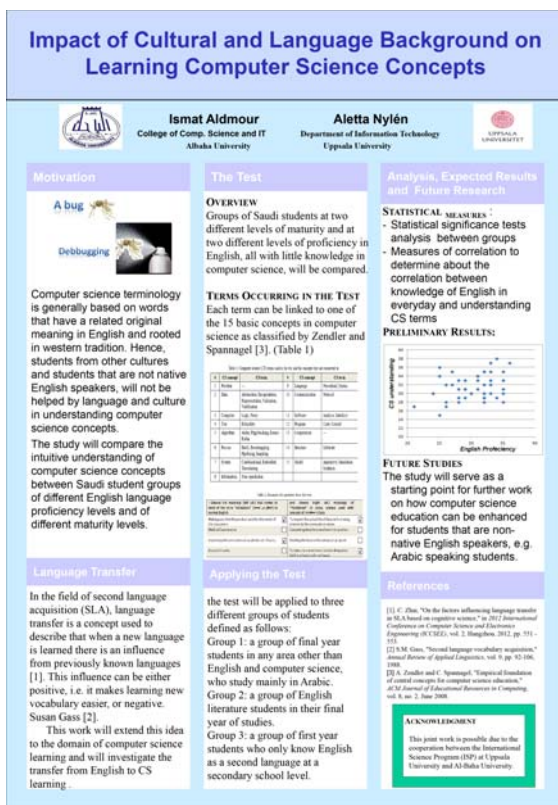


Figure 8. Poster by Ismat Aldmour and Aletta Nylén

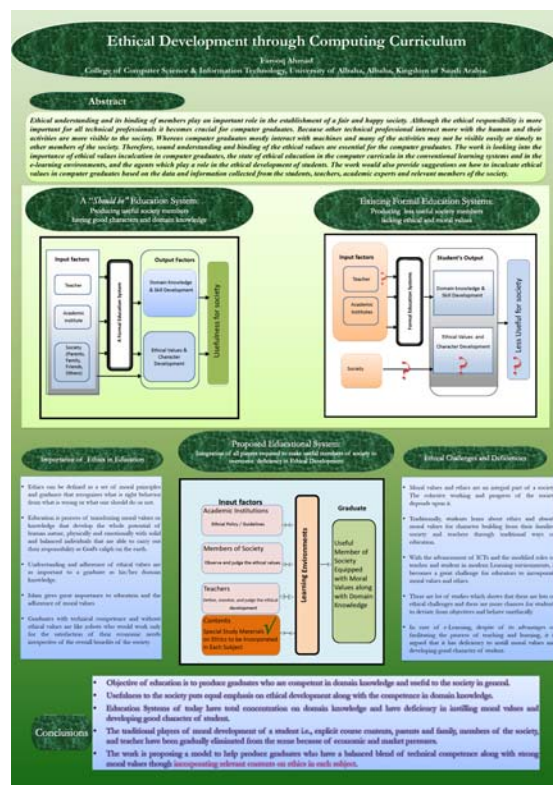


Figure 10. Poster by Farooq Ahmad

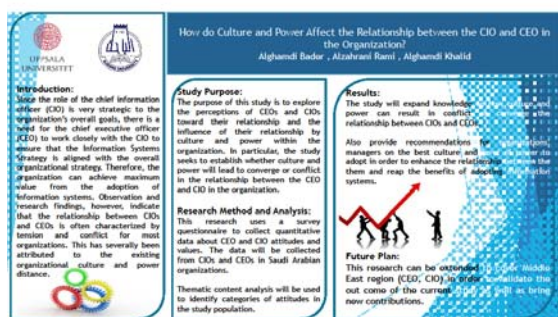


Figure 9. Poster by Alghamdi Bader, Alzahrani Rami and Alghamdi Khalid



Figure 11. Poster by Farooq Ahmad and Abdul Hafeez



**Figure 12. Poster by Farooq Ahmad and Hamadah Shihab AlSadoon**