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This is the submitted version of a paper presented at *International Conference on Learning and Teaching in Computing and Engineering (LaTiCE 2014)*, 11-13 April 2014, Kuching, Malaysia.

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# Learning to develop learning and teaching of CS

## a collaborative example

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**Abstract**— Developing and improving teaching and learning in computer science is a complex task. One of the most significant challenges involves encouraging students, teachers and the formal university structures to all move in the same direction, for example to embrace the ideas of Scholarship of Teaching and Learning (SoTL). Much of the difficulty can be found in the fact that the intrinsic nature of SoTL implies that teaching and learning should be researched and critically examined. This in turn demands a development of underlying staff and organisational attitudes. As a consequence, the ways to relate to the students, the subject area, the teaching and our colleagues must be scrutinised, with the intent of finding new teaching and learning forms. This contribution discusses an on-going four year project, ABoLT (Al Baha optimising Teaching and Learning), in which Uppsala University (UU) in Sweden and Al Baha University (ABU) in Saudi Arabia collaborate on developing computer science (CS) education at ABU, based in the ideas of SoTL to the benefit of both partners. In the project, ABU will renew its teaching in CS and, at the same time, initialise, formulate and conduct research in computing education, as a means to understand and improve its own teaching and the learning of its students.

**Keywords**---staff development, exchange of best practice, scholarly learning practice, computer science education, Saudi Arabia

### I. INTRODUCTION

Establishing a “scholarly commons” within which teaching practice and insights into teaching and academic teaching can be shared between universities in different cultures is a complex endeavour.

In this paper, an on-going project, ABoLT (Al Baha optimising Teaching and Learning), is described, in which the Uppsala Computing Education Research Group (UpCERG) at the Department of Information Technology, Uppsala University, Sweden and Faculty of Computer Science and Information Technology, Al Baha University, Saudi Arabia, are engaged in a collaboration to enhance the quality of teaching and learning of CS at ABU.

The cultures differ considerably between the two countries [1], and this also affects teaching, as teaching and learning are culturally [2]. Recent research also stresses that students’ understanding of their subject area, computer science, varies between cultures [3].

### II. THE AIMS OF THE ABoLT PROJECT

The ABoLT project has a range of goals, which engage with scholarship of teaching and learning at different levels:

Locally, at ABU:

- The students’ learning should be enhanced as a result of better teaching.
- The staff should become recognized for their Computing Education Research

Goals for ABU in an international context include:

- The Faculty should become a centre for good practice of learning and teaching Computer Science and gain international visibility in research.
- Al Baha University emerges as leading university in computer science within the GCC countries<sup>1</sup>

At a broad level:

- The project should also contribute to better gender equality in Saudi Arabia.
- Research-based insights should be gained on teaching and learning of CS in the Arab countries.
- Academic collaboration between the Arab countries and Europe should be encouraged.

The project tackles these goals in a number of ways, for example through a staff development course, arranging workshops/meetings/seminars on research in Computing Education, mutual staff exchange, student exchanges at different levels (bachelor, master and doctorate levels), and joint conferences. The underlying idea is that the pedagogical capability in CS education should be enhanced by the project while simultaneously developing a research capability in Computing Education Research in the Faculty of Faculty of Computer Science and Information Technology.

The two universities are different in character: While Uppsala University is old and prestigious and has a strong international reputation both for research and education, Al Baha University is young, rural and dynamically developing. There are similarities, for example in that the staff is internationally recruited, and are devoted to their tasks. Both universities influence and are influenced, by the cultures in

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<sup>1</sup>Six collaborating countries on the Arab peninsula: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates.

which they exist [4]. As Western traditions and values tend to dominate academic life, these cultural differences contribute to the challenges that ABU and its students face in order to enter the international scene.

In this context, we take the following principles as our point of departure for the ABoLT project:

- Scholarship of Teaching and Learning (SoTL) is a philosophical and practical position in regard to teaching and learning, which aims to cultivate a scholarly, evidence-based approach to students' learning and teachers teaching [5].
- Computing Education Research is a field of research that explores students' understanding and learning of CS as well as teachers' teaching within the field [6]
- As good learning and teaching differs between subject areas, this project is organised in one subject area, computer science.
- Good teaching has to be developed in and for a local context.

### III. THE COMPONENTS OF THE ABoLT PROJECT

We employ a number of instruments as a means with which to evaluate the project.. The most important are, in chronologic order:

Academic year 2013-2014: A course *A scholarly approach to learning and teaching computer science*. During the course, the participants make their own pedagogical development projects, and study their own practice and its outcomes using rigorous research-based methods.

Academic year 2014-2015: A set of workshops, mainly with a methodological focus, aiming to support the participants in their projects.

Academic year 2015-2016: A conference for the GCC countries in Computing Education Research, with a particular focus on its applications.

Academic year 2016-2017: An international conference in Computing Education Research.

Certainly these activities are not the sole means to reach the aims: Exchanges, scaffolding, local presentations, and international collaborations will also be arranged.

### IV. THEORETICAL BACKGROUND

The project draws on many years of research in the application of principles of Scholarship of Teaching and Learning (SoTL) to the enhancement of the university learning experience [7]. The current project is informed by bodies of research dealing with teacher's attitudes and conceptions of their role in the university teaching environment [8].

Computing Education Research is a field of research that explores students' understanding and learning of CS as well as teachers' teaching within the field. While much of the research in the area concerns learning CS concepts, there is a body of more theoretical work that deals with conceptions of the factors underlying student learning success and failure. Drawing on our previous work in this area we have designed

a series of activities which facilitate transfer of CER results into the Arab education context [9].

The project also draws on general principles from research in higher education, for instance research on deep and surface learning, constructive alignment, and university learning and teaching and work done on international curriculum standards and research on other aspects of disciplinary content. Above all we hold that good teaching has to be developed in and for a local context. In particular teaching needs to take into account the gender politics of Saudi Arabia. This has implications for mixed gender group work for example.

### CONCLUSION

As a part of this project, we investigate the participant, instructor and leadership perceptions of changes in thinking and practice of teaching and learning in computer science at Al Baha University in conjunction with the course. The aims are two-fold: Firstly, we wish to facilitate the continuous development of the project, and to prioritise feed back into the activities. Secondly, we wish to learn and research teaching, learning and understanding of CS in an Arab culture.

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