Z.C. Chagra

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Mobile Software Engineering Field: Innovation in Education to Shape the Engineer Profile

The Private High School of Engineering and Technologies Tunis, Tunisia
Z.C. Chagra

During 2011, the Private High School of Engineering and Technologies (ESPRIT) came to decide that modifications ought to take place in the study plan within the school. The mobile section is one of the main fields that were born after a global analysis of several profiles and engineering technologies. This paper addresses a model of mobile software engineering taught through the mobile section curriculum.

Key words: active learning, CDIO, educational programs modernization, education engineering, mobile software engineering.

I. INTRODUCTION

Reconceiving the study plan is a process that aims to shape the profile of an up-to-date engineering student. Most of the newly-conceived plans are focused on the CDIO standards, on the modernization of the actual courses and projects in order to follow the PBL approach: Project/Problem Based Learning.

Mobile Software Engineering is one of the recent fields that are acknowledged after analyzing the trending technologies and profiles on the market. This field consists of two years of studies during which the engineering student will essentially learn software development on the trending mobile OS: Android, iOS, BlackBerry, Windows Phone in addition to several other trending types of development as cross platform using HTML5. The study plan was entirely established according to the CDIO standards.

Mobile Software Engineering field at ESPRIT is implementing student-centered education approaches to join worldwide programs as the CDIO initiative. Therefore, this experience's outlines meet CDIO standards as learning outcomes, integrated curriculum, active learning and integrated learning practices.

This experience resulted in three generations of student engineers:

- 2011/2012 first generation: 1 class, 32 students.
- 2012/2013 second generation: 3 classes, 94 students.
- 2013/2014 third generation: 4 classes, 128 students.

The Mobile Software Engineering field has faced multiple challenges whilst achieving its objectives, if major and unpredictable changes in mobile development trends were to be taken into consideration. That is why partnerships were made with Samsung, Microsoft, BlackBerry and other key partners in the mobile development industry, to plan a decent and updated course support.

This paper will mainly present this educational experience as a potential solution for building ready-to-market engineers profiles.

II. THE OBJECTIVES

The main objectives of Mobile Software Engineering are made and reviewed according to the needs (CDIO Standard 2):

- Shaping ready-to-market engineer profiles.
- Participating in mobile development activities enhancement locally and globally.
- Expanding mentoring and development activities from classes to learning factories.

III. THE PROGRAM OUTLINES

Since 2011, faculty teaching model at ESPRIT was meant to be reconceived in a manner that meets the fixed objective: moving from the classical learning procedure to active learning. In this context, several alumni students were selected according to the targeted skills in order to integrate new pedagogic and research teams.

ESPRIT Mobile is the research team supervising all mobile development activities: teaching, developing as well as Research and Development activities.

Furthermore, ESPRIT Mobile is the pedagogic team mentoring the Mobile Software Engineering field from a basic creative stage.

The targeted mobile software engineer profile is pictured through an analysis of different feedbacks. Essentially the feedback of a graduate student's experiences in mobile development during his/her graduation project: a ready-to-market mobile engineer is a developer mastering the mobile operating systems: Android, iOS, Windows Phone, BlackBerry with a basic knowledge of cross platform development and trending mobile development activities.

The major key players in the mobile development activities offer different academic programs; this must be beneficial to reach the aimed objectives: working on the latest trends of technologies and being in a direct contact with the companies developing the appropriate mobile operating system, and thus, guarantee a distinguished quality of courses content.

IV. THE BASIC PRINCIPLES

The Mobile Software Engineering student has to develop an application per mobile OS and publish it to the appropriate store or marketplace in order to be graded. This is the main idea around Mobile Software engineering field. It is quite common that in every mobile OS, there are market places or stores in which the developer has to send his project so that it can be published and reviewed by the mobile OS users.

Once the project is sent, several teams from the targeted and the compatible store has to test each function in order to verify the compliance with the guideline principles and the decency of the project. Afterwards, the project can be granted the access to the worldwide market as a new mobile application or a report containing the errors made could be sent.

Mobile applications published in different stores have numerous benefits:

In the first hand, it is a proof of what the student is capable of during his learning process (using the technical knowledge, respecting the design and user interface guideline to produce a decent application on the market). On the other hand, the generated applications in each store are, as a matter of fact, genuine sources of incomes. This has been subject to several discussions: Where should the generated income go? Which business model to opt for? Knowing that this field is an adoption of producing and processing a lifecycle, subject of continuous improvement through Conceiving Developing Implementing and Operating (CDIO Standard 1), the mentoring team responsible of conceiving the Mobile Field took the decision to benefit from the incomes statically in order to teach the best practices and income generating practices/ subjects to the next generations. A part of the decision was to also be committed to the actual projects that are published in the Mobile Software Engineering Field stores owned by the mentoring team. The generated incomes are fully reserved to buy devices for the next generations. As a result, each generation learn and produce projects by re-using the devices coming from the last generation incomes.

V. THE MENTORING AND THE LEARNING PROCESS

Once the targeted profile was pictured, multiple measures were taken in order to reach the objectives:

- Retargeting the learning experience to be student-centered in a way that the student masters the mobile OS specifications through developing a meaningful project (CDIO Standard 3).
- Rebuilding the teacher-student relationship to mentor-apprentices following active learning concept: the teacher is no longer the main source of the information. In this case, the student becomes directly engaged into the courses' objectives through problem statements, usually taking shape as workshops covering the basic learning outcomes of the appropriate software mobile OS development. The mentor is a guide or a facilitator to the desired objective: solving the problem statements in a way to master the mobile OS development (CDIO Standard 8).

VI. ASSESSMENT AND EVALUATION

The key feature of the program is that assessment meets with learnings outcomes. Assessments are the way students measure their capabilities and the degree of their success to reach the learning outcomes.

In Mobile Software Engineering field, and following the fixed objectives, the student is rated according to a project made during the learning procedure and knowing the best practices of mobile development through publishing the project (the impact of design and user interface, business model followed and other concepts on the generated incomes). The student guarantees the validation of his grade once his application is published on the appropriate store. This procedure is a perfect measure of the educational product maturity level. Then, the additional assessments (oral, quiz, respect of deadlines) are added to the basic grade in order to finalize it.

It is necessary to update the learning outcomes, the teaching methods, as it is for the courses' content and the mobile OS version (CDIO Standard 12). It is a continuous process due to program evaluation by both teachers and students at the end of every course.

In addition to this evaluation, other means to measure student's success and teacher's expertise are offered to the mobile developers, which are the national and international development contests.

The students and mentors of the Mobile Software Engineering field at ESPRIT participated and won several developers contests. This task, along with Research and Development activities, is a way to enhance the faculty teaching competences (CDIO Standards 9, 10).This continuous challenge is the perfect opportunity to measure the success of the program and fix the next generation's aims.

VII. PERSPECTIVES: LEARNING FACTORIES

The Mobile Software Engineering field, in its fourth year, expands the activities from classes to learning factories: dedicated spaces for training, incubation and R&D activities. This space is basically offered by the Engineering school and equipped and branded from partners as Samsung Electronics and Orange Telecom who were the first partners to join this step of the program. Learning factories are the space in which the graduated student can get in touch with the professional world and evolve while maintaining a relationship with his educational ecosystem. This may facilitate the transition and guarantee the success of the aimed engineer profile.

VII. CONCLUSION

In this paper, we presented the experience of Mobile Software Engineering as one of the reconceived fields at The Private High School of Engineering and Technologies. This experience, joined with other software engineering fields' experiences, consequently had the acceptance of ESPRIT as a CDIO member in 2013. In order to insure the efficiency of this field, the basic concepts demonstrated are fundamental: actualized courses and published mobile applications, workshops based on active learning, continuous evaluations and so on. The perspectives that the mentoring team is working on depends mostly on the feedbacks and the continuous evaluation of each step. Studying the impact that these generations are making after graduation is the key to keep the productivity and the efficiency at its highest levels.

REFERENCES

1. The CDIO STANDARDS 2.0 [Electronic resource] // CDIO™ Initiative: [offic. site]. – [Gothenburg, 2014]. – URL: http://www.cdio.org/implementing-cdio/standards/12-cdio-standards, free. – Tit. from the screen (usage date: 10.09.2014).
2. Loyer S. A faculty teaching competence enhancement model: a mentoring approach [Electronic resource] / Solange Loyer, Nelson Maureira // Proc. 10th Int. CDIO Conf., Univ. Politиcnica de Catalunya, Barcelona, Spain, June 16-19, 2014. – [S. l.], 2014. – P. 1-10. – URL: http://www.cdio.org/files/document/cdio2014/28/28_Paper.pdf, free. – Tit. from the screen (usage date: 11.12.2014).
3. Vargas X. Analysis of a project course at a basic level for the engineering program at university of Chile [Electronic resource] // Ibid. – P. 1-9. – URL: http://www.cdio.org/files/document/cdio2014/109/109_Paper.pdf, free. – Tit. from the screen (usage date: 11.12.2014).
4. Rechistov G. Computer engineering educational projects of MIPT-Intel Laboratory in the context OF CDIO [Electronic resource] // Ibid. – P. 1-10. – URL: http://www.cdio.org/files/document/cdio2014/44/44_Paper.pdf, free. – Tit. from the screen (usage date: 11.12.2014).