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Programming for Refugees – An Active Learning Approach for Teaching Java to Heterogeneous Groups

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1 Introduction

The refugee crisis was one of the main challenges of Europe in the last year. It forced millions of people from the middle-east to flee their homeland due to conflict, poverty or substantial threat and migrate to Europe. Germany played an important role in welcoming 475,000 refugees in 2015 [Bu16]—and faced huge political and logistical challenges associated with it. The goal was to enable a fast and successful integration of the newly arriving people, regardless of age, gender and standard of knowledge. Education is one of the key success factors of such an integration [Ro99, Ko03, SW07]. The paper at hand illustrates an initiative to allow refugees to make first steps in the fields of computer science and programming, loose potential fear of contact with IT and learn a valuable, sought-after new skill. In teaching *Java*, we address the most popular programming language [TI16] and deliver an entrance to object-oriented and modern approaches. In the resulting paper we describe two different iterations (2, 3), their challenges as well as solutions and lessons learned. Finally, we conclude and deliver an outlook for future activities (4).

2 First Iteration

Because of the momentousness of the refugee crisis in September 2015, we identified — amongst others—the three immediate challenges which refugees were facing. First, they were not able to work upon arrival since they had to wait to be processed (which could take up to six months). Second, the refugees were willing to integrate, but were excluded of most common activities due to a lack of money and language skills. Third, they could not commit to long term programs since they needed to stay flexible for administrative interactions.

In order to address those challenges in an efficient way, we tried to offer a first iteration of a programming course as fast as possible. We decided to reuse adapted material from

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the Java programming lectures for Business Engineers from the soon starting winter term, which is based on Ratz et al. [Ra14]. The material (slides and exercises) had a scientific and theoretical background for university students with a high GPA. We offered a weekly course starting in September 2015 with four hours per session and a total of four sessions. Each session was separated into lecture and exercise phases, usually alternating to teach new content first and then let participants implement it respectively. The exercises took place in the large computer labs of the university. We witnessed a fast decrease in the number of participants on the one hand (c.f. Figure 3) and had to frequently repeat basic content in the sessions 2 to 4 on the other.

3 Second Iteration

While our focus in the beginning was to come up with a working concept, we reconsidered the basic concept after conducting the course twice.

Organizational Since most refugees are regularly transferred to other camps, which impedes long-term planning for the participants, we adjusted the duration of the course to three weeks while increasing the number of sessions to two per week. We noticed a significant lack of attentiveness towards the end of each session and hence shortened each session to two hours. Furthermore we reduced the group size to about 15 people to improve the cohesion.

Content Considering the heterogeneous target group—some of the participants never used a computer before—we decided to radically cut the amount of information and focus on very basic topics. Unlike in the regular university course we have no pressure to cover a certain content which enables us to move on in a slower pace, allowing us to take care of individual skills.

Teaching Method After we did frontal teaching in the first iteration of the course we identified a lack of motivation within the participants. While this kind of teaching style works well for some topics in university, we recognized that the refugees needs were different: The separation of lecture and exercise phases was not effective. To avoid this we now use the concept of *active learning*, which Silberman describes as: "Above all, students need to 'do it'—figure things out by themselves, come up with examples, try out skills, and do assignments that depend on the knowledge they already have or must acquire."[Si96] To implement this teaching method we adopted successful concepts from websites like "Rails for Zombies[3]" and "Codecademy[4]" and followed the steps described by Hazzan et al. [HLR15]:

[3] `http://railsforzombies.org/`, last received 12-05-2016
[4] `https://www.codecademy.com/`, last received 12-05-2016

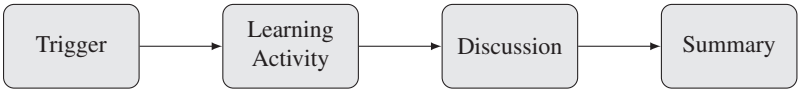

Fig. 1: Active-learning based teaching model [HLR15].

At the beginning of each session a *trigger* is presented which in our case consists of a simple working Java program that solves a certain problem. As *learning activity* the participants are confronted with the source code of the program. The teacher explains each command and encourages the learners to experiment with the code. He also provides simple tasks within the given source code. While performing the learning activity, the refugees work in small groups of 2-3. After about 80 minutes the participants present their results which leads to a *discussion* about the presented material. Each session is concluded by a summary of the covered topics given by the instructor. As Hazzan et. al propose, this summary can be designed in different ways, such as a poster, a so called cheat sheet (like in our case), a mind map, or else.

Fig. 2: Frontal teaching during first iteration (left) vs. team work (active learning) during second iteration (right).

Trough the improved concept, the role of the instructor shifted from a lecturer presenting information to a supportive and encouraging tutor who motivates the participants to explore and experiment by themselves.

4 Conclusion

Due to our feedback analysis, the course was taken as a valuable offer by the refugees. The interest of the refugees was aroused and they were thankful for the opportunity. One of the refugees was later able to successfully apply to an internship at SAP. For all of them, the idea of studying at a university was of higher interest than before and we got asked frequently on what their academic possibilities might be. As witnessed in the second iteration, the number of participants was more constant than before (c.f. Fig. 3). Besides the changing of the teaching method, there are other possible reasons for the decreasing number of participants in the first iteration. For instance, they could have moved to a different location, which made a commute too far. Unfortunately, we were not able to gain any information on why previous participants discontinued to attend. Nonetheless, our con-

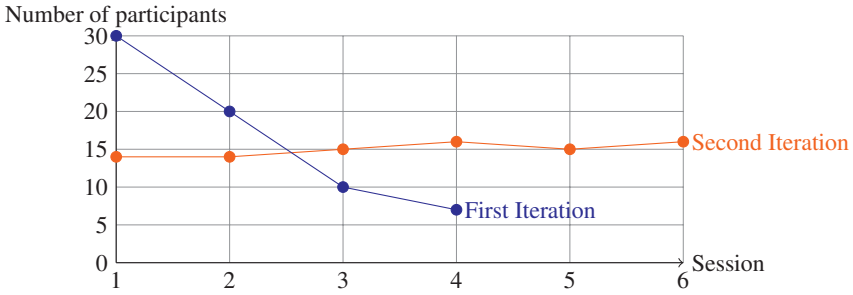

Fig. 3: Number of participants in both iterations

stant number of participants in the second iteration can lead to the conclusion that the new teaching method was more suitable and motivating.

To integrate the experiences which we gained during the first two iterations and to further promote the concept we founded a non-profit association called "EduRef – Education for Refugees e.V." by the end of 2015. More courses will be held in 2016 covering further topics in the field of computer science and others.

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