# Proposal by the Faculty of Informatics, TU Wien, for the Best Practices in Education Award, 2019 Edition 'Inclusive Education'

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# Description of the Achievements

## Motivation

Due to the wars in Middle East the number of refugees increased tremendously in 2015. According to the UNHCR the total number of Syrian refugees exceeded four million in July 2015 (UNHCR, Press Releases, 9 July 2015: http://www.unhcr.org/559d67d46.html). Although most refugees from Syria have been fleeing to neighboring countries, hundreds of thousands of refugees (including those from Afghanistan, Iraq, and African countries) fled to European states. Sad to say, thousands of refugees have lost their life on their way to Europe using boats or inside trucks. These tragic events and the continuous flow of refugees have sensitized Europe. Whereas an enormous number of citizens (in the best sense) in several countries have shown solidarity and have been volunteering to help the refugees, many others have been spreading intolerance. Several right-wing political parties that made the issue of refugees the main topic in elections have been increasing their votes.

Universities are focused on research and teaching, on knowledge creation and distribution. This leaves them with an important role in the society. But this can not only be seen in "utility" or "usefulness" terms, in our view a university should also reflect on the society, its developments and problems, it should try to identify solutions and, finally, take position even in "rough times". In Europe an intensive political debate regarding the refugee crisis was taking place and clear positioning of universities regarding refugees was crucial, because their influence and reputation is significant.

## Begin of courses for refugees at the TU Wien

Following the controversial discussion regarding the refugees in Austria at the time when the number of refugees was increasing in 2015, Hannes Werthner from the  Faculty of Informatics at TU Wien started an initiative to organize summer courses for unaccompanied young refugees (age between 14 and 18). The student body of our faculty joined the action immediately and the project was named Welcome.TU.Code. The intention was to give a clear message that the refugees are welcome in Austria.

After the preparatory work in June/July 2015, the computer courses began in the end of July and took 4 weeks. Around 60 young refugees from different countries (Syria, Afghanistan, Somalia, Iraq, etc.) were among the participants of these courses. One of the challenging questions was which curriculum to teach in these courses. The initial curriculum included computer programming for kids, but due to the heterogeneity of the refugees and their different needs the

curriculum was adapted and changed to better match the participants' background and interests. The complete curriculum for these four weeks included game programming for kids, basics of operating systems, internet and basics of security and privacy, and office applications. Furthermore, for few advanced participants programming in Java and Python was taught individually. This was only possible, because tutors, i.e., computer science students of the TU Wien, had knowledge from these different areas and were flexible in their approach and adapted the curriculum for different groups. It was very important to be flexible regarding the curriculum and we have learned that continuous adaptation is needed in order to better meet the needs and interests of refugees.

The team of our 20 tutors / students had different nationalities and different language skills. It was very important to have tutors of different nationalities and also have some tutors who speak the languages of refugees who had difficulties communicating in German or English. It is important to note, that none of the participating people was paid. At the end, the young refugees got a certificate for visiting the course and their feedback clearly suggested that we should continue this project.

Although this action took only four weeks it needed a good organization and commitment of organizers and tutors. We also were able to find support for food and drinks, as the courses in summer were very intensive.

We also noted that such actions can trigger and motivate other people and organizations to do similar projects.

## Continuation of courses at the TU Wien

At the end of courses in Summer 2015 we had a meeting with the NGOs that take care of the teenagers who visited our courses. Their feedback was very positive and they strongly supported the idea of continuing with such courses at the TU Wien. Furthermore, we had a strong support from the Faculty of Informatics (especially from Hannes Werthner, who was elected as the Dean of the Faculty) and TU Wien to continue with courses.

In the winter semester 2015/2016 we decided to continue with the new courses. We turned these courses into a regular course in the "transferable skills" catalogue of TU Wien and changed the curricula to include three difficulty levels. These levels included basics of computers, office applications and introduction to programming. Additionally, we included a psychological and didactical preparation for tutors (i.e., students of TU Wien) that had to teach refugees.

We also extended our contacts with NGOs and offered the courses also for older participants, although most of refugees were still young. The number of refugees registered for these courses

increased very quickly and our courses got also very popular for TU students, who wanted to participate in a "transferable skills" course.

Our courses have been taking place regularly every semester since WS 2015/16. Since 2015 more than 400 refugees (we note that we did not officially collect the data of refugees and every interested refugee could take the courses) attended our courses and more than 200 students of TU served as tutors and could successfully finish the courses. Participants that regularly attended the courses got a certificate from the Faculty of Informatics, TU Wien.



Students and refugees (proudly showing their certificates) at the end-of-year celebration at the Faculty of Informatics of TU Wien, Austria, in June 2016

In the summer semester 2017 we were contacted from the NGO Refugees Code and were asked to help them to organize specialized courses for their participants that usually studied before fleeing from their home countries and had knowledge about computers. The aim of Refugees Code was to prepare refugees to find internships/jobs in programming. Together with Refugees Code we started new programming courses with around 25 selected participants. These courses offered to participants the possibility to learn principles of programming based on Harvard CS50 course, which includes introduction to algorithmic thinking and basics of programming in several programming languages, and Java courses. From WS 2017/18 the programming courses turned into 2 semester education, where the second semester included larger software projects to prepare participants for their internships.

Currently (summer semester 2019) we are organizing three computer courses. The beginner course is the continuation of courses that started in 2015 and teaches basics of computers and office applications. The course organized in collaboration with Refugees Code is this semester is based on CS50 Web Programming course. Additionally, this year we started collaboration with the Faculty of Architecture and Planning at the TU Wien (Project DISPLACED: see http://www.futurelab.tuwien.ac.at/displaced/). We are organizing computer courses on

beginners' level for refugees at their accommodation (i.e., outside the faculty building) as part of the DISPLACED education project. These courses are also supported by computers that we collected from the institutes of our faculty.

## The importance of courses for refugees and TU Wien students

As mentioned above, since Summer 2015 more than 400 refugees visited our courses. Although in the beginning the focus was on young refugees, in the last years our courses have been visited also by older participants. For example, one of our courses in this semester (the course organized in collaboration with the Faculty of Architecture and Planning) is attended by several mothers from Afghanistan. It was important to organize the courses for them at their accommodation since they would not attend courses without their kids elsewhere. Based on our experience and the feedback from refugees and NGOs the courses were very important for refugees, as they helped them in several aspects:

- In the first phase (Summer 2015) courses were visited almost only from unaccompanied young refugees. For example a 14 year old boy from Syria did not want to miss any class and the course was for him a window to the world. As his parents were still in Syria, he was very happy to talk to tutors and other staff and enjoyed the university atmosphere. Similar situation was for other refugees, because the course offered a very good opportunity to get in contact with local students and to learn more about Austria. An interview with one of the young refugees can be seen in the video that was produced by Communications of ACM for our courses (see https://vimeo.com/181069328).

- The courses we organized in the last four years contributed to increase computer skills of all participants. There were refugees that did not know how to use a keyboard, but they managed to learn basic skills about computers. Many of the refugees learned very well to use Office applications, which are very useful for various jobs. Finally, our programming courses were very important to gain knowledge in areas that are very important for job market. Some of the attendees continued further courses with Refugees Code and could get a job.

- Our courses encouraged refugees to concentrate on gaining new skills that help them to integrate in the job market and in the society. The aim of our courses was also to offer a positive atmosphere for refugees and to encourage them to be active in the everyday life in Austria.

- Confirmations of participation and certificates that refugees got at the end of the courses were also important for interviews with Austrian authorities, as they showed that refugees want clearly to integrate in our society and work as soon as possible.

- The contact of refugees to tutors was very important. Many of them kept the contacts and meet also outside of the university. This helped the refugees to better understand the Austrian society and to improve German language skills.

More than 200 TU students that served as tutors also profited a lot from the courses. The courses widened their horizon and were "transferable skills" courses in the true sense of the word. The courses raised the awareness about the refugees, their experiences and the difficulties that they tackle in everyday life. It was a personal enrichment for students to create relationships and interact with their colleagues from completely different cultures and backgrounds.

Our courses helped Refugees Code in their bootstrapping phase. The first generation of their participants visited our courses. Some of these participants were further trained by Refugees Code and have meanwhile managed to find jobs. Students of our courses also helped their participants to get more knowledge by finishing larger projects that required programming and software engineering. We note that Refugees Code continued their program and got also funding from the City of Vienna and other organizations to train refugees for programming. According to their information, 90% of their participants last year could find a job. Currently we are still collaborating with Refugees Code on organizing programming courses at the TU Wien.

Our courses are supporting the project of the Faculty of Architecture and Planning for refugees and extended their activities by providing special courses for women. Furthermore, our Welcome.TU.Code program donated several computers that can be used by the refugees also outside our computer courses.

Finally, our project also had some other side effects. For example, one of the refugees was admitted to study computer science, some refugees got laptops, which were donated by several departments of TU Wien and other people, and some opportunities for internships arose.

# Evidence of availability of the outcomes of the initiative to the teaching community

## Article in the Communications of the ACM

In our article "Universities and computer science in the European crisis of refugees", which appeared in Communications of the ACM 59(10): 31-33 (2016), we reported on our computer courses for refugees. The article was directed to the Computer Science community and it was meant as an encouragement to stand up and take a clear position in favour of tolerance and the rights of refugees. On the one hand, we sketched our view of the responsibility universities have and the role they should take in the crisis of refugees. On the other, we gave some hints how to organize computer courses such as ours. Above all, we mentioned the principal idea that students serve as tutors for the refugees. We also mentioned some challenges that we faced – above all the great diversity of the background and pre-knowledge of the refugees. Finally, we also listed the topics that we touched on in the very first edition of these computer courses in the summer holidays 2015. Note that also a video produced by the ACM and accompanying this article is available: https://vimeo.com/181069328

## Welcome.TU.Code web site

On the web site of the Welcome.TU.Code initiative of the Faculty of Informatics (see http://www.informatik.tuwien.ac.at/welcomeTUcode), we report on the computer courses organized within this initiative. Additional details (compared with the CACM article) on how we ran the computer courses can be found here. Moreover, in contrast to the article published in 2016, the web site has been updated from time to time as new editions of the course have been organized. The pictures provided there also give a more lively impression of the courses.

## E-learning platform

As part of the course organization, an e-learning platforms based on Moodle has been developed. This platform is used as a means of communication between the students and the refugees. Moreover, a lot of additional material in the form of exercises and self-tests on various topics

covered in the courses are provided there. Access to this e-learning platform is not public and currently only available to the reviewers (see References section). However, we are happy to share any material and information with other universities in case they consider to organize similar courses.

## Collaborations

As has already been mentioned above, we have closely collaborated with the NGO Refugees Code (see http://www.refugeescode.at/). In particular, during their bootstrapping phase, when resources were scarce, all the programming education was provided through our programming courses. Initially, we thus ran both a Java course and a general introduction to programming based on the Harvard CS50 course. Meanwhile, Refugees Code and the New Austrian Coding School (founded and run by the same team as Refugees Code, see https://www.newaustriancodingschool.at/) receive sufficient funding to offer a full-fledged training program for refugees. For the programming courses included in this program, the New Austrian Coding School still draws on the experience made with our courses.

# Evidence of impact

## Impact on the society

In the European "crisis of refugees" in 2015, when hundreds of thousands of refugees passed through Austria and tens of thousands of refugees sought asylum in this country, the willingness to help was originally quite big in the population. This was witnessed, for instance, by pictures of numerous volunteers (in particular, from the young generation) who helped the arriving masses of refugees at the border, in reception centres, in railway stations, etc. However, very soon, these positive feelings were mixed and often overlain by negative feelings of anxiety doubting that the social system and society as a whole could cope with such a big number of  refugees from different countries with different cultural backgrounds. Since then, society has been divided between those who believe in the integration of the arrivals and those who would go as far as "to send them back". Up to now, right-wing populist parties have been very "successful" in stirring up fear and offering oversimplified answers to a difficult problem.  In a situation like this, we believe that universities have a responsibility that goes beyond research and teaching. Universities with their reputation can have an impact on the political atmosphere and public discussions. Apart from the obvious goal of offering a useful introduction of young refugees to working with a computer (many of them had never used a computer before), our computer courses for refugees also aimed at giving a clear sign that intolerance towards refugees is not acceptable and that refugees are welcome. This was also made explicit by choosing the name "Welcome.TU.Code" for this initiative of the Faculty of Informatics. The courses, which started in the summer holidays of 2015, were among the first actions of universities in Austria that dealt directly with the refugees. As such, it attracted the attention of Austrian newspapers, state TV and radio. These media broadcast several reports about this activity during the time when the number of refugees coming to Austria was drastically increasing and the number of locals opposing the acceptance of refugees was increasing as well. In this situation, our courses were also meant and perceived as a clear political statement in favour of the rights of refugees. Many people, above all alumni, wrote us to show their readiness to help in this action. In addition, also some financial support was offered by several organizations and companies. For instance, the Mensa of TU Wien provided free meals to the refugees participating in the computer courses in the summer holidays 2015. The publisher HERDT provided several free copies of an introductory book ("You Start IT") as well as a book for the ECDL base module, which the refugees could use in the computer courses. The Austrian Computer Society (OCG) provided free material (such as name badges) for our courses.

## Part of the MORE program of Austrian universities

In 2015, the Austrian universities started the MORE program (see https://uniko.ac.at/ projekte/more/) with the goal to provide access to education for young refugees. In addition, the MORE program has recently also started activities especially tailored for graduates among refugees. All these activities are based on the firm belief that universities play a key role in society and that they have a responsibility for promoting a climate of tolerance and mutual understanding. With the MORE program, the universities thus wanted to emphasize that the refugees with their knowledge and skills are not simply a burden for the social system but, on the contrary, may constitute a gain for the host society if they are supported in further developing their talents and skills. Our computer courses for refugees are an integral part of the TU Wien's contribution to the MORE program and were in fact among the very first activities organized in the context of this program. We believe that our activity in this field and some similar initial actions of other universities encouraged more institutions to start similar projects, because the number of actions from different universities in support of refugees has been increasing since then. Currently, discussions on a MORE 2.0 program are under way between rectorates of different universities. For instance, a full-fledged training program over a longer period of time, involving language courses and professional education, is currently being discussed on rectorate level of TU Wien. Our computer courses (as part of the professional education) will, of course, be included in this enhanced MORE 2.0 program.

## Strengthening public efforts for the integration of refugees

There are many activities by public institutions themselves and/or by organizations supported by them, whose primary task is the integration of refugees. The City of Vienna has thus launched and/or (financially) supported many projects promoting the integration of refugees. This integration has many aspects; one of them is some kind of professional training. Our contribution to the activities of the City of Vienna in this field are twofold:

- The obvious contribution is the computer training offered to refugees by our computer courses. Originally, in the summer of 2015, these courses targeted young unaccompanied refugees in the first place. However, very soon we noticed that the need for some kind of computer education is not a matter of (young) age. On request by NGOs taking care of refugees, we opened our courses to refugees of any age. Last semester, our programming course (i.e., the course at the highest level) was integrated into a project run by the Vienna Business Agency – an institution funded by the City of Vienna to strengthen Vienna as a business location. The importance attributed to our courses was underlined by the fact that the councillor of finance of the City of Vienna, Peter Hanke, was present at the award-giving ceremony, where successful participants of the programming course

in the winter semester 2018/9 were honoured (see http://www.informatik.tuwien.ac.at/aktuelles/1641?utm_campaign=feed&utm_term=atom).

- Another contribution to support the activities of the City of Vienna is in the PR-potential of successful events. Public institutions, in general, have to justify their expenditures – even more so for activities in favour of refugees, which are always at risk to be criticized by right-wing populist parties. It is therefore of great importance to public institutions to be able to tell success stories to the general public. Consequently, events like the above mentioned award-giving ceremony for refugees who successfully participated in our programming course were also an excellent public relations opportunity for the City of Vienna and for the Vienna Business Agency. Indeed, a professional photographer of the City of Vienna was present at this event and the pictures taken there were used for PR purposes by the Vienna Business Agency.

In the remainder of this section we would like to report on some **lessons learned** over the past 4 years of running the computer courses for refugees. We are happy to share our experience with other universities or faculties where similar activities are planned.

## Thorough preparation of students

The organization of computer courses for refugees poses several challenges not normally encountered in everyday life of students. The biggest challenge is the diversity of the refugees participating in our courses. Above all, there is a broad spectrum of pre-knowledge of the refugees, which ranges from those who have never used a computer before (and first of all need to get used to a keyboard) to those who are experienced users of computers (in particular of office programs) and are interested in learning a programming language. The diversity of refugees also applies to their language proficiency in German, English or other languages. Another challenge comes from the unstable situation of refugees who may have to change accommodation (e.g., because their status or the  NGO taking care of them has changed) or have to change their weekly routine (e.g., because a language course has been offered to them at the time when they planned to attend our computer courses), etc.  Over the years, we have therefore developed a programme for students to prepare them for their role as tutors in the computer courses for refugees. This preparation covers several aspects, which are detailed below:

- *Organizational preparation:* students have to be informed upfront that the organization of computer courses for refugees differs significantly from the organization of regular university courses. On the one hand, we expect a high level of reliability (including punctuality) from the students; on the other hand, we ask for the students' understanding that they have to be very flexible and accept that changes of plan are the rule not the exception. For instance, in one semester, we had an overwhelming number (over 100) of refugees registered to our computer courses. However, it turned out that less than 70% would show up in the first class. On the other hand, over the following classes, new

participants would constantly join – many of them without prior registration and simply accompanying a friend who attended the course.

- *Didactic preparation:* from the beginning, we organized the computer courses on three or more different days and times so that students and refugees alike could choose the course which fit best into their time schedule. Originally, we tried to form more or less homogeneous groups of participants in terms of pre-knowledge. However, it turned out that this was not feasible since refugees would form groups, e.g. in terms of joint accommodation rather than joint computer background and interest. Hence, students had to be prepared for teaching a very inhomogeneous group of participants. In the didactic preparation we also touched on issues such as which language to choose (surprisingly, in many cases, the communication in German turned out to be easier than e.g. in English, which is only spoken by refugees with a higher level of education), how to deal with occasional lack of concentration by participants, etc.

- *Psychological preparation:* especially in the first semesters of running our course, we considered it important to provide also a psychological preparation to our students. We had to address a certain degree of tension by the students, who did not really know what to expect in these courses. They felt insecure as to how they should interact with refugees who are possibly traumatized by terrible experiences they made in the war in their home country or along the route to Europe. Through personal relations, we got a psychologist on board who explained to the students the psychological background of traumata and gave hints how to react in case a refugee would suffer a crisis during one of the courses. Luckily we have never experienced such an exceptional situation. However, we consider the role of psychological preparation similar to that of first aid courses as part of the driver's licence education: you hope you never need it but it's good to know that you have at least some idea how to react in case of a crisis. In the last semesters, we have noticed that the importance of the psychological preparation has decreased: there are hardly any new arrivals these days; most of the refugees participating in our courses have been in Austria for two or more years and the contact with them has more and more become routine.

## Design of the curriculum

As already mentioned above, one of the major challenges in our computer courses for refugees was the huge inhomogeneity of the participants. Consequently, we had to design a curriculum for participants with greatly varying pre-knowledge. We thus decided to provide courses at 3 levels: a very basic introduction to using computers, a more advanced level with a deeper introduction to office programs, and an introduction to programming. On all levels, the choice of appropriate course material had to be made. Here, we had to take the constraint into account that the effort required from the students had to match the 3 - 4.5 Ects credits available for participating in this "transferable skills" course. For the first two levels, we therefore happily accepted the books

provided by the HERDT publishing company: one for "absolute beginners" and one for slightly advanced computer users. The additional course material created by the students over the years is made available to the students and refugees of the current semester via an e-learning platform specifically created for our courses (see link https://itprojekte.ddns.net/moodle/login/index.php below). On the third level, we provided an introduction to programming. Here, we tried out both a general introduction based on the Harvard CS50 course (https://cs50.harvard.edu/) and a specific programming language course – namely Java (based on the introduction to programming taught to first semester students in Computer Science). In the current semester, we are for the first time following the Harvard CS50 web programming course (https://cs50.harvard.edu/web/). In all cases, the effort of the students for preparing classes was greatly reduced by following fixed course schemas.

Despite the selection of course material, we noticed that a lot of flexibility is required when choosing concrete topics for the classes in this course. For instance, with the office programs taught in the second level described above, we realized that there was little motivation for the refugees to learn these programs to an extent that would allow them to pass the EDCL base module certification. Clearly, the language barrier played a significant role here (note that many of the menu items in programs like Word, Excel, or Powerpoint are difficult to understand even for native speakers). The other issue was that for more sophisticated functionalities of these programs, the refugees simply missed a concrete use case that they could relate to themselves (what's the point of learning how to create a bulk letter in Word, if you have never experienced the need to do so?). It therefore became clear, that also here a lot of flexibility was required and the students always had to be open to adaptations of the curriculum to the refugees' needs. However, we also learned that this attempt to meet the refugees needs must not go as far as to ask open questions like "What would you like to learn next?". We received a clear signal from the NGOs taking care of the refugees that such open questions would simply overwhelm the refugees. Instead, concrete proposals such as "Would you like to learn how to …?" seem to give the refugees the right amount of freedom of choice. Of course, making the right proposals requires to anticipate the refugees' needs to some extent. For instance, creating a mail account can turn out to be very helpful for them when the future need to communicate with companies arises.

To conclude, we have received a lot of positive feedback from all parties involved: the refugees, the NGOs taking care of them, as well as the students serving as tutors in these courses. It is also worth mentioning that, apart from the explicit feedback received from students, we see a very positive "implicit feedback" in the form of a high level of commitment not to be taken for granted in ordinary university courses. In particular, we have observed that students have typically taken the preparation of classes very seriously and we have never received complaints about too much effort. All in all, the feedback from all sides is very encouraging and we clearly plan to continue with this course.

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  https://dl.acm.org/citation.cfm?doid=3001840.2893180
- E-learning platforms for our computer courses:
  https://itprojekte.ddns.net/moodle/login/index.php
  (login for reviewers: user rpichler, pw Minerva-1234)
- Award-giving ceremony with the dean of the faculty Hannes Werthner and the city councillor of finance, Peter Hanke, to honour the successful participant of the programming course in the winter semester 2018/9:
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- Homepage of the NGO New Austrian Coding School:
  https://www.newaustriancodingschool.at/
- MORE Initiative of the Austrian University Conference:
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Articles reporting on our initiative:

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