

The Women's Postgraduate College for Internet Technologies (WIT) - A Role Model for Promoting Female Researchers at Universities!

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Abstract: The Austrian Council for Research and Technology Development has initiated a project series on the promotion of women in science and technology (fFORTE), to provide for competitiveness in the global marketplace and the scientific world. The Women's Postgraduate College for Internet Technologies (WIT) is the largest project within fFORTE.

WIT is a five years project and has been established at the Vienna University of Technology in response to the underrepresentation of women in science and technology, particularly in Computer Science. WIT offers a unique Ph.D. programme pursuing research on the highest international level in combination with career development activities for female students and researchers. The goal of WIT is to increase the number of female Computer Science beginners, undergraduates, graduates, and junior researchers at the Faculty of Informatics, at the Vienna University of Technology. The implementation of WIT is based on various activities, which are structured into three main fields:

- *Ph.D. Programme for Women in the Area of Internet Technology.* A Ph.D. curriculum and training programme provides an introduction to the role of a scientist and an entry into the scientific community for eight female Ph.D. students. By the means of a broad and diverse qualification development approach (technical as well as non-technical) the Ph.D. students are also prepared for managerial and leadership functions.
- *Career Development Activities.* Special programmes shall encourage young women during their final year in school to study Computer Science (e.g. hands-on practical system administration workshops held for women by women, IT information days for female high school students). Personal and professional skills are fostered throughout the female student's university career, in order to actively motivate them to pursue a successful scientific career e.g. by a mentoring programme. Visiting female lecturers as well as international scientific cooperation and exchange programmes support the creation of role models and the integration of the pre-doc researchers into the scientific community.
- *Communication Initiatives.* A diverse set of communication initiatives (e.g. the colloquium series, further education tutorials) shall foster the exchange of knowledge, and make women visible in Computer Science.

In this paper, we present WIT, the motivation for designing and implementing WIT, the activities of WIT targeting different career stages of women, preliminary outcomes, and what we have learned so far.

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1 Motivation

The Women's Postgraduate College for Internet Technologies (WIT) is a five years project and has been designed and established at the Vienna University of Technology in response to the underrepresentation of women in science and technology in Austria, particularly in computer science. In 2004, 11.8 % of Computer Science graduates at the Vienna University of Technology were women [5]. This percentage is similar to many other countries in Western Europe [4].

In the 1980ies, the enrolment of women in Computer Science (in Austria called Informatics) at the Vienna University of Technology hit a record high of 21.7 %. Since the 1990s, this percentage is continuously declining and went down to 16.6 % in 2004. The problem of the 'shrinking pipeline' has been well researched and documented for US universities in [2]. Unfortunately, this phenomenon is also true for the Vienna University of Technology, and will probably lead to a declining number of graduates in the near future. Beside the negative aspect of the 'shrinking pipeline', women have additionally a higher dropout rate compared to men.

The Austrian Council for Research and Technology Development² stated that "despite the lack of highly trained and qualified people in research and industry women are underrepresented in education as well as in the professional life", and recommended activities that promote women for high qualification levels. WIT is part of a series of projects promoting women in science and technology called fFORTE³, and initiated by the Austrian Council for Research and Technology Development to provide for higher competitiveness in the global marketplace. fFORTE is an umbrella initiative for the advancement and encouragement of women in science and technology. fFORTE was launched in February 2002 and promotes girls and women on all educational levels, and contributes to the career enhancement of female scientists. WIT is funded by the Austrian Federal Ministry for Education, Science, and Culture, and the European Social Fund (ESF)⁴ of the European Union.

WIT is the largest and most comprehensive project within fFORTE and offers a unique Ph.D. programme pursuing research on the highest international level in combination with career development activities for female students and junior researchers. WIT was launched in January 2003. Its goal is to:

- bring more women into IT,
- provide education at the highest qualification level,
- increase the number of female Computer Science beginners and graduates,
- mentor and promote women at all levels of their professional Computer Science career
 - high school students,
 - undergraduate and graduate students,
 - junior researchers
- reduce barriers, motivate, initiate networks, and
- raise awareness and visibility: make women in IT more visible.

WIT is a project of the Faculty of Informatics at the Vienna University of Technology. Its head is Gerti Kappel, a full professor of Computer Science, at the Institute of Software Technology and Interactive Systems at the Vienna University of Technology. Thus, WIT is very well integrated into the university structure. A senior researcher, a project manager, and an administrative assistant support the head of WIT. The senior researcher, Beate List holds a Ph.D. in Computer Science (CS) and supervises some of the Ph.D. theses. Furthermore, she is involved in activities related to the Ph.D. curriculum and the undergraduate programme. The project manager, Ulli Pastner holds a Ph.D. in economics and social sciences, and is responsible for project management and reporting, finance, and career development activities.

WIT is organised like a regular CS department, with a full-professor, 8 Ph.D. students, a senior researcher, a project manager and an administrative assistant. The difference between WIT and a regular CS department is that at WIT all staff are women! WIT is extremely well integrated into the Faculty of Informatics and very much accepted for its high quality research, career development activities, and events.

The implementation of WIT is based on various activities, which are structured into three main fields and described in the following sections: the Ph.D. programme, the career development activities, and the communication initiatives.

² <http://www.rat-fte.at/>

³ <http://www.fforte.at/english.php>

⁴ http://ec.europa.eu/employment_social/esf2000

2 Ph.D. Programme

The Ph.D. programme for women in the area of internet technology is the core component of WIT. Today, 8 Ph.D. female students are working, researching and publishing within the Ph.D. programme. WIT has developed its own Ph.D. curriculum, which is described in detail in subsection 2.2. In the following subsection we describe the educational background, the research areas, and the employment conditions of the Ph.D. students at WIT.

2.1 Ph.D. Students

2.1.1 Educational Background and Recruiting

WIT started in January 2003. In March 2003, we began to spread the word about the 8 open Ph.D. positions. The required educational background was an MSc in CS, or a related field. The duration of the Ph.D. programme was designed for four years. We planned to have all students at the end of 2003 on board. As we realised that it was hard to find good Ph.D. candidates, we extended the application deadline. We received about 60 applications between March 2003 and December 2004, and selected eight out of them. Most of the applicants were either in their early to mid twenties applying right after their studies, or in their thirties, considering WIT as a way to get back after a career break, mostly after the maternity leave. One student got an offer but rejected and stated 'I am currently 30 years of age. I am 34 when I finish the Ph.D. I would like to have kids and then I am too old to start an industry career and there is no opportunity for a tenure track'.

The first student started in July 2003 and the last one in January 2005. Consequently, for some students the Ph.D. programme is less than 4 years and thus, we have to keep it more focused on the actual research. So far, only one student left for another university, as her supervisor got a chair there. In this way, the WIT expertise has been expanded.

The background of 3 Ph.D. students is an MSc in CS and 5 hold an MSc in Business Informatics. This ratio represents also the applications. We received more applications from candidates with a Business Informatics degree, which is a less technical background.

2.1.2 Research Areas

At the beginning of WIT, we had the vision that all Ph.D. students have a similar research area. The focus was on internet technologies and databases. We planned to have regular visiting professors at WIT, who would work with the Ph.D. students, give lectures and seminars, write papers with the Ph.D. students, and act as mentors to them. We realised very soon that this idea is hard to realise, due to a highly diverse applicant pool. As there are not many female CS and Business Informatics graduates available in general, we had two choices: Firstly, to lower the bar and stick to the narrow research area, or secondly, to promote very bright and talented female graduates. We decided for the latter. Consequently, the research areas are very heterogeneous and include among others the following: conceptual modelling and model engineering, data warehousing, e-learning, business process engineering, peer to peer computing, networks, web engineering, semantic web, or intersections of these fields. The Ph.D. titles represent the diverse research fields:

- Adaptivity in Learning Management Systems Focusing on Learning Styles
- Aligning Business Processes with Software
- Ant Algorithms for Query Routing in Peer-to-Peer Networks
- Supporting Model Transformation in the Area of Business Process Modelling
- Applying Aspect-Oriented to Model-Driven Web Application Development Abstract
- Conceptual Modelling and Business Metadata for Data Warehouses
- The Relevance of Data Warehousing in the Field of Evidence-Based Medicine to Support Healthcare Decision-Making
- Hybrid Ad-Hoc Networks

As a result, we could not supervise all WIT Ph.D. students and needed external supervisors for four Ph.D. students.

2.1.3 Employment Conditions

The conditions WIT offers are slightly better than those of the Faculty of Informatics, in order to encourage female CS students to apply. Each Ph.D. student receives a salary of 1.950 EUR per month, 14 times a year. According to the Austrian labour law, the salary includes healthcare, accident insurance, pension fund, and unemployment insurance. The employment contract is limited to four

years. Additionally, each Ph.D. student has a travel budget of 6.000 EUR per year for attending conferences, workshops, summer schools, doctoral consortia, or staying at another university as a guest researcher.

2.2 Ph.D. Curriculum

The Ph.D. curriculum provides an introduction to the role of a scientist and an entry into the scientific community. The WIT Ph.D. curriculum fosters a goal oriented realisation of the research work within 3 - 4 years and provides a detailed job specification of a Ph.D. student at WIT. The Ph.D. at WIT has a broad focus and requires work consisting of advanced studies in preparation for research, the preparation, the completion, the publication of original research, the approved examinations on courses, teaching assignments, development of a running prototype, acquiring of transferable skills, and the production of a doctoral dissertation. These requirements are described in detail in the following sub-sections.

2.2.1 Ph.D. Proposal

The Ph.D. proposal is a means of communication to peers, supervisors and other experts, in order to foster discussion, feedback and new ideas. At WIT all Ph.D. students must prepare a Ph.D. proposal. The Ph.D. proposal is organised in a way to be reused in subsequent publications (e.g. scientific papers, dissertation). The final outcome of the Ph.D. proposal is a publication at a recognised Doctoral Consortium. The WIT Ph.D. students considered the proposal as very useful to state the research question, research result, and evaluation in a very concise way.

2.2.2 International Research Community

For developing a successful research career as well as a remarkable research record, it is of major importance that Ph.D. students get involved in the international academic community at an early stage of their Ph.D. thesis. The creation of the Ph.D. student's own research network is vital and can be achieved through systematic initiatives. Thus, the WIT Ph.D. curriculum is based on the following activities: participation in international conferences and workshops, summer schools, doctoral consortia and spending time as a visiting researcher or engineering intern at an internationally recognised institution.

2.2.2.1 Conferences and Workshops

Conferences and publications are main venues for reporting research findings, exchanging ideas, and developing new plans for research. Particularly, conferences are major venues for research communities. These communities often have a very powerful impact on career paths of researchers. Conferences are a vital part of a research culture and career planning. Usually, Ph.D. students become involved in the international research community at conferences with the acceptance of their first paper. As the first publications of a Ph.D. student are generally accepted at conferences or workshops after one or two years of research, WIT recommends that its Ph.D. students visit conferences without having a paper. This 'passive participation' at an early stage of the Ph.D. programme fosters the integration of Ph.D. students in the research community, support the elicitation of new research ideas, provide an overview of latest research issues, and give the opportunity of getting to know general conference customs. WIT supports up to 3 'passive participations' in conferences or workshops. 5 Ph.D. students took advantage of this opportunity.

2.2.2.2 Summer School

International summer schools offer to young researchers at the Ph.D. level an excellent opportunity of an intensive studying week (or two). A summer school is a forum for meeting new people, other Ph.D. students as well as top researchers in the field and really getting acquainted with them. It is also a place to create collaboration networks between scholars working on similar issues. Activities in most summer schools are based on collaborative projects. Lectures give inspiration and novel ideas to the students' work. Summer schools support the continuous development of the research work of Ph.D. students. Therefore, WIT recommends that its Ph.D. students should attend one or two summer schools. So far, all WIT Ph.D. students attended one or two summer schools (e.g. the European Summer School on Ontological Engineering and the Semantic Web, the Max-Planck Advanced Course on the Foundations of Computer Science, the International Summer School on Educational Technology, the Summer School on Generative and Transformational Techniques in Software

Engineering). The integration component worked out very successfully: The Ph.D. students met a lot of researchers in their field, some are still in touch with them, and thus are better integrated in the research community. One student met a professor who became her co-supervisor. She works with him very closely, and visits his research group regularly in New Zealand. Another student got an offer for an internship. A couple of foreign Ph.D. students visited WIT and gave talks in the WIT research seminar.

2.2.2.3 Doctoral Consortium

A Doctoral Consortium (also called Doctoral Symposium or Doctoral Workshop) is intended to bring a small group of Ph.D. students within the same area of research together, and to give them the opportunity of presenting and discussing their on-going thesis research in the context of an international conference, outside of their usual university atmosphere. A Doctoral Consortium will be accompanied by prominent professors, who will actively participate and contribute to the discussions. A Doctoral Consortium is a great forum for Ph.D. students to receive useful and constructive feedback from a knowledgeable audience, to exchange ideas, to compare approaches and meet fellow researchers in the field. Due to the mentoring nature of the event, mentors foster discussions related to future career perspectives, and give advice for possible future direction of the research work as well as general advice on doing research, e.g. publication strategy, research methodology etc. WIT recommends that Ph.D. students attend one or two Doctoral Consortia at different stages of their Ph.D. thesis. So far, only three WIT Ph.D. students attended a Doctoral Consortium. Reason for this is that they were integrated into the research community at an early stage of their Ph.D., and that they have a very close relationship with their supervisors. The students who attended a Doctoral Consortium stated that the proposal helped them to describe the research question and the goal of the theses concisely.

2.2.2.4 Visiting Researcher / Engineering Internship

In order to advance the thesis research and the professional background, the Ph.D. students should visit an internationally recognised research or development institution. In addition to the advantage of improving and maturing their research results, Ph.D. students have the opportunity to experience a new research culture or a professional development environment. The research or development institution must have a good reputation for the particular research or development area. It can either be a university, a commercial research and development centre, or a non-commercial international research centre. Three Ph.D. students have already done an internship with a company (IBM research, HP research) or a research stay at a university (University of Paderborn in Germany, and Massey University in New Zealand).

2.2.3 Peer-Reviewed Publications

Publications are the most important tool for communicating a good idea and for demonstrating that the research community considers an idea to be important and well developed. The feedback obtained from reviewer reports or a conference presentation can be extremely helpful to value the research result and to further develop research. Therefore, WIT Ph.D. students are strongly encouraged to look for opportunities to publish their ideas and research work. In Europe, it is common that Ph.D. candidates have a number of published papers. At least three peer-reviewed publications, either conference papers or workshop papers addressing the thesis research is the requirement for a Ph.D. at WIT. After four years, WIT Ph.D. students have published more than 60 peer-reviewed papers in leading conferences and journals of their fields (e.g. International Conference on Very Large Data Bases, VLDB Journal, International Conference on Data Warehousing and Knowledge Discovery, International Conference on Advances Learning Technologies, International Conference on Intelligent Tutoring Systems).

The WIT Ph.D. candidates are also required to take part in the review process of international conferences. The role of a referee teaches Ph.D. students to focus on publications from a different perspective. Ph.D. students learn how to review a paper and, as the expectations of programme committees become more transparent, they learn important criteria for getting a paper accepted. As the head of WIT is part of a lot of programme committees, the Ph.D. students have at least three times a year the opportunity to get publications for review.

2.2.4 Teaching

Regular contact with undergraduate students is valuable as preparation for a possible academic career. Presentation proficiency and experience in communicating ideas to groups will be important in any setting, academic as well as outside the university. Teaching expertise is a significant and integral requirement in computer science Ph.D. programmes at top US Universities. At WIT teaching experience is also considered to be a significant part of graduate education. Each doctoral student must take part in the department's teaching programme. All Ph.D. candidates are required to assist with lectures, labs, practicals, seminars or theses. As teaching is a uniquely effective learning experience, the intent of this requirement is to assure that all doctoral students have the benefit of having taught for at least two terms. Teaching is an important skill, but it is also a means to present female researchers as role models to students. CS courses given by female lecturers make women visible as professionals.

The WIT team supervised 7 master theses and more than 30 bachelor theses. All Ph.D. students are involved in undergraduate teaching, mainly labs or seminars. Some Ph.D. students are involved in specialisation courses within their research area. A Ph.D. student has designed two E-learning courses for undergraduates, a web engineering course and a course for conceptual modelling and UML (Unified Modelling Language). She used the E-learning course for the implementation and evaluation of her research approach. The goal was to detect learning styles from user behaviour. The next step is to integrate adaptivity based on the learning styles into the course.

The Ph.D. students see teaching as a means of cooperation on research projects with students. The integration of students into research projects provides the opportunity to exchange ideas and share state-of-the-art projects. So, it is a win-win situation. WIT has become an integral part of CS teaching and its courses are seen by students as high quality teaching.

3 Career Development Activities

3.1 Graduate and Ph.D. Students

For MSc or Ph.D. students at the Faculty of Informatics, WIT has additional support to offer, such as the transferable skills workshops and the mentoring programme TU!MentorING.

3.1.1 Transferable Skills

Skills that are useful in many contexts are called transferable skills. Such skills are equally useful in all areas of our lives - academic, work, social and personal. Generic (or transferable) skills are rated by employers as of almost equal importance to specialist scientific skills and technical skills. WIT acknowledges its responsibility to provide opportunities for the development of transferable skills, and therefore features a transferable skills programme for its Ph.D. students as well as for all female members of the Faculty of Informatics. The aim of this transferable skills programme is to enhance generic skills and help Ph.D. students to present as well as to improve their research undertakings.

WIT focuses on the professional development of Ph.D. students, providing courses directly linked to the Ph.D. and future careers structured into 4 fields: communication skills, research methodology, project planning and management skills, and special research topics and new technologies. WIT offers 4 transferable skills courses per year that last between one and two days. The courses include among others CS research methodology, scientific writing, time management, rhetoric, presentation technique, strategic negotiation, career development, tax, description logic, and voice training with an professional opera singer. When WIT hosts famous guests, we offer a special get-together, like with Monika Henzinger, the Research Director of Google on the topic 'How to pursue a successful research career?', and Jim Gray, the ACM Turing Award Winner 1998 on the topic 'How to do a Ph.D.?'.

3.1.2 TU!MentorING

Mentoring relationships are needed for advice and guidance in career matters. Today more than ever, information about organisational culture is vital for pursuing a successful research career. Therefore, WIT provides mentors to its Ph.D. students and to members of the Faculty of Informatics. Two types of mentoring are offered: One is targeting a research career, while the other is focusing on an industry career. The mentors involve university professors, senior researchers, managers, or senior engineers from multinational companies acting as close, trusted, and experienced peers and guides in order to explain the working dynamics of both formal and informal systems within the institution. Most of the

WIT Ph.D. students decided for a research mentoring, in order to get additional information that should help with the decision for or against going ahead with research after the Ph.D.

3.2 Undergraduate Students

For students choosing to study at the Faculty of Informatics, WIT has additional support to offer, such as the Admina.at workshops and the mentoring programme `big_sister.first_steps`.

3.2.1 Admina.at

Admina is the short female form of system administrator. The Admina.at project offered by WIT provides a number of hands-on practical experience system administration workshops, created and held by women exclusively for women. Admina.at follows the example of the highly successful `admina`⁵ project created in 1995 at the University of Hamburg.

Admina.at workshops offer current, immediately useful computer science knowledge outside of the regulations and exam pressure of the ordinary university course programme. The focus on practical application on the one hand rapidly gives the participants a sense of achievement and allows them to identify their personal strengths, while on the other hand it also emphasises the relevance of theoretical knowledge.

Admina.at workshops are organised in small groups (12 participants, 2 supervisors), allowing strong individual support for every participant. The workshops are offered on two different levels, for teenagers and university students. Their main focus lies on teaching hands-on computer science skills, thus raising the level of self-confidence as well as on improving the communication between female students of the same peer group, thus encouraging networking activities, which are crucial for success in the academic and the professional world.

Admina.at introduces the workshop participants to the large variety of topics in the world of computer science and to stimulate their interest. Students at the workshops have fun and make new friends, while at the same time learning useful skills, all in line with the project's goals to increase the number of female beginners as well as graduates at the Faculty of Informatics as well as improving the students' academic success and career entry opportunities.

Currently, Admina.at offers the following workshops:

1. PC Hardware: How to take a computer apart and put it back together again. Includes the characteristics of the components, installation and basic configuration of an operating system, command line interaction, and tips and advice for buying hardware and trouble shooting.
2. Programming for beginners: Includes installation of the necessary software components (e.g. development environment, compiler, and editor), the fundamental concepts of programming, tips and advice, trouble shooting and many useful examples. The workshop teaches the programming languages Java and C++.
3. Linux: Installation of a dual-boot system (adding Linux to a Windows system). Includes partitioning, configuration of a boot manager, the Linux file system hierarchy, a choice of command line tools for system administration and monitoring, using text editors, a number of common application scenarios (data exchange between Linux and Windows, installation of additional software, remote data access, digital cameras and other removable hardware, etc.), and the differences between Linux and commercial operating systems.
4. Databases: How to describe a database at a conceptual level and transfer the gained model into code? Insert data into the database as well as update, delete and query the database. Finally, the database is linked with the web as the user interface.

Participants receive certificates of participation. The courses are free of charge and last two days.

We started off in September 2003 with the first PC Hardware Workshop and hoped that enough female students will register and we can hold the course. We were also a bit scared that these workshops held for and by women were seen as a threat against male students and would result in an uncontrollable negative publicity against women attending the workshop. Nothing of these weird thoughts happened and the evaluation of the workshops presented a very positive feedback. This was

⁵ <http://www.informatik.uni-hamburg.de/Frauen/Admina/>

a huge success also, because the demand for further PC Hardware workshops and other workshop topics was expressed. After the huge and unexpected success of the PC Hardware workshops, we designed the Programming, Linux and Database workshops.

Up to now, WIT offered 25 PC Hardware, 5 Programming, 6 Linux, and 1 Database workshops for more than 320 participating female students. All workshops were extremely well received, as they provide practical knowledge that is implicitly required for many university courses, but not taught beforehand.

We evaluate each workshop at the end and each participant fills out a questionnaire. Additionally, the supervisors give also feedback. Generally, the students stated that they like the women groups, as they dare to ask all types of questions without thinking it might be a stupid one. They also like the productive and supportive atmosphere and the pragmatic approach of the workshops. By experiencing hard- and software in a practical and hands-on manner, the female students developed a strong interest in, and a close relationship with the field. The students stated that they have acquired a lot of skills and are very confident to apply them, e.g. to repair their own computer, to install Linux. At a grade range between 1 (the best) and 5 (the worst), the calculated average grade was 1.5, based on the responses of 320 participants. The students asked for further workshops addressing advanced technical topics, like networks, security or other programming languages.

We perceive the Admina.at workshops as a huge success. Unfortunately, up to now there is no quantitative evidence available that emphasises a correlation between the Admina.at workshops and the reduction of undergraduate drop-outs, or the increase of graduates. The high demand for Admina.at workshops as well as the request for additional workshops makes visible that the curriculum of the Faculty of Informatics is very theoretical, and gives a tremendous advantage to people who have a lot of hands-on experience with programming, hardware, operating systems, and software applications in general. Furthermore, it shows that women do not have enough hands-on experience at the beginning and need the Admina.at workshops to catch up with their peers. In general, the female students are very much interested in practical skills.

3.2.2 big_sister.first_steps

The `big_sister.first_steps` programme was inspired by the Big Sister/Little Sister programme [1] of the School of Computer Science at the Carnegie Mellon University⁶ and is a mentoring activity for female beginners. The purpose of the `big_sister.first_steps` programme at the Faculty of Informatics is to provide a forum for guidance and support for beginners. We pair freshmen Little Sisters with upper-class Big Sisters. The Big Sister / Little Sister relationship is intended to serve as a way for first year students to get to know successful female computer science students who they can experience as role models and ask for guidance and advice. Furthermore, the programme encourages Big Sisters to share their experiences and perceptions of computer science. The project started in 2005 and was carried out with seven pairs. `big_sister.first_steps` was very successful and thus, will be continued in 2006 with 4 big sisters of the previous year.

3.3 High School Students and Girls / K-12 Programme

To encourage girls and high school students to study computer science or to choose a technical subject, WIT offers activities such as girls IT information and Admina.at goes School.

3.3.1 girls IT information (giTi)

girls IT information (giTi) is a project aimed at attracting the interest of female high school students between 16 and 18 years of age in Vienna and Lower Austria to computer science studies at the Faculty of Informatics of the Vienna University of Technology. It is organised by WIT in close cooperation with the team of FIT Vienna, the Vienna branch of the Austrian FIT initiative (career orientation, FIT stands for "Women into technology").

Female ambassadors, especially trained students from different areas of technology, visit high schools and inform pupils in their last two years at school about studies in science and technology at the Vienna University of Technology, the Vienna University of Natural Resources and Applied Life

⁶ <http://women.cs.cmu.edu/>

Science, and the Universities of Applied Science of Vienna. They visit the schools in pairs, and every pair contains one student of computer science.

Once a year, WIT holds an open house day, offering sample lectures, presenting the computer science programme, laboratory experiments and a taste of university life to entourage female high school students to study computer science. The departments of the Faculty of Informatics present their research prototypes, which include among others the following: a six legged robot, a syllabication, and a pattern recognition application.

Since 2004, WIT has organised three giTi Days at the Faculty of Informatics, and about 220 female high school students participated.

3.3.2 Admina.at goes School

Admina.at (for more details see subsection 3.2.1) for undergraduate students has become a huge success. In 2004, WIT decided to offer the PC Hardware workshops also for girls and high school students between 12 and 18 years of age. The goal is that girls can experience technology used in their every day lives in a very pragmatic and practical way, and perceive in turn computer science as something they are capable of and get attracted by the field. We have chosen the PC-Hardware workshops, because it is something tangible and, we think more exciting and easy to capture for kids than software. Admina.at goes School can be seen as an activity complementary to giTi, which informs about the computer science programme, whilst the PC Hardware workshops provide hands-on experience.

In 2004 we carried out 9 PC Hardware workshops with about 60 girls participating. We learned that the young girls between 12 and 14 years of age were much more interested in technology than girls between 15 and 18, who are in the middle of puberty. Thus, we decided to open the workshop for girls from the age of 10. The girls are divided into two age groups, between 10 and 13 and between 14 and 18. About 2/3 of the girls belong to the younger age group.

Up to now, WIT has carried out 47 PC Hardware workshops for about 430 girls. Similar to the workshops for undergraduate students, each participant fills out an evaluation form. The feedback is always very positive and the girls and high school students state that they are interested in other IT topics than hardware as well. A girl stated 'I liked it a lot. It was great. I will come again next year, for sure! I have never thought that I can learn so much in two days'. We get a lot of feedback like this. The girls stated that they are very confident to apply the acquired hands-on skills. At a grade range between 1 (the best) and 5 (the worst), the calculated average grade from 430 participants responding to questionnaires was 2. There was no significant difference between the younger and the older age group. The supervisors say that the girls approach the PC in a very unbiased manner. They are enjoying the hands-on approach, love to work with a screwdriver, and are very talented as well. This shows that girls are interested in technology, and should be encouraged by hands-on workshops regularly, which start at a very young age.

4 Communication Initiatives

The colloquium series and further education tutorials foster the exchange of knowledge, and make women visible in computer science. Our idea was to host 'super star' speakers at our events and thus, to draw the attention to WIT. We have three types of speakers: top CS researchers, women CS researchers, and speakers that cover topics related to women in science, engineering and technology. WIT offers three to four talks or tutorials per semester. After 4 years we hosted 23 events and had about 2400 participants. They include among others the following people: Monika Henzinger, Research Director of Google, Jim Gray, ACM Turing Award Winner 1998 and Microsoft Research, Wendy Hall, University of Southampton, David Harel, Weizmann Institute, Peter Wegner, Brown University, James Rumbaugh, IBM Distinguished Engineer and Co-Developer of UML, Britta Schinzel, University of Freiburg, Lenore Blum, Carnegie Mellon University, Heinz Zemanek, Vienna University of Technology, Erich Gamma, IBM Research, Frank Leymann, IBM Distinguished Engineer, Simon Peyton Jones, Microsoft Research Cambridge, and Christiane Floyd, University of Hamburg.

Videos, photos and slides of the talk are available at the WIT-Homepage. The well organised and high quality events support the great acceptance of the project. Most activities at WIT focus on women only, while the colloquium series and further education tutorials provide an insight into the other WIT activities to male colleagues. These events target also industry people, who very often register their daughters to the Admina.at goes School workshops.

5 Results and Lessons Learned

In general, WIT and its staff are very well accepted by the Faculty of Informatics and the Vienna University of Technology. Eight Ph.D. students are very active in teaching and research and have published more than 60 peer-reviewed papers. Three Ph.D. students visited well-known research institutions and improved their research work and professional experience. A Ph.D. curriculum has been developed, according to which the Ph.D. students pursue their Ph.D. 85 Admina.at workshops have been conducted with more than 750 participants. Three girls IT information days took place with approximately 200 high school students and 23 colloquia attracted about 2500 participants.

The strength of WIT is the comprehensive approach, targeting women at all career levels: Girls, high school students, graduate and undergraduate students, and junior researchers. A further strength is that the positions are reserved for women only: There are excellent CS women professionals out there, you have to find them! A basic requirement for successful Ph.D. students was the integration of WIT into a well-accepted university, which employs well-connected staff members, who are supportive and willing to integrate the junior researchers into the faculty and the international research community.

Sustainability is the major weakness of WIT. The funding of WIT ends in 2007, and consequently all the activities end as well. Despite its huge success, a five years project cannot change the CS world. Sustainability is the keyword when it comes to changing the structures and the culture of an organisation. At WIT sustainability has two dimensions, firstly the project itself that should encourage and promote women continuously, and secondly, the people. At the end of 2007, 8 women will hold a Ph.D. in CS. It is unclear what career paths they are following. It would be an opportunity for the Vienna University of Technology to offer research positions to the best.

Our vision is to establish WIT as a role model for encouraging girls and female high school students to study CS and promoting female undergraduate and graduate students at universities. WIT can increase the number of women researchers at a university when certain prerequisites are met. Firstly, when a university addresses diversity as a strategic goal and wants to employ more women researchers, secondly, when a tenure track or long term career perspectives based on transparent performance criteria exist⁷, and thirdly when women are encouraged to go ahead with their research and get employment offers.

Anyway, we are very proud of the success of WIT and what we have achieved so far towards "Unlocking the Clubhouse" [3].

6 References

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⁷ Unfortunately, since 2002 the Vienna University of Technology does not offer permanent contracts to researchers.