

Practitioner Report:

Rene Herlitz

*Qualification of Lecturers for the Establishment of Computer Science
Faculties at Afghan Universities*

QUALIFICATION OF LECTURERS FOR THE ESTABLISHMENT OF COMPUTER SCIENCE FACULTIES AT AFGHAN UNIVERSITIES

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Abstract: To strengthen the Afghan higher education in the field of Computer Science, 25 Afghan lecturers are studying at the Technical University of Berlin (TU Berlin) in a Masters program, that has been designed to fit to the specialized needs of Information Technology (IT) in Afghanistan. This report summarizes the national IT strategy of Afghanistan, the framework in which the Masters program was conceptualized. An overview of the structure and the curriculum of the program, which combines teachings and practical projects at both TU Berlin and the six participating Afghan universities in Kabul, Herat, Nangarhar, Kandahar, and Balkh, is given. After the first year of the program, some reflections are made on the problems that have arisen, solutions that have been found, and experiences that have been gained. The paper concludes that while higher education in Afghanistan has not reached an internationally comparable level, there is a demand for further qualification of lecturers abroad. These study programs can be most effective when offering courses that conform with the IT demands of Afghan society.

Keywords: Afghanistan, Capacity Building, Computer Science Education, ICT for Development

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1. INTRODUCTION

1.1 IT IN AFGHANISTAN

Afghanistan has come a long way since the Transitional Islamic State of Afghanistan came into existence in December 2001. After the end of the Taliban regime, Afghanistan's infrastructure was in a desolate condition. Water and power supply had been either destroyed during the years of war or never been developed broadly, the educational system had been widely disregarded and telephone lines were limited to few households.

When the international community had agreed upon supporting the extensive rebuilding work in late 2001, the role of education in this post-conflict reconstruction received a lot of attention. The number of enrolled students is now as high as never before and with the increasing number of students graduating from high schools still on the rise. The challenge for the government of Afghanistan is to meet this demand, as higher learning forms the basis for state- and nation-building and there continues to be a critical shortage of professionals to comply with the needs of reconstruction, growth and poverty reduction.

Information technology (IT) plays a crucial role as it provides many opportunities to improve overall educational conditions of today such as

- the lack of libraries and technical literature,
- the lack of cooperation between national and international universities,
- the limited computer experience,
- the complicated and non-transparent administration.

This impression is reflected in the ambitious intentions of the donor countries as well as private companies to invest in IT. It is widely considered an opportunity for Afghanistan to become part of the "global knowledge society".

However, the IT landscape had to be build up from zero, because any technology usage was strictly forbidden during the rule of the Taliban. Beginning in 2002 the universities started introducing Computer Science study programs with the help of foreign lecturers from mostly Pakistan and Iran, as well as some Afghan lecturers who had studied in exile. Currently there is a Faculty of Computer Science at Herat University; the universities of Kabul, Nangarhar, Bamyan, and Kabul Polytechnic University all have Departments of Computer Science. In addition to these offers by public universities, there are six private universities and numerous institutes offering IT courses (Herlitz 2008), though quality assurance standards are difficult to achieve in the current situation in both sectors.

The universities do not have enough qualified lecturers to meet the demand for IT qualification. Currently the gap on the supply side is still filled by foreign lecturers who support teachings for one or two semesters as well as young graduates who still lack the necessary qualification.

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1.2 National IT Strategy for Higher Education in Afghanistan

The lack of qualified IT personnel is only one of the many problems IT faces in higher education in Afghanistan. These problems have been analyzed by the Ministry of Higher Education (MoHE) which has been involved in supporting IT projects at several Afghan Universities in the last six years and as a result has developed a “National IT Strategy for Higher Education in Afghanistan” (MoHE 2008), which is composed of the following areas:

IT infrastructure

As mentioned above, the physical infrastructure of Afghanistan is in a state of rebuilding. Reasonable computer usage though requires a certain stability in power supply¹; buildings need to be clean, dust free and the temperature variations should not exceed a certain level.

Acquisition and use

To meet with the deficiency of equipment the incomplete knowledge to maintain them, the organization and planning of IT supply for institutes of higher education needs to be coordinated.

Budgetary and personnel

Offering introductory courses for university administration and academic staff is necessary to assure efficient management of the resources.

Supervision and quality control

Quality assurance standards for IT trainings as well as academic degrees have to be developed, monitored by a national IT board. IT representatives at each institute of higher education assure a close collaboration with the MoHE.

Coordination of all national and international co-operations

All IT projects in higher education are coordinated by the IT Department of the MoHE in close cooperation with the international partner organizations.

These initiatives show the great demand for IT specialists and computer scientists, which currently cannot be met due to the lack of sufficient educational programs in IT and Computer Science.

1.3 Support by TU Berlin in Building Up IT Structures in Afghanistan

This lack of IT specialists had also been recognized by the Technical University Berlin (TU Berlin), which started its activities in Afghanistan in 2002. In that year Dr. Nazir Peroz, head of the Centre for International and Intercultural Communication (ZiiK) of the university, joined a fact finding mission in Kabul in order to examine the current situation of higher education in Afghanistan. TU Berlin agreed upon supporting the process of bringing IT into Afghan higher education by constructing an IT center at Kabul University (ITCK), opened in March 2003 (Peroz 2008). The technical realization of the ITCK was accompanied by a training program for future administrators and trainers, who trained the students, lecturers and personnel of Kabul University in the upcoming years. Up to today, more than 1800 university members have received IT training as part of this program.

In the following years, the engagement of TU Berlin in Afghanistan has been extended to many other projects, which include the establishment of a Computer Science Faculty at Herat University

¹ Currently the average household in Kabul receives three hours of electricity per day. The situation in Kabul University is better, with an average of 1 hour of power blackout per day. A backup power supply by inefficient and polluting diesel generators therefore remains necessary.

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(Mahr and Peroz 2006), summer and winter academies at TU Berlin, and support in the establishment of an IT section within the Ministry of Higher Education.

All projects conducted have had a holistic approach, covering infrastructure and education as well as concepts and management.

2. CONCEPT OF A MASTER PROGRAM FOR AFGHAN LECTURERS

Since the lack of qualified Computer Science teaching personnel at Afghan higher education institutions is one of the biggest challenges that IT development in Afghanistan faces today, a concept has been developed to further qualify the best young graduates from six universities in order to become the future lecturers in Computer Science. This concept has been elaborated by TU Berlin in a joint effort with the Ministry of Higher Education of Afghanistan and Herat University.

The curriculum of the Master Program has been designed to meet the requirements for future lecturers in Afghanistan. These lecturers are going to teach in an environment, in which the field of Computer Science is only some six years old. To meet the demand for IT specialists, Computer Science studies in Afghanistan are focused on building capacity to work on IT solutions within the Afghan society rather than on scientific research on an international level.

Sem.	CP	Studies in Computer Science				General Studies	Place	Date
		Application Project						
1. Preparatory Semester	30	Fundamentals of Programming (6)	Fundamentals of Data Base Systems (6)	Fundamentals of Technical Computer Science (6)	Fundamentals of Mathematics for Comp. Science (6)	German Language and German Culture (6)	Kabul University	1 Dec 2007 to 28 Feb 2008
2. CS Studies I	30	Software Engineering and Data Structures (6)	Information and Data Base Systems (6)	Network Architecture (6)	Other Computer Science modules of choice (18)	Teaching Computer Science (Didactics) Part I (3)	TU Berlin	14 Apr 2008 to 27 Jul 2008
		Focus Studies in 1 of the 3 expertise areas (6)						
3. CS Studies II	30	Focus Studies in 1 of the 3 expertise areas (6)				Teaching Computer Science (Didactics) Part II (3)	TU Berlin	13 Oct 2008 to 20 Feb 2009
		Computer Science and Society (6)						
4. Application Project	30	Application Project (24)				Teachings (6)	Afghan Universities	1 Mar 2008 to 30 Sep 2009
5. Master Thesis	30	Master Thesis (30)					TU Berlin	1 Oct 2009 to 28 Feb 2010

Table 1. Structure of Special Master Program for Afghan Lecturers

The program is made up of five semesters (see Table 1), the first being a preparatory semester in which the Computer Science fundamentals, normally taught at Bachelor level are laid. This propaedeutical semester gives the opportunity to flatten the knowledge and experience gap that existed between participants from different universities. The two subsequent semesters at TU Berlin provide a compact education in the most important Computer Science fields for the needs of Afghanistan.

The National Strategic Plan for IT in Higher Education of the Ministry of Higher Education (MoHE 2008) suggests four departments for Computer Science Faculties at Afghan universities: “Computer Networks and Operating Systems”, “Information and Database Systems”, “Software

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Engineering”, and “Computer Science and Society”. The curriculum for the special program has been developed to fit around these four pillars. Everyone is participating in basic courses of all four fields. One of the former three fields has to be chosen as a study focus, the area in which the participant will teach in the future. The courses offered are new modules within the Master studies in Computer Science at TU Berlin, that are designed to meet the special demands of Afghanistan. Topics such as the internationalization of database systems and the localization of user interfaces to Dari and Pushto, the official languages of Afghanistan, were included in the modules. The courses are being taught by lecturers that have experience in the implementation of IT projects in developing countries. Since sustainability in Afghan universities can only be assured by relying on Open Source Software, all courses use Open Source technologies to impart the relevant concepts.

The focus on didactic techniques is important since the action field of the participants is teaching of Computer Science. The Afghan educational system is based on repeating memorized facts. In the course “Didactics of Computer Science” the participants are familiarized with teaching methods suitable for transferring Computer Science techniques and training abstract thinking and problem solving. The action fields of the graduates of the Bachelor programs of Computer Science at Afghan universities are numerous. There is demand in the public and private sector as well as in the offices of international donor organizations. Due to the demand caused by the latter, the wages of a Computer Scientist in Afghanistan reach amounts of up to 5000 US dollars per month. To avoid a brain drain of the participants of the program to the non-educational sector, the Ministry of Higher Education obligates all participants to sign a contract of working in the university for at least five years after their return to Afghanistan.

The theoretical knowledge gained in the first three semesters is going to be put into practice during the fourth semester, in which an application project is being implemented by the participants at their respective universities. The application projects do not only help the participants gain practical knowledge on implementing IT projects, but will also directly help to improve the IT landscape of the university or institution. The final semester, in which the Masters thesis is being written, is again held at TU Berlin.

After a selection process from different concepts by international organizations, World Bank decided to finance the deployment of the concept from TU Berlin as part of the Strengthening Higher Education Program (SHEP). The financing for the preparatory semester has been granted by the German Academic Exchange Service (DAAD).

3. EXPERIENCES AND REFLECTION

The deployment began in late 2007 with a selection process for candidates for the program. At current the program concluded its third semester and the participants returned to Afghanistan to start their application semester. Having passed more than half of the program gives the opportunity to reflect on some problems, solutions, and experiences.

3.1 Selection Process

In order to select candidates for this scholarship, the Universities of Kabul, Herat, Balkh, Nangarhar, Kandahar, and Kabul Polytechnic University were asked to select eight lecturers of Computer Science in order to participate at a selection process in Kabul in late 2007. The selection committee was compound of members from the Ministry of Higher Education, DAAD, and TU Berlin. The requirements to participate in the program were

1. completed studies in Computer Science or a related subject at a higher education institution in Afghanistan, and

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2. at least two years of teaching experience as lecturer or tutor.

Since Computer Science is so far only taught in Kabul, Herat and Nangarhar, graduates from subjects similar to Computer Science were given the opportunity to participate. This is the only possibility to build up Computer Science Departments at Balkh and Kandahar Universities, as graduates from Kabul University are unlikely to be willing to move to Kandahar for their professional career.²

The examination procedure consisted of a personal interview and two written tests: English language as well as mathematics and logical thinking. In the personal interviews the candidates were asked for their experiences and the motivation for becoming lecturers and were tested on the fluency and understanding of English language. Selection of the participants was not an easy task, as the education that the different candidates had received in their respective provinces had been of different quality levels. Minimum requirements were defined that all participants had to meet, regardless of their university. Not all the lecturers chosen by the universities met the minimum requirements so that it was not possible to have an even distribution of participants across the universities as it was originally planned. This caused some frustration among the members of the universities of which many candidates had to be rejected. From each university between two and six of the applicants were finally chosen for the program.

Only the universities from Kabul and Herat sent women as candidates to the selection process. Eight of them were chosen for the program. Due to the strong family ties and the weak stand of women in the Afghan society, a lot of effort had to be put into convincing their families. Some families argued it was a weakness of the program that it is not possible to get a scholarship for an accompanying family member for the stays abroad.

3.2 Preparatory Semester in Kabul

The preparatory semester was held by three lecturers from TU Berlin at the IT Center of Kabul University. This provided the opportunity for the students of getting acquainted with teaching methods used at a German university while still being in a familiar environment (cf. Carver 2008). During this propaedeutical semester, the most experienced students of the group were giving tutorials on the topics taught, so that it was possible to narrow the knowledge gap a little. The lecturers were able to profit from the experiences gained in introducing a tutorial model to Herat University in 2005, as the tutorial concept is completely new in Afghan higher education.

Nevertheless the time was too short to narrow the knowledge gap to a satisfying level. At the end of the semester there was still a very wide distribution of final test results. In a repetition of the program there will probably be a complete propaedeutical semester at TU Berlin and a preceding additional introductory course in Afghanistan for those participants that have not studied Computer Science before joining the program.

3.3 Second and Third Semester at TU Berlin

In the beginning of the second semester the students chose one of the three study focuses. This distribution had to be done in a coordinated manner, so that students from the same Afghan university are now studying in different study focuses. It was difficult to convince students, that a basic knowledge of the remaining two study focuses is also necessary. The basic knowledge was taught in lectures with accompanying exercises. The study focus classes were taught always taught

² The situation can be compared to the first study programs in the field Computer Science in the 1960s and 1970s in western countries in which the lecturers came from Mathematics, Electrical Engineering, and similar fields.

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by the same lecturers. This resulted in a very close relationship, since the students had a constant contact person in their study field throughout the whole program. Almost all participants visited the weekly consultation hours on a regular basis. Additionally there was a constant e-mail exchange on all kinds of technical issues.

The Afghan education system seems to encourage the students little of studying independently outside the classroom. Continuing motivation of the students was necessary, which could be achieved by constantly providing examples of how the theoretical foundations taught could be used in practice in the context of Afghanistan. This was even more effective in the study focus classes, since there were only between seven and nine students in one class. In each of these classes a semester project that could be used in the Afghan context was implemented. The courses showed that soft skills as project management and team work had not been exercised before. In a future instance of the program they should have some theoretical introduction to these skills before applying them directly in a project.

Some of the participants criticized, that in the second semester there was only a limited offer of Computer Science modules, which were not part of the special program. This made interaction with other students more difficult. Countering this issue was not an easy task, since not all modules at TU Berlin are offered in English and many of them were based on fundamental courses offered only in the winter semester. This situation improved in the third semester in which more elective courses in English language were available. Having been fascinated by the idea of Open Source in the previous semester, many participants chose the module "Open Source and Development Cooperation". Future instances of the program should be arranged in such a way that the second semester of the program is a winter semester at TU Berlin, so that more fundamental modules are offered at the faculty.

Students who had failed courses in the second semester were given the opportunity of attending repetition courses during the semester break and taking a retest at the end of the semester break. This gave the possibility of not having to repeat the course in an upcoming semester and thereby extending the duration of study, which would not have been possible due to the limited amount granted by the scholarship. Failing courses has been a new experience to Afghan students, since this is practically impossible within the Afghan higher education system (cf. Carver 2008).

To cope with this kind of situation was just one of the cultural shocks that the participants had to experience. An accompanying cultural program was aimed to getting to know other aspects of German culture and thereby reducing the risk of such cultural shocks. One student assistant was taking care of this cultural program. He was also the contact person for all kinds of administrative, health, and personal problems. Having a full time student assistant in charge for the Master's program proved to have been a wise decision. Currently there are thoughts of extending this role to two student assistants, because currently the women participating in the program feeling better contacting a female scientific employee, who is dedicating a lot of her work time in helping to solve problems.

To further narrow the knowledge gap between the participants, a special course was offered in the semester break for all students that had not studied computer science before. It repeated some of the fundamentals of algorithms, as well as other topics in which difficulties had been identified.

3.4 Application Semester

In the upcoming semester, each participant will design and implement an application project in their home university. Depending on the current development of IT at the respective universities, the students designed projects ranging from laying the basic infrastructure foundations for a future IT center at Kandahar University to developing specialized software systems for university administration in Kabul. As a lot of the projects are functionally intertwined, a colloquium was held in

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the last weeks in Berlin, in which each participant was introducing his or her plans to the other participants and the supervising lecturers from TU Berlin. The supervision of the implementation of the projects will be the most difficult part in the application semester, as there is only limited internet access in some of the Afghan universities. A communication platform has been established that consists of a project management system (Trac) and an IRC channel. The participants are asked to publish a biweekly progress report on the wiki in the Trac system. The IRC channel gives the opportunity to communicate directly and with fast responses using only a minimum of bandwidth. Additionally there is a constant communication by e-mail between lecturers and students. Personal progress reports and feedback from the projects will be collected during a lecturer's visit to Kabul in May 2009.

4. CONCLUSION

The action fields that graduates from Afghan universities will be working in, differ from those in western countries. This leads to a curriculum which is orientated more on the practical application of IT solutions in Afghan society. Computer Science lecturers at Afghan universities need to gain a profound knowledge of their field, which so far can not be gained within Afghanistan. Afghan teaching staff must therefore receive further qualification at foreign universities. The differing prerequisites of the participants and the different kind of IT demand in Afghanistan results in a different profile for the lecturers which can be achieved by offering specialized courses within a Master study course in Computer Science at an internationally comparable level.

Since the presented project is a pilot project in this area, there is a need for further evaluation of the outcome, once the participants have completed their studies and are teaching in Afghanistan. Experiences gained in this program can be used to provide similar courses aimed to participants that are going to work in a developing country in the future.

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