



UNIVERSITÀ  
DEGLI STUDI  
FIRENZE

## FLORE

# Repository istituzionale dell'Università degli Studi di Firenze

### **The introduction of a EUR-ACE based system for Quality assurance and accreditation of Engineering Education in Central Asia: outcomes**

Questa è la Versione finale referata (Post print/Accepted manuscript) della seguente pubblicazione:

*Original Citation:*

The introduction of a EUR-ACE based system for Quality assurance and accreditation of Engineering Education in Central Asia: outcomes and lessons learnt / Guberti, Elisa; Betti, Michele; Borri, Claudio. - CD-ROM. - 1:(2015), pp. 0-0. ( 43rd SEFI Annual Conference 2015, Diversity in engineering education: an opportunity to face the new trends of engineering Orléans, France June 29 - July 1, 2015).

*Availability:*

The webpage <https://hdl.handle.net/2158/1005780> of the repository was last updated on 2017-02-27T09:51:06Z

*Publisher:*

SEFI - Société Européenne pour la Formation des Ingénieurs

*Terms of use:*

Open Access

La pubblicazione è resa disponibile sotto le norme e i termini della licenza di deposito, secondo quanto stabilito dalla Policy per l'accesso aperto dell'Università degli Studi di Firenze (<https://www.sba.unifi.it/upload/policy-oa-2016-1.pdf>)

*Publisher copyright claim:*

La data sopra indicata si riferisce all'ultimo aggiornamento della scheda del Repository FloRe - The above-mentioned date refers to the last update of the record in the Institutional Repository FloRe

(Article begins on next page)

## **The Introduction of a EUR-ACE Based System for Quality Assurance and Accreditation of Engineering Education in Central Asia: Outcomes and Lessons Learnt**

**E. Guberti<sup>1</sup>**

School of Engineering, University of Firenze  
Firenze, Italy

E-mail: [elisa.guberti@unifi.it](mailto:elisa.guberti@unifi.it)

**M. Betti**

School of Engineering, University of Firenze  
Firenze, Italy

E-mail: [mbetti@dicea.unifi.it](mailto:mbetti@dicea.unifi.it)

**C. Borri**

School of Engineering, University of Firenze  
Firenze, Italy

E-mail: [dir-dicea@dicea.unifi.it](mailto:dir-dicea@dicea.unifi.it)

Keywords: Accreditation of engineering education; Curriculum development; Diversity in engineering education; Quality assurance engineering education;

### **INTRODUCTION**

The introduction of easy comparable practices for the accreditation of programmes in the Engineering/Technology field is the main change at national level the QUEECA project is aiming at. The self-sustainability (and consequently the success) of this strategy is being assured thanks to a massive involvement of relevant actors in all consortium members countries. Partner countries' Ministries are actively involved in the project in order to comply with legislation obligations as far as higher education (HE) institutions system changes are concerned. Given the project structure it is evident that the involvement of academics, and students, at large scale is being ensured mainly through the active participation of ENAEE and SEFI. These European associations can in fact be listed among the main actors in the field of Engineering Education with a direct involvement in the accreditation issues. With specific reference to the main priority (governance reform) of the QUEECA project, which is the introduction of quality assurance, this is to report (April 2015) about a general correspondence between the project activities and the actual needs and priorities of the concerned partner higher education institutions.

---

<sup>1</sup> Corresponding Author  
E. Guberti  
[elisa.guberti@unifi.it](mailto:elisa.guberti@unifi.it)

The creation of national, self-sustainable Engineering Education (EE) societies and strictly connected accreditation centres in charge with quality assurance and accreditation issues has been a very ambitious goal of the project impacting directly the local (Kazakh, Uzbek, Kyrgyz and Tajik) university management and governance. The autonomy and the self-sustainability of such bodies will be among the most ambitious goals of the project as the QUEECA project has to solely transfer know how and encourage capacity building in the concerned countries. This is believed to be the main added value of the whole initiative and a great asset for the involved Central Asia (CA) partners.

## **1 THE QUEECA PROJECT RATIONALE**

The need for international recognition of engineering degrees is becoming more and more demanded at several levels. Two types of accreditation of education are, for example, actually taking place in Kazakhstan: an institutional one - for an estimation of activity of the Higher Education Institutions (HEIs) and a specialised one - for a quality estimation of curricula. Institutional accreditation is normally ensured by the Ministries of Education and Science and carried out by National Accreditation Centres. The specialised accreditation is carried out by international accreditation agencies or accreditation organisations created by (or strongly connected with) professional associations. The CA governments are interested in creating and developing internationally recognized systems of educational and professional qualifications: in particular, the creation of accreditation organizations belonging to international networks is felt as an urgent need in the Central Asian countries. Kazakhstan and the other CA countries have therefore declared their priority interest in the implementation of their Engineering and Technical programmes in analogy to the European Qualification Frameworks (EQF). However, international recognition of qualifications and programmes can only happen if the fulfilment of shared qualification standard is assessed through a periodic evaluation of study programmes by both internal Quality Assurance (QA) and peer review processes. Following this growing interest towards the internalisation of CA engineering degrees, the assessment procedure of the EUR-ACE [1]-[2] system appeared to be the natural answer to these emerging requirements. In this respect, the QUEECA project aimed to promote the adoption of the EUR-ACE system in the partner countries, thus increasing the impact and attractiveness of Bologna principles among Engineering and Technology higher education institutions: the achievement of objectives for QUEECA is expected now to bring a significant contribution to the effective implementation of the Bologna process among the involved partner countries and region.

Following paragraphs shortly present the objective, the outcomes and the activities of the QUEECA TEMPUS project.

### **1.1 Objectives**

QUEECA aims at setting up and implementing a system of QA of Engineering Education (EE) in CA countries, finalized to the pre-professional accreditation of engineering programmes (i.e. accreditation of educational programmes as entry route to the engineer profession). The accredited programmes must satisfy the same pre-requisites for the award of the EUR-ACE quality label, i.e. the EUR-ACE Framework Standards (EAFS) and the European Standards and Guidelines for Quality Assurance in Higher Education. This is being achieved by the creation of a network of National QA/accreditation Agencies (and possibly a Regional Federation) able to accredit engineering programmes and authorized by ENAEE to award the EUR-ACE quality label. Through all above introduced structural measures, mobility of

engineering students from and to Central Asia as well as the mutual recognition of degrees within the EHEA will improve decisively.

## 1.2 Main Project Outcomes

The project objectives are met through the creation of a network of National QA/accreditation Agencies able to accredit engineering programmes and authorized by ENAEE to award the EUR-ACE quality label. The main outcomes from the QUEECA TEMPUS project can be hence itemised as follows:

- To create a National EE Society where it does not exist (in Kazakhstan, strengthen the existing KazSEE) and a CA Federation of EE Societies, partnered with SEFI and IFEES;
- To adapt the EUR-ACE Framework Standards (EAFS) and formulate analogous CA Standards (CAEAS) in Russian and English;
- To create Accreditation Centres in each CA country;
- To train the relevant “accreditors“;
- To run a series of Trial Accreditations with international teams to test the draft CAEAS and the local accreditors;
- To take into account the Trial Accreditations results, formulate the final version of CAEAS;
- To conduct a first run of pilot accreditation of engineering programmes and award the first EUR-ACE labels in CA;
- To formulate a self-supporting financial plan for carrying out accreditation after the project closure.

## 1.3 Activities

The activities of the project are focused on the implementation of a system of QA for engineering education in CA. This is done through the proposal of the EUR-ACE accreditation system to be locally managed, thanks to the creation of local accreditation centres and association of engineering education. The long lasting effect and the sustainability of the planned structural measures will be ensured by the determination shown repeatedly by the stakeholders in the CA countries (Ministries, HEIs, Associations, etc.).

## 2 STAFF TRAINING AND MOBILITY

CA partners staff training is one of the key activities of the QUEECA project as it precisely aims at transferring knowledge and creating competences within the CA partners institutions in order to let them gain enough confidence and knowhow to proceed autonomously to quality assurance and accreditation processes in the field of engineering education.

Training courses for accreditation specialists have been developed mainly with the help of ENAEE Member Associations which have a consolidated experience in accreditation of engineering programmes (CTI, ASIIN, Engineers Ireland, Engineering Council and most of all AEER) and of other experts from a Europe-wide Association such as SEFI. The courses have been scheduled to take place in several locations throughout CA. The peers-evaluators have been trained for assessing engineering educational programmes on the basis of the EUR-ACE Standards. To implement national qualifications frameworks with an understanding of and according to the same interpretation of the overarching European framework, a common methodology based on learning outcomes (i.e. knowledge, skills and competencies descriptors), as well as a common approach to their self-certification is probably the most important instrument of the QUEECA project. CAEAS standards will be largely

tested through trial accreditations of already selected engineering programmes at CA partners HEIs which are taking place in May-June 2015. This process will be followed by an ad hoc workshop already scheduled for next 31 July in Almaty (KZ).

Staff mobility is still taking place within the project mainly for: attending the project meetings, including public workshops and events, taking part to the training activities, delivering training activities and disseminating the project results. In case of internal meetings (such as the management board meetings) the participants are the members of the designated board and no particular procedure is adopted to select the participants. With respect to this type of mobility, active involvement of the partner institutions has been observed from the very beginning, despite the long and heavy travel itineraries between CA and Europe. Also in the light of this consideration a merge of meetings is being adopted in order to save (as much as possible) both time and financial resources. The presence of all partner institutions to the project meetings has efficiently contributed to establish a friendly and cooperative atmosphere and to enable the partners to know each other. On the other hands public events (e.g. the QUEECA forum organised in Almaty in April 2013) see the participation also of a larger audience, including local stakeholders, university management representatives and policy makers gathered through an intense activity of dissemination by the local partners.

As far as the training activities are concerned (intensive language courses and training sessions for accreditation experts) the attending participants have been identified within the CA partner institution on the basis of a specific interest to pioneer the way. These people are mainly to be identified with the chair of the degree courses that will have to undergo the accreditation process in the second half of the project. It appears to be pertinent to mention that the partner's home institutions strongly encourage the mobility of their staff and the participation of their representative people in the project activities.

### **3 ACADEMIC CO-ORDINATION AND MANAGEMENT**

The Management Structure of the Project includes the Project Board (plenary assembly where all partner institutions are represented) and the Project Management Board (smaller executive board). The QUEECA Project Board (PB) is mainly focused on the coordination and implementation of project activities, the monitoring of the proposed objectives, outcomes, activities and budget management and it is constituted by one representative per partner Institution and chaired by the legal representative of the contracting partner institution. The PB identified and nominated the QUEECA Management Board (MB) made up by representatives from one Institution per involved country.

The monitoring of the project activities, including the implementation of the quality control, is the main task of the MB. Meetings of this governing body are taking regularly place, although in conjunction with other project activities in the best interest of the project efficiency, in order to assure the project with the necessary internal quality assessment and control. The Management Board meets twice a year on average and verifies the quality control also taking into account the reports prepared by the external experts. Moreover, the solid previous experience of the EU partners in the field of European cooperation project in Engineering Education appeared to be an asset to guarantee the project with a smooth and effective management. This experience, considering the contribution offered in the past by the University of Firenze-School of Engineering to the implementation in many countries of the EUR-ACE System, is in fact offering an effective benchmark of the results to be reached allowing a continuous check of the project development. The Management Board

was also in charge of elaborating a detailed dissemination strategy that has been implemented by all partners for the whole duration of the project and that will continue after its ending. The main target will be the external audience (stakeholders, employers, professional orders and students) particularly in partner countries.

Finally day by day activity is under the responsibility of the Project Manager identified within the coordinating institution. It appears pertinent to mention that a strict synchronisation with the CA partner's coordinator is maintained in order to ensure that the activities are being managed in the best interest of the direct beneficiaries of the project (the Central Asia partners). It is than care of the CA partner's coordinator to keep all partner institutions updated on the current activities. Besides each CA country identified a coordinator to be in touch with CA partner's coordinator for assuring timely coordination of the project activities among all of the partners. As a matter of fact, intense communication is taking place through the CA partner's coordinator with the aim to enhance partners' awareness on the project activities.

#### **4 SUSTAINABILITY**

Sustainability and long-term effectiveness of the results are key-points of the project, and they are guaranteed by the creation during the project lifetime of independent permanent agencies in Central Asia to carry out the accreditation of curricula in the field of engineering and technology in accordance to the European quality Label EUR-ACE. Concrete steps (such as the establishment of the Kyrgyz and Uzbek Societies for Engineering Education) have been taken in order to allow the creation of these agencies and to ensure that they gain the necessary experience to carry out self-sustainable international accreditations of curricula of the Central Asian Higher Education Institutions. This is being achieved with the help and expertise of European Higher Education Institutions and Associations and of the KZ partners who already have some experience in the field. The new agencies will be very competitive in comparison to similar European and American ones as the accreditations will have lower costs due to the significant reduction of transport costs and the lower wages of experts of Central Asia. In addition, the possible award of the EUR-ACE label will improve attractiveness and international recognition of such accreditations.

QUEECA is moreover helping to improve the preparation of quality of experts in the field of engineering and technologies in CA, their competitiveness at international level, and also the transparency and comparability of their titles, through the creation of accreditation agencies and systems respecting the developed international criteria corresponding to the European quality label EUR-ACE. The increase in the international recognition of the degrees of engineering graduates of the Central Asian HEIs in the European countries will take place as the accreditation of programmes according to the EUR-ACE Framework Standards allows the comparison of outcome results i.e. of the content of the formation, instead of the duration of the curricula. The project is promoting the development of curricula in cooperation with the European universities, to the creation of double degree programmes and the development of curricula in Central Asia which are similar to the ones of European Union.

#### **5 QUALITY CONTROL AND MONITORING**

As above mentioned the internal quality assurance of the project is mainly dealt within the Management Board of the project. This is in fact the body in charge with the assessment of the project activities and the periodic control with respect to the project original work plan. Questionnaires to be distributed at the occasion of project meetings have been used at the very beginning of the project. On the other hand the project has been provided with an additional quality assurance body. In fact

according to the discussions held at the level of the QUEECA Project Board two appointments for external experts providing the project with external quality assessment and evaluation were approved. The two experts (Prof. Stephanie Farrell and Prof. Andrzej Rucinski) have been permanently invited to all the project meetings and had to produce annual reports on the project progresses, which should be focused on the respect of the original plans. In particular their specific tasks included:

- provide expertise in the planning, delivery and assessment of the educational process;
- provide in-depth knowledge of engineering pedagogy, learner-centred teaching methods;
- provide global experience leading instructional development workshops related to engineering education and pedagogy.
- provide expertise related to an extensive work in Kazakhstan related to faculty development, educational innovation, academic mobility, student exchange, and research collaboration.

The external experts have participated in three project board and project management board meetings thus far: in October 2012 in Italy, in April 2013 in Kazakhstan and again in Italy (Firenze) at the beginning of June 2014. At the end of year one and year two, an evaluation was conducted by the external experts. The purpose of this evaluation was to assess on-going project activities and to provide information to monitor and improve the process. Despite the important added value of this external evaluation process at the end of the second year of the project the QUEECA board decided not to renew the appointment to the experts who are now still involved in some of the project activities but without a formal framework.

## **6 SETTING UP NATIONAL ENGINEERING ACCREDITATION CENTRES**

The concept of the training visits foresees that, in the four participating countries, workshops have been conducted with a double purpose: to engage in internal QA capacity building of the participating CA HEI (on the one hand), and to train the future accreditation agencies (to be developed out of the newly established engineering societies). In the first track, the university representatives have learnt how to write a self-assessment report and have been familiarized with state of the art in setting up internal quality assurance systems. In a parallel process the representatives of the accreditations agencies *in status nascendi* including their future peers have been trained in best practice of external quality assurance, including the analysis of SAR (Self-Assessment Report), interviewing techniques, the art of writing reports etc.

## **7 PROGRESSES**

At the present moment (April 2015) the project has almost arrived to its end. Looking back to the fulfilment of specific goals, such as the creation of the Kyrgyz and the Uzbek Societies for Engineering Education (October 2013 and May 2014 respectively). All project's milestones have been almost completely achieved. With respect to the QUEECA project work plan, the progress made on each work package can be itemized as follows:

- Development of intensive Language Courses: Intensive English courses have been completed at CA partner Institutions;
- Development of Central Asia Engineering Accreditation Standards (CAEAS). The statutes of the Association for Engineering Education of the 4 involved CA countries have been developed and sent to the relevant Ministries of Higher Education and National Centre for testing for approval;

- Establishment of national engineering societies and a Central Asian Federation of Engineering Education Societies. The 4 involved countries have reported about the successful creation of a national EE society. Moreover the Federation of Engineering Education Societies will be formally acknowledged in a meeting already scheduled for mid October 2015 in Tajikistan;
- Establishment of National Engineering Accreditation Centres. The 4 involved countries have reported about the successful creation of national Engineering Accreditation Centres which will have a very active role in the forthcoming (May 2015) trial/actual accreditation visits;
- Accreditation of Central Asian Programs. The engineering programmes has been selected at the CA partners HEIs and the visits will take place in May 2015;
- Management of the project via project management meetings. Project management meetings have taken place in October 2012 (Italy), March 2013 (Kazakhstan), October 2013 (Uzbekistan), June 2014 (Italy) and January 2015 (Portugal). In addition internal meetings are scheduled for July and September 2015;
- Performance of quality control and monitoring processes. Internal and external quality control processes have been put in place in order to monitor the project activities. Reports have been produced and corrective actions have been put in place whenever necessary;
- Dissemination of QUEECA outcomes. The dissemination of the QUEECA project activities and results has taken place whenever possible and taking profit of all possible occasion (such as the submission of the present paper). An extensive list of these dissemination activities is available on the QUEECA website [www.queeca.eu](http://www.queeca.eu).
- Exploitation of results. A series of national workshops organized by National Accreditation Centres in Central Asian Countries has been implemented. In June 2013, workshops were conducted in Kyrgyzstan, Tajikistan, and Uzbekistan. The Tajik workshop focused on "Quality of Engineering Education in Central Asia". The Uzbek workshop focused on the "Creation of National Engineering Education Societies in Central Asia". The workshops were attended by representatives of each of the four Central Asian countries represented in the project.

A part from the list of progress made on each work package above reported it appears pertinent to mention that the "QUEECA Standards and Guidelines ('QUEECA Model') for the internal quality assurance of study programmes in engineering" (EN version) has been elaborated and formally approved by all the partners of the project at the occasion of the 4th Management Board meeting held in Bishkek (KG) in March 2014. Moreover a Russian version of this document has been also produced in order to enhance its readability and applicability throughout the CA partner countries.

## **8 CONCLUSIVE REMARKS, FUTURE DEVELOPMENTS AND RISING EXPECTATIONS**

The paper presented the recent outcomes of the Tempus project QUEECA led by the University of Florence, School of Engineering, under the leadership of Prof. Claudio Borri. The QUEECA project involves 4 out (Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan) of 5 TEMPUS countries in Central Asia (CA) and aims at setting up and implementing a system of Quality Assurance (QA) of Engineering Education (EE) in CA countries through the creation of a network of National QA accreditation Agencies able to accredit engineering programmes and authorized by ENAEE to award the EUR-ACE quality. At the present moment (April 2015) the project has almost arrived

to its end. It is expected that the partner countries are having a very active role and that they are gaining significant autonomy.

As a matter of fact expressions of interest also from outside the CA partners of this project have been received and it is reasonable to think that the EUR-ACE model could be successfully spread also to other geographical areas [3]-[6]. In this framework the QUEECA TEMPUS project appears to be an important asset for the European Accreditation System as it significantly contribute to its spreading also behind the European Union area. Moreover it appears important to mention that the adopted approach appears to be fully bottom up thus giving important prior guarantees on its possible success. As to the unexpected outcomes, it is quite evident that amongst the CA Institution the expectations concerning a rapid integration into European QA standards are concretely rising. It is likely that the CA accreditation agencies will join ENAEE.

## 9 ACKNOWLEDGMENTS

The contribution of the European Commission under the TEMPUS programme is kindly acknowledged.

## REFERENCES

- [1] Augusti G. (2006), Trans-national recognition and accreditation of engineering educational programmes in Europe: perspectives in a global framework, *European Journal of Engineering Education*, Vol. 31, No. 3, pp. 249-260.
- [2] Augusti G. and Guberti E. (2011), EUR-ACE 14+: Empowering the European System for the Accreditation of Engineering Programmes, Proc. of SEFI Annual conference 2011, Lisbon, PT.
- [3] Borri C., Manfrida G., Catelani M., Guberti E. and Betti M. (2012), Focusing the Gap Between Teaching Profile and Professional Skills, Proc. of the 1st ENAEE Conference, Porto, 12-13 November 2012.
- [4] Borri C., Guberti E. and Betti M. (2013), The Quality of Engineering Education in Central Asia. The TEMPUS QUEECA project, Proc. of the 41st SEFI Annual Conference 2013, Engineering Education Fast Forward 1973 > 2013, Leuven, Belgium, 16-20 September 2013.
- [5] Borri C., Guberti E. and Betti M. (2013), Towards a European Engineering Curriculum. The Tempus QUEECA project, Proc. of WEEF (World Engineering Education Forum), Cartagena, Colombia, 24-27 September 2013.
- [6] Augusti G., Borri C., Betti M. and Guberti E. (2013), NEW "MARKETS" FOR EUR-ACE: a Central Asia project and a proposal for the Mediterranean Basin, Proc. of the 2nd ENAEE Conference: "EUR-ACE® – The European Quality Label for Engineering Degree Programmes – Impact and Perspectives", Leuven, Belgium, 16-17 September 2013.