AQAS
Agentur für Qualitätssicherung durch Akkreditierung von Studiengängen

Decision of the Accreditation Commission of AQAS

on the degree programme

- **Licenciate in Educational Science "Mathematics and Informatics"**

at the Tiraspol State University (Republic of Moldova)

Based on the report of the expert panel and the discussion of the Accreditation Commission in its 58th meeting on 23./24. February 2015, as well as in circulation procedure on 20 March 2015 the Accreditation Commission decides:

1. The Bachelors-level programme **"Mathematics and Informatics" (Licenciate in Educational Science)** offered by the **Tiraspol State University (Moldova)** is accredited according to the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG).

   The accreditation is **conditional**.

2. The study programme essentially complies with the requirements defined by the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) and the European Qualifications Framework (EQF) in their current version. The required adjustments can be processed within a time period of nine months.

3. The conditions have to be fulfilled. The fulfilment of the conditions has to be documented and reported to AQAS no later then **30. November 2015**

4. The accreditation is given for the period of **five years** and is valid until **30. September 2020**.

Conditions:

1. More modern and broader issues of mathematics education have to be incorporated into the didactics part of the curriculum.
2. There has to be a clearly defined process how the update of the curriculum is organized involving the stakeholders.
3. A complete and updated module handbook must be provided to the students and descriptions of the overall goal of the study program as well as every single course/module must be documented in a competence oriented way.

The conditions were fulfilled within the given timescale.

The Accreditation Commission confirms the fulfilment of the conditions in it's decision of 22./23.02.2016.

The following **recommendations** are given for further improvement of the program:

1. The general courses should be more integrated into the structure of the program and their purposes should be made more transparent to the students.
2. Different programing-languages should be integrated in the curriculum.
3. A course in software engineering and project management should be included in the curriculum
4. The curricular link between mathematics and informatics should be strengthened.
5. The range of competence based exams should be strengthened (oral, project/practical based, presentations).
6. A process to evaluate the student workload (assignment of credit points) should be established and documented.
7. There should be continuously strong efforts to increase international mobility.
8. It is recommend to document clearly software needs as well as hardware needs and to allocate a budget for software.
9. The university should focus the QM-system on the outcomes that are needed and how improvement measures can be reached. Based on the target a formal approach to collect and analyse the data provided by the QM-system could be implemented.

With regard to the reasons for this decision the Accreditation Commission refers to the attached assessment report.

Experts' Report

on the degree programme:

Licenciate in Education Science "Mathematics and Informatics"

offered by the Tiraspol State University

Visit to the University: 24./25. November 2014

Panel of Experts:

Prof. Dr. Ioan Bucataru	Faculty of Mathematics, Alexandru Ioan Cuza University, Iasi, Romania
Andrei Hohan	FiaTest, Bucharest, Romania (expert from professional field)
Frederic Menninger	Student of Financial Mathematics, University of Konstanz, Germany (student expert)
Prof. Dr. Michael Neubrand	Institute for Mathematics, Carl von Ossietzky University Oldenburg, Germany
Prof. Dr.-Ing. Frank Slomka	Institute of Embedded Systems / Real-Time Systems, University of Ulm, Germany

Coordinator:

Doris Herrmann / Ronny Heintze	AQAS e.V., Cologne, Germany

1. Introduction

This report results from the external review of the Licenciate in Education Science in Mathematics and Informatics programme offered by the Tiraspol State University, Chisinau, Moldova. The review is based on the criteria that where developed jointly as part of a TEMPUS project under participation of the Ministry of Education of the Republic of Moldova. They are based on the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) that were developed by the European Association for Quality Assurance in Higher Education (ENQA) and presented to the Bologna Follow-Up group in 2005.

The University produced a Self Evaluation Report. The accreditation procedure was officially initialized by a decision by the AQAS Accreditation Commission on 18./19. August 2014. The Accreditation Commission nominated the before mentioned expert panel and the University did not raise any concerns against the composition of the panel.

After a review of the Self Evaluation Report on 24./25. November 2014 a site visit to the University took place. On site, the experts interviewed different stakeholders and consulted additional documentation and student work. The visit concluded with the presentation of the preliminary findings by the group of experts to the University representatives**.**

2. Profile / Outcomes of the Programme

Following the condition of the interconnection between the specialties 141.01 / 141.02 Mathematics and Informatics (general field of study Sciences of Education), the program is supposed to be organized in such a way, as to ensure the covering of graduation competencies required by both specialties, and, additionally, to allow graduates to reach professional standards and to successfully advance in their career with specialties of Mathematics and Informatics (general field of study Exact Sciences).

The study program of the specialty Mathematics and Informatics has the goal to train specialists with the qualification “Licensed in Sciences of Education”. After four years the graduate of the study program is supposed to have the necessary competences to

- continue his/her studies at master’s programs in the fields of Mathematics and/or Informatics (Sciences of Education or Exact Sciences);
- work as a mathematics and informatics teacher in pre-university education institutions (secondary schools, lyceums, colleges, polyvalent schools and others);
- or work as mathematician and computer scientist.

The implementation of the program is supposed to follow the idea of harmonizing the contents of the curriculum by two aspects:

- the theoretical integration between Mathematics, Informatics and Pedagogy;
- The theoretical-practical integration between the theoretical training in mathematics and informatics and the development of professional abilities. These abilities are supposed to be created preponderantly through initiation internships, pedagogic internships (in secondary schools, lyceums, colleges and professional schools), licentiate internships, semester-projects, and extracurricular activities (participation in scientific seminars, part-time employment in the specialty fields etc.).

Experts' Evaluation

From the experts' point of view, to understand the profile and program of the Licenciate in Education Science in Mathematics and Informatics a brief look into the history of Tiraspol State University is helpful. Tiraspol State University was the first University in Moldova, founded in 1920, and well reputed in the society. Tiraspol State University is now in exile in the own country, since the city of Tiraspol lies in Transnistria, which today practically is not controlled by the Moldovan authorities. Since its beginning, Tiraspol State University focused on teacher education, and is still the only place in the country with chairs in didactics for Mathematics and Physics. After 1990 when the country opened up, many new programs –also without educational focus- came into existence.

Thus, the experts appreciated the broadness of the program. On the one side there is a clear aim to prepare students to be able to continue their studies in a Master's program in mathematics or in Informatics (Computer Science). On the other side, the staff of Tiraspol State University nevertheless understands quite well that the majority of their students later will become teachers. The program therefore contains both components, a content kernel of mathematics resp. informatics, more or less the typical scope of the lower semesters in an university study plan of mathematics, resp. the basics of programming and data bases, but less on software engineering, in informatics, and various lectures and seminars on the didactics of mathematics resp. informatics. Furthermore, internships are provided also in both, the fields of mathematics and informatics in industry, finance and administration, and as well in schools, the contacts to the schools being far more developed.

The program seems to reach its goals quite well under the given political and economic constraints of the country. The experts observed and learned by students and alumni that students feel well prepared, and even from the job they keep some contact to the university. All graduates found qualified employment in the last years, which particularly reflects that teachers are needed in the country. Beyond this, the fields of employment are remarkably broad for graduates of the programme. Additionally, the staff of Tiraspol State University clearly expressed their commitment towards students' further development after the studies. Students seem to be quite are conscious of that, since they reported about the good relations between students and professors by giving precise examples in a convincing way.

Part of the profile is also that some general courses are provided for the students, e.g. in languages (English), economy (European Economy), philosophy and pedagogy/psychology. However, the integration of the core contents of the programme (mathematics and informatics) and these general courses is not as developed as it could be. At least the students do not really see the ties between the two fields of studies. The experts recommend strengthening these connections and outlining more explicitly the gain students can get for their later professional life from such general studies. **(Finding 1)**

Additional information on the further development of the profile of the programme can also be deducted from the assessment of the curriculum.

3. Curriculum

The curriculum consists of eight semesters and each semester has a workload of 30 credit points following the ECTS. In each semester at least one course is an elective resulting in 20 credit points of elective content over the course of studies. Furthermore three practical placements are part of the program. They are included in the fourth, sixth and seventh semesters and sum up to 22 credit points.

Experts' Evaluation

The programme accepts incoming students coming directly from school, so the curricular design needs to take into consideration the knowledge base of new students in mathematics, which apparently means that certain deficits have to be considered. The experts therefore highly appreciate that Tiraspol State University provides modules covering the fundaments of High School mathematics. However, the panel recommends that these courses should not be conceptualized as remediation courses; instead they should reflect the basic ideas and principles behind school mathematics.

In the field of mathematics itself, a rather broad bouquet of topics is addressed in the study program. As far as it is possible to assess the level of the content as part of such an external review procedure this seems to be appropriate, meeting a moderate, but adequate level.

However, in the lectures on Didactics of Mathematics & Informatics some supplements are needed. In the didactical courses presented so far, the panel observes adequate broadness in general issues like principles of teaching and learning mathematics, the modes of thinking mathematically, and - with a special focus - on various aspects of problem solving, including learning how to solve Olympiad Problems. Surely, these are fundamental issues of the didactics of mathematics. However, the recent international development of mathematics education as a scientific discipline increasingly turns towards a new direction: Even Mathematics is, when learned and adopted by human beings, a very fragile issue, causing misunderstandings, misconceptions, idiosyncratic constructions, epistemological obstacles, etc., not to speak of the social complexity in the classroom. These aspects of mathematics education should be more explicitly reflected in the didactics courses. The panel concludes that at least some of these broader issues of mathematics education have to be incorporated into the didactic part of the curriculum. While this could happen in a step by step approach, it would also increase the international acceptance of the graduates. One of the steps addressing this challenge could be to not only look at the gifted students (which, clearly, is still and continuously necessary), but also to study the behavior of the weaker students. A parallel assessment can also be made in the didactics of informatics, however these progressive approaches are not yet so much elaborated there as in mathematics education. **(Finding 2)**

One general issue regarding the curriculum remained open and should be addressed as soon as possible: How is the procedure of redefining the curriculum? While there is a formal approach defining the intervals it remained quite unclear to the panel members how the stakeholders are systematically involved in the process. **(Finding 3)** The question has several aspects: Is there a way to communicate changes in the curriculum, among the members of the staff, and with the participation and the involvement of the students? How is the way of communicating the results of the discussion to the public in the Tiraspol State University and potential employers? How results of these interactions then are integrated in an adapted curriculum? At current stage, from the expert's point of view, several content related suggestions should be considered when redefining the curriculum: Directions to sharpen the program are: (a) incorporate new issues if ICT, esp. software oriented approaches. (b) Enlarge the scope of mathematics education (see above). (c) Make elective courses more visible in the module descriptions and the study plans; consequently giving the students more flexibility in planning their individual studies. (d) Include the growing influence of electronic media in teaching (not only mathematics) in schools.

Regarding the documentation of the curriculum it has to be recognized that to facilitate the accreditation procedure Tiraspol State University provided a complete English version of descriptions of the study program (Module Handbook) which was extremely helpful to understand the substance of the programme. At the same time the panel members recognized that students are mainly informed and supported by course program plans and oral introductions to the courses by each lecturer at the beginning of the semester. In some cases a module description is also available in the eLearning platform "Moodle". From the experts point of view it is essential to provide

students with a description of each module of the study program in advance of a semester so students can understand what is expected from them, but also what they can expect over the semester. Consequently this document must be in Romanian language as it is made for the use of the students and regularly updated. **(Finding 4)** While the experts recognized that in some descriptions of the modules some significant mistakes could be found they concluded that this was a result of translation problems and the Romanian version of the descriptions are appropriate.

Informatics

However, looking at the description of the learning outcomes in the field of informatics they should be completed in the way that the defined learning outcomes clearly describe which skills are given at the end of each course, and how each module of the program is related to the overall goals of the program. **(Finding 4)** The informatics learning outcomes must be clearly described in the context of educating teachers as well as IT experts at the same time. It must be clear that the focus of the program is the education of teachers. However, the particular skills required for this purpose are also not clearly documented in the program description. A clear definition of learning outcomes on the course level will help to be able to document the required learning outcomes on the program level. Implicitly this will then also help to address the questions why Tiraspol State University supports special programming languages, or how technical-informatics modules are related to the needs of a future teacher. These questions where discussed as part of the site visit and the experts found the answers presented by the University convincing, recognizing the context of the University and the needs of the market. However a more precise documentation of the intended outcomes as outlined above will be helpful to understand the program from the outside as well.

The curricular program in informatics follows the classical path. This means students will learn a programming language. At Tiraspol State University they start using Pascal. However, Pascal nowadays is not used in industrial applications any more. The intention to teach Pascal in the beginning is the fact, that Pascal is used at schools in Moldova. The experts agree that it is an advantage that students start with a language they are familiar with and it is also a language which is used on their later teaching activities. Therefore starting with Pascal reflects the goal of the study program to educate future teachers. From the perspective of expert education it is important that Tiraspol State University offers courses in actual used languages as C/C++ as well. Teaching different programing languages is supported by courses on algorithms and data structures and on theoretical aspects of programing. **(Finding 5)** To address the needs of students who want to become teachers, this is an adequate program.

The program is completed by assembler-language-programing and courses on different technical aspects of informatics, operating systems as well as computer networks. To educate IT specialists (as a secondary goal of the course program) a sufficient education in the field of programming in the large is missing. This in particular means that a course in software engineering and project-management is currently not given as part of the program. During the panel's discussion with students and graduates, it also became obvious that a more project oriented approach would be highly welcome by students. Based on these two findings the experts agree that Tiraspol State University should consider implementing a software engineering course using a project based learning approach. **(Finding 6)** In such a course students could design and develop a larger informatics-project defined by the lecturer in a team of 3-5 students.

A second point of curricular integration to be considered is the currently weak link between mathematics and computer science. **(Finding 7)** A course addressing this topic is *Numerical methods*. However, the experts agree that such a course requires a practical part implementing algorithms in a project by the students, too. It seems vital to the experts to integrate modern mathematical tools as computer algebra systems (CAS) and commercial numerical solvers in the study courses

as well. Consequently it is necessary to also document how mathematical software applications will be used in a course or in the whole program in the module/course descriptions.

In the field of informatics-education additional potential for consideration could be released by offering an assembler programming course on cheap embedded platforms like Rasberry Pi. The advantage at hand is teaching a second technical platform to complement the existing PC platform.

Through its curricular design the program reflects the European standards aiming to enable student mobility, as module/course descriptions with learning outcomes as well as ECTS credit points are available in the documentation. Learning agreements should be tools to enable student mobility. The experts recognize that due to historical and economical facts it is challenging for Moldovan students to move abroad for student exchange.

4. Student Support

According to the SER within the faculty, the persons responsible for student consulting and advising are the dean, the vice-dean, the heads of departments, the academic group advisers and the didactic staff of the departments.

During the first weeks of study, there are meetings with each academic group of students to explain their rights and responsibilities, the content of the study program and to familiarize them with the course schedule and the timetable of the educational process. First year students sign a contract that is also part of the documentation to define rights and responsibilities of both sides.

Following the information of the faculty at the beginning of each academic year, the adviser draws up, together with the students, a plan of extracurricular activities. This plan includes weekly group meetings (where both academic and social problems are supposed to be addressed), educational events, cultural activities, excursions and documentation visits to relevant companies, and other activities targeted at supporting students' successful advancement through the stages of university education. The office of the dean informs students regarding the evaluation methods in the disciplines included in the study plan, as well as regarding the student evaluation system during the semester. After the first exam session, the advisers invite parents to inform them about the academic results of the students. Following the information provided by the faculty the contact with parents is maintained during the entire study period.

Based on the information provided by the faculty assessment of students is done using:

- final exams - assessment actions scheduled at the end of the activities of a discipline of the educational activity, for which an individual preparation time is offered. Final assessments can be examinations, ongoing assessments, licentiate exams and licentiate thesis defenses;
- continuous exams - assessment actions scheduled during the progress of the educational process, for which and individual preparation time is offered and which are included in the final grading procedure. Partial assessments during the semester are done through written works, homework, discipline (individual and group) projects, lab reports, essays, case studies, public reports, debates etc.

Experts' Evaluation

The assessment regulations are defined in advance of each semester. A mentor explains them, as well as the curriculum, to the students at the beginning of the according semesters. The assessment at the end of semester is realized with 7 - 9 written and oral exams at the end of each

semester within a time period of 4 weeks. Additional continuous evaluation takes place during the semester, which seems appropriate to the panel of experts. This was also addressed extensively in the discussions with students and they stated that the 4-week time frame for final exams is sufficient. The design of the exams seems sufficient to measure the achievement of the intended learning outcomes. The experts reviewed a small selection of final thesis of the program and they are all written using scientific standards and demonstrate an appropriate understanding of a specific field in mathematics/informatics. Failure rates in written and oral exams as well as the final thesis are very low. If students fail, additional tutorials are offered to them in order to prepare them for additional attempts. The mixture of oral and written exams seems appropriate to the experts, but the number of project based learning units as well as corresponding examinations such as presentations is very low. **(Finding 8)** As described in the assessment of the curriculum clearly here is room for further development. Based on the discussions and questioning of the students the experts also conclude that the grading standards seem to be fair and time periods for the return of written exams is appropriate.

Based on the discussions with students, the workload within the semester is 3 - 4 hours per day in addition to the time spend at the university. If the workload is excessively high, students can discuss this in an open atmosphere with the professor or their mentor. Students confirmed that this process is efficient and the workload does not reach unfeasible levels. The evaluation of student workload, in its informal way currently seems to be appropriate for the program under review considering the size of the program. On the long run the question of workload-evaluation of students should be discussed on a wider level, as today it is not transparent how workload is determined. Therefore a process to evaluate credit points (ECTS) should be established and documented. **(Finding 9)**

The information provided to students at the beginning of the program is sufficient, but informal. A mentor is assigned to each semester and provides the students with rules of the university, the curriculum and other administrative information. This also includes information about possibilities to study abroad. Next to information about the study program, the students can get information about career possibilities as well as scholarships. The discussions with the students showed that there is no shortage of information and university staff as well as professors are available for questions at all times. This is also the case for questions regarding details of single courses, including comprehension questions. The experts agree that the current way to spread information is effective, however it should be considered that potential students who are not enrolled yet, consequently have less resources to find information, as they are not available in a formalized way for outsiders. Increased transparency by a more structured and available information on the details of the program might be considered for the future.

This strongly individualized way of information sharing could also be considered in another perspective. Tiraspol State University should further consider if in some cases, esp. in the first two semesters, the work of tutors (peers, i.e. students in upper semesters) couldn't give some specific learning support to the younger students. Sometimes, esp. when questions about understanding certain topics are touched, the assistance of a peer student can be valuable (as is the assistance of the professor in other cases). The experts are convinced that TSU will find appropriate formats to further develop this idea.

In contrast to these very positive aspects at TSU, other aspects leave room for improvement. While information for a semester abroad is given, the number of outgoing students is very low (3-5 per year). This is partially based on limited language skills in English. The experts see progress in this field in the last years (ECTS are recognized from other Universities), but further efforts on different levels are essential to send more students abroad. **(Finding 10)**

While not being specific for this program since it derives from what seem to be national regulations, is the fact that the module 'Physical Education' is a compulsory course for all students while

no credit points are awarded for this course. In lights of transparency and the principle that credit points should reflect the workload of the students this should be recognized, while not over emphasized.

5. Career orientation

Based on the information provided by TSU the career options for graduates are supposed to be: pre-university education, statistics, economic- financial mathematics, applied mathematics, computational engineering, computational services in various fields etc. The curriculum of the program is supposed to be designed so that, after specialization in the same field through a corresponding master's program, students are prepared to do scientific research in one of the areas: Mathematics, Informatics, Didactics of mathematics, Didactics of informatics, General pedagogy. At the same time, graduates of the study program can also opt to continue their studies in the field of management of educational institutions and follow a manager career.

The office of (professional) career orientation of TSU is implemented to support the professional orientation of their programs and according to the information provided by the faculty it works in strong collaboration with employers, in order to identify, recruit and develop future leaders in education. Furthermore, annually TSU receives information regarding the distribution of the required specialists for pre-university educational institutions from the Ministry of Education. TSU trains specialists according to these requests. According to TSU the distribution of graduates in the labor market is a planned event and takes place in the period April - May of each year. Students benefitting from a scholarship provided by the Ministry of Education sign a contract during the first year of their studies, which coerces them to work for at least three years according to the specialty they will have obtained

Experts' Evaluation

Taking into account the primary profile of the Programme – preparing mathematics and informatics teachers – full information on the requirements and availability of employment in teaching positions is collected, analysed and duly disseminated on a formal basis.

The panel of expert found strong evidence of strong involvement of the leadership of the University / Programme with the Ministry of Education, local authorities and alumni in order to:

- identify and influence the national frame curriculum, that sets the guidelines and limits of the programme's objectives
- provide internship / practice opportunities.

Additionally, the panel found clear evidence of involvement with research institutions such as the Academy of Science of the Republic of Moldova, opening career opportunities for graduates in the field of research.

Contact of the programme with the IT sector, although existent, is limited to participation in IT Forums and conferences and to informal contacts. Nevertheless, graduates have reported support from teaching staff in identifying employment opportunities and general adequacy of studies to their initial workplace, which can be assessed positively by the panel.

Taking into account the marked decline in enrolments in the past years, correlated with a significant stock of unoccupied teaching positions, the University and the programme could benefit from a more structured communication of alternative employment opportunities towards students and potential candidates.

Also, the programme and the University as a whole can benefit from a formal approach to the interaction with the representatives of the labour market, such as "curriculum workshops", official partnerships, joint scholarships, periodic meetings / feedback. Such benefits can come in terms of

increasing the attractiveness of the programme to potential graduates, increased employability for graduates, joint projects with companies that can improve infrastructure, and research opportunities. The required actions in this field were already outlined in the assessment of the curriculum demanding a structured process of curricular adjustments involving the stakeholders. **(Finding 3)**

The Diploma Supplement handed to the student at the completion of the programme follows a national template that mainly mirrors the Outline Structure for the Diploma Supplement, developed by the European Commission.

Positive recognition should also be given to the activities of the Tiraspol State University in teachers' further education. As enough contacts seem to exist to of schools this sector should be further developed also addressing new topics. Two suggestions for possible topics could be: (a) How teachers can care about the weaker students. (b) How teachers can foster the use of electronic media in teaching mathematics.

6. Resources

The facilities of the faculty are concentrated in 30 lecture halls, 5 (internet connected) computer rooms, 8 laboratories, one interdepartmental laboratory in collaboration with the Academy of Sciences of Moldova for specialization in the field of Rigid Bodies, a library with a reading hall with more then 10.000 specialty books, a hall for festivities, a printing office, and a canteen. The faculty of PMIT is situated in the block I of studies of the TSU, which has a total surface of 5433 m^2, including 3559 m^2 of study areas.

Based on the information provided by the PMIT faculty, in order to improve the current didactic- methodical literature available, during the years 2000 - 2014, the PMIT professors have elaborated around 100 manuals, lecture notes, methodical works and recommendations that can be used by the students of the program. Additionally TSU has a student dormitory with 270 places and some other 500 places are rented.

Experts' Evaluation

The staff employed within the faculty consists of 50 members. Out of these 40 are involved in didactic positions (32 have a Ph.D.) and the other 10 represent technical support. There is a good mix in generations for the academic staff. Compared to the number of students, the ratio of students/didactic staff member is very low and this represents an important qualitative argument for a good teaching process. A not so well acceptable aspect is related to the extraordinary teaching load for the academic staff that is very high (at least 16 hours/week) and does not leave too much room for research activity. The level of the research activity is moderate; only four professors have papers published in journals of good impact factor. It is obvious to the panel that the question of the teaching load cannot be solved on the level of a program or university; however it is a requirement of an external review procedure to outline these negative impact factors as well in order to put the options of a program into context.

There is a chair on Didactics of Mathematics with two full professors that can supervise Ph.D. studies in this field. This contributes to the main objective of the study program, namely preparing teachers for secondary schools.

In Republic of Moldova, all academic positions have to be reconfirmed every five years. There are two sides regarding this. The positive aspect refers to the permanent care of the academic staff to improve their teaching and scientific activity. The negative aspect refers to the lack of security for having a permanent position. After each five years the academic staff has to report on its didactic and research activity to be reconfirmed or be promoted for a higher position. There is a board at the university level (a vice-rector is the president of the board) that evaluates all the applicants for

the five-year contracts. A positive aspect is represented by the fact that for renewing the contract, the minimal duties, in terms of research and teaching, are clearly presented. Each year, members of a chair have to report on their academic activity. After each course students give feedback about teaching by filling in questionnaires and the results are used for the five-yearly renewal process.

The faculty does not have a separate budget. It is good that at the university level there are strategies and a mechanism for promoting the performance and to motivate the staff involved in research. 30% of the research budget goes for co-financing the research projects. Within the university, there is an internal competition for research projects and prizes for the research activity.

Some members of the Institute of Mathematics of the Academy of Science of Moldova cover the part-time didactic activities, especially for optional advanced courses in mathematics. This way qualified staff covers all teaching activities.

There is a Center for Career Counseling and Orientation (CCCO) at the university level that coordinates the counseling activity for students within the faculties. At the faculty level each group of students has a supervisor that informs them about the content of the study program. However, a booklet containing all information about the courses/module description is not available to the students, neither on print or online. There is not an official tutoring program offered to the students and the panel already made a suggestion to implement such programs when assessing the feasibility of the studies.

There is an official agreement between the university and the School Board in Chisinau that allows students to perform the internship (pedagogical field experience) in good schools. There are four periods of internship. The first two are of passive-type; when students are informed about the teaching process and assist teachers. In the next two periods (four weeks in the 6th semester and 6 weeks in the 7th semester) the students have to practice teaching in the school, under the supervision of the school teacher. To the panel it seems that this process is better organized for mathematics than for informatics.

Due to the low number of students, the computer labs and teaching rooms are appropriate for the goal of the study program. At the faculty level there is a reading room and a computer room that is supervised by a support staff and can provide assistance when required. There is support for distance learning and the use of data basses and e-libraries. Since 2011 there is a center for IT at the university level that provides support to the academic staff for using the IT infrastructure in the educational process (Moodle platform). At TSU Windows (DOS) related platforms as well as Linux based Systems are available. During the evaluation of the program it could be demonstrated that modern mathematical software applications are used. However, the documentation of resources only reflected the hardware part. It was not 100% transparent to the panel which software applications and how many licenses are available, and how the financing of these resources is realized. Thus the panel recommends to clearly document software needs as well as hardware needs and to allocate a budget for software. **(Finding 11)**

Without the notion of a negative assessment it should be recognized that a hardware computer laboratory is missing. Particularly since technical computer skills are one corner stone of modern education in informatics, in the future development of the program TSU may develop a plan to setup a small hardware lab using cheap embedded platforms. On the other hand this goal could also be achieved by supporting modern simulation software (SPICE, Logic Event Simulators, and Instruction Set Simulators) to teach light physical and hardware skills on PC platforms. In the latter case even the existing computer hardware could be used.

The university has a library, which offers the minimally required selection of literature, with study rooms and computers connected to the Internet. At this point the particular history of the University must be considered to explain the situation. TSU is an exile university now located in Chisinau

that has left most of their library in Tiraspol. Since access to the Internet is given, students should also have access to internet based journals as well as standard literature.

70% of the students, whose studies are financed from the budget, receive also various types of scholarships (for good school performance but also to assist students with very low family income).

7. Quality Assurance

Based on the information provided by TSU in the context of the competition on the educational market and in order to fulfill the requirements of the quality standards, the TSU, by the Senate decision from 27.10.2009, approved a regulation regarding their Quality Management System (QMS) that also applies to the program under review. Based on this regulation, the TSU implements and develops a Quality Management System, to ensure and improve the educational performance and the successful implementation of the quality assurance university strategy. The system includes the different levels of university, faculty and department level structures.

Following this system the quality management of the education process includes primarily the determination of curricula correspondence with the requirements of the provisional framework plan for the Bachelor level approved by order of the Minister of Education, but also the correspondence with European and national standards, with the modular principles of content (concentric, linear) and organization of the teaching process, and with the assurance of professional functionality and the students exit into the labor market after each training level/degree.

A part of the quality of the education process is the annual assessment of the curriculum quality, the analysis of general objectives transposition in reference objectives, the rationality of time allocation for objectives fulfillment, the reflection of the teacher's researches in curriculum content, the stipulation of tasks, modalities of carrying out the student's individual work and active learning-teaching strategies. The assessment of education quality is supposed to also include the disciplines supply with curricular support, teaching and laboratory materials appropriate for the achievement of the planned generic and specific skills. Furthermore the quality management of the education process includes the analysis of the strategic and operational plans of the faculty, departments and of their documents, the analysis of the rational organization of teachers and students' time, the analysis of their individual work and their self-development skills required to the students' instruction, and the analysis of students' involvement in teaching activities.

Experts' Evaluation

The experts positively recognize that extensive data is collected with regards to student progression, success rates and grades. A students' satisfaction questionnaire was developed within the quality assurance system and is collected on a yearly basis. The questionnaire includes data on students' satisfaction with their programmes, teaching staff and resources, perception on employability, evaluation process, and representation of students in decision-making. The questionnaire also includes tools for profiling the data collected against demographics of student population. These steps deserve positive recognition through the panel.

Although data on student workload is collected informally, the panel found no evidence of formal mechanisms to collect data on the de facto student workload. **(Finding 12)**

Data is analyzed in the Quality Assurance Committee of the faculty, which has as objectives, among others, to:

- assess the quality of education, research and other services provided by TSU;

- monitor the activity of the quality assurance committees within the faculties;
- drive improvement and seek compliance with national and international regulations and standards.

Although the "Regulation on Quality Management System (QMS) of Tiraspol State University" states the use of "performance indicators as tools for determining the fulfilment of the operational objectives of quality management system", the panel found no evidence of systematic definition of perfomance indicators, collection of data to monitor and measure perfomance of such indicators, and imporvement action triggered by data analysis. Resulting from this and based on the pronising discussions during the site visit the panel highly recommends to continue the efforts particulary in the last step of the quality assurance cycle when data is used to derive actions for improvement from the results of the evaluation. Based on the perception of the panel, a key factor should be a more structuralized approach in this field.

The programme, and the University as a whole can benefit from a more structured approach to data collection, analysis, dissemination and using data to stem improvement initiatives, including:

- Data collection tools from all relevant stakeholders: students, graduates, staff, other stakeholders (such as enterprises, research, etc),
- Structured reporting of data, including analysis of trends and segmentation of results (e.g. by year, enrolment, gender, etc),
- Alignment of data collected, key performance indicators and strategic objectives of the University,
- A systematic approach to drive improvement actions based on performance measurement, and to monitor effectiveness of improvement actions.

As an important subtopic of this action also in the dimension of quality assurance it should be mentioned that the information of the students about changes in the curriculum and the study conditions seems to be less clear as expected and possible. Students do not use the description of the modules/courses as their source of information about the content, and consequently are not able to select, as far is possible, between the few (see above: "curriculum") elective courses. Here a more structured and transparent approach in the use of data and reporting will also be helpful, assuming that a certain level of public accessibility of the information is guaranteed. **(Finding 12)**

8. Recommendations of the panel of experts

The panel of experts recommends to accredit with conditions the Licenciate in Education Science "**Mathematics and Informatics**" program (Bachelor Level) offered by **the Tiraspol State University in Chisinau, Republic of Moldova.**

Findings:

1. The general courses should be more integrated into the structure of the program and their purposes should be made more transparent to the students.
2. More modern and broader issues of mathematics education have to be incorporated into the didactics part of the curriculum.
3. There has to be a clearly defined process how the update of the curriculum is organized involving the stakeholders.
4. A complete and updated module handbook must be provided to the students and descriptions the overall goal of both study programs as well as every single course/module must be written in a competence oriented manner.

5. From the perspective of expert education different programing languages should be provided.
6. A course in software engineering and project management should be includes in the curriculum
7. The curricular link between mathematics and informatics should be strengthened.
8. The range of competence based exams should be strengthened (oral, project/practical based, presentations).
9. A process to evaluate the student workload (assignment of credit points) should be established and documented.
10. There should be continuously strong efforts to increase international mobility.
11. It is recommend to document clearly software needs as well as hardware needs and to allocate a budget for software.
12. The university should focus the QM-system on the outcomes that are needed and how improvement measures can be reached. Based on the target a formal approach to collect and analyse the data provided by the QM-system could be implemented.