STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

VILNIAUS UNIVERSITETO

STUDIJŲ PROGRAMOS *MATEMATIKA IR MATEMATIKOS DIDAKTIKA (621G10002)*

VERTINIMO IŠVADOS

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EVALUATION REPORT

OF *MATHEMATICS AND DIDACTICS OF MATHEMATICS (621G10002)*

STUDY PROGRAMME

at VILNIUS UNIVERSITY

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Išvados parengtos anglų kalba
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2014

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	*Matematika ir matematikos didaktika*
Valstybinis kodas	621G10002
Studijų sritis	Fiziniai mokslai
Studijų kryptis	Matematika
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2 metai)
Studijų programos apimtis kreditais	120
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Matematikos magistras
Studijų programos įregistravimo data	2003-05-29

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INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	*Mathematics and Didactics of Mathematics*
State code	621G10002
Study area	Physical Sciences
Study field	Mathematics
Kind of the study programme	University studies
Study cycle	Second
Study mode (length in years)	Full-time (2 years)
Volume of the study programme in credits	120
Degree and (or) professional qualifications awarded	Master of Mathematics
Date of registration of the study programme	2003-05-29

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I. INTRODUCTION

1.1. Background of the evaluation process

The evaluation of on-going study programme is based on **Methodology for evaluation of Higher Education study programmes,** approved by Order No 1-01-162 of 20 December 2010 of the Director of the Centre for Quality Assessment in Higher Education (further – SKVC).

The evaluation is intended to help higher education institutions to improve constantly their study programmes and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: *1) self-evaluation and self-evaluation report prepared by Higher Education Institution (further - HEI); 2) visit of the expert team at the higher education institution; 3) production of the evaluation report by the expert team and its publication; 4) follow-up activities.*

On the basis of external evaluation report of the study programme SKVC takes decision to accredit study programme either for 6 years or for 3 years. If the programme evaluation is negative such a programme is not being accredited.

The programme is **accredited for 6 years** if all evaluation areas are evaluated as "very good" (4 points) or "good" (3 points).

The programme is **accredited for 3 years** if none of the area was evaluated as "unsatisfactory" (1 point) and at least one evaluation area was evaluated as "satisfactory" (2 points).

The programme **is not accredited** if at least one of evaluation areas was evaluated as "unsatisfactory" (1 point).

1.2. General

The Application documentation submitted by the HEI follows the outline recommended by the SKVC. Along with the self-evaluation report and annexes, the following additional documents provided by HEI before, during and/or after the site-visit:

No.	Name of the document

1.3. Background of the HEI/Faculty/Study field/ Additional information

The mission of the Vilnius University, taken from the institution's self-evaluation report (SER), is described as

> *a solemn duty and inalienable right, arising from the past, stimulated by the challenges of the present and passed on to the future generations, to strengthen the cognitive and creative powers of Lithuania and the world, to foster academic as well as spiritual and social values, to educate active and responsible citizens and leaders. This mission is based on the imperatives of academic freedom, responsibility to the Lithuanian nation and Lithuanian state, openness and accountability to society.*

The study programme with the title Mathematics and Didactics of Mathematics came into existence on 23rd January 2014. It had previously been referred to as the study programme on Teaching of Mathematics and Informatics and as such had been in existence since 2003. Students

successfully completing this earlier programme obtained a Masters degree but also a teaching qualification; the teaching qualification is not automatically available to graduates completing the Masters degree in Mathematics and the Didactics of Mathematics, an observation that is likely to affect the employability of graduates. The reason for the changes relates to changes in the regulations for teacher training.

The programme Mathematics and Didactics of Mathematics is offered by the Department of Didactics of Mathematics and Informatics in the Faculty of Mathematics and Informatics. A successful internal validation of the earlier programme had occurred in 2005 and in 2009, it was accredited by the Centre for Quality Assessment in Higher Education.

1.4. The Review Team

The review team was completed according *Description of experts' recruitment*, approved by order No. 1-55 of 19 March 2007 the Director of the Centre for Quality Assessment in Higher Education. The Review Visit to HEI was conducted by the team on *19th November, 2014*.

1. **Prof. Dr. Andrew McGettrick (team leader),** *Chair of ACM Education Board and ACM Education Council, Member of ACM Education Board, BCS representative to the General Assembly of IFIP, the International Federation for Information Processing, Ph.D. in Pure Mathematics, Cambridge University, United Kingdom.*

2. **Prof. Dr. Jose Maria Sarabia,** *Professor of Quantitative Methods in Business and Economics, Professor of Statistics and Operational Research (University of Cantabria), Spain.*

3. **Prof. Dr. Manuel Samuelides,** *Full Professor in Applied Mathematics, Ecole Nationale Suprieure de l'A*ǁ*eronautique et de l'Espace (SUPAERO), Toulouse, Head of Applied Mathematics Department (1978 to 2006), Joint position as senior scientist in ONERA (French National Agency for Research in Aeronautics and Space) (1988 to present), France.*

4. **Doc. Dr. Vytautas Janilionis,** *Dean of Faculty of Mathematics and Natural Sciences at Kaunas University of Technology, Lithuania.*

5. **Mr. Benas Gabrielis Urbonavičius,** *student at Kaunas University of Technology, Lithuania.*

During their visit to the Institution, the Review Panel met with the staff who had responsibility for the production of the self-evaluation report, with the staff teaching on the study programme, with students, with alumni and with social partners. On the previous day the Panel had met staff from the faculty administration.

II. PROGRAMME ANALYSIS

2.1. Programme aims and learning outcomes

The main aim of the programme is, according to the SER, to 'educate highly qualified mathematicians, capable of teaching mathematics at colleges and other educational institutions, pursuing doctoral studies, carrying out research, and participating in research and project activities of an applied nature'. The Review Panel viewed this positively, seeing it as providing an important professional background for those aiming to teach on professional bachelor degrees and their equivalent in Lithuania. Unfortunately, the website for the Faculty of Mathematics and Informatics still highlights under admissions the Master in the Teaching of Mathematics and Informatics.

The programme competences and learning outcomes are captured as generic competences and subject-specific competences. There are two generic competences, communication (communicating and collaborating in groups) and the other is referred to as 'improvement of activities' (reflecting on careers and ongoing professional development). The subject specific competences include: having 'a good awareness of recent achievements in mathematics' and being able to apply modern mathematical methods; selecting mathematical models, performing research and critically evaluating results; adapting methods of teaching mathematics to a target audience; selecting appropriate information technology to support the teaching of mathematics, and providing an educational environment conducive to learning.

The name of the study programme had been changed on 23rd January 2014 from *Teaching of Mathematics and Informatics* to *Mathematics and Didactics of Mathematics.* The Review Panel found no evidence of anyone (students, social partners, alumni) being consulted about the wisdom of the name change. The word 'didactics' can have negative overtones of excessive teaching and lecturing; it is a strange word to use in the title of a modern study programme that has to appeal to a local as well as an international audience. Social partners felt that the earlier title was much better.

The name change had been brought about by a change to the regulations on teacher training. As a result of these, graduates of the study programme Mathematics and Didactics of Mathematics would no longer obtain a teacher training qualification. This change had naturally caused, or should have caused, a shift in the focus of the programme. There was no change in practice brought to the attention of the Review Panel as a result of the name change.

The programme aims and learning outcomes are consistent with Masters degree provision and so with the type and level of studies. The learning outcomes and the content are mutually compatible and do reflect a programme on the teaching of mathematics.

2.2. Curriculum design

The curriculum design meets the formal legal requirements for Masters degrees. There are classes valued at 120 credits with 60 credits worth of classes in each of the two years of the programme. There are 92 credits of field of study classes (60 is required), and the final thesis is rated at 30 credits (30 required). All the teachers on the programme hold a scientific degree and 43 credits worth of teaching from 120 credits of the teaching is carried out by professors (the legal requirement is at least 20%). There are precisely 2-5 subjects taught per semester, within the legal requirement being at most 5.

The student workload (31) is calculated as 3200 hours, of which 972 hours (30.4%) are contact hours and the remaining 2228 are for self study.

The classes are spread evenly over the four semesters so that 30 credits worth of classes are taught in each of the four semesters. The classes studied are: in semester one, discrete mathematics and algorithms, functional analysis, didactics of mathematics, information technology in teaching, and psychology of adolescence and youth; in the second semester, classes include algebra, geometry, number theory, an optional class and an introduction to the work of the final thesis; in the third semester, classes include analysis of statistical data, history of mathematics, computer training design and philosophy of education. The final semester is devoted solely to the final thesis.

For a study programme of this kind, a considerable range of selection of mathematical topics would be possible and perfectly acceptable. Moreover, students entering the programme can come with quite different mathematical backgrounds and skills. In the circumstances the content of subjects / modules is entirely reasonable and consistent with the type and level of studies. The scope of the programme is sufficient to ensure the learning outcomes.

Modern thinking about the teaching of mathematics does involve the use of computers in support. This programme does address this and so does equip students with a rich set of abilities with which to enter a career in mathematics teaching.

However, students themselves and social partners identified a number of deficiencies with the programme and its curriculum. Although didactics were important, other topics were also important to the formation of a well-qualified teacher but were absent from the curriculum. Amongst these were: the many issues associated with examining and assessment, managing high quality group work and its assessment, relevant communication skills, creating physical as well as virtual environments that would encourage learning, management in education, and educational policy. They wished to be encouraged in work that was creative and innovative but such opportunities were very limited. Given the trends internationally, a greater emphasis on informatics would be beneficial.

Staff mentioned difficulties with teaching on the programme. The wide spectrum of student abilities of entering students presented real challenges. Moreover, didactics were taught in semester one but not thereafter, and yet the degree title now reflected differently.

2.3. Teaching staff

According to the SER, the study programme is provided by the staff meeting legal requirements. Thus 100% of the teachers are classified as scientists and have a doctorate (requirement is at least 80%), 93% of the staff claim to conduct research directly related to the work of the study programme (legal requirement is at least 60%) and 27% of the programme is taught by professors (legal requirement is at least 20%). The teaching staff consists of 15 lecturers; 7 of these are from the Department of Didactics of Mathematics and Informatics and they teach 9 of the 17 subjects on the study programme. The student/teacher ratio is quite low if we consider that the current class counts 5 students.

The qualifications of the teaching staff are adequate to ensure learning outcomes. According to the SER, among the lecturer's of scientific courses
-    2 teachers are in the age group 36-50
-    8 teachers are in the age group 50-65

- 5 teachers are in the age group 65-75

All the teachers who teach mathematics are more than 60.

The other teachers teach social science subjects (history, philosophy, psychology) or computer sciences. This is a real problem for the future renewal of the teaching staff and for the involvement of students into research in mathematics. The subjects of pure mathematics that are chosen in the course titled "Selected chapters in…" are not the best subjects to address the learning outcomes especially if it is considered that the students are expected to teach mathematics in applied environments (physics, mechanics, social sciences…). So it would be better to recruit new teachers according to these aims than to ensure that present theoretical "courses are consistently taken over by younger lecturers" (as stated in the SER).

The teaching staff is very active in the domain of didactics and the students acquire high level learning outcomes in the philosophy of education, the history of mathematics, and the didactics of mathematics and information technology. Still, the students feel that they do not have sufficient opportunities of practising these outcomes and generally their thesis subjects are quite theoretical. Historically some of the research has been oriented towards primary and secondary education at school level, and the recent removal of the ability to grant a teaching qualification in conjunction with the Masters programme ought to disturb the focus of some of the research.

Due to poor financial motivation, students are generally forced to combine their studies with work, which often has a negative impact on students' academic results. Students' articles get published relatively rarely. The Review Panel felt that research supervisors should more frequently collaborate with students in their research area and encourage students to publish their work.

According to the SER, the international mobility of the teaching staff is quite active; between 2008 and 2012 staff have been involved in 7 traineeships in countries such as Finland, France, Romania, Switzerland, Taiwan and the UK; moreover almost all staff have attended conferences, congresses or seminars abroad. The Department of Didactics of Mathematics and Informatics has joined the network of Nordic countries for the development of scientific research of teaching mathematics and informatics engineering between Nordic and Baltic countries.

The students are given the "possibilities to hear lectures delivered by invited foreign professors"; there have been 24 such lectures between 2009 and 2013. Still, the planned internationalisation of the programme is highly questionable since there is an apparent lack of English skills which appear in the discussion with a part of the teaching staff during the visit by the Review Panel. Moreover, it would be interesting to develop relationships with foreign institutions which are active in the field of didactics of mathematics and to develop common projects in that particular field according to the SER which mentions that "Teaching staff mobility and many contacts with several tens of institutions of higher education in European Union countries and others are not exploited to a satisfactory extent".

In conclusion, the teaching staff in mathematics is not sufficiently innovative and productive and has to be renewed. The contents of the courses have to be oriented in more applied directions and connected with the other disciplines. The courses of social sciences and didactics are taught at a high level and the corresponding teaching staff have a real ability to pilot the formation. But these courses have to be followed by practical implementation and production which use the mathematical courses and an appropriate teaching staff has to learn students to implement these productive activity in didactics. It would be good if this part of the teaching staff was in contact with mathematics teachers and form them in short seminars to use these tools.

The Review Panel was of the view that a Master programme had to be underpinned by sound research and they sought clarification on this matter. Given the name change to the study programme, this was seen as an important concern since it would serve to identify a forward direction for future developments of the study programme. The Review Panel received no hint of any clear vision on this matter, and was disturbed as a result.

The Review Panel drew attention to the new possibilities being opened up by the digital technologies report and by the developments involving MOOCs, seeing these as ways of moving ahead positively on the research front.

2.4. Facilities and learning resources

The faculty is quite well equipped with physical infrastructural facilities like classrooms, laboratories, library, staff rooms, rest room. The number of classrooms, auditoria and computer laboratories are sufficient for successful studies. There are 8 auditoria (total number of seats 1282) and 5 computer laboratories (total number of seats 156). The library reading room has 110 seats. There are 2-4 workplaces for teaching staff in each staff room. The total workspace of premises of the Faculty is 6,818 square meters. There is also a rest room, where students usually read, relax or use a self-service cafeteria. However, students certainly need more space for communication, group work and meetings. The premises are currently not adapted for people with disabilities.

High speed wireless internet connectivity is available in all buildings. The number of computers in computer laboratories does not meet the students' demand. There are not enough computers for all students. During the lecture two or three students would typically share one computer. There is a supercomputer facility but it is not used in the teaching on the programme. Software used for the teaching of mathematics is not described in the self-evaluation report and was not obtained during the visit by the Review Panel. To improve the quality of studies, additional ICT facilities are needed (computers, multimedia projectors).

The Review Panel had a tour of facilities during their visit and this highlighted the following: the equipment was largely out-of-date and was not being used. No students were present in all the laboratories. As far as the library was concerned the journals that were available were in Russian; the English journals were available online. The supply of books in English was limited. The library was very quiet with scarcely any students at the time of the tour.

In the programme 10 credits are assigned for students' professional practice (teaching practice). The host organization for teaching practice is Vilnius College which has 7 faculties. In four of them, the mathematics and informatics subjects are taught. So, Vilnius College has a sufficient number of practice places and due to flexible schedule of lectures it is easier to organize practice. However, the Review Panel felt there would be benefit in having more than one such location for Practice.

Professional practices are organized in accordance with the Practice Provisions approved by the Council of the Faculty (on 15 December, 2009). The student prepares a report at the end of the practical training. The Department's commission takes into account the mentor's evaluations, and there is a defence to assess the Practice. The practical training is a good opportunity for the students to apply knowledge in practice.

The ERASMUS+ program offers students the possibility to go in for practical training abroad, but students do not tend to take this opportunity.

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The library contains about 75000 various learning resources (books, journals, textbooks) on mathematics, mathematics didactics, probability theory, informatics, information technologies, and other subjects in different languages (mostly in English and Lithuanian). The students have access to the licensed electronic databases. The library updates (at the request of the staff or the students) its catalogues and provides a range of services in cooperation with other libraries. Wireless internet connection is available in the library's reading room.

The Review Panel noted that the main textbooks of some courses are not available for the students or there are a limited number of copies at the library. The number of textbooks in Didactics of Mathematics topics could be bigger in order to allow the students not only to read the books in the library but to borrow and take them home.

Some links to the information resources are not active. For example, in the course "Psychology of adolescents and youth" two links to the information resources are not active.

The learning materials developed by the university staff and other methodological materials needed for studies are available online, but there is no unified course management system (virtual learning environment Moodle is used episodically, etc.). Parts of learning materials are accessible via different websites but it is inconvenient for the students.

The students and university staff have access to electronic databases, which are available for academic work or students' learning, but the databases are not mentioned in the course descriptions and are not used enough by the students.

2.5. Study process and students' performance assessment

Admission to the programme is open to students who have obtained a Bachelor degree from the University's own Mathematics and Informatics programme as well as graduates from other fields of study. For the latter students there is a formal entrance examination that addresses the expertise of students in algebra and geometry, mathematical analysis, differential equations, probability theory and informatics. Performance on this entrance examination is used together with performance on the candidate's Bachelor's diploma certificate. Despite this, staff mentioned difficulties with teaching on the programme. The wide spectrum of student abilities of entering students presented real challenges. Moreover, didactics were taught in semester one but not thereafter, and yet the degree title now reflected differently.

In the years 2011, 2012, 2013 the numbers of applicants and the numbers of students entering the programme have been respectively 13, 19, 17 and 8, 10 and 9. On the basis of entrance scores provided in the Institution's SER, the standard of entrants has been retained.

Students on the programme have the opportunity to work with staff who are engaged in a wide variety of activities including mathematical competitions such as the national Olympiad in mathematics, the International Olympiad in Informatics and there are activities associated with popularizing mathematics and informatics. Students are encouraged to take part in academic activity beyond their course. On several occasions students have won awards for activities organised by the Research Council of Lithuania and one student has jointly authored with a staff member a conference paper.

Staff from foreign institutions give invited lectures to students. There is some evidence of student mobility; in 2013 one student spent one semester at the Ivane Javakhishvili Tbilisi State

University. The Review Panel felt that this area should be strengthened to make a further oppositive impact on the programme. A small number of staff from the department have given lectures in universities in countries such as Finland, Holland, Hungary, Italy, Spain, Sweden and Switzerland. Certainly the department maintains contacts with many institutions in European countries and further afield and is a member of a network for the development of informatics engineering education in Nordic and Baltic countries. It is also a partner in the Erasmus supported FETCH project which runs from 2013 to 2016 and is considering at future education and training in computing.

Academic support information about study programmes is provided through the Study Offices of the Faculty, consultations can be arranged electronically and the web pages of the institution, the faculty and the department provide useful information. The latter includes information about the programme but also careers information and mechanisms for the best students to become engaged in doctoral studies. Also, the Students Representative Office provides support including a programme observer who assists with discussions about the updating of subjects and the quality of teaching.

Social support for students is seen to take the form of scholarships, the provision of facilities for disabled students and financial support for students who encounter certain kinds of hardship, e.g. natural disasters, illness of family members. The University has student hostels; students whose main place of residence is not Vilnius may apply for accommodation. The Faculty's students representatives are working actively, involving students in various cultural and sports programmes. In the view of the Review Panel the social support was good.

Of the students who entered in the years 2011, 2012 and 2013 (8, 10 and 9 respectively) the number of graduates or continuing students is now 9, 5 and 7. The drop-outs occur in both years of the programme and, according to the institution's SER, these are attributed to personal circumstances, illness or underachievement. In the view of the Panel this 'wastage rate' is excessive for a study programme of this kind, given that an entrance examination is utilised.

During the assessment visit, the Review Panel met with 3 second year students. It also met 5 alumni three of whom graduated in 2012 and two of whom graduated in 2014; two of the 2012 graduates were now PhD students in the department. The Review Panel also met 4 social partners of whom 2 were alumni from the study programme. All these meetings were very open and very positive.

Both students themselves and social partners identified a number of deficiencies with the programme. Although didactics were important, other topics were also important to the formation of a well qualified teacher but were absent from the programme, for example the many issues associated with examining and assessment. Students and alumni also expressed dissatisfaction with certain subjects, e.g. algebra, and the manner in which it was taught. In such subjects students wished to see applications that were relevant for them but these were not forthcoming. Much of the teaching was regarded as boring. There was a perception amongst them that staff taught what they wanted and not what the students needed.

Assessment is carried out in accordance with the University Statute 'Study Provisions, an Procedures for Assessment of Study Results'. For 12 of the 17 subjects in the programme assessment is by examination at the end of the relevant semester; for 3 subjects a defense is involved and the remaining 2 straddle several semesters and then utilise intermediate assessments which attract credits. The schedule of examinations is arranged by agreement

between the staff and the students and there is an understanding that at least two days should elapse between any two examinations.

In the Institution's SER there is no mention of matters such as either internal or external moderation of examinations, double marking, etc. to ensure quality control over the assessment process and the concept of academic standards did not feature in the self-evaluation report or in discussions.

The staff of the department place importance on 'honest study'. It employs a plagiarism detection system that is used to scrutinise all submissions including final Master theses.

Only incomplete data about the placement and employment of graduates from this study programme is available. Of 30 responding to a questionnaire, 15 are working as teachers or lecturers. During their visit the Review Team were told by social partners that graduates of the study programme are appreciated in the job market and have no problems in obtaining employment.

2.6. Programme management

The name of the study programme had been changed on 23rd January 2014 and this had created a situation where evidence of strong management was required. Yet the Review Panel found little evidence of innovative and creative thinking that would reposition this programme to ensure it had a bright and positive future. The Review Panel had noted with amazement that the new degree title does not feature under admissions on the Faculty web site.

The Review Panel found no evidence of anyone (students, social partners, alumni) being consulted about name change or about the wisdom of the name change. Social partners felt that the earlier title was much better. The change in the name of the study programme had been accompanied by only very modest changes to the curriculum; the list of modules did not change and in most cases the content of modules did not change. There was no change in practice brought to the attention of the Review Panel as a result of the name change.

The number of students entering the programme in October 2014 was 5.

The Review Panel was of the view that a Master programme had to be underpinned by sound and appropriate research and they sought clarification on this. The Review Panel received no hint of any clear vision on this matter, and was disturbed as a result.

The Review Panel drew attention to the new possibilities being opened up by the JMC report on Digital technologies and mathematics education and by the developments involving MOOCs, seeing these as ways of moving ahead positively on the research front. MOOCs would assist with problems such students with differing backgrounds, remedial activity, supporting novel concepts such as the flipped classroom and assisting gifted students but also gaining insights into student learning, a very fundamental matter. Embracing these ideas could involve a radical change to the Masters degree and result in the inclusion of machine intelligence, learning science, and so on. But the staff had to develop their own direction for the future and be confident that they could deliver.

At the end of each semester students are asked to fill in a questionnaire about an evaluation of the subject matter and also staff performance. In addition, regular requests for students' opinion are made on the University web pages and these are utilised by the University Quality

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Management Centre. Yet this formal system seemed somewhat ineffective. Students expressed considerable frustration that their views about the study programme were not sought. They would have welcomed - and this seemed to the Review Panel insightful in view of the nature of the programme - more Practice, more group work, more material on didactics, more opportunities for dialogue and reflections with staff and the opportunity to bring about positive developments.

There were little indications of leadership, of willingness to seek and to embrace new ideas. At the meeting with staff the view was expressed by a member of the teaching staff that really the only way to teach mathematics was chalk-and-talk. There was one exception; she sought and obtained a copy of the JMC report on *Digital technologies and mathematics education* and was aware of the potential for MOOCs.

All the lectures on the study programme were given in Lithuanian. The Review Panel recognized considerable challenges for the Department in adhering to the mandate from the University that by 2016 all Master programmes had to be internationalized (and so all teaching had to be in English).

There were mechanisms for gaining feedback from students; these involved questionnaires to be completed at the end of each semester. But the mechanism was not working and students were frustrated by their inability to be heard – to give feedback and to be listened to. In the view of the Review Panel their views were of considerable value.

III. RECOMMENDATIONS

1. The Department had to formulate a vision about its future and this had to include a clear statement about the research strengths that would underpin the programme.

2. A complete review of the curriculum was required and this had to be informed by their vision statement.

3. Steps should be taken to advertise and promote a revised study programme and to ensure that student cohorts were reasonable (and certainly far greater than 5).

4. If it was in accord with the vision statement, the Department should be encouraged to regain its status with respect to granting teaching qualifications in mathematics / informatics.

5. The Department should reflect on the age profile of its staff and its ability to deliver their vision for the future, and take action accordingly.

6. Steps should be taken to develop relationships with foreign institutions which are active in the field of didactics of mathematics and to develop common projects in that particular field.

7. A very positive approach and attitude to the role of information technology and informatics in the teaching of mathematics and in innovative teaching had to be adopted. This had to be incorporated into Master programme.

8. The Department had to pursue a far more positive attitude to the involvement of all stakeholders and see them providing valuable input that would assist then in the development of the programme.

9. The Department should take steps to ensure the pedagogic competence of the staff teaching on the programme and to ensure this on an ongoing basis.

10. Steps should be taken to provide computing facilities that are up-to-date and appeal to the students. The opportunity should be taken to provide both physical and virtual environments that are stimulating for students and assist them in their learning.

11. Teaching staff had to recognise that this was a Masters programme and this carried responsibilities about the material being taught and the manner in which it was taught. Staff had to feel confident in defending the Masters nature of the programme.

12. Staff should be encouraged to engage students of this study programme in their own research work and they should further encourage publication of results in suitable publishing outlets.

13. Staff had to have a far more positive approach to engaging students and encouraging them in both formal and informal dialogue and reflective practice. Each of these responsibilities must be clearly allocated.

14. The library provision should be reviewed to include more texts on didactics.

15. The feedback mechanisms for dealing with feedback from students should be reviewed to ensure that they are effective and remain effective.

16. The Department had to take urgent steps to ensure that the requirements of internationalisation would be met in session 2016.

17. Steps had to be taken to strengthen programme management so that there was strong evidence of dynamic and purposeful leadership.

18. The issue of ownership of academic standards should be addressed so that it is clear where responsibilities lie. These should aim to encourage all students to meet their full potential.

19. Steps should be taken to address the issue of the quality control of all assessment to ensure that it is robust, defensible and appropriate.

IV. EXAMPLES OF EXCELLENCE (GOOD PRACTICE)*

The member of staff associated with the subject *Computer training design* drew attention to real expressions of enthusiasm from students in seeking new and exciting computer based approaches to the teaching of mathematics.

V. SUMMARY

This Master study programme on Mathematics and Didactics of Mathematics is administered by the Department of Didactics of Mathematics and Informatics in the Faculty of Mathematics and Informatics. Until January 2014 the study programme had the title Teaching of Mathematics and Informatics, a programme that attracted a teaching qualification in mathematics and informatics as well as a Master qualification. The name change had been brought about by changes to the regulations for teacher qualifications and it was no longer possible to automatically gain the teaching qualification automatically on completion of the study programme; a new name would avoid confusion in the eyes of interested parties.

The Review Panel found no evidence of any stakeholder being consulted about the name change. During the visit the social partners expressed negative feelings about the new name, and the Review Panel questioned its appeal to international applicants. Despite the significant name change, the curriculum had scarcely been altered - the set of subjects was the same and most of these had not been adjusted. No change in practice by the teaching staff was brought to the attention of the Review Panel.

There were very positive aspects to the programme. Graduates were seen by social partners as having high quality abilities in mathematics, indeed the best such abilities from all programmes producing graduates with a teaching qualification in mathematics. The Review Panel met with 3 second year students from the programme, 5 alumni who graduated in either 2012 or 2014 and 4 social partners including one from Vilnius College who hosted many students on their Practice. All those meetings were very positive and informative.

However, a number of matters raised certain concerns. The Review Panel took the view that Master programme had to be underpinned by strong research. Given the recent changes, it was felt important that there should be strong forward facing vision about research directions and developments for the department, and indeed strong leadership. This was not forthcoming. Indeed the Review Panel struggled to identify areas of strong practice, a wish to embrace new ideas and new teaching methods, and evidence of exciting leadership.

In addition, students and alumni expressed negative views about the willingness of the staff to engage them in dialogue and reflective practice and they felt the need for greater amounts of practice, team and group work, and other skills that would help them become better teachers. It was noted that all the teaching on the study programme was in Lithuanian, and yet the University had issued a mandate that from 2016 all programmes should be internationalized and so all teaching would be in English.

A tour of the resources had highlighted that the equipment was dated, often badly dated and the laboratories were not being used. Likewise the library facilities were not heavily used although nowadays students might be expected to rely mainly on online resources.

Overall, the Review Panel reflected long and hard about this programme. There were very exciting possibilities to be gained by research on various topics associated with MOOCs including their use for remedial work, for gifted students but also gaining insights into learning. The Panel identified one staff member who could take this forward but questions arose was to whether there was enough interest and support to take this forward.

* if there are any to be shared as a good practice

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VI. GENERAL ASSESSMENT

The study programme *Mathematics and Didactics of Mathematics* (state code – 621G10002) at Vilnius University is given **positive** evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation of an area in points*
1.	Programme aims and learning outcomes	3
2.	Curriculum design	2
3.	Teaching staff	2
4.	Facilities and learning resources	2
5.	Study process and students' performance assessment	3
6.	Programme management	2
	Total:	**14**

*1 (unsatisfactory) - there are essential shortcomings that must be eliminated;
2 (satisfactory) - meets the established minimum requirements, needs improvement;
3 (good) - the field develops systematically, has distinctive features;
4 (very good) - the field is exceptionally good.

Grupės vadovas: Team leader:	Prof. Dr. Andrew McGettrick
Grupės nariai: Team members:	Prof. Dr. Jose Maria Sarabia
	Prof. Dr. Manuel Samuelides
	Doc. Dr. Vytautas Janilionis
	Benas Gabrielis Urbonavičius

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VILNIAUS UNIVERSITETO ANTROSIOS PAKOPOS STUDIJŲ PROGRAMOS
MATEMATIKA IR MATEMATIKOS DIDAKTIKA **(VALSTYBINIS KODAS – 621G10002)**
2014-12-30 EKSPERTINIO VERTINIMO IŠVADŲ
NR. SV4-614 IŠRAŠAS

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V. APIBENDRINAMASIS ĮVERTINIMAS

Vilniaus universiteto studijų programa *Matematika ir matematikos didaktika* (valstybinis kodas – 621G10002) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	3
2.	Programos sandara	2
3.	Personalas	2
4.	Materialieji ištekliai	2
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	2
	Iš viso:	**14**

* 1 - Nepatenkinamai (yra esminių trūkumų, kuriuos būtina pašalinti)

2 - Patenkinamai (tenkina minimalius reikalavimus, reikia tobulinti)

3 - Gerai (sistemiškai plėtojama sritis, turi savitų bruožų)

4 - Labai gerai (sritis yra išskirtinė)

<...>

V. SANTRAUKA

Magistrantūros studijų programą *Matematika ir matematikos didaktika* vykdo Matematikos ir informatikos fakulteto Matematikos didaktikos ir informatikos katedra. Iki 2014 m. sausio mėn. ši studijų programa vadinosi *Matematikos ir informatikos mokymas,* o ją baigus buvo suteikiama matematikos ir informatikos mokytojo kvalifikacija ir magistro laipsnis. Pavadinimas buvo pakeistas pasikeitus mokytojų kvalifikacijos reikalavimams, nes, baigus šią studijų programą,

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nebuvo galima automatiškai įgyti mokytojo kvalifikacijos. Naujas pavadinimas turėtų padėti suinteresuotosioms šalims išvengti painiavos.

Vertinimo grupė nustatė, kad su socialiniais dalininkais dėl pavadinimo pakeitimo nebuvo tartasi. Vizito universitete metu socialiniai partneriai išreiškė neigiamą nuomonę apie naują programos pavadinimą, o vertinimo grupė suabejojo dėl programos patrauklumo užsienio studentams. Nepaisant to, kad iš esmės buvo pakeistas pavadinimas, studijų turinys beveik nepakito – išliko tų pačių dalykų rinkinys, dauguma jų net nebuvo pakoreguoti. Vertinimo grupė nepastebėjo, kad būtų pasikeitę ir dėstytojai.

Programa turi daug teigiamų aspektų. Socialiniai partneriai absolventus vertina už aukšto lygio matematikos gebėjimus, nes jie iš tiesų pasižymi geriausiais gebėjimais, palyginti su visomis programomis, kurios rengia absolventus, turinčius matematikos mokytojo kvalifikaciją. Vertinimo grupė buvo susitikusi su trimis šios programos antrojo kurso studentais, penkiais absolventais, baigusiais studijas 2012 ar 2014 m., ir keturiais socialiniais partneriais, iš kurių vienas buvo iš Vilniaus kolegijos, kurioje praktiką atlieka daug studentų. Visi šie susitikimai buvo teigiami ir informatyvūs.

Tačiau kai kurie klausimai kėlė tam tikrą susirūpinimą. Vertinimo grupė laikosi nuomonės, kad magistratūros studijų programa turi būti pagrįsta tvirtais moksliniais tyrimais. Atsižvelgus į pastarojo meto pokyčius, manoma, kad svarbu parengti viziją, kurioje didelis dėmesys būtų skiriamas mokslinių tyrimų kryptims, katedros pokyčiams ir tvirtai lyderystei. Šių dalykų dar trūksta. Iš tiesų vertinimo grupei sunkiai sekėsi nustatyti stiprios praktikos, noro perimti naujas idėjas ir naujus mokymo metodus bei puikios lyderystės sritis.

Be to, studentai ir absolventai išreiškė neigiamą požiūrį į dėstytojų norą juos įtraukti į dialogą ir reflektyviąją praktiką. Jų nuomone, programoje reikia daugiau praktikos, komandinio ir grupinio darbo bei kitų įgūdžių, kurie padėtų jiems tapti geresniais mokytojais. Pastebėta, kad visa studijų programa dėstoma lietuvių kalba, nors universitetas įsipareigojo, kad nuo 2016 m. visos programos turės būti tarptautinės, todėl dėstomos anglų kalba.

Apžiūrėjus materialiuosius išteklius pastebėta, kad įranga yra pasenusi, dažnai labai pasenusi, laboratorijos nenaudojamos. Biblioteka nėra ypač aktyviai naudojamasi, nes šiais laikais studentai, tikėtina, daugiausia naudojasi interneto ištekliais.

Apskritai vertinimo grupė ilgai ir daug diskutavo apie šią programą. Egzistuoja puikios galimybės atlikti mokslinius tyrimus įvairiomis temomis, susijusiomis su MOOCs, įskaitant ne tik jų naudojimą dirbti su silpnesniais, bet ir gabiais studentais, taip pat giliau pažvelgti į mokymąsi. Vertinimo grupė išskyrė vieną dėstytoją, kuris galėtų imtis šio darbo, bet iškilo klausimas, ar pakanka susidomėjimo ir paramos imtis tokių veiksmų.

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IV. KOMPETENCIJOS (GEROSIOS PRAKTIKOS) PAVYZDŽIAI

Personalo narys, susijęs su dalyku *Kompiuterinis mokymo projektavimas*, atkreipė dėmesį į studentų išreikštą entuziazmą ieškoti naujų ir įdomių kompiuterinių būdų, kaip mokyti matematikos.

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Studijų kokybės vertinimo centras

III. REKOMENDACIJOS

1. Katedra turėtų suformuluoti savo ateities viziją, kurioje būtų aiškus teiginys apie mokslinių tyrimų stipriąsias puses, kurios sustiprintų programą.

2. Būtina išsamiai peržiūrėti studijų programos turinį ir šį reikalavimą įtraukti į viziją.

3. Reklamuoti ir remti patikslintą studijų programą bei užtikrinti tinkamą studentų grupių dydį (didesnės nei 5).

4. Katedra turėtų stengtis susigrąžinti savo statusą, kuris atitiktų viziją, ir suteikti matematikos / informatikos mokymo kvalifikacijas.

5. Katedra turėtų atkreipti dėmesį į dėstytojų amžių, jų gebėjimą įgyvendinti ateities viziją ir imtis atitinkamų veiksmų.

6. Reikėtų imtis priemonių ryšiams su užsienio valstybių institucijomis plėtoti, kurios aktyviai dirba matematikos didaktikos srityje, ir šioje srityje rengti jungtinius projektus.

7. Formuoti ypač teigiamą informacinių technologijų ir informatikos vaidmenį mokant matematikos ir taikant šiuolaikiškus mokymo metodus. Ši nuostata turėtų būti įtraukta į magistrantūros studijų programą.

8. Katedra turėtų suformuoti pozityvesnį požiūrį į visų socialinių dalininkų dalyvavimą ir vertinti jų indėlį tobulinant studijų programą.

9. Katedra turėtų imtis priemonių programą vykdančių dėstytojų pedagoginei kompetencijai gerinti ir šiuo klausimu rūpintis nuolat.

10. Stengtis aprūpinti šiuolaikiška kompiuterine įranga ir taip pritraukti studentus. Stengtis sukurti tiek fizinę, tiek virtualią aplinką, kuri skatintų studentus ir padėtų jiems studijuoti.

11. Dėstytojai turėtų įsisąmoninti, kad tai magistrantūros studijų programa, todėl turėtų atsakingai apgalvoti dėstomą medžiagą ir būdus, kaip ją dėstyti. Dėstytojai turi būti įsitikinę ir tvirti, kad vykdo magistrantūros programą.

12. Dėstytojai turi būti skatinami šios studijų programos studentus įsitraukti į jų vykdomą mokslinių tyrimų veiklą ir skelbti rezultatus tinkamuose leidiniuose.

13. Dėstytojai turėtų taikyti pozityvesnį metodą, siekdami studentus įtraukti į formalųjį ir neformalųjį dialogą bei reflektyviąją praktiką ir skatinti juos dalyvauti. Šie įsipareigojimai turi būti aiškiai paskirstyti.

14. Reikėtų iš naujo įvertinti bibliotekos išteklius ir įtraukti daugiau didaktikos medžiagos.

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15. Reikėtų iš naujo apsvarstyti grįžtamojo ryšio mechanizmus, susijusius su studentų grįžtamuoju ryšiu, ir užtikrinti jų veiksmingumą dabar ir ateityje.

16. Katedra turi imtis skubių veiksmų tarptautiškumo reikalavimams įgyvendinti iki 2016 m. sesijos.

17. Imtis priemonių programos vadybai gerinti, kad būtų aiškiai matoma veikli ir kryptinga lyderystė.

18. Apsvarstyti akademinių standartų nuosavybės klausimą, kad būtų aiškiai nurodyta atsakomybė. Tai turėtų skatinti studentus išnaudoti visą savo potencialą.

19. Imtis priemonių vertinimo kokybės kontrolei užtikrinti, siekiant kad vertinimas būtų patikimas, pagrįstas ir tinkamas.

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Paslaugos teikėjas patvirtina, jog yra susipažinęs su Lietuvos Respublikos baudžiamojo kodekso 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė, parašas)

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