Attitudes of First Year Students towards Studying Mathematics

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Abstract

First-year students have to deal with a variety of challenges, i.e. to adapt to the requirements of the new studying environment and various styles of teaching as well as diverse methods of assessment, e.g. tests, short investigations, written assignments, etc. The majority of students find this adaptation to be difficult. Taking this into consideration, studying Mathematics also has its own specificities and peculiarities. The non-engineering specialties have a small number of academic credits for studying Mathematics during the first semester of the first year of studies at Aleksandras Stulginskis University. However, this course is quite extensive, i.e. it includes the basic topics of Advanced Mathematics and it has its learning continuity. Moreover, studying Mathematics requires active participation in the lectures and consistent self-study. The lecturer's role is to engage students, to explain and to teach how to study Mathematics effectively. The generation of nowadays students is the generation of technologies, thus any result should preferably be achieved automatically and quickly. However, we encounter the problem of incapability and inability to use Mathematical literature. A survey was carried out at the end of the semester to find out the consistency of students' studying, the attendance, the use of literature and the amount of time spent on self-studying and its efficiency. Furthermore, students expressed their opinion on the quality of teaching. The article introduces the method of teaching Mathematics using mini-tests which aims at ensuring and verifying students' self-studying. What is more, it discusses the findings of the survey which characterize the students' attitudes towards studying Mathematics. It also analyses the factors which interfere with studying Mathematics as well as the ones which determine its better results.

1. Introduction

Research has shown that formation of attitude is experiential [1]. According to some authors, the attitude towards Mathematics could be described as favour or disfavour of it, while others state that Mathematical skills, the comprehension and the usage of it in the future should also be taken into consideration. Attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour [2]. For Zan and Di Martino [3], attitude towards Mathematics is just a positive or negative emotional disposition towards Mathematics. Hart [4] offers a tripartite definition of attitude towards Mathematics and defined an individual's attitude towards Mathematics as a more complex phenomenon characterised by the emotions that he associates with Mathematics, his beliefs about Mathematics and how he behaves towards Mathematics. Having entered the university students might change their attitude due to the change of the environment. Students might develop a positive attitude towards Mathematics if it is interesting or students succeed in it and see its benefits. Thus teachers play one of the most important roles while developing a positive attitude towards Mathematics. This article presents the attitude towards studying Mathematics during the first year of studies at the university. Moreover, it discusses the reasons why Mathematics tends to become a difficult subject and not all students manage to achieve good results.

2. Why is it difficult to study Mathematics at the university?

The knowledge of Mathematics of students who have entered the Aleksandras Stulginskis University (ASU) has been constantly tested using the same test since the year 2000. Based on the long-term analysis we notice a shortage of Mathematical preparation in secondary schools. There are differences between the actual result of Mathematical preparation in secondary schools and the expectations held at university level [5]. Thus, lots of our non-engineer specialties students have been studying Mathematics at B level and have not taken the final state examination of Mathematics. Such a situation is a challenge for both teachers and students as they have the same study program, but their Mathematical preparation is different.

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Students lack motivation and interest to study Mathematics. It is clear that some students lack motivation not only for this subject, but for studies in general. They study because it is a steady standard of the society, the family and the environment expect this from them.
The studying of Mathematics is based on theoretical material which is mastered through solving the tasks and application. Students who have poor Mathematical preparation have to spend a lot of time self-studying. The hours for self-sufficient tasks of Mathematics are spent ineffective due to the fact that students are not able to work in a self-sufficient way. During the first year of studies they don't know how to work with coursebooks.
Another thing impacting studying is the change of the studying and/or living place. Aleksandras Stulginskis University offers agriculture related study programmes which are popular among students from all around Lithuania. Young people have to show their maturity, responsibility and the arrangement of key priorities when they have to leave their hometowns and start living and studying in another city. However, not everyone manages this, thus studies fail as students start skipping lectures, they don't accomplish their tasks or they tend to postpone studying till the deadline of the arranged tests. These factors form the approach that Mathematics is a difficult to learn subject, everything is unclear.
Nowadays students are skilful and fond of using various information technologies. This special interest in computer programs and social networking decreases the interest in sciences such as Mathematics as it requires efforts to master the theory and practical skills. Hardly if this problem will disappear in the near future, thus it should be solved by including ICT into the process of studies. Thus, it is very important to exploit the possibilities of e-learning very purposefully and effectively both for teaching and learning activities. At Aleksandras Stulginskis University full-time students use Moodle environment as one of the additional means of studying. Moodle environment is very convenient for presenting Mathematics material. However, due to the particularity of Mathematical language the solution of tasks and various other assignments are presented as regular essays. While assessing Mathematical knowledge the ability to deal with mathematical language and tools, handling mathematical symbols and formalism should be taken into consideration.

3. The teaching process with mini-tests

Mathematics is a compulsory subject for first year students at ASU. The scope of the short course at the Faculty of Agronomy is 3 credits, and it lasts for 8 weeks. Each week a new topic of Mathematics is presented, and it is necessary to have the knowledge of the previous course. For the purpose of ensuring the consistent self-sufficient work and checking the level of knowledge the method of mini-tests was included into the teaching of Mathematics in 8 groups of this faculty in 2015. Each week the last 20 minutes of practical lectures were devoted for the mini-test which was comprised of self-sufficient activities that students had to present that week. While taking the test students can use the literature they have (notebooks, formulae, e-material, etc) and the test is evaluated in the grading scale from 0 to 1. The average evaluation of these tests is added to the grade of Mathematics examination and it comprises 10% of the final evaluation. This is a very intensive activity for both students and teachers. However, it allows to ensure the fast learning speed, thus students can analyse the mistakes they have made and they learn how to use the Mathematical literature. This methodology trains the internal discipline which is needed during the first year of studies. When students manage to achieve better results, they also gain motivation for learning. The quite good attendance of both theoretical and practical lectures was favourable for testing the method of mini-tests.

4. Questionnaire

An anonymous questionnaire was created in order to find out the students' opinion towards the method of mini-tests, the way they use teaching material as well as how much time do students spend on studying Mathematics at home. The questionnaire was comprised of 14 multiple choice questions. Some questions had only one possible answer, and some had multiple options (e.g. references). There was also one open-ended question: "Impressions about Mathematics". The aim of this questionnaire was a reflection of the Mathematics course and the answers were treated as the students' attitude towards studying Mathematics.

5. Results and discussions

The current study was at the Faculty of Agronomy. The data has been collected during the year 2015-2016 and the results of Mathematics mini-tests were used (1 grade scale), as well as the results of the examination (10 grade scale) and the records of the questionnaire. Students were asked to answer the questions of the above mentioned questionnaire at the end of the Mathematics course. Altogether 156 students participated in the questionnaire: 53.2% males and 46.8% females.
The students' opinion about studying revealed in the questionnaire is presented in the Table 1.

Table 1. Consistency of Studying Mathematics

Do tests encourage you to study consistently?	Yes	Sometimes	No
	55.5%	39.4%	5.1%
Do you spend the same amount of time for Mathematics during the semester?	The same	More and more	Fewer
	48.4%	43.9%	7.7%
I do my homework	After the lesson	Before presentation	Every day
	38.4%	56.2%	5.4%
I get homework	Too much	Enough	More tasks
	15.4%	79.5%	5.1%

The use of Mathematical literature is illustrated in Figure 1. Moodle environment is mentioned by most of the students. Some students have indicated several sources of literature.

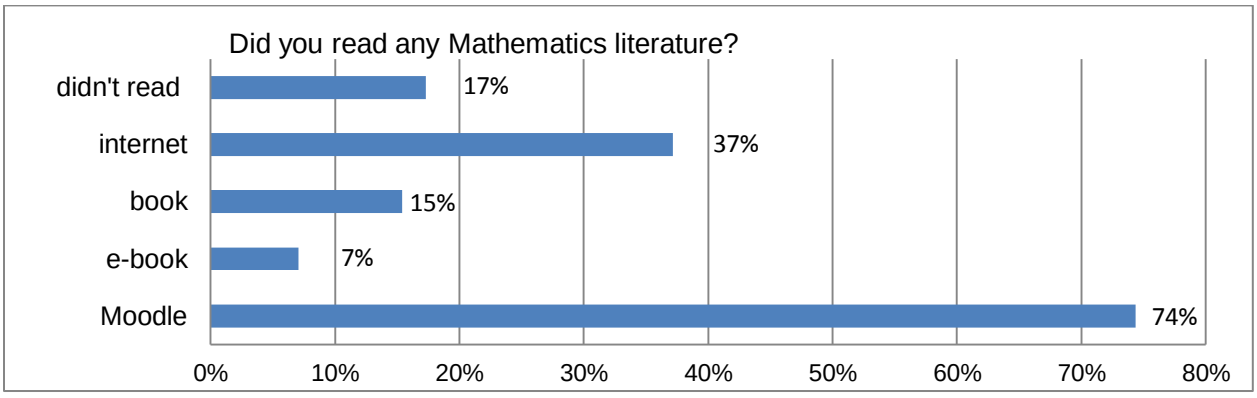

Fig. 1. The Use of Mathematical Literature at Home

The Figure 2 shows that while taking the mini-tests students mainly use formulae. Thus it is considered as a self-sufficient activity in the classroom.

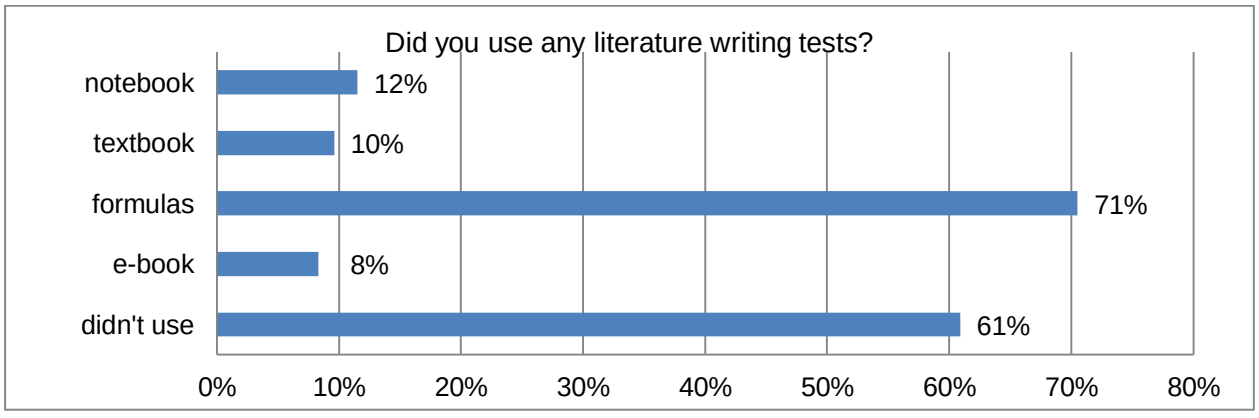

Fig. 2. The Use of Mathematical Literature in the Classroom

The results also showed that 43.6% of students consider mini-tests as a useful activity, 53.2% think that they motivate them to study better, and only 3.2% of students think this activity is useless. The results of the questionnaire revealed that on the average students spend only 46.4% of time that is provided for this type of studying.
It is worth mentioning that consultations are very relevant while studying Mathematics. 43.6% of students indicate that they have consulted their teachers, 76.9% of students have consulted their friends, 1.9% of students have consulted their tutors, 10.3% of students state that they get enough information during the lectures and only 4.5% of students postponed their consultations.

Table 2. Students free comments regarding the „Impressions about Mathematics"

Positive: the teaching is clear, consistent and comprehensible; the teachers are good and kind; the mini-tests are useful because they motivate to study during the semester, not only before the examination; there is no stress when you can use your notes; it wasn't difficult to study because everything was clear; the teachers answer students' questions and they spare enough time for consultations; I enjoyed Mathematics; I wish there were more lectures of Mathematics; etc.
Negative and suggestions: Mathematics requires a lot of efforts; the pace could be slower and there could be more examples; the lectures were too difficult; there could be less theory and more practical lectures; some topics were too difficult; there could be more lectures on difficult topics such as integrals; the theory and the solutions are too difficult to understand in the coursebook; etc.

6. Conclusions

There are lots of factors which influence the successful studying of various subjects as well as Mathematics at the university. However, the most important is students' attitude towards learning. If the students bring good basic knowledge of Mathematics from their secondary school, if they are motivated to achieve their goals in the chosen field then they attend the lectures, they accomplish the given tasks, they attend consultations and study constantly and self-sufficiently. This positive attitude and the constant studying lead to the successful learning of Mathematics at the university and the gained knowledge can be used in students' further professional activities. Conversely, a negative attitude towards studying of Mathematics can develop from two reasons: firstly, the weak basic knowledge and/or inability or reluctance to study.
Moreover, the enough amount of time spent on self-sufficient studies at home play a great role in successful studies of Mathematics. The research has shown that only half of the time that is intended in the program is used. What is more, it has been revealed that first-year students don't understand the necessity of the academic lecture. There were no such lectures at school, thus students need to take time to realize that both a lecture and the analysis of literature are inseparable activities while studying at university. Moodle environment can be accessed easily by students and it is very convenient, thus its contents should be improved according to the needs.

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