International Conference for International Education and Cross-cultural Communication. Problems and Solutions (IECC-2015), 09-11 June 2015, Tomsk Polytechnic University, Tomsk, Russia

Influence of Evaluation System on Effectiveness of Foreign Students' Mathematical Education

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Abstract

This paper studies the problems of improving the quality of mathematics education of foreign students in Tomsk Polytechnic University. We found out that changes in the evaluation system had provided students progress in studying math. The effectiveness of point rating system introduction is proved according to statistics over the last 5 years. The research involved the application of mathematical statistics, correlation analysis and variance analysis methods. Influence of different evaluation systems on the final grade is shown. We worked out that the studying time started to be used more rationally and the students' activity increased during the term. Observational results showed a higher level of motivation, orderliness and responsibility. Assessment of the permanent knowledge confirmed the expected results.

1. Introduction

Over the last few years, higher education in Russian universities has changed to the two level system (Bachelor-Master) widely used in many countries. This gave rise to the necessity to reform educational technologies as well as the evaluation system. The problem of evaluation attracts a lot of attention as it clearly shows a connection between

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a student's activity and his professional advancement. Different evaluation systems have been used for more than 60 years all over the world. The main points of these systems must be accessibility for students and entrants. However, their perfectibility is still discussed (Borland, 2002; Richard Frye et al., 2007; Judith Dodge, 2009).

In Russia this problem has appeared after joining the Bologna process. As a result, the point rating system became well-spread in higher school. Its theoretical aspects are considered by Boev O. & Chuchalin A. (2004); Arzhanik & Chernikova (2010); Perevoschikova (2012).

2. Discussion

This article is dedicated to the comparison between two evaluation systems: traditional and point rating, and finds out their effectiveness. We research the grades in math of several student groups (from 40 to 70 persons) studying IT, based on statistics over the last five years in National Research Tomsk Polytechnic University (TPU).

2.1. The traditional and the point rating evaluation system

In the traditional evaluation system, the total grade of subject is a result of the final examination. Thus, results of studying during the semester don't influence the overall result. And, moreover, the final exam often doesn't show students' competence but continues a studying process. The point rating evaluation system has some advantages: a) encourages students to study regularly; b) controls students' progress; c) raises students' responsibility; d) makes the overall result more predictable; e) stimulates self-education etc. Except for obvious differences, this system is more flexible at management of the studying process. Depending on chosen criteria of evaluation, it is possible to develop necessary skills and expected competences. We mark out the following ways of control: an entrance test, current tests, intermediate control (the sum of current semester tests' marks) and a final test. The overall result (maximum is 100 points) consists of summary control (maximum is 60 points) and a final test (maximum is 40 points). The main idea of an entrance test is to work out problems in some branches of mathematics, which is essential for success in further education. According to the score of this test, lecturers can choose an appropriate studying plan: elite (profound study), basic or adaptive (for weaker students).

2.2. The comparison of the results

The comparison of the marks of Russian State Exam (RSE) in Math and an entrance test is given in the table 1. This table shows that the results of RSE and the entrance test are not the same. It is explained by the difference in aims and contents of these tests.

Table 1.Average marks and correlation between RSE (Math), entrance test and final test in Calculus (the 1st semester)

	2009	2010	2012	2013
Average score of RSE (%)	62,9	68,3	65,1	74,1
Average of the entrance test marks (%)	57,6	46,4	55,4	60
Correlation between RSE and the final test results	0,31	0,34	0,27	0,38
Correlation between entrance test and final exam results	0,52	0,46	0,62	0,4

In 2009 and 2010 the traditional evaluation system was used. The progress in semester had no influence on exam results. There are histograms of average semester grades and exam grades in Calculus in the figure 1. We used ten-point scale. Points greater 5.3 mean "passed".