

COOPERATIVE LEARNING ENGINEERING STUDENTS IN PROJECT GROUP

Svyatskov V.A.
Pskov State University, Russia

Introduction

Considerable space is devoted to cooperation in a team of students in many international projects as SIFE (Students In Free Enterprise) [1], ISA (International Society of Automation) [2] and cetera.

It is the first part of the author's research. The second part focuses on the optimal structure the team of students. The third part is the answer of the question. How go for team's learning method progressively without breaking the curriculum.

Project Group (Roskilde University [3])

The project work is carried out throughout the whole semester where students will be working with a problem within: Mathematics, Physics, Computer Science or with a combination of two or more subjects. Exploring a project of interest is more motivation than classroom sessions. Since secondary school education, students were not sure which part interested their most. Project Group give to students the chance to try out the various parts of Natural Science. Research is never a one person job, there is always a research team. So students learn to cooperate. That will be an advantage in their job situation.

My opinion on the investigation of technical problem

1 stage. Transfer from a technical problem to mathematical. The unrepairable error arises at this stage.

2 stage. Investigation of a mathematical problem. Application of qualitative methods. Take for example algebraic equation. The quantity of complex roots of such equation is defined under the basic theorem of algebra.

Take for example initial value problem for the ordinary differential equation. At the beginning we shall apply the theorem of existence of the solution. If the solution of such problem exists, we apply the theorem of uniqueness of solution.

Then we apply analytical methods. The solution of modern problems is difficult for receiving such methods in the closed form. Therefore we often apply asymptotic methods. Application of such methods is very useful, if the solution has a point of branching. Branching shows that nonuniqueness of the solution is observed. It is difficult to manage this analysis at the further numerical solution.

Then we apply numerical methods. At a choice of a method there is an error of a method. At realization of a method at the computer there is a computing error. Application of analytical and asymptotic methods helps to estimate numerical results.

3 stage. Transfer from the mathematical problem to technical. The full error of an investigated problem consists of these three errors: unrepairable, an error of a method and a computing error. It is the most difficult part of research: reception of the solution of a technical problem with the set error.

Integration of two previous sections gives the name of next paragraph.

General Problems for Team Project

1. Make statement of physical task.
2. Transfer from the physical problem to its mathematical model.

3. The proof of the existence of the solution of mathematical problem, analytical solution of the mathematical problem.
4. Computer solution of the problem.
5. The solution of the physical problem on the basis of paragraphs 3 and 4.
6. Technical solutions of the project. Conclusions from the numerical calculations, graphs, diagrams.

References

1. <http://www.sife.org> (date accessed: 2013, July, 08).
2. <http://www.isa.org> (date accessed: 2013, July, 08).
3. <http://www.ruc.dk> (date accessed: 2013, July, 08).