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The implementation of cooperative methods in higher education

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Abstract

The general problems of the Hungarian education system surface in the higher education sphere as well. Instructors frequently note the knowledge, skill, and competence-related deficiencies of newly enrolled students. Additional difficulties are posed by the lack of motivation or the low level of interest toward learning. Furthermore, the prevalence of traditional educational methods, the lectures designed for a large student audience and similarly structured seminars tend to exacerbate the problem. Students do not prepare for classes or strive to increase their knowledge via independent work and active in-class participation. Consequently new methods are needed for increasing the efficiency of the educational process, along with the enhancement of internal motivation and the promotion of subject-related interest.

Key words: higher education, cooperative methods

As Tamás Kozma asserts the main driving force behind the transformation of the higher education sphere is the conversion from an elitist perspective to a mass oriented one. While this phenomenon originally emerged in the 1970s in Western Europe, mass education became dominant in Eastern Europe in the 1990s. The rise of the mass perspective in Eastern Europe coincided with the "second expansion" of higher education in Western Europe during which the children of "mass education" graduates entered the higher education sphere. Thus "mass education' compels structural and functional alterations of traditional higher education schemes on the one hand, while the student and instructor communities experience changes as well" [Kozma 2006].

Consequently, the need for innovative pedagogical methods, including cooperative learning tends to intensify. The educational policies of the European Union increasingly favour cooperative learning as such methods can be beneficial not only in traditional educational contexts, but in lifelong learning, and in the working world as well. While in Hungary cooperative learning has primarily become dominant in the public education sphere, results can be seen in higher education as well. Cooperative methods are not only deployed for improving the efficiency of teaching a given subject, but for exploring the feasibility of applying such approaches in the higher education sphere and for other subjects as well.

The description of the research process

My research program took place at the Budapest Business School, an institution with a long history of computer science instruction. While teaching the respective subjects I use computer technology to synthetise the other economic subjects-related knowledge of students and adapt the acquired computing, statistics, and operation research methodology while providing an introduction to the foundation of data base management. In my essay I review the respective international research results, provide an introduction to cooperative learning tasks, and finally I analyze the results of a questionnaire-based survey.

The longer term objective of my research is to examine cooperative learning's capability to promote student performance. My hypothesis is that such learning format has collateral benefits including shortened learning time, improved communication capability, and favourable changes in student attitudes to ICT.

Definitions of cooperative learning

Cooperative learning is not only a teaching method, but a philosophy as well. A cooperative perspective implies collaboration based on mutual respect and the appreciation of the contribution of each member of the community. It is the opposite of the competitive perspective as a result of which each individual attempts to defeat or surpass the achievement of the other. The prerequisite of cooperative learning is a community wide consensus based on mutual collaboration. Research results have confirmed that those adopting a cooperative perspective in their learning effort tend to favour "collaboration over competition" in other spheres of life, thereby maintaining a better relation with others [Green 2005].

The application of cooperative learning in the classroom or lecture hall results in the modification of the teacher's or instructor's role as well. The teacher is freed from the traditional knowledge transmission role and as a "collaborating associate" he or she contributes to the work of the group either as a helper or supporter, or coordinator [Giesecke 1996].

Spencer Kagan's groundbreaking work *Cooperative Learning* offers several methods for promoting cooperative learning and teaching. Cooperative learning differs from simple group work in several regards. Accordingly, for a group-based effort to be classified as cooperative learning four pre-requisites have to be met: constructive interdependence, individual responsibility, equal participation, and parallel or simultaneous interaction [Nyíriné Fejszés Tóth 2011].

International research efforts related to cooperative learning

Next I provide a brief overview of the international research efforts related to the topic. The respective countries are listed according to the level of recognition regarding the efficiency of cooperative learning.

United States of America

As research results confirm cooperative learning was first applied in the U.S. Most researchers focus on the impact of cooperative learning on the cooperation of students, social coexistence, intentional harassment, and willingness for sacrifice. Answers are being sought to the following questions: how can the efficiency of cooperative learning be improved, what is the impact of the formation of different groups, and which methods of cooperation tend to be most successful for the given subjects. Altogether American research efforts underline that cooperative learning is more effective than any other type of group work.

The treatise in focus titled "Successful Group Work: Using Cooperative Learning and Team-based Learning in the Classroom" explores the group work related experiences of students. The author uses both cooperative learning and group-based learning to highlight three main features: the structuredness of the given activities, the connections and interactions between group members, and the responsibility or accountability of group members. Consequently, students preferred cooperative group work to simple group work due to more effective communication, the formation of new friendships, and the greater responsibility related to the former.

Australia

The most frequently and thoroughly researched pedagogical or classroom practice in Australia is cooperative learning. Several studies focus on the method's applicability in the business and community sphere while exploring the impact of cooperative learning and traditional instruction forms on cooperation and competition.

According Julie Boyd's leading treatise titled "The Future and Cooperative Learning" cooperative learning was always more than a classroom strategy since cooperation was needed in all aspects of life due to the adaptation and evolution of humankind. Boyd focuses on the role of cooperation and competition in public education, higher education, in the business and community sphere along with examining the integration options of various methods and the objectives of collective instruction. In sum the above described research urges prioritised treatment of the issue as the respective competences can be used in all walks of life.

Japan

Located close to Australia, Japan has achieved significant results in cooperative learning as well. The project method implying a variety of ways for knowledge acquisition has been a significant component of educational reforms taking place since the 1990s. Japanese researchers emphasize the educational applicability of cooperative learning, the correlation between cooperative learning and motivation, the promotion of the efficiency of student interaction and coopera-

tion, and the formation of in-class and extracurricular student communities. On the whole Japanese studies focus on the importance of cooperative learning and the maximization of the efficiency of learning and the promotion of cooperation.

Spencer Kagan's scholarly article titled "Cooperative Learning Structures" [Joritz-Nakagawa] introduces examples from the Kagan school. Accordingly, cooperative learning is regarded as a structured interaction whose components are equally important leading to positive human interaction. This approach facilitates collaboration on a basis of supportive and equal level cooperation. Kagan argues that cooperative learning can be used in case of teaching all subjects including foreign languages, mathematics, and social sciences. The survey was performed among Japanese college students.

United Kingdom

Researchers in Britain tend to focus on the positive aspects of cooperative learning regarding skill development and cognitive knowledge acquisition. Researchers explore a variety of themes including the promotion of greater student participation via cooperative methods and the potential extracurricular application of cooperative approaches. All in all essays and scholarly works written on the topic primarily deal with the development options of cooperative perspectives and attitudes.

The study of Robert White and Sokratis Dinos titled: "Investigating the Impact of Mediated Learning Experiences on Cooperative Peer Communication during Group Initiatives" reveals that the cooperative communication of collaborating groups, in other words, on-task communication can be influenced by intra and intergroup factors. Cooperative learning promotes student collaboration and the efficiency of cooperation can be increased if the work is led or helped by an adequately trained professional in a positive, accepting atmosphere.

The main research topics in Germany include the connection between cooperative learning and success, the democratic school, the school of the future, and the school as a teaching organisation. Several handbooks have been published on cooperative methods and complete texts are also available in many topics.

Carmen Druyen ad Heiner Wichterich's study explores the following issues: the origin and development of the concept, the democratic school and cooperative learning, cooperative learning as group work or a road to academic success, cooperative learning and school development, and the evolution of the school as a learning organisation.

Hungary

In addition to international research results I provide an overview of Hungarian efforts related to exploring cooperative learning. Several texts and program packages have been prepared in this topic along with a variety of inquiries into the propagation, applicability, and impact of the cooperative method in case of different subjects.

Viewing cooperative learning as a model József Benda published a two part study with the title of "Options and Successes of Cooperative Pedagogy in Hungary" in 2009. In addition to exploring the respective structural components Benda introduces specific processes along with summarising the results and pedagogical values achieved. The author presents the HKT model and analyses it according to sympathy group, group dynamics, time use, learning process, activity design, unstructured activity time, theoretical aspects of subject matter content, and the structure of the given model or program. As a whole the method was successful and was introduced in several schools.

Case study for the application of cooperative methods

In the present essay I describe the application of the cooperative approach in my classes. Since my professional perspective is closest to the concepts introduced by Kagan [2001] I am using the terms developed by him.

The CooSpace[1] system is crucial for groups using the cooperative method. It provides a community site and facilitates the tracing of data acquisition habits with data mining methods.

In case of materials taught by the cooperative method the formation of groups is crucial. Since most students do not know each other the teacher or instructor has to play an active role in promoting group formation. Kagan prefers groups with 3-5 members, while groups with 4 persons are also optimal for facilitating student work in pairs. I follow Kagan's recommendations while striving for gender balance and the inclusion of all students. After the formation of the groups the members will use the Interview method to get to know their group mates.

Cooperative learning methods imply basic approaches that can be modified or refined, along with trying new ones as well. However, I believe it is important that we use traditional methods in addition to the cooperative approaches.

I rely on Kagan's Mosaic method to process new material, which approach was particularly useful in dealing with mathematical functions in finance. The same method is used in the instruction of the recently reconceptualised Business Informatics subject.

One such task in which the Mosaic method was particularly useful is the preparation of labels used in commerce. The retail labels display the name of the given product, the unit price, and the respective bar code. The task was divided into two parts. First a product list had to be compiled. Accordingly, the product bar codes were prepared and both the respective products and bar codes were

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[1] LMS – Learning Management System: Learning management systems are such web-based framework systems which facilitate the systemization and storing of educational materials, auxiliary materials, and any learning objects related to instruction. Learning objects include courses, tests, questionnaires, calendar notes, and regular notes.

LCMS – Learning Content Management System: a system for the management of educational materials.

stored in a chart. In the second part of the assignment the merchandise labels were prepared according to the product list. The four member groups were divided into pairs, the first pair prepared the product list, and based upon this product list the second pair made product labels to be used for the printing of the adhesive bar code labels. Subsequently, each pair taught its task to the other. In conclusion the whole group solved a similarly comprehensive task independently. The solution of the respective task required the aggregate knowledge of all group members. Students had to rely on their previously acquired knowledge including the use of the random number generator, guided insertion, or the preparation of circular letters.

The other task solved in a cooperative manner was a research problem chosen by drawing from a given list of options. The solution was achieved with the Mosaic method as well. Students had to collect materials relevant to the topic drawn at random and make a maximum10 minute presentation with the PREZI system. Before the performance of the task each group was informed that the evaluation points will be part of the semester grade, and each group member will receive identical number of points. The distribution of subtasks was left up to the discretion of the group members, and after the allocation of tasks the given group discussed the exercise with the instructor. Consequently, the four principles of cooperative learning were observed and left intact. The CooSpace system enabled the group members to see the materials of the rest of the group. Thus the presentation at the next session was based upon such mutually known information and in most groups all members contributed to the presentation. During evaluation the points were determined jointly by the instructor and the group members, and the respective group members discussed how many points should be awarded to one another. It was interesting to observe the behaviour of group members during the evaluation process. Students were critical, sometimes even self-critical. While the allocation of points caused sporadic disputes, basically all groups came to a consensus in the matter.

Practical experiences related to cooperative learning

The advantages of the cooperative approach became obvious already at first application. The activity of students increased, while the atmosphere became more open and less formal. At the same time it was revealed that the cooperative approach requires more time for processing the given material and such methods should only be used in case of projects warranting collaboration or calling for problem solving. According to Attila Horváth [1994] the pre-requisites to such conditions include the following: the given task is interesting and its solution is within the capability range of the group members, there are many potential ways of solving the problem, and all members of the group can contribute their knowledge and skills to the solution. Therefore if a problem has only one solution, which can be arrived at individually more quickly than in a group format,

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or the solution requires memorization, the respective exercise is less suitable for the cooperative approach. Consequently cooperative learning can only be successful if the given assignment calls for the application of the acquired knowledge, the deduction of certain conclusions, and the identification of creative solutions.

Questionnaire-based survey

At the end of the semester student views concerning the efficiency of cooperative learning were surveyed by a questionnaire. The evaluation of the 55 fully completed questionnaires according to the Likert scale ranging from 1 (not efficient) to 5 (very efficient) revealed that 65 % of the participants gave at least a positive evaluation.

As the evaluation of the presentation component of the questionnaire revealed 85% of students considered the point distribution fair.

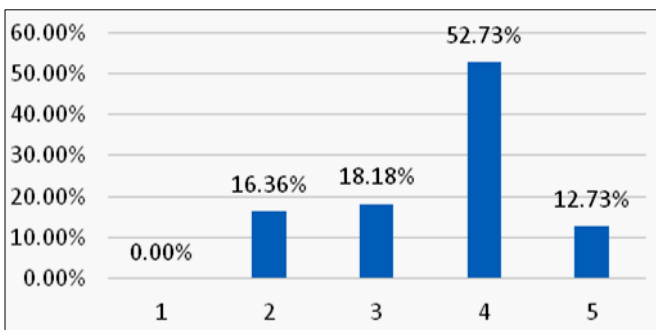**How effective was the given group work in your opinion**

Figure 1. Student's view of cooperative learning

In your opinion did the group allocate points in a fair manner to each member for the performance of the given task?
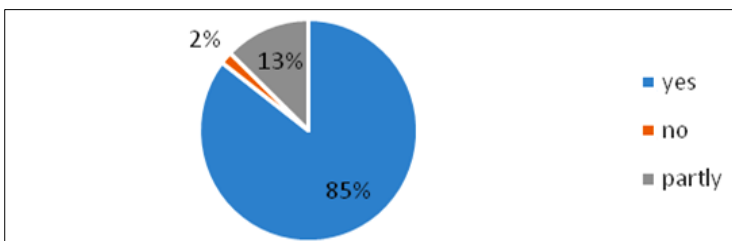

Figure 2. The opinion of students on the evaluation

57% of the students felt that the explanation provided by their groupmate helped to a better understanding of the new information.

The questionnaires, however, revealed some negative aspects of cooperative group work:
− Some students had difficulty in understanding or working with each other.
− Some students had a negative attitude, did not want to participate in group work.
− In some groups students did not contribute equally to the solution of the given task.
− Due to the formation of groups on a random basis some students had problems in working with unfamiliar peers.
− Some students prefer to work alone, or the individual approach is more successful for them.

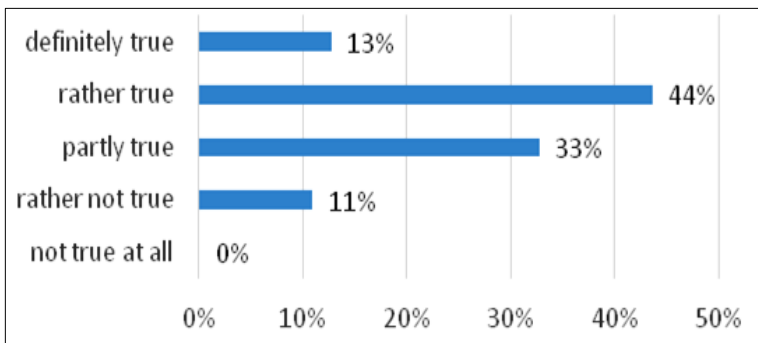**The explanation provided by my groupmates was very important in understanding the new material**

definitely true	13%
rather true	44%
partly true	33%
rather not true	11%
not true at all	0%

Figure 3. Student's view on the help provided by fellow group members

Summary
The next stage of my research focuses on the extension of tasks solved in a cooperative manner along with the alteration or modification of already processed data. My objectives include the expansion of the cooperative method and its adaptation to analysis purposes, along with the respective modifications. In addition to the assessment of group performance I plan to continue the questionnaire based survey with an increased set of questions. I would like to assess the extent cooperative learning can help in the acquisition of the given material. Among my additional goals I would mention the impact of specific conditions on group work, namely whether the absence of certain group members negatively impacts group performance. The analyses will be helped by the CooSpace framework facilitating the exploration of the connection system and the respective modifications within the groups along with examining the interaction between group members and the respective groups.

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