

# COLLABORATION TRENDS DURING ACTION RESEARCH IN AN E-LEARNING ENVIRONMENT FOR DEVELOPING AND ACQUIRING EFFECTIVE PERSONAL KNOWLEDGE

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Keywords: e-Learning, Collaborative learning, Action research.

Abstract: The present article is devoted to the experience of teaching a bachelor level business course at the Riga Technical University using the action research approach during student group work in an e-learning environment. The objective of the article is to identify the main trends of collaborative work in an e-learning environment: what effect the students' involvement in the action research method which is based on creating personal knowledge via reflection has on acquiring the course (1); how to measure and assess the students' creativity (2); how collaboration within the group influences the development of knowledge and creativity (3). The methods of statistical and qualitative analysis as well as systemic content analysis of the students' work are used in the article. The research allowed identifying several new trends which help to improve the effectiveness of e-learning.

## 1 INTRODUCTION

With the advance of information and communication technologies (ICT) the e-learning methods assume greater importance in educational practices. The integration of the latest discoveries of contemporary pedagogical science into e-learning is essential but has not been properly investigated. The present article analyses the research results of the effectiveness of a comparatively new learning method — action research — in e-learning project-based (PBL) group studies. Research on the formation of collaboration and interaction among the students, on the influence of the method on student motivation and the quality of the learning process has been described. The basis of mastering the subject is reflection leading to a discourse.

The discussion method, as an effective tool for getting the learners to think constructively while interacting with the rest of the group, creates an environment in which the students gain knowledge not only from the instructor and the study materials but also from each other. (Geidžs, 1998). This type of learning is based on social interaction. At the beginning one or more challenging questions are substantial for promotion of the discussion. The method stimulates the learners to discuss the basic

questions and guides to a logical conclusion. A student's ideas trigger other students' reaction expressed via reflection. In its stead, it causes the reflection of the author of the idea (Geidžs, 1998). Distributed cognition expresses a wider notion of the sum of individual cognitive processes. A group sometimes successfully solves problems which no individual member of the group can solve since the ideas of the participants of a discussion are formed in their interaction. (Salomon, 1997).

The discussion method is integrated into the collaborative learning – based on the model that knowledge can be created within group where learners actively interact by sharing experiences and have asymmetry roles (Mitnik 2009). They engage in common tasks and interdependence. It has several positive aspects in addition to creating and acquiring new knowledge: it helps to discard prejudices, to enhance participation and the ability to express one's views and to improve the student's record in relation to his/her cognitive skills (Shachar, 1994). Acquiring the ability to collaborate requires a relevant learning environment which has to promote the study process and comply with J. Dewey's criteria (Dewey, 1997; Hansen, 2002) : it has to be simple (acknowledging previously acquired skills and values) purified (stimulating the wish to listen to others), well-balanced (promoting individual

development in collaboration with other people), stabilizing (furthering the harmonization of knowledge based on the interconnectedness of all life areas).

Collaborative learning methods are sometimes criticized for posing several risks. They are the following:

- Transfer of potentially faulty knowledge.
- The possibility of conceiving group work as fun and not as search for truth.
- Excessive mutual dependence.
- The possibility of avoiding participation or, on the contrary, of dominating the discussion.
- The tendency to accuse each other in incompetence (Geidzs, 1998).

The learning process can be paralyzed by uncritical groupthink or by the initiatives of the group leader.

The objective of the research paper is to get to know how action research as e-learning method promotes learner's creativity and creation of personal knowledge. It was tested, how group discussion in e-learning environment influences forming of roles in the group. During research suitability of e-learning environment for action research as the learning tool was tested.

During the research, the students of the Business course discussed their business ideas developing and acquiring personal knowledge in an internet environment. This discussion was supervised and promoted by an e-learning consultant. An interview and polls revealed the teacher's and the students' views on the effectiveness of the learning method and the students' attitude to it. The analysis of the content of the students' discussion text revealed the degree of the students' involvement, motivation and creativity. The quantitative parameters of mastering the course were also analyzed.

## 2 ACTION RESEARCH AS THE LEARNING METHOD

One of the collaborative study methods is action research. It is based on J. Dewey's philosophy created at the end of the nineteenth century (Dewey, 1997) and further advanced by K. Lewin's (Lewin, 1946). B. Dick analyses the development of the action research theories up to 2007 (Dick, 2009). Action research concerns ideas and their application in helping to improve practice by systemic reflection. It comprises 5 steps in one learning cycle (Rust, 2006):

- Objective – the necessity of improvement (making the commitment).
- The creation of the living theory – questions and answers (designing a study).
- Making sense of experience – data and analysis.
- Complementing the living theory – better questions (beginning again).
- Improving the practice.

An important aspect in the creation of the action research theory concerns the theory creation methods – the creation of Grounded theory, offered by B. Glaser and A. Straus (Glaser, 1967). Performing any action people usually make predictions, i. e., they have a theory. Usually it is informal and relies on the results of actions. The Grounded theory is a systemic high quality research method creating theories from data and not from hypotheses which may seem to contradict scientific methods. Practical theories differ from scientific theories at least in three ways. First, practical theories are often viewed as instruments or tools. Secondly, practical theories are openly heuristic since they use notions and instruments and allow different interpretations of one and the same situation. Third, practical theories envisage actions that may improve the existing situation (Kevin Barge, 2008).

J. Whitehead evolved Grounded theory approach by creation of a basic method of the living theory approach in education. (Whitehead, 2009). The idea is based on the potential of the individual to provide personal unique explanations to educational ideas that influence him/her in the learning process. The living theory approach is essential in action research and is based on phenomenology, i. e., subjective perception, practices and reaction. It creates reflection on which the living theory is based. Basic and living theories are practical theories. The understanding that is created by the theory may help in improving practical activities.

In recent years, several research projects have supported that the action research approach is an effective means of motivating the students and encouraging them to participate (Herington 2008), as well as stimulating self-education (Keiny, 2008). We know from experience that an individual perceives information better if he/she is solving real life situations (Kapenieks, 2008). In the process of creating personal knowledge, action research encourages those persons who feel excluded and insecure. By its critical reflection of practices including a review of one's own views, value systems and tacit considerations dialogic action

research attracts people (Maurer, 2010). Involvement into a discourse - dialogue, leading to an assessment of rival views allows one to make better judgments as a basis for action, taking into account the existing perspectives, motivations and arguments which are supplemented in the next discourse (Boyer, 2006) It has been proved that students who use the action research component in their studies are willing to continue research work more often than other people (Kenneth, 2010).

With the advent of modern information and communication technologies in education, the question arose how to use them in collaborative learning. The computers provided the possibility to exchange ideas by e-mail, gave an easy access to information sources and the possibility to create a new collaborative environment for studies. Internet-based Learning Management Systems (LMS) give the possibility for teachers and administrators to supervise the study process, to organize the course activities and unified assessment systems and compare the relevant courses with parallel courses and the courses of the previous years. Interactive learning is sustainable learning, centering on the students' current needs (Purg, 2009). The development of the ICT makes it possible to realize G. Salmon's five-step model in collaborative e-learning (Salmon, 2002).

The action research method used for knowledge creation in e-learning group studies has not been investigated. As in fulltime studies this method is effective, the author of the present paper investigates whether it is a motivating factor in acquiring knowledge and how the participants in the group motivate one another. The method allows the teacher to motivate the students and get involved in group work. There is reason to foresee that a group working in an asynchronous way in an internet environment will not create distinct group leaders and the contribution of each group member will be larger and the group will be more homogeneous in comparison with face-to-face groups. It can be easily checked. As the action research method was based on creating the living theory, it was expected that the students' creative activities would be influenced by the success achieved by their group mates.

### **3 PARTICIPANTS AND THE LEARNING ENVIRONMENT**

The participants of the research were the bachelor students of the Riga Technical University whose curriculum includes the Business course which is not

their basic subject. The course was supervised by a teacher but the work in the e-learning environment was conducted by an e-learning consultant. In coordinating the action research, the Riga Technical University e-study portal „ORTUS” was used. It relies on the open source MOODLE software. The students receive instruction on the assigned tasks and can download the study aids and assignments as well as assignment templates or upload the tasks fulfilled. Action research was carried out in the environment of *Google documents*. Figure 1 illustrates the algorithm of learning by the action research. Filling in a form, the students had to answer questions which were summarized and recorded in an MS Excel sheet. The e-study consultant divided the students into groups and ensured each student's access to the sheet of his/her group for corrections or viewing the results. In the sheet, the students complement one another's ideas, summarize them in the living theory and view the teacher's corrections and assessment. This environment gives the students of the whole group the possibility to work on the common sheet as well as provides easy communication between the group members and the consultant by e-mail which is used also for motivating the students.

214 Riga Technical University bachelor level first year students from 10 academic groups of the Faculty of Electronics and Telecommunications participated in action research of whom 177 students performed 2 cycles of creating the living theory, but 148 students participated in all the 3 cycles. On completing the course, 100 students voluntarily participated in a poll on the course.

On the whole, the target group was responsive; they asked questions both during the classes and sent them by e-mail. During the study cycles, the teacher sent them reminders about the assignments, each time triggering a rise in student activity. Increased activity was observed also shortly before the end of the course. The content analysis of group work was carried out by selecting the first 75 students' performance (chosen from 15 groups) in cycle 1 applying no special selection criteria.

### **4 INVESTIGATION OF GROUP WORK IN THE E-ENVIRONMENT**

Knowledge creation was divided into learning cycles according to consecutive themes. The Knowledge acquirement spiral in Figure 2 reflects the learning strategy. It is based on the systemic constructivist

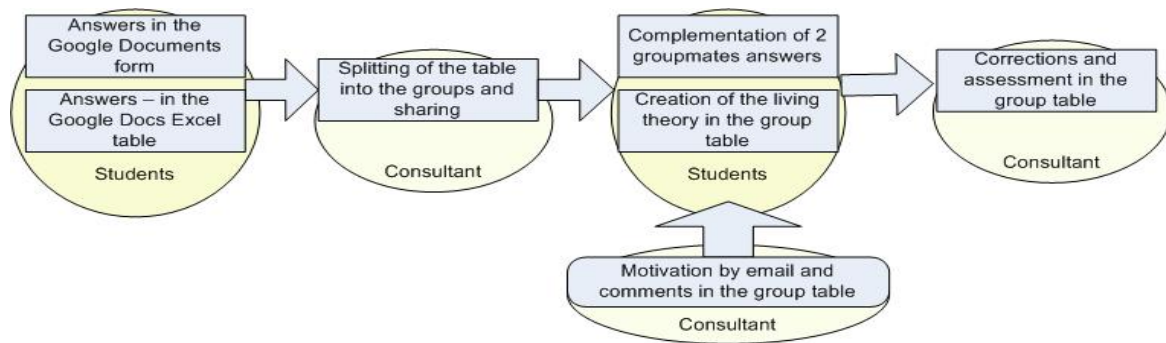


Figure 1: Algorithm of the e-learning by the action research during the learning cycle.

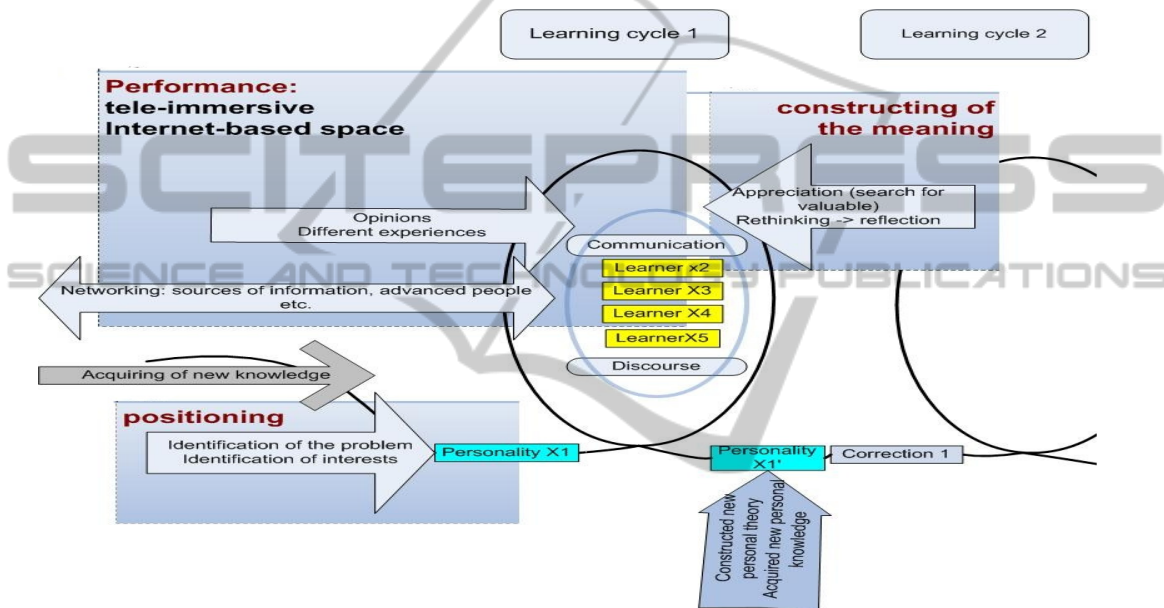


Figure 2: Continuity of learning by action research in the Business course.

approach which pays attention to three important discursive practices: (1) the construction of meaning, (2) positioning and (3) the performance.

Each learning cycle begins with the identification of the problem to be solved. In each learning cycle the living theory is created on the basis of group communication within the framework of action research. It is further developed in the following cycle (Figure 2).

The theory creation is based on reflection and assessment depending on personal views, experience and interests. In the theory creation process, the student's interests and views change which is recorded at the beginning and end of each cycle. Communication with other individuals introduces different experiences in the theory leading to discourse. At the end of the learning cycle, the living theory is analyzed and corrected, if necessary. The teacher's and consultant's role is substantial during the correction period.

The students in groups of 4 to 6 persons participate in 3 action research cycles. Before learning cycle 1 during the introductory lessons, the students get acquainted with the main notions and interconnections. The students found some exciting business success stories and learn more about them. Then the students choose their own business idea of an enterprise and create its development plan.

Before action research, the students are introduced into the course in an face-to-face class in which the objectives of the course are defined and basic information provided. The problems and questions to be solved in cycle 1 are also defined. At the beginning of the learning cycle, the student's interests, motivation for taking the course, experience and views are clarified.

Learning cycle 1 starts with the student's answers in the *Google documents* environment form to questions on the planning of the balance sheet (the revenues and expenses) of his enterprise. Some of

the questions to be answered in the first cycle are the following:

- What kinds of income do you expect to receive in your enterprise?
- What criteria will you apply for choosing your target clientele and who will they be?
- Please characterise the geographic, demographic, professional and social segmentation of the market.
- Please characterise the aims for setting the prices.

Their answers were automatically summarised in a MS Excel table by *Google* application tool. Students were divided into groups of four to six in the order of filling in the questionnaire form. Each group worked in on MS Excel document; each student created their own living theory in cooperation with two group mates. The group mates complement one another's views in this environment and each of them summarizes his discursive opinions in a general conclusion - his living theory. The e-learning consultant evaluates each student's performance and corrects it, if necessary. He/she also follows the learning process and motivates the students for work in face-to-face classes and by e-mail. In cycles 2 and 3 of action research, each student using a similar procedure develops his/her living theory on drawing up the balance sheet and the tax policy of his/her enterprise trying to ensure the most effective business success. As a result, each student develops his/her own reference system for the assessment of the content and the vaster implications of the *Business* course building personal knowledge and attitudes and developing personal interests and views.

## 5 RESEARCH

### 5.1 Research Method

To characterize the influence of group work on creating and acquiring knowledge, the students' reflective records in the e-learning environment during the course on Systemic Content Analysis (one semester) were used. At the end of the course, a student poll was carried out in which they had to evaluate the benefits of action research in acquiring knowledge, the contribution of the group, the importance of communication and motivation. Statistical analysis of the data obtained was made.

The teacher conducted an interview aimed at comparing the activity of the students' participation, motivation and performance with those of the

previous years when no action research in an e-learning environment was used in the course.

### 5.2 Parameters

To define learning efficiency, the following parameters were used as a result of content analysis of the students' opinions and commentaries:

- **Discourse** – the number of new ideas expressed in complementing the peer performance and creating the living theory. We may attribute creativity to discourse since the result is something new which in our case are the new ideas expressed by the students. The discourse in which the students complement their group mates' ideas corresponds to the criteria of creative thinking since it is created by thinking of "what might happen" and not of what has already happened (De Bono 1985).
- **Student performance** – the number of procedures in cycle 1 of action research. The procedures involve filling in the MS Excel sheet, expressing one's views to a group mate on a definite theme, recording the general conclusions – the living theory. The maximum number of procedures in cycle 1 is 12.
- **The number of discursive ideas in the living theory** reflects the number of the student's own ideas and the number of his group mates' complementary ideas that he/she has included in his/her living theory. This parameter has been incorporated into the discourse.
- **Assessments** – the assessment of the student's performance according to the themes which correspond to the learning cycles as well as the final assessment at the end of the course.
- To characterize the activity of participation, the order in which tasks are commenced has been used among all students (the number of the group) and among the students of one group (the sequences of starting work).

On completing the course, a student poll was conducted in which the students were asked to evaluate the contribution of action research to acquiring knowledge, the performance of the group and the significance of communication and motivation. They evaluated usability of e-learning environment as well.

## 6 RESULTS AND ANALYSIS

It was expected that the participation of the group mates in the development of the living theory and the views expressed by them would contribute to the knowledge gained by individual students. Figure 3 shows the students' assessment of the benefit of other students' participation.

Work in the group influences the students' activity and motivation. 62 % (62 students) stated that they had benefited from the ideas contributed by their group mates and 24 % (24 students) approved of summing up their and their group mates' ideas into the living theory.

As a result of developing the living theory, communication in an e-environment obtained the character of a social network. As the students came from different academic groups they did not know one another. 28 % (28 students) got acquainted with their group mates when they were discussing the course assignments.

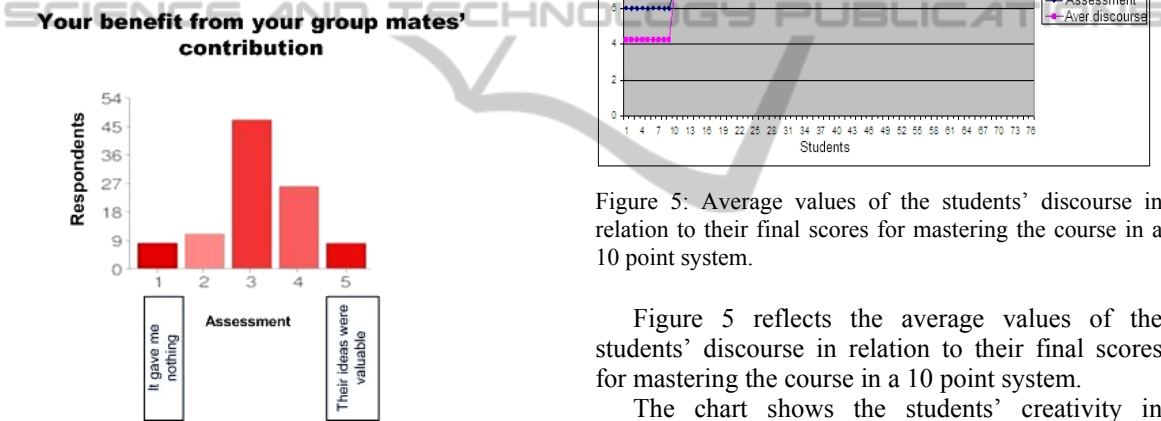


Figure 3: Benefit from group mates' contribution.

Work in a group is sometimes difficult. Thus, 23% (23 students) found it hard to understand their group mates' theories and 34 % (34 students) had difficulties in complementing the other students' ideas. Psychological factors must also be taken into account – 30 % (30 students) admitted they had been afraid to hurt their group mates' feelings by expressing their ideas as their opinion could influence the final assessment (though it was announced beforehand it would not).

Analyzing the content of the students' records, the parameter characterizing their creativity was determined as the number of discursive ideas expressed by a student commenting on the answers of two of his/her group mates' business ideas (Figure 4) and his/her own discursive ideas contained in his/her living theory (including his/her

group mates' recommendations).

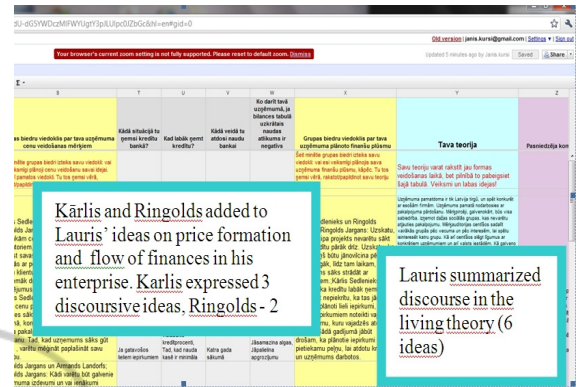


Figure 4: Excerpt from a group's common work sheet.

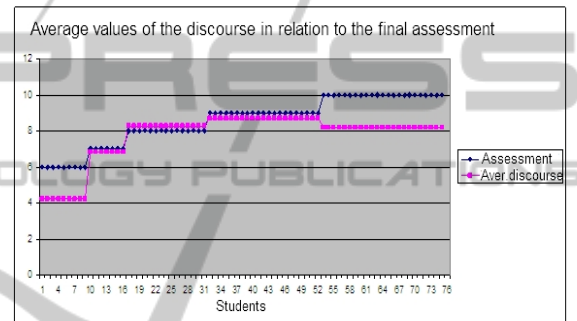


Figure 5: Average values of the students' discourse in relation to their final scores for mastering the course in a 10 point system.

Figure 5 reflects the average values of the students' discourse in relation to their final scores for mastering the course in a 10 point system.

The chart shows the students' creativity in developing the living theory in relation to the quality of mastering the course. When the students' performance improved creativity increased. However, the creativity of the students whose performance was outstanding (assessed by 10 points) was slightly lower than the creativity of these students who had scored 9 or 8 points. Perfect performance does not always mean high creativity. It testifies to the fact that innovative ideas do not always come from excellent students, and this applies also to business.

The students' motivation was characterized by the sequence of their involvement in group work and the number of procedures performed. In order to complete all the 12 procedures in each learning cycle and apply for a consultation to the e-study consultant, each student had to turn to the study material in the e-learning environment at least 4 times. In each learning cycle, he /she was motivated

in face-to-face classes and by e-mail. Figure 6 reflects the change in the students' performance depending on the sequence of his/her involvement in group work. "0" – means that the students did not get involved in the discussions of his/her group mates' ideas at all during the course.

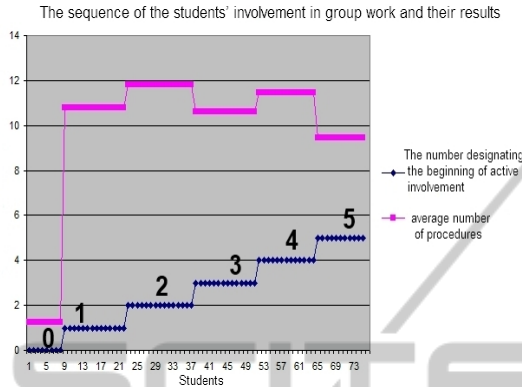


Figure 6: Students' performance depending on the sequence of the students' involvement in group work. "1" – means that these students were the first to get involved in group work, "2" – they were the second, etc. "0" – means that the students did not get involved in group work at all during the course.

The chart shows that on the whole the students had completed almost all the tasks (11-12) and as expected the last students to complete the tasks were somewhat superficial performing on the average 9 procedures out of 12. We may conclude that active involvement in group work in an e-learning environment is rather homogeneous in difference to that of the face-to-face study groups. Homogeneity is reflected also in the chart offered in Figure 7 which shows that the number of the students' discursive ideas in the living theory is related to the sequence of their involvement in group work.

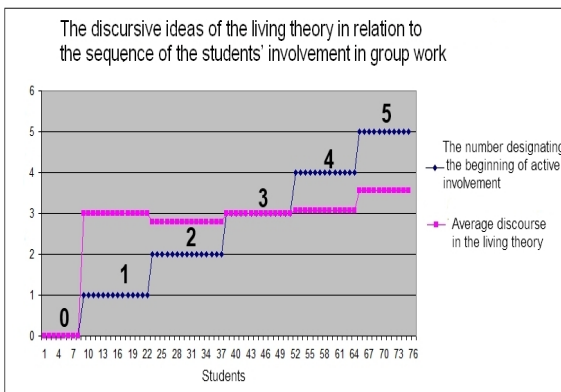


Figure 7: Students' creativity depending on the sequence of their involvement in group work.

The chart shows that on the average the students' discursive ideas do not depend much on the sequence of the students' involvement in group work. It points to their independence which is rooted in their motivation. The hypothesis that those students who get involved in group work rather late would be influenced by the ideas expressed by the more active students and thus have more ideas was not proved. The analysis of the content of texts written by the students showed that they did not have the tendency to repeat the ideas expressed by their group mates but they often either approved of them or rejected them. There were no distinct leaders in the groups, each group member's work was individual and at the same time it was connected with the performance of other group members. However, from all the target groups 9 students (12 %) did not participate in the discussions.

The research also revealed the fact that the homogeneity of the students' discourse was not dependent on the sequence in which the groups were formed.

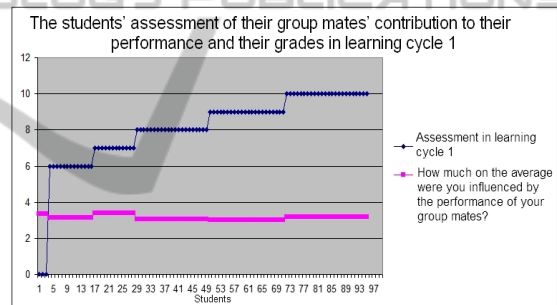


Figure 8: The average values by which the students assess the contribution of their group mates to their performance in a 1 to 5 point system.

It was confirmed by the answers of 100 students to the question – How much was your work influenced by the performance of your group mates? The chart in Figure 8 shows that on the average the contribution of group mates to a student's work did not depend much on the quality of mastering the course – the final grade. In each grade group the grade point average was given ("0" refers to those students who had not managed to complete the tasks).

The teacher of the course assessed the students' activity, motivation and the quality of mastering the course comparing the data obtained with those of the previous years. He noted that there was a marked increase in the students' interest and activity in comparison with the previous years. The quality of acquiring knowledge was considerably higher this year.

Some criticisms of the method refer to the subjective nature of the assessment of creativity by method of content analysis. Novelty of ideas, expressed by learners sometimes is hard to distinguish.

## 7 CONCLUSIONS

A new method has been elaborated in the investigation which allows evaluating the students' creativity.

The method enables to conclude that group work in an e-learning environment using the action research as a learning method stimulates the students' motivation and increases the quality of mastering the course. The investigation proved that this method had several advantages in comparison with face-to-face studies:

- Each student in the e-learning environment works on an individual basis and his/her performance is obvious and can easily be assessed.
- In a discourse, creating and acquiring new knowledge, the students are not shy to express innovative ideas. They get accustomed to accept and assess other students' ideas and include them in their own statements.
- Action research e-learning groups are relatively homogenous in respect to performance
- The students' creativity increases if the student improves his performance and his/her average score is 9 out of 10 points. Students having a maximum score of 10 out of 10 points are less creative.
- The students' creativity does not depend much on the sequence of their involvement in group work. Students whose involvement is a little delayed create more discursive ideas.

Majority of students found the method as useful (83 %) and recommended it for application to other courses as well (83 %)

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