Evaluation of e-learning courses using communicative and cooperative tools

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Abstract

In the contribution are presented the results of research directed at evaluation of e-learning course with help of specific tools, particularly for communication and cooperation are presented in this study. The research was drafted as pedagogical experiment and for data collection the knowledge test and nonstandard questionnaire aimed at the subjective course evaluation were used. We extended the e-learning courses for the experimental group about discussion forum, chat, and wiki. We followed evaluation of course in dependence on application of the introduced tools and further even on frequency of the approach to courses in both groups. In closing of the project discussions with students were realized and we obtained immediate subjective reaction on possibilities of implemented tools in the frame of the experiment.

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1. Introduction

Among frequently discussed disadvantages of e-learning belongs insufficient motivation of students disability of independent work and its organization or even independent learning. Individual study is a common practice in e-learning. The student could feel in cyberspace isolated, lonely. The teacher could not be always at his disposal, when the student needs him, it could make deeper student´s loneliness and helplessness (Zounek, 2012), communication „face to face“ is absent, etc. Individual study lacks elements of cooperation, which is considered as an important part not only of education, but even of successful „function in teams“ (working and private).

We found out during informative preparation of the project, in process of problem study that existed researches in this area of e-learning bring especially quantitative approaches and are mainly directed on perception of the course
as a whole without specific directing on the tools of communication and cooperation. The tools exploited in the frame of e-learning course and quality of communication from student’s view was investigated by David Bremer and Rueben Bryant (2004), Michael Machado and Eric Tao (2007). Clayton R. Wright compiled evaluation criteria of e-learning courses, Kearsley (2000), Benigno., and Guglielmo Trentin (2000) and Barbera (2004) were also engaged in this problem.

2. The project

We came out, in the frame of monitoring the condition of LMS Moodle, from the analysis of the tools used in the courses formed in the given environment. We directed our attention to a fact, if the course contains this tool and at the same time is actively used by student and teacher. The courses of Institute of primary and preprimary education Faculty of Education of University Hradec Králové were selected for the analysis of e-learning courses. In total 132 courses from Institute of primary and preprimary education Faculty of Education of University Hradec Králové were analyzed.

It follows from the analysis that:
- the most common part of e-learning courses are teaching materials determined for self-learning – the tool set (100 %), task aimed at independent work of students – tool task (60 % on the average), parallel respective completing tests (73 % on the average) and URL references (48 % on the average).
- Communication tool chat is used on an average from 4 %
- Communication tool Forum is used on the average from 48 %
- The tool for cooperation WIKI is used on the average in 1 %
- The tool of research is used on the average from 2 %

In the frame of separate courses were not used the tools as dictionary, public inquiry, questionnaire, lecture, workshop, book, unit and page.

According to our opinion e-learning courses drafted this way (i.e. courses, which contain tools, sets, tasks, tests, URL references) do not consider the important aspect of learning as communication, cooperation and mutual interaction of the participants of learning in the virtual space and do not exploit the potential, which is offered by the systems for conducting of learning.

2.1. Aim and methodology

Main aim of the research was to find out, if application of the tools for communication and cooperation in LMS Moodle influenced subjective evaluation of e-learning course from the standpoint of the teachers of the 1st level of primary school. The following partial aims ensued from the main of the research:
- to compare subjective evaluation of e-learning course of classic type, i.e. without application of specific instruments and e-learning course with exploitation of specific tools namely in the frame of the students of each faculty and then mutually
- to find out the application of specific Moodle tools by means of internet statistics of Moodle especially in the frame of students of each faculty and then mutually
- we determined, on the base of research aim formulation, research problem and research questions, following hypotheses:
  H 1: We suppose that the students, who will work in e-learning course with the tools for communication and cooperation will have better results in knowledge test than the students, who worked in the course without application of these tools
  H 2: We suppose that e-learning course with the tools for communication and cooperation will have positive evaluation than e-learning course without application of the tools
  H 3: We suppose that the students, who use e-learning course with the tools for communication and cooperation would attend more frequently the course than the students, who have for disposal the course without application of the tools
As a design of research we selected mixed designs, where the fundamental quantitative research method was determined by pedagogical experiment, which was subsequently completed with discussion (qualitative method). Total number of 97 students of teaching for the 1st level of primary school took part in the research. The students were divided by toss up in the control and experimental group. They subsequently passed teaching one whole semester in the selected groups. Teaching was conceived as a blended learning (Poulová, Šimonová, xxx).

2.2. Research results

To fulfill the basic requirements of the pedagogical experiment to from the same entering parameters in the control and experimental group, the students passed the pretest. For satisfying of entering parameters of pedagogical experiment, hypothesis on the results of pretests was tested.

We came out in hypothesis formulation from zero hypothesis:

H0 There is no statistically significant difference between the average number of points in the entering test of the control and experimental group.

The results of tests are introduced in the table 1. It was confirmed that there is not statistically significant difference between the results of entering tests at the control and experimental group of the students of Faculty of Education of University Hradec Králové.

Table 1. Comparison of the entry

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>T-Value</th>
<th>Z-Value</th>
<th>H0</th>
</tr>
</thead>
<tbody>
<tr>
<td>C control group</td>
<td>50,4</td>
<td>-0,4623</td>
<td>-0,5342</td>
<td>Accept</td>
</tr>
<tr>
<td>(Cj_vs_K)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C experimental group</td>
<td>51,1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Cj_vs_E)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

In conclusion of the course the students of all groups passed the output test – posttest aimed at the knowledge. On the basis of obtained data we could tested the first designated hypothesis”

H1: We suppose that the students who will work in e-learning course with specific tools (communication and cooperation) would have better results in the knowledge test that the students, who worked in the course without application of these tools.

For testing we came out from zero hypothesis:

H10: We do not suppose statistically significant difference between the resulting score of tests of the experimental and control group.

The test results (T-test and nonparametric Mann-Whitney tests) are given in table 2.

Table 2. Comparison of the output

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>T-Value</th>
<th>Z-Value</th>
<th>H0</th>
</tr>
</thead>
<tbody>
<tr>
<td>C control group</td>
<td>79,7</td>
<td>-3,4568</td>
<td>-2,4519</td>
<td>Reject</td>
</tr>
<tr>
<td>(Cj_vys_K)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C experimental group</td>
<td>95,6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Cj_vys_E)</td>
<td></td>
<td></td>
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</tbody>
</table>
It follows from the results that zero hypothesis was not confirmed and thus we are inclined to a fact that there was statistically significant difference between the results of tests at control and experimental group.

We were further interested in the subjective course evaluation on basis of non-standardized questionnaire. We started out from generally formulated hypothesis H2:

H2: We expect that e-learning course, in which specific tools will be used (communication and cooperation) will have more positive evaluation that e-learning course without application of these tools.

<table>
<thead>
<tr>
<th>Table 3. Questionaire T-tests</th>
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<tr>
<td></td>
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<tr>
<td>General information</td>
</tr>
<tr>
<td>C control group</td>
</tr>
<tr>
<td>C experimental group</td>
</tr>
<tr>
<td>Communication</td>
</tr>
<tr>
<td>C control group</td>
</tr>
<tr>
<td>C experimental group</td>
</tr>
<tr>
<td>Cooperation</td>
</tr>
<tr>
<td>C control group</td>
</tr>
<tr>
<td>C experimental group</td>
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</tbody>
</table>

How we can observe in table 3, statistically significant difference was not proved in total evaluation of control and experimental group. Only at evaluation of the course from view of communication, zero hypothesis was rejected and we can conclude that there is statistically significant difference between subjective evaluation of possibilities of communication and cooperation in the frame of e-learning course.

The object of our interest was comparison of approach frequency to courses. We came out of the hypothesis:

H3: We suppose that students using e-learning course with specific tools, spend in this course more time than students, who use course without application of these tools

We formulated zero hypothesis for our own testing of the number of approaches:

H30: There will not be statistically significant difference between the number of approaches to e-learning courses at experimental and control groups.

Control and experimental groups were tested. The fundamental characteristics of tested variables are introduced in table 4. The results of testing are summarized in table 5.

<table>
<thead>
<tr>
<th>Table 4. Described characteristics</th>
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<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>C control group</td>
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<tr>
<td>C experimental group</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5. Results of T-test and Mann-Whitney test for H30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>C control group</td>
</tr>
<tr>
<td>C experimental group</td>
</tr>
</tbody>
</table>
It is obvious from the results that zero hypothesis was not confirmed between control and experimental group. We can conclude that the students of the experimental e-learning courses entered the e-learning courses more often on the average. We were also interested in spreading of the approaches, if the students used the courses continuously during the semester or in certain periods. In graph 1 spreading of approaches to all courses is visible, which were applied for the purpose of pedagogical experiment.

![Graph 1: Spreading of approaches at control and experimental groups during semester](image)

Discussion in the focus group was used as a quantitative research method. Our aim was to obtain student’s reflection to newly introduced tools. E-learning courses usually include basic learning materials supplemented by references, self-tests, tests and tasks (see course analysis). Students are used to work regularly with these materials and evaluate them positively: “we have materials in hand, we need not to search anything for a long time”..“ we can print the material and insert in our notes, draw off the needed texts from reference.” The self-tests are less exploited, mostly before credit test:“ Sometimes I do the self-test, - I go through self-test before paper, it is before credit test – It is super – I try to tap the test on computer, then I feel more experienced in the credit test. If the lector uses tests regularly, the reactions are more inconsistent: “Test every week is a little bit stressing “if we must write the test regularly, it pushes us to stand attention all the time...I got used to tests during semester, it presses us to learn regularly... in the course of the semester one must think on it, not to forget it, but at the credit it is about one test less.

Commitment of the tasks – seminar works does not make any trouble – I loaded up the set without any problem, but at the beginning I lack certainty if I loaded it correctly, – but now it keeps me calm.”

**Forum** as a tool for discussion is rather well-tried at Faculty of Education UHK. Students use it for practice reflection from the first year of study, then especially in the fourth year. Students are used to evaluate openly their practice even the approach of the faculty teachers, they work regularly with Forum, sometimes they enclose photo documentation from the practice – interesting situation in the class or photography of pupil’s work. Opinions on the use of the tool Forum were positive: “I quite enjoy to discuss on Forum, I got used to that even the teachers answer“.. “it is not so informal as facebook, but I like to read the viewpoints of my classmates and their experience“.....“ I think that it is important to get used to discuss and express ones meaning. “

**Chat** was applied as a tool, which has not been used at any faculty. Students are accustomed to usage of facebook and to other social nets. For chat in Moodle they took up rather critical standpoint: “Chat in Moodle is
seen by teacher, chat on facebook nobody could see, therefore we prefer facebook, where we arranged special
group. I do not like to go to Moodle as I know that it is connected with school, when I click I know that only work is
waiting for me, but on facebook it is combination of duties, work with entertainment “on social nets we have our
friends and environment, which is close to us, it is the reason that combination of work, e.g. on facebook together
with informal chat is pleasant”

Wiki – the tool for cooperative teaching has not been yet used in Moodle at Faculty of Education UHK.
Generally cooperative teaching is not common. We tried to introduce this type of teaching in the frame of
experiment by means of e-learning environment. It is true that students fulfilled the task, worked out wiki pages, but
their reaction was confused “.we met and settled that one of us would fulfill the task“....".Maybe that we did not
comprehend that it should have made our work easier"., “.I think that we should learn to work with it, try it on some
informal topic“., "I know from practice that children enjoy cooperative teaching, but somehow we did not catch the
strategy“.

We were also interested in the student’s recommendation for learning improvement supported with e-learning
course. We partially awaited their opinions and it was instructive for us when it was heard:

- “education as long life trend should not be differentiate – now I better myself for school and now I
  better myself for life.”, “LMS should take it in consideration and be more tempting and enable
  combination of private and school life”
- “as Moodle is exploited at school now, the teacher should show it already from the 1st year, how we
could use it for communication and cooperation – not only “here you have materials and tests and it is
all “, “we should be shown how to work with Moodle in each subject – now, after long time in the fifth
year we have to retain the log-in for Moodle, which we input long time ago”
- “In the same way we had schooling about information system in the 1st year, we should have schooling
  about Moodle, i.e. as a part of entry. Moodle should be more utilized by teachers not to lost the
  continuity and not forget log-in, improve the style of work.”

Our aim was to catch opinions and relation of the respondents in the focal group to e-learning course, especially
specific tools used in the subject Didactics of information and communication technologies. In a short resume we
mentioned that all questioned teachers had positive attitude to e-learning course as a support of teaching and
consider it already as an inseparable part of teaching. They also take into consideration the conditions, which should
be fulfilled to make work effective in their course. It follows from their opinion that the specific tools must be
introduced from the 1st year already, as an inseparable part of the course, students must only „touch them“ get used to
apply them.

3. Conclusion

The level of output knowledge of control and experimental group was tested and statistically significant
difference was confirmed (experimental group reached better results). We could presume that application of the
tools for communication and cooperation could evoke greater interest about subject in the students and they
developed greater study effort. From the viewpoint of the course evaluation influence of used tools for
communication and cooperation was not proved. It followed from the discussion with students that application of
the specific tools except Forum was novelty for them, they did not meet with this tool in any course till now and it
was the main reason for subjective evaluation of the course as a whole and its part. Chat is used by students in
different style, its application in the course could be influenced by teacher’s presence. Students in discussion
mentioned that the tool could be more satisfying for them, if chat, in some cases, could be opened only for students.
Further phenomenon occurs from the results – students from experimental group joined the course significantly
more frequently. This finding corresponds with that they were involved in discussion forum. Applied chat and
formed seminary work in the frame of wiki. Frequency of approaches was similarly spread in both groups, students
most often entered the course at the beginning of the semester and the highest frequency of course attending was in
closing of the course.

In spite the fact that we did not prove effect of the tools for communication and cooperation on e-learning course
evaluation, we considered their implementation as beneficial for pedagogical practice in general.
References


