Respondents’ feedback on online learning reflecting individual learning preferences

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Abstract: The three-year research project “A flexible model of ICT-supported process of instruction reflecting individual learning styles” has been running at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic. The main research objective was to verify whether reflecting individual learner’s preferences within the ICT-supported process of instruction result in improving students' knowledge in comparison to the process reflecting teacher’s style or being self-managed by the learner. The paper provides results of monitoring students’ feedback after studying in the online course. After finishing the process of instruction students expressed their opinions, experience and attitudes in the final questionnaire, containing 22 items providing detailed information about the sample group (five items); and seventeen questions dealt with respondents’ experience in studying the course. Despite the learning process was provided in three different versions, most students expressed their satisfaction with the way of instruction they underwent. This result was deeply analyzed and several interpretations provided.

Keywords: tertiary education, online, learning styles, individualization, questionnaire, feedback.

Introduction

Since 2010 the research project “A flexible model of ICT-supported process of instruction reflecting individual learning styles” has been solved at the Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic. The main objective of the research was to verify whether tailoring the process of instruction in online courses to learner’s individual learning style and preferences results in improving students’ knowledge in comparison to the traditional teacher’s style led instruction and self-managed process (Felder, 2010), (Šimonová, Poulová, 2012), (Kostolanyová, 2012). The project was structured into four phases: (1) detecting students’ individual learning styles; (2) designing the online course “Library services – Information competence and education” in three versions reflecting (a) students’ individual learning style, (b) teacher’s style of instruction and (c) monitoring the process of instruction managed by each student individually; (3) running the pedagogical experiment to verify or reject the hypothesis that tailoring the process of instruction to student’s preferences results in better knowledge expressed in higher test scores; (4) monitoring students’ feedback after the process of instruction.

The questionnaire focused on the phase four of the process.

Research Methodology

Nine topics were included in the learning content of the online course: Basic terminology, Library services, Bibliographic search services, Secondary sources, Electronic sources, Writing professional texts, Bibliographic quotations, Bachelor and diploma theses, Publishing ethics. Study materials for each topic were prepared in several forms: (a) full texts providing detailed information; (b) short texts structured for the distance form of education, where the structure of the material aspires to simulating the traditional, face-to-face process of instruction; (c) PowerPoint presentations; (d) animations; (e) video-recorded lectures; (f) links to additional sources and other types of study materials. Each chapter included not only the learning content but also examples, practical applications and individual activities in such forms appropriate to the online course concept (version) described below. The sample group consisted from nearly 400 respondents from the Faculty of Informatics, University of Hradec Kralove.

The course was designed in three versions reflecting:

- **Respondent’s style of learning.** Students in the experimental group 1 (group LCI) were offered such study materials, exercises, assignments, ways of communication and other activities which suit their individual learning styles detected by the Learning Combination Inventory (LCI). The preferred order of materials was made electronically by an application which automatically generates the “offer”, i.e. it provides each student with types of materials appropriate to his/her learning style.

- **Content general approach.** Students in experimental group 2 had access to all types of materials (CG – content general) and the process of selection the appropriate type was the matter of their individual decision (group CG).
Teachers style of instruction. Students in the control group (group K) studied under traditional conditions, when their course was designed according to the teacher’s style of instruction which they were made to accept.

Before the process of instruction started, individual learning style of each respondent was detected. The Learning Combination Inventory (LCI) by C. A. Johnston (1996) was used. It includes 28 multiple-choice questions and three open-answer ones. The results is defined by a “pattern” of individual style of learning which presents the combination of four approaches to processing information - the Sequential, Precise, Technical and Confluent Processor.

The learning style pattern structure of all research groups did not differ significantly. Final results are displayed in fig.1 and table 1. The first feature which is apparent when comparing the four figures is that hardly any differences can be seen in comparison the three groups. So, all groups were considered equal and no statistic verifications were required.

![Learning styles structure in LCI (exp1)](image1.png)

![Learning styles structure CG (exp2)](image2.png)

![Learning styles structure in K (contr1)](image3.png)

Fig. 1. Learning styles structures in the LCI, CG and K groups.

<table>
<thead>
<tr>
<th>Group/n</th>
<th>Sequential</th>
<th>Precise</th>
<th>Technical</th>
<th>Confluent</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCI 108</td>
<td>preferred</td>
<td>75</td>
<td>29</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>accepted</td>
<td>33</td>
<td>75</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>rejected</td>
<td>0</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>CG 103</td>
<td>preferred</td>
<td>76</td>
<td>23</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>accepted</td>
<td>26</td>
<td>76</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>rejected</td>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>K 113</td>
<td>preferred</td>
<td>80</td>
<td>26</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>accepted</td>
<td>31</td>
<td>80</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>rejected</td>
<td>2</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

The experiment having been closed, students expressed their opinions, experience and attitudes in the final questionnaire, both from the technological and didactic point of view. The questionnaire included 22 items as follows:

- detailed information about the sample group was provided in five items;
seventeen questions dealt with respondents’ experience in studying the course – seven statements were evaluated on the four-level Likert scale, four items used the four-level classification (1-best, 4-worst) and six ones were the open-answer questions.

Research Results

Data collected in the first part of the questionnaire described the main characteristics of the research sample. The sample group (400 respondents in three groups, 230 – 235 each) consisted from 60 – 63 % of men in all three courses. Respondents were from 20 – 50 years old, approximately 80 % in the 20 – 24 year-old group. Respondents mainly graduated from secondary professional schools (62 – 67 %), followed by grammar school graduates (29 – 45 %). Most of respondents (60 – 65 %) did not have any previous experience in studying online courses, approximately 20 % of them had studied one course and 5 % were experienced online learners having passed four or more courses.

The second part of the questionnaire provided data on students’ satisfaction with the process of instruction in online courses. First, respondents expressed their satisfaction with clearness of instruction on how to study in the course and whether the organization/re-organization of study materials on the home page reflected/non-reflected their preferences. More than 80 % of respondents considered the instructions clear and 95 % and more respondents expressed their full and partial satisfaction with the way how study materials were re-/organized on their personal home page of the course, i.e. various types of study materials were presented in such order which reflected students’ preferences.

Another problem considered by respondents was the length of study relating to the learning content and amount of events scheduled in their diaries. Most respondents (64 – 68 %) did not have problems to master the learning content in the given period but one third of them (32 – 35 %) would appreciate slightly more time. On the other hand, 41 – 52 % found the three-week period for studying the course in their schedule without any problems, followed by another group of 37 – 46 % of respondents who might have had some slight problems and expressed partial satisfaction.

Following two items dealt with evaluation of various types of study materials from the point of respondent’s preferences. All materials were categorized in seven main groups described above (i.e. fulltexts providing detailed information; short texts structured for the distance form of education, PowerPoint presentations; animations; video-recorded lectures; links to additional sources and other types of study materials). Four of them (fulltexts, texts for the distance education, PowerPoint presentations and animations) were evaluated by respondents from the point of their appropriateness to the individual learning style (from 4 – fully matched to 1 – completely mismatched to my learning style), when each value can be used once only.

As mentioned above all groups were stated identical from the point of learning patterns structure (Fig. 1, Table 1). The results of the experimental group 1 (LCI), where the study materials were re-organized by the plug-in so that the process of instruction reflected individual learning styles, show rather strong preference of full text study materials (1 – 39 %, 2 – 22 %) and texts structured for distance learning (i.e. where the applied methods, tools and style of writing simulate the real process of instruction, 27 %, 37 %), while approximately half of respondents (20 %, 33 %) most appreciated presentations and animations are least preferred type of study materials (23 %, 21 %).

Respondents of the experimental group 2 (CG), who were provided all types of study materials and no re-structuralization was made by the plug-in, also show strong preference to full texts (40 %, 23 %) and texts structured for distance education (27 %, 3 %); presentations show the lowest preference in all three groups (13 %, 31 %), they are even less appreciated that animations (21 %, 17 %).

Results in the control group (K), where the process of instruction reflected the teacher’s style, preferences were nearly identical with the experimental group 1 where the learners’ preferences were reflected, i.e. fulltexts were the most appreciated type of study materials (25 %, 35 %) followed by texts structured for distance education (23 %, 26 %); presentations received the highest rate of appreciation from all groups (24 %, 30 %) and animations are in-between the experimental group 1 and 2, reaching 32%- and 14%-preference, which is higher rate than in the LCI group and lower than in the CG group.

If the collected data are transformed to nominal values (4 points for mark 1 – this type suits best and 1 point for mark 4 – fully does not suit), results clearly show

- very positive appreciation of fulltexts in all three groups followed by partially positive evaluation;
- comparable rate of full and partial appreciation of texts structured for distance learning;
- rather high rate rejecting presentations;
- strong appreciation of full texts in the control group where instruction follows teacher’s style, as displayed in Fig. 2.
Furthermore, several items collecting students’ feedback on the difficulty of mastering the learning content were also included in the questionnaire. The learning content was structured in nine above mentioned chapters. Fig. 3 displays respondents’ opinions on the difficulty of selected topics. The difficulty was evaluated by on the seven-level scale from value 1 – least difficult topic (dark colour) to value 7 – most difficult topic (light colour). While mastering the topics of Library services, Bibliographic search services and work with Secondary sources were considered rather easy than difficult (dark colour – easy to master, light colour – difficult to master), other three topics were evaluated rather difficult (levels 6 and 7) – i.e. Electronic sources, Creating quotations and Professional writing. Two items are surprising within this evaluation: first, ranking work with electronic sources among difficult topics by today’s students who declare modern technologies to play irreplaceable role in their (both private and professional) lives; second, at the same time their evaluation of mastering bibliographic search services rather not difficult.

Creating quotations is considered the most difficult topic (level 7) by 40 % of respondents in the control group (K) reflecting the teacher’s style of instruction and 25 % on level 6), followed by the LCI group (experimental group 1) in which individual learning styles were reflected in the process of instruction (35 %, 25 %) and by the CG group (experimental group 2; 29 %, 16 %).

Professional writing was also regarded as a difficult topic: 26 % and 28 % of respondents in the control group evaluate it very difficult (levels 7 and 6), and similar results appeared in other groups: respondents in the LCI group showed 27 % and 25 %, in the CG group the results were 24 % and 31 %. The complete data are presented in fig. 3.
If the learning style preferences are not taken into account, results of total difficulty evaluation are displayed in fig. 4. The darker the colour is, the less difficult (i.e. easier) the mastering the topic was for students. Thus it is clearly visible that chapters of Quotations and Professional writing are evaluated the most difficult, similarly to fig.3.

The course of study was also evaluated from the point of learners’ problems, difficulties and limits. Five criteria were set as follows:
to start studying,
- to keep studying,
- lack of time,
- tiredness,
- problems with technology.

Data were evaluated on the six-level scale from no problems (level 1) to crucial problems (level 6). Results are presented in fig. 5.

**Fig. 5. Selected matters within the process of instruction.**

Half of respondents (48%) had no or little problems (levels 1 – 3) to make efforts and start studying in the LCI group while slightly fewer ones were detected in CG (46%) and K (44%) groups; higher rate was even expressed under the second criterion, i.e. keep studying, when respondents in the K group reached the highest score of 61%, followed by the LCI group (55%) and CG group (53%).

Approximately 20% in each group suffered from lack of time for studying (61% in the LCI group, 54% in the CG group and 52% in the K group).

What is rather surprising students did not feel so much tired as could be expected when studying in the combined, i.e. part-time form. Fifty-nine per cent of respondents in the LCI group had no or slight problems with tiredness before or within learning, and even the higher scores were reached in other groups - 63% both in the CG and K group.

Most respondents did not have substantial problems with technology (85% in the LCI group, 79% in the CG group and 84% in the K group).
Research results and discussions

From the above presented results can be clearly seen that respondents – participants in the online course, expressed their positive approach and satisfaction with the course of study. Hardly any crucial problems appeared which could be also caused by the fact, that the respondents were students of the Faculty of Informatics and Management (Applied Informatics and Information Management study programmes, future engineers) and neither the online learning (i.e. ICT-supported instruction), nor the entire learning environment built limits and restrictions to them in the process of forming knowledge. Unfortunately, neither the research results, nor learners’ evaluation proved our expectations that the reflection of individual learning style might be the means which (if applied in the didactic and sensitive manner) could help them substantially within the process of online learning (Honey et al., 2000). This result was surprising for the team because the learning style reflection was understood to be a powerful factor providing strong impact on the process of learning, and statistically significant increase in knowledge of the LCI course participants was expected. Despite all the possible and real problems course participants had during the course of study, approximately 80% would take another course (other courses) within their university study, i.e. they would prefer online learning to traditional face-to-face approach.

There might be several reasons how to interpret the results. First, neither strong, nor marginal preferences were discovered in patterns within the sample group which could produce statistically significant differences. We agree with e.g. Honey (2010a), Mitchell (2004), Sternberg (2001) saying that not tailoring the process of instruction to learners’ individual preferences results in increase the knowledge but they consider the developing new learning strategies to be more contributive to the learner. Thus the research question is as follows: Is it really worth dealing with learning styles if the pedagogical experiment did not prove any increase in knowledge?

Second, as mentioned in the theoretical part, there exist some researches (and researchers) that reject the theory of learning styles resulting in the individually tailored process of instruction, e.g. Honey and Mumford (2002), Honey (2010b). The proposal might be to work with learners (a) showing very strong preferences in one learning style, and help them develop other strategies and approaches; (b) attract attention and show those who have very weak preferences and are able to study efficiently using any strategy that there exist some approaches and methods which might suit them better, which finally can increase their motivation in learning, make the process more interesting for them, which is not of little importance (Sternberg, 2010).

Third, there could be several other reasons why the expectations and hypotheses were not verified, both on the researchers’ and learners’ side. In further research activities other approaches running the process of instruction reflecting individual learning styles can be tested, i.e. tutor’s role as a facilitator could be strengthened and emphasized so that learners feel and study in a more friendly environment, being provided wider technical and didactic support, use their experience in online learning developed in this course, and many other measures could be taken. On the learners’ side the skill of independent work and study must be supported and gradually developed, as online learning has become standard not only in the tertiary education but particularly in lifelong learning (Černá and Maněnová, 2010).

One of the project outcomes - the plug-in generating the learning content in adequate order has been designed and can be used as freeware on request but no increase in learners’ knowledge was discovered. What has been appreciated is the learners' positive approach to online learning which was expressed by their approach to further learning in online courses. Despite this factor did not belong to the primary or crucial ones, it can be considered a positive side contribution without any hesitation.

Conclusion

Thus it can be concluded that despite the contribution of the learning style theory to the online learning process was not proved within this project, no decrease in learners’ knowledge was discovered in comparison to the traditionally led process of learning which follows teacher’s style of instruction. The above mentioned authors (Gregorc, Mitchell, Honey, Mumford etc.) also described results not verifying the learning styles contribution to the knowledge development and educational objectives within the learning process reflecting individual learning styles; including Felder particularly focussing on engineering education. As mentioned in the first chapter, the time came to deal with didactic aspects of ICT implementation into the process of instruction. Students have not reached higher but the same level of knowledge in online learning, which corresponds to predefined learning objectives; and both teachers and learners have to develop their knowledge and skills towards studying efficiently being supported by modern technologies. This conclusion and recommendation is natural for engineering students and engineering pedagogy, both having close relation to modern technologies.

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References


