ADAPTIVE TEACHING VIA E-LEARNING FORM

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Abstract: The proposal of the adaptive form of teaching stems from the analysis of tested student characteristics. The testing involved modified questionnaires localized to Czech conditions of teaching (LSI, ISL, …) in context with e-learning teaching. Based on tipped, most frequently occurred groups of student characteristics, the optimum procedures for presentation of the content of study according to learning styles of individual students are proposed. Students will be recommended the optimum method of the passage through the course, but at the same time, they will be offered other forms and methods of presentation of a particular topic of study. The contribution deals with the proposal of teaching tools according to most frequently occurring clusters of student characteristics.

Key words: Adaptive teaching, eLearning

1. Introduction

Proposals on individual education and learning are subject to two individualization principles:

1. principle of mastered learning: each student will be given a chance to reach the specified education target through an independent different way

2. principle of continuous progress in learning: each student should continuously progress towards new learning requirements = the student should not be inhibited in their learning pace (faster students must not be decelerated by slower ones)

The stated principles can be met by several methods while some methods are aiming at the former, some at the latter.

The implementation of the individual approach to all students in the classroom is not feasible for any teacher. The adaptive approach to education requires from the teacher knowledge of a wide spectrum of teaching methods. If we apply this topic in the area of electronic education, we will want to establish the adaptive environment according to objectives and needs of a particular user.

2. The principle of the adaptive environment development

The adaptive environment (the LMS under development) monitors behaviour and characteristics of the specific student (user). Firstly, the student completes the induction questionnaire which will suggest his/her prioritized method of learning and certain characteristics connected with education. Following evaluation of questionnaires it is obvious that certain characteristics are grouped together, occurring more frequently and of higher probability, while others occur sporadically, or not at all. The most frequently occurring groups of characteristics become the basis of the methodology development which will describe the production of adaptive tools and optimum process of teaching. The study material, which is in accordance with capabilities, preferences, needs and learning styles of specific users, is being prepared. The principle of adaptation of study materials based on typical characteristics of users is the issue less elaborated as opposed to testing of students for the sake of their learning style determination.

3. Testing of students – the outcome is the preferred learning style

There is a series of qualifications of learning styles in available literature always based on typical characteristics of students. In context with future proposal of an e-learning form of teaching, those characteristics have been selected which are applicable in the e-course. Individual characteristics of students including their other qualities having impact on the learning process are called learning styles.

Classifications extensively described in various references are enrooted in several elaborated theories whose basis is Kolb cycle of knowledge learning. The analysis of various types of testing was conducted (according to various criteria) and its results were arranged in the table of the following form:

Source	Author	Name of learning style	Description (characteristics)	characteristic 1	characteristic 2	…	…	…	Characteristic n

The characteristics (characteristic 1 … characteristic n) involve: pictures, video sequences, written text, independent work, necessary assistance of teacher,….The table shows if the particular style has, or has not that characteristic. Following consultation of psychologists and pedagogues the characteristics applicable in e-learning were included in groups of the following values:

perception: intuitive perception - logical;
sensual perception: visual – auditive – kinesthetic - verbal;
social aspects: he/she likes to work independently – in a couple – with teacher – in a group;
affective aspects: motivation to study – internal, external;
learning tactics: orderliness with poles – order - freedom
       method with poles – theoretical derivation - experimenting
       method with poles – analytical, bottom-up – holistic, top-down
       perception with poles – in depth – superficial
       self-regulation with poles according to instructions - independently

Even at pilot testing each characteristic was not considered as two-value only (exists/ does not exist), but in the question/answer the questions are formulated in the scale of both poles at limits. The individual learning style particular for each student will not be named (for the time being) but it will be characterized by n-value in the relevant scale of characteristics.

4. Pilot testing of learning styles

Pilot testing of students involved questions from LSI, ISL and VARK tests to test the aforesaid characteristics. This is how primary data was obtained for further analysis and draft methodology of study supports development.

Majority of questionnaires included statements with annexed scale expressing the level of consent with a particular statement. Usually, that scale ranged from 1 (disagreement) to 5 (agreement); regarding TSI the scale was from 1 – 7. VARK questionnaire consisted of questions to which 4 variants were included, each for single sensual type.

That group of questionnaires was transferred into the electronic form. Prior to their completion, the questionnaires were submitted to students individually, while evaluation was available after completion of all of them.

5. Results of testing

Due to a small range and low level of data sources the results presented further on should be considered as tentative, only.

Main components

The expectation of well designed questionnaires was not confirmed, because the number of main components determined from answers is multifold higher that the number of main components determined from results of questionnaires.

It appeared that resulting characteristics were mutually dependent. Out of the original 28 characteristics only 18 would have been enough to cover variability of majority of data. The number of characteristics describing a student could have been reduced to the main components revealed, yet interpretation of such new characteristics would not have been obvious. Therefore, it is more convenient to maintain original characteristics. The reason of those dependencies between characteristics of the student may stem from the fact that those characteristics originate from several various questionnaires which aim at various groups of characteristics.

Decision trees

The most interesting results were revealed in sensual types. The auditive type of student strongly depends on if such particular student is/is not a multimodal type. Should the student is multimodal type, they are usually auditive types, too. The same result was obtained even for visual and verbal type of student. That finding is confirmed even by the result of main components where the main component was multimodal type. That dependency was slightly different for kinesthetic type. It is evident that for those data the kinesthetic sensual type can be completely left out and substituted by remaining sensual types, specifically by multimodal and visual. That is to say, absolute majority of multimodal types is also of kinesthetic type. Otherwise, kinesthetic type occurs only, if there is no multimodal and at the same time visual type. Additionally, that result is greatly supported which indicates that the same result could occur even in different data.

Clustering

Regarding clustering, according to all characteristics no significant clusters came up; there was only a quantity of isolated points obtained. Such results suggest that there are no groups of students who would be similar in majority of characteristics. That can indicate a fact that students evenly cover the space of all characteristics. However, it can be both reflected by small quantity of data in respect of the number of characteristics, and incorrectly designed questionnaires, their incorrect translation or their completion by students who did not fully concentrate.

The analysis of completed questionnaires by students revealed potential unreliability of applied questionnaires. However, the interesting results which were found can be used as hypothesis for next phase of learning styles analysis with more reliable questionnaires and more numerous population of students.

6. Conclusion

The aim of the adaptive teaching will not involve mere adjustment to the learning style of a particular student. The student will be proposed an optimum method of passage through the course according to result of testing of his/her characteristics, abilities and skills. Following processing, followed by analysis or real data obtained from questionnaires and finally, following successive modification of characteristics describing learning styles, it will be possible to proceed in similar processing of teaching styles. At this point we can set on a direct path which leads to the formulation of adaptive algorithms managing automated e-learning teaching.

Literature

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