Cognitive Style Variable in E-learning
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Abstract

Body of research shows the impact of cognitive style preference on students’ attitudes towards e-learning. Our research results did not indicate statistically significant impact of the analytic-intuitive and category width dimensions of cognitive style on perception of e-learning. The correlation coefficient was on an insignificant level ranging from \( r=0.02 \) to \( r=0.16 \), \( p<0.05 \), \( n=234 \) (Simuth and Sarmany-Schuller, 2008).

Based on these results, we assume that we need a more refined tool to further investigate the cognitive style variable in e-learning. Recently, Cools and Van den Broeck (2007) reported on the development of a reliable, valid, and convenient cognitive style instrument – the Cognitive Style Indicator (CoSI). Reliability, item, and factor analyses confirmed the internal consistency and homogeneity of three cognitive styles: a knowing, a planning, and a creating style. The article focuses on possible relationship between CoSI preference and preference of e-learning activities.

1. Introduction

The recent trend in adult education is the use of e-learning tools. We came to the conclusion that the development of e-learning is characterized by transition from learning machines and programmed education toward learning by using internet as a mediator of information and communication between real human subjects of education. It seems that the era of closed e-learning courses (off-line courses) is over. There are several advantages of online e-learning. It offers flexibility allowing students to progress in their own pace. This makes students more responsible for their own learning which enhances student centeredness. Using ICT enables students to access the study materials anywhere at any time by using computers and / or mobile devices such as tablets, smartphones etc. Despite of the popularity and obvious advantages of e-learning there is permanent lack of solid research and information about the pedagogical and psychological aspects of e-learning. The literature and conferences are prevailingly focused on the potential of technology, application of new features in specific courses and administrative – organizational aspects of e-learning. One claim is that e-learning lacks the ability to satisfy the diverse learning needs of adult learners. Thus, identifying different types of learner variables and their impact on learning should be a major area of study in e-learning (Smith, 1997).

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In this article, we focus on student’s cognitive style variable in e-learning. Cognitive style can be defined as the way people think, the accuracy of their perception, how they process and remember information or how they use the information in problem solving (Sarmany-Schuller, 1999). Hayes and Allinson (1996) define cognitive style as a tendency to perceive stimuli and use information in a certain way to guide their behavior. Riding and Rayner (1998) understand cognitive style as the missing link between personality and cognition. Therefore, it seems logical to focus on cognitive style in connection with learning. There are studies that show the impact of cognitive style preference on behavior and attitudes of students in e-learning environment (Liu a Ginther, Jonassen a Wang, 1993; Yoon, 1994; Price and Repman, 1995).

McLoughlin (1999) has found that individuals learn best when information is presented in ways that are congruent with their preferred styles. According to Khan (1997) learners should also be empowered by providing them with access to a wide range of information (objectives, learning strategies) and communication options, both synchronous and asynchronous that can be used in large group, small groups, and one-on-one settings. We also carried out a research to find impacts of two cognitive style dimensions on the perception of e-learning. We included the analytic – intuitive dimension of cognitive style (Allinson and Hayes, 1996). We hypothesized that intuitive students perceive the typical online instruction, limited possibilities for interaction with the instructor and study group as barriers more than analytic students. The next dimension of cognitive style included in the research was category width (Pettigrew, 1958). We hypothesized that broad categorizers consider the online communication with instructor and study group as barrier more than the narrow categorizers. The research results did not indicate statistically significant impact of the analytic-intuitive and category width dimensions of cognitive style on perception of e-learning (Simuth and Sarmany-Schuller, 2008).

Our and other findings still do not contradict the hypotheses that cognitive styles have impact on the students’ activity in e-learning. These types of studies are more focused on attitudes of students. However, we still assume that student’s activity in e-learning courses differ based on the cognitive style preference. They may be equally satisfied and perform on the same level. However, they may prefer different activities and benefit from different activities depending on their cognitive style.

2. Method

We assume that for studying the learning activity preference, we need a more refined tool. Cools and Van den Broeck (2007) reported on the development of three dimensional tool which is a reliable, valid, and convenient cognitive style instrument – the Cognitive Style Indicator (CoSI). The questionnaire consists of 18 items. Reliability, item and factor analyses confirmed the internal consistency measured by Cronbach’s alpha coefficients ranging from .73 to .85. The instrument offers homogeneity of three cognitive style dimensions: knowing, planning, and creating. Authors found that the knowing cognitive style can be related to concepts as analysis in CSI (Allinson and Hayes, 1996) and in regard to personality it correlates with introversion positively and negatively with agreeableness. They claim that planning style is related to such characteristics as Adaptiveness in KAI (Kirton, 1994); Sensing and Judging in MBTI (Myers et al, 2003); Rationality in REI (Pacini and Epstein, 1999) and in link to personality, it positively correlates with conscientiousness and negatively with openness to experience. The creating style was found to be related to intuition in CSI (Allinson and Hayes, 1996) and innovator characteristics in KAI (Kirton, 1994). With regard to personality, authors found positive correlation with extraversion and negative correlation with conscientiousness (Cools and Van den Broeck, 2007).

Based on these findings we think that students with a knowing style search for facts and data. They want to know exactly the way things are and tend to keep precise facts and details. They like to search for rational solutions. These students can be characterized as objective, impersonal and reflective. Students with a planning style are characterized by a need for structure. Planners like to organize and control, and prefer a well structured work environment. They attach importance to preparation and planning to reach their objectives. They prefer to learn in a sequential and structured way. These students like conformity, routine and objectivity. Students with a creating style
tend to be communicative, creative and like experimentation. They see problems as opportunities and challenges. They like uncertainty and freedom. They are impulsive, flexible and subjective.

We assume that preference in the CoSI dimensions will have impact on students’ preferences in e-learning activities. In the research, we focused on possible relationship between student’s cognitive style preference and his/her preference of e-learning activities. We assume that knowing style will benefit from e-learning activities such as information search on internet, analysis of information on given subject and summarizing information from e-books. Students preferring the planning style will probably most benefit from activities that are planned and scheduled by the instructor like asynchronous discussions, online PowerPoint presentations, video lectures etc. Students with the creating style will perhaps benefit mostly from e-activities such as synchronous online discussion, video conferences, case studies, problem solving and research assignments etc.

To confirm our assumptions, we have distributed CoSI with a 15 item questionnaire measuring the level of e-learning activity preference. In summary, we have asked about following e-activities: internet information search and summary, asynchronous discussions with instructor and peers, power point presentations, video lectures, synchronous discussions with instructor and peers, synchronous consultations with instructor, video conferences, open ended case studies, activities with delayed feedback, computer simulations and exercises with automated feedback. The preference was measured on a scale from 1 to 5 (1 represented the highest preference while 5 the lowest).

We have distributed these questionnaires to management students studying in distance education format at School of management / City University of Seattle in Slovakia. The return rate was 63%. That means that the research sample counted 97 students (58 women and 39 men, average age was 26.3).

We used Pearson’s correlation coefficient “r” to find the relationship between two quantitative parameters – cognitive style preference and e-learning activity preference.

3. Results

Based on the statistical analysis, we arrived at the conclusion that the cognitive style preference on the knowing, planning and creating dimensions can have impact on some of the e-learning activities preference.

We have found a significant correlation between students preferring the knowing style and the low preference for activities such as video conferences (r=0.17, p<0.05, n=97). We have also observed that the preference of planning style correlates with students’ preference of asynchronous discussions with peers and instructor (r=-0.24, p<0.01, n=97) and also with activities such as synchronous consultations with the instructor (r=-0.19, p<0.05, n=97). In the relationship to creating dimension, we have found that these students prefer solving open ended case studies (r=-0.16, p<0.05, n=97). Students with creating style show low preference for video conferences with teachers and students (r=0.21, p<0.01, n=97), research activities tied to searching for information on internet (r=0.19, p<0.05, n=97) and activities with delayed response or feedback from instructor (r= 0.18, p<0.05, n=97).

4. Discussion

Our findings confirm to some extend our assumption that cognitive style preference measured by CoSI can have an impact on the e-learning activities students prefer in their studies. Students in the sample were adults having some degree of experience with e-learning activities in online form of distance education. Therefore, we think that their preference for learning activity is also tied to their positive or negative experience with the particular activity and thus the activity effectiveness. From among the 15 activities, we have found that students preferring the knowing style would benefit the least from video conferences as they prefer impersonal and reflective way of studying with factual information. Also our experience shows that video conferencing can include a lot of social talk not directly related to the subject matter. It seems that asynchronous communication such as discussions with
instructor and classmates or consultations would be the most beneficial for planners. These type of students need to have their term and activities planned and structured. They need to have the security in meeting deadlines, consulting the instructor if they are unclear about the material or instructions. Students with prevailing creating dimension of cognitive style would mostly benefit from creative activities like solving open ended case studies which would give them opportunity to apply their creativity and invention. These students would probably struggle in activities focused on searching and summarizing information and in activities where they do not get immediate feedback on their performance. Moreover they seem to have low preference for video conferences with peers and an instructor. Based on these findings, we can claim that to certain extend student’s individual cognitive style preference influences his/her preference of e-learning activities. Therefore, we suggest instructors and e-learning designers to keep in mind individual differences of students and offer variety of activities to accommodate various cognitive style preferences. The discussion should not be about what potential the technology has in education but how to use the potential of technology to accommodate all types of students. It seems that students, especially those with experience, have clear idea of what activities are the most beneficial for them. It looks logical to let them decide which way they take to reach the learning goals. Otherwise they would probably drop the courses. However the situation is different for less experienced students. We would suggest identifying their cognitive style preference at the beginning of their studies. Based on this, they could make the best use of e-activities. This, however, requires a lot from the instructors. They need not only be the subject matter experts but also have skills at using the full variety of e-activities. Here we face another issue worth researching - the teaching style. In other words, teachers seem to have preferences for certain e-activities. Is this also related to their cognitive style preference? We also see several limitations of our pilot study. First the sample is quite limited in number and representativeness. Second the perception of e-activities might be influenced by the ability of their instructors to effectively apply e-activities. Third limitations might be the fact that success or failure of these activities lie in technology reliability and not in individual student characteristic. These variables may have influenced the exactness of our study. Nevertheless, we can conclude that the student’s preference of cognitive style impacts their preference for e-activities and through this connection may influence their satisfaction with e-learning and their success.

References:
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