An Innovation Diffusion Approach to Online Student Question-Generation and its Effects on the Relationship of Perceived Task Value and Learning Approach

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Abstract: The purposes of the study are two-fold: first, to design an online student question-generation activity in light of an innovation diffusion approach, and second, to examine if it influences the relationship between learner perceived task value and their approaches to learning. This study found that the innovation diffusion approach let participants perceive the introduced technology as valuable and that it moderated the predicative effect of task value on the adoption of deep approach. Implications for technology diffusion and instructional implementations are provided.

Keywords: online student question-generation, technology integration, task value, approaches to learning

1. Introduction

Despite that research on student question-generation generally supports its educative efficacy, students exposed to the activity were reported to react differently in terms of perceived task value and learning strategy use [1]. Though differences in personal characteristics (e.g., academic ability, past experience in the adopted strategy) have been examined and yielded useful suggestions for instructional implementation, the effects of context arrangements of student question-generation are less noticed and remain unknown. Thus, the purpose of the study is to design an innovation-diffusion based student question-generation activity and to examine its effect on the relationship between learner perceived task value and their approaches to learning.

2. Innovation Diffusion Approach as the Guiding Theoretical Framework for the Structures of the Online Student Question-Generation Activity

Principles suggested by innovation diffusion theorists were referred to and used as the framework for structuring the online student question-generation activity: informing the relative advantages and compatibility of the strategy, reducing the complexity of the innovative technology, and enhancing opportunities to interact with the technology and observe the consequence [2]. First, learners are informed of the value of the technology for their current learning process and future use so as to enable them to judge the relative advantages and compatibility of the strategy. Second, a training session was design to demonstrate the process of learners interacting with the features of technology so as to

reduce the possible anxiety to the innovative technology and to enhance the accuracy of their estimating the cognitive demands for accomplishing the required tasks. Third, learners were given opportunities to practice generating questions as a routine. Finally, as for the constant observation of the consequence of their practice principle, participants received feedback both from their peers and a teaching assistant to accentuate important question-generation practices.

3. The Relationships between Perceived Task Value, Approaches to Learning and Contextual Arrangements

General Value-expectancy theory argues that learners' perceived task value influence their decisions on time and efforts devotion to learning tasks [3-5]. Additionally, according to Student Approach to learning (SAL) theory, students select information processing strategies according to their interpretation of the learning context and requirements [6-8]. Theoretically speaking, the extent and way of students experiencing the question-generation technology should affect their interpretation of the learning task and associated perceived task value, thus, leading to different degree of learning approaches. As the effects of contextual arrangements are less noticed, the study set examined if and how an innovation diffusion approach to online student question-generation influences the relationship between learner perceived task value and learning approaches.

4. Method

Two conditions were set up. For the innovation diffusion approach, 50 university students registered in a teacher preparation course participated in the activity, structured according to innovation diffusion theorists as described. For the non-diffusion approach, one hundred and sixty-one comparable participants, after being briefed about the features and values of online student question-generation technology for teaching and learning, experienced generating questions in one class session.

Two measures were used in this study. Task value, consisted of 9-item, is a 6-point Likert scale (1, "not at all true of me" to 6, "very true of me.") with established validity and reliability [4]. "*The Study Process Questionnaire*" developed by Biggs, Kember and Leung [9] was adopted. It consists of deep and surface approaches, each with corresponding ten items on a five-point scale (0, "never true of me" to 4 "always true of me").

5. Results

Descriptive statistics indicated that for the innovation diffusion approach, the mean scores of perceived task value rested in the upper half of the possible score ranges, while for the non-diffusion approach it rested in the middle. Results on the correlations between task value and deep approach found that the intensity of the correlations in the innovation diffusion group reached the large level, $r = 0.63$, while the non-diffusion group reached the medium level, $r = 0.32$. Moreover, the correlation patterns between the task value and surface approach and between the surface approach and deep approach are very different for the two groups—negative correlations for the innovation diffusion group and positive correlations for the non-diffusion group.

To further examine if and how online student question-generation diffusion approach effects the relationships between task value and learning approaches, moderation analyses

was adopted. Results found that the interaction between innovation diffusion approach and task value on the deep approach reached statistical significance, $F(1, 207) = 9.89$, $p < .05$. Such an interaction on surface approach did not reach significance, $F(1, 207) = 1.79$, $p > .05$.

6. Conclusions

The fact that learners in the innovation diffusion condition associating higher task value with the introduced technology (as compared to the non-diffusion group) supported the design of the innovation diffusion approach to online student generation-generation activity. Additionally, innovation diffusion approach to the introduced strategy, as shown, lead to the comparatively greater predicative power of task value on deep approach orientation.

According to the innovation diffusion, general value-expectancy and SAL theories, learners' perception of the technology attributes and recognition of the cognitive demands associated with the cognitive gains would influence their level of adoption, their interpretation of the learning context, their perceived value level and their orientation to learning approaches [2-8]. This study further substantiated that the innovation diffusion approach moderated the predicative effect of task value on the adoption of deep approach. Based on the data, it is suggested that instructors aiming to induce learners in adopting technologies (both soft and hard technologies) and construing higher task values shall refer to the innovation diffusion theory. Particularly, by explicating the values of the introduced technology and exposing students to the delicate experience of its use, as found in the study, would influence the magnitude of the predicative effect of perceived task value on deep learning approach (i.e., intrinsically motivated devotion to learning).

Acknowledgements

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