Personalized Competition Model: Students' Choice and System Adaptability

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Abstract: Since competition is a powerful motivational factor, a set of competition models have been proposed, such as individual competition and social competition. However, few studies highlight students' choice preference on these different models, especially students' choices is attracting more and more attention in student-centered design. Thus, this paper proposes the concept of personalized competition model, which offers different competition mechanism according to students' choice preferences. More specifically, students can choose self-competition, social competition, or self- and social competition. For each category of competition, different adaptability design based on students' choices is discussed to maintain their engagement. Now, a learning system is being developed according to this conceptual model and an evaluation of the system on student learning would be conducted in the near future. The result would help revise the design of personalized competition model.

Keywords: Competition, choice, computer support personalized learning, adaptability

1. Introduction

Competition is a common but significant motivational factor in digital game-based learning (DGBL). One of reasons lies in that it can reinforce the goal structure of learning activities [8], which, in turn, enhances students' motivation and learning achievement [9, 10]. However, the use of competition might also have some possible negative influences [12], such as the lack of a scheme for improvement [3] and a high degree of stress [13]. This is because competition does involve a social comparison process, during which participants are compared with each other [10]. Such over-comparisons might affect students' confidence, attitudes, and belief in success [11]. In addition, most competition occurs under a specific condition: a student loses the competition while the other wins. The loser may feel hurt as a result. Thus, there is a need to take the negative effects of competition into account.

To this end, a number of competitive models are proposed. Some emphasize the individual model, whereas some focus on the social model. For instance, the improving space [4], learning companion [4], and avatar [6] mechanisms are individual models, which are designed to help students improve their learning through extra exercises, virtual agents, and avatars, respectively. In contrast, the anonymous mechanism [14], group mechanism [9, 10], and surrogate mechanism [7] are social models, which help students alleviate possible negative effects by hiding identities, forming groups, and training surrogates, respectively.

Although these competitive models can be applied to different educational settings, students' choice preferences on different models are seldom taken into account. Moreover, from the perspective of DGBL design, students' control and challenge are two key features that are different from traditional schooling. The former refers to offering more choices for students, whereas the latter implies offering appropriate difficulties according to students'

capability. In other words, a well-design DGBL should take *students' choices* and *system adaptability* into account. In this way, we can engage students to learn, and further optimize the development of students' capabilities by accommodating their different personal characteristics, which is consistent with the goal of computer support personalized learning (CSPL). Consequently, the purpose of this paper is to propose a personalized competition model of DGBL, through which the influence of personalized mechanism for competition can be addressed in the future.

2. Personalized competition model

Figure 1 illustrates the conceptual model of personalized competition, which consists of three sub-models based on students' choice preferences.

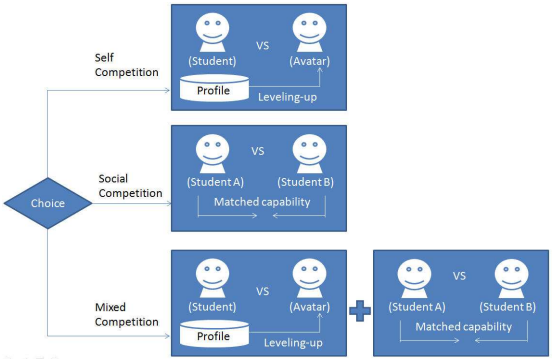

Figure 1. Conceptual diagram of personalized competition model

Regarding the self-competition, it refers to the model that students compete against themselves, rather than other students. To this end, an avatar is used as data representation and a level-up mechanism of the avatar is shown to students for fostering their goal-setting and learning improvement. In other words, a student's learning progress is aligned with the leveling up of the avatar. Students' game goal can be consistent with the learning goal. In this way, students compete themselves through a game-playing mechanism: could the learning effort make them improve enough to level up their avatars to the next level. For this model, the system adaptability for students' choices is to mimic *the next level of avatar*, which is driven by various students' profiles and progress, and serves as a specific goal so that students can further observe, edit, negotiate, and compete with the avatar [1, 2, 5].

Regarding the social competition, it refers to the model that students compete against other students, instead of students themselves. However, as discussed above, social competition should take possible negative influences into account. Thus, the social competition offers the three mechanisms for students to choose: (1) *Anonymous mechanism*: hiding students' identities as a protective mechanism. (2) *Group mechanism*: sharing the risk and responsibility between group members. (3) *Surrogate mechanism*: offering virtual characters as mediators in competition for shaping positive attribution and belief. For this model, the system adaptability for students' choices is to offer a *matching mechanism*, which helps pair two students having similar capability so that each of students can meet an optimized challenge.

Regarding the mixed model, it contains both of the two sub-models: self and social models. More specifically, while students choose this model, they first use the self competition to prepare themselves better for achieving their final goal: wining the social competition. In other words, this model offers a two-layered scheme to motivate students

to learn for the competition. For this model, the system adaptability is not only to offer *the next level of avatar* based on students' different profiles and progress, but also the *matching mechanism* to find appropriate opponents with similar capability.

3. Work in progress

According to the conceptual model, a competition system is being developed, which would serve as an instance of the conceptual model to further investigate its influence on students in terms of motivation and learning achievement aspects. In particular, how students choose their preferred competition models and the correlation between students' choices and their personal characteristics would also be analyzed. The results would be helpful to the tuning and revision of the competition system, and contribute to the future development of competition-based learning.

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