My-Avatar: Using Avatars to Promote Self-Competition in Pupils' Idiom Learning

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Abstract: Competitive learning attracts increasingly attention in digital game-based learning. However, since the limitation of social competition in application, there is a need to investigate other competitive models. In this paper, a self-competition model is emphasized, and a My-Avatar system with self-competition model is developed to further investigate students' preference on the choice between self-competition and peer-competition. The result revealed that over half of participants (63%) preferred the peer-competition version and fewer (37%) participants preferred the self-competition version. The major reasons why they preferred the competition versions were discussed.

Keywords: Avatar, competition, game-based learning, idiom learning

1. Introduction

Competitive learning recently attracts increasingly research attention. Several studies investigate the effects of competitive learning on student learning [3, 9, 10, 16, 17]. Since competition involves the process of social comparison, in which students are exposed to numerous comparative information, it would significantly influences students' development of self-concept [8, 11], such as the lack of confidence [1] and lower self-efficacy [14].

To prevent possible negative effects, previous works have proposed several mechanisms to enhance competitive learning models. For example, anonymous mechanism is used to diminish negative impacts resulting from a keen face-to-face competitive context [15]. Group mechanism is used to share the responsibilities of the competitive failures [13]. Surrogate mechanism is developed to enhance the belief of effort-making through virtual characters as competitive buffer [2].

However, these mechanisms seem to be limited in some aspects. Regarding the anonymous mechanism, although the anonymous competition could conceal students' identities from the public, students might still suffer from slight damages to their confidence. Regarding the group mechanism, the application setting is restricted to group-based learning contexts so that the responsibilities could be shared by group members. Regarding the surrogate mechanism, this mechanism can be applied to different learning contexts, but its development cost is higher than other mechanisms since it involves the mediation of virtual characters.

Due to these limitations, there is a need to investigate other mechanisms to make competitive learning be more flexible. Consequently, this study proposes a self-competition model, in which each student competes against himself/herself rather than competes against other students. Due to the fact that such self-competition owns different features, it might further benefit student learning. To address this issue, this study develops a learning system with self-competition model to investigate its influence on students' perception. More specifically, the following research question is addressed: *how do students prefer to learn via self-competition when compared with peer-competition?* Based on the results of this study, further system design and evaluation could be improved.

2. Self-competition model

2.1 Design rationales

Using avatar mechanism to make students be more aware of their learning status
Two rationales are used to underpin the design of self-competition model. The first design rationale is related with avatar mechanism: using avatar mechanism to make students be more aware of their learning status. Avatars are frequently used in digital game-based learning to represent the students' presence, appearance, and actions. This is due to the fact that avatars refer to graphical representation of students in the form of virtual characters. More specifically, the students not only could see what they do from a third-person point of view, but they could also be observed by others through these virtual characters. Thus, avatars could enhance students' feelings of telepresence, even as the alter ego in the learning environment [12]. This is the reason why avatars are used to help students enhance their self-awareness in this study.

Using comparison mechanism to encourage students to improve their learning status
The second design rationale is related with comparison mechanism: using comparison mechanism to encourage students to improve their learning status. As described above, although social comparison is an effective and immediate approach, they might have negative impacts on students. Thus, this study emphasizes the effect of self-competition. This is due to the fact that self-competition focuses on the comparison between what they had done before and what they have done so far. In other words, regardless of whether they are capable students or not, their opponents are themselves. It implies that if they are willing to make more efforts to improve their learning status, they could make progress in the self-competition.

2.2 Conceptual model

Underpinned by the two rationales, the conceptual model of self-competition is illustrated in Figure 1. The model involves two components: *self-awareness* and *self-improvement*. Regarding self-awareness, to facilitate students' self-awareness of learning status, an Open Learner Model (OLM) approach [4, 5, 6] is adopted in this study. In particular, we use avatars to reflect students' learning status. This is due to the fact that one of significant OLM applications is to promote students' self-reflection through collecting students' learning profiles. Although OLMs have different presentation formats [7, 18], a simple format of numerical OLM is used in this study because of its ease of use.

Regarding self-improvement, to foster students' improvement in subject learning, self-competition is held in the form of a comparison game, in which students' current learning status would be compared with their past learning status. In other words, the difference of students' learning progress between the past and current statuses is highlighted in the competition. By doing so, students could be aware whether they have improved their learning status, and whether they should make more efforts to improve learning status.
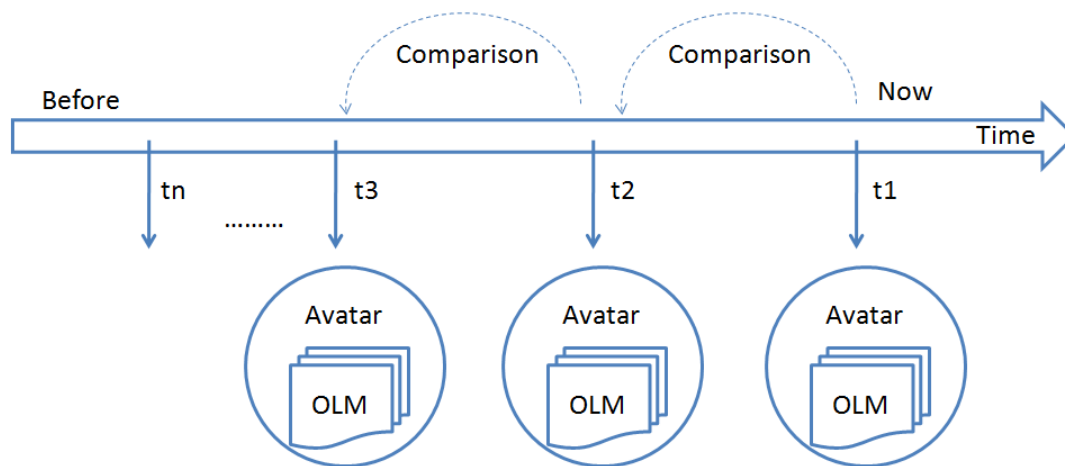
Figure 1. Conceptual model of self-competition

3. My-Avatar system

A self-competition system, named My-Avatar, is implemented according to the conceptual model. The My-Avatar system consists of three major functions, including customizable avatars, avatars as OLMs, and avatar arenas.

3.1 Customizable avatars

When using the system, each student has an avatar, which could be customized according to the student's different preferences. As illustrated in Figure 2, the student has a basic boy/girl figure to choose. Then, the student could further customize their styles, including different hairs, eyes, eyebrows, clothes, plants, and shoes. By doing so, the student could own an avatar to represent him/her in the following usage.

Figure 2. Students could customize their avatars

3.2 Avatars as OLMs

To examine the system feasibility, the learning activities of Chinese idioms is used in this study. The learning content contains three parts: identifying-word (basic and advanced), sequencing-words (basic and advanced), and applying-idioms. More specifically, the identifying-word part offers learning tasks to help students recognize a correct keyword from an idiom; the sequencing-words part provides students with learning tasks about how to order the four words of an idiom in a correct sequence; the applying-idioms part offers students opportunities to learn how to appropriately apply idioms to the given contexts.

In addition, a student's learning status is further represented as the attributes of his/her avatar, as shown in Figure 3. Since the avatar is used to represent him/her, these attributes could be related with his/her status. In particular, the learning status of Chinese

idioms is also represented as his/her learning attributes. In other words, when the student observe his/her avatar's attributes, he/she could know what his/her learning status is. By doing so, we hope that such design could enhance students' self-awareness towards Chinese idiom learning.

Figure 3. Using avatars as OLM to reflect students' learning status

3.3 Avatar arenas

After doing learning tasks about Chinese idioms, a student could attend an avatar arena, as illustrated in Figure 4. The result of the arena is determined by the comparison of the attributes between the current round and previous round. More specifically, the attribute values of Chinese idioms in the current and previous rounds would be listed respectively so that the student could clearly know the details and why he/she wins or loses the competition. Through showing this information, the student could know how to improve his learning status if he/she loses the competition.

Figure 4. Using avatar arenas to improve students' learning status

4. Method

The research question addressed in this study was: *how do students prefer to learn via self-competition when compared with peer-competition?* To answer this research question, a within-subject experiment was conducted in an elementary school in Taiwan.

4.1 Two system instruments

Two different versions of the My-Avatar systems were used in the experiment. The subject content of the two versions was the same, i.e., Chinese idioms. Each student was presented with learning status through a customizable avatar. However, in the Self-Competition (SC) version, the self-competition mechanism described above was used to highlight the difference between their current and past learning status. Nevertheless, in the Peer-Competition (PC) version, a peer-wise competition mechanism was used to highlight the difference between their current learning status and other student's status. Table 1 summarizes the different system

instruments between the two versions, and selected snapshots of the two system versions are also illustrated in Figure 5.

Table 1. Different system instruments between the two versions

	Self-competition (SC) version	*Peer-competition (PC) version*
Avatar mechanism		
Customized avatar	○	○
Avatar as OLM	○	○
Competition mechanism		
Self competition	○	X
Peer competition	X	○

Peer-competition (PC) version

(a) Choosing a peer who is ready to attend the competition

(b) Competing against a peer based on their OLMs

Self-competition (SC) version

(a) Starting a new competition

(b) Competing against his/her past status based on the OLM

Figure 5. System snapshots of the two system versions

4.2 Participants

This study took a within-subject quasi-experiment. Participants of two classes (N=54) used the variant versions of the My-Avatar system. The elementary school took policy of normal distribution. In other words, each class included students with various levels of background, knowledge and learning capabilities. Table 2 illustrated the numbers of participants with three different levels of capability in the language literacy subject.

Table 2. Participants for each version

	Participants
Level 1 (low-capable)	16
Level 2 (medium-capable)	17
Level 3 (high-capable)	21

4.3 Procedure

Since this experiment is a within-subjects design, all students were organized to experience the two system versions. To reduce the bias of treatment order, participants of the two classes used the systems in a different order, as shown in Figure 6. More specifically, in Class I, participants first used the SC version for two sessions and then used the PC version for another two sessions. In contrast, in Class II, participants first used the PC version for two sessions and then also used the SC version for two sessions. Each session lasted 40 minutes and was held within a week. The procedures employed were as follows: (1) Before the experiment, participants were instructed to use the systems for ensuring that they know how to use. (2) During the sessions, to increase the validity of their opinions, the participants were told that they could freely use the system functions. (3) At the end of each system version, data collection (DC) was conducted. In other words, students were required to fill out a preference questionnaire to express their opinions. the questionnaire contains two items: "*which system version you preferred to use*" and "*the reason why you preferred to use*".
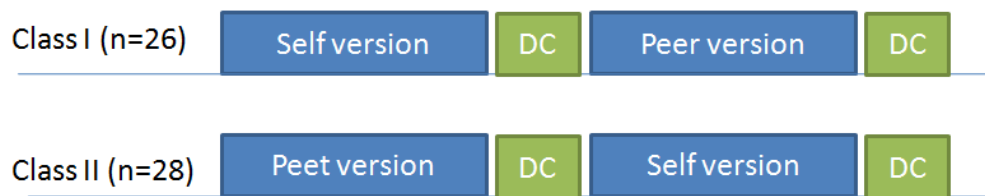

Figure 6. Experimental setting: a within-subject design

5. Results and discussion

The result of the preference questionnaire was shown in Table 3. Totally, the ratio of SC to PC was approximately 3:5. Regarding low-capable (level 1) students, four students preferred the self-competition (SC) version, whereas 12 students chose the peer-competition (PC) version, as listed in Table 4. The major reason why most students preferred the peer-competition lied in the fact: peer-competition was more fun and exciting. An interpretation for this result was that low-capable students felt fun and joyful experience was a key feature for a learning system.

Table 3. The result of participants' preferences

Preferred version	N
Self-competition (SC) version	20 (37%)
Peer-competition (PC) version	34 (63%)

Regarding medium-capable (level 2) students, six students liked the SC version, whereas 11 students preferred the PC version. Most students preferred the PC version because they felt that peer-competition was more fun and exciting (the reason is the same as the low-capable students), whereas several students chose the SC version because self-competition could make them understand more about the level of self-improvement. In other words, self-competition version seemed to offer them more information about their learning progress. An interpretation for this result was that medium-capable students felt fun and joyful experience was a key feature for a learning system, but some students also felt that information about the level of self-improvement was a crucial feature.

Regarding high-capable students (level 3) students, ten students preferred the SC version, whereas 11 students chose the PC version. The reason why most students liked the

peer-competition version lied in the fact that this version made them know better about peers' learning performance. On the other hand, the major reason why most students preferred the SC version was the fact that self-competition version could offer them more information about self-improvement. An interpretation for this result was that knowing peers' learning performance and self-improvement information were both significant for high-capable students.

Table 4. Participants' preferences and reasons

	Preferred version	N	Reasons
Level 1 (N=16)	SC version	4	Knowing the level of self-improvement (2) Fun and exciting (2)
	PC version	12	Fun and exciting (7) Interaction with others (2) Driving force to improve (1) Easy to use (1) Sense of achievement (1)
Level 2 (N=17)	SC version	6	Knowing the level of self-improvement (4) Fundamental to compete with others (1) Lower pressure (1)
	PC version	11	Fun and exciting (5) Interaction with others (3) Knowing other students' status (2) More challenging (1)
Level 3 (N=21)	SC version	10	Knowing the level of self-improvement (5) Indicator of how much effort should made (2) Preferring the game rules (2) The biggest enemy is self (1)
	PC version	11	Knowing peers' learning performance (7) Fun and exciting (2) Interaction with others (1) More challenging (1)

6. Conclusion

The research question examined in this study is: *how do students prefer to learn via self-competition when compared with peer-competition?* Regarding the research question, this study showed some preliminary findings: (1) Over half of participants (63%) preferred the peer-competition version and fewer (37%) participants preferred the self-competition version. (2) For low-capable and medium-capable participants, most of them felt that a key feature for a learning system was fun and exciting, which was also the major reason they preferred the peer-competition version. However, several participants also felt that knowing the level of self-improvement was another key feature, which was another reason why they chose the peer-competition version. (3) For high-capable participants, half of them preferred the peer-competition version, and half of them preferred the self-competition version.

However, due to the limitations of this study, some further investigations are required. Firstly, although this study showed some preliminary result, it was a short-term study. The long-term effects of self-competition are still unclear. Secondly, due to the relatively small sample sizes in each condition, some treatment effects (e.g., the lack of a non-competition treatment) cannot be addressed in this study. This should be clarified in future works.

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Acknowledgements

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