Explicit social goals and learning: enhancing a negotiation game with virtual characters

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Abstract. Games are increasingly being adapted for use as educational tools. One relatively new use of games is to facilitate learning social or interpersonal skills such as conflict resolution by simulating human behavior with virtual characters. This work investigates students' social goals to understand how they help motivate students to acquire cultural understanding in BiLAT, one such system designed to teach cross-cultural negotiation skills. We hypothesized that students who were given explicit social goals (e.g. “Come to understand your partner’s point of view”) would be more successful learning from the game than students who were given task-only goals. We ran a randomized controlled experiment in which 59 students played BiLAT. 30 students played the game as designed, with negotiation task goals. 29 were additionally given a social goal. The results did not confirm our hypothesis – the group without the social goal learned more according to most measures. However, on further investigation, students who reported having social goals in a manipulation check, regardless of condition, seemed to learn the most. These results suggest that social goals and interactions are important in learning cultural negotiation, but that setting explicit social goals may not be the right scaffold.

Keywords. Virtual environments, motivation

Introduction

Simulation-based instructional systems are increasingly being used to facilitate learning social or interpersonal skills such as conflict resolution by simulating human behavior with virtual characters [14]. These skills are currently taught through methods like role-playing exercises and tutoring, both of which are very resource-intensive teaching methods [9]. Computer-based simulations, which are growing more realistic, offer a major advantage for social learning by providing a cheaper solution to a much larger number of students. Examples of existing game-based instructional systems with social learning components include FearNot [6], PeaceMaker [2], and BiLAT [7]. BiLAT, the game in which we situate this work, is a virtual environment that supports cross-cultural interactions in the context of a negotiation task.

While results on learning from such simulations are preliminary, they are purported to be highly motivating (e.g., 8, 11, 12). Motivation is important in learning contexts because it can lead students to make greater effort, seek greater challenges, and have higher achievement (see 15). However, there has been little research on how aspects of student motivation affect learning in social simulations, and even less on how they affect learning of intercultural competence in such environments. Since motivation is a very multi-faceted notion, it is important from a practical and a
theoretical perspective to better understand what aspects of student motivation are particularly conducive (or not) to student learning in this context.

One standard framework of student motivation that is relevant to games which has been studied extensively within the realm of educational psychology is goal orientation. Goal orientation researchers tend to focus on mastery and performance orientation (e.g., [1, 5]). However, in a domain like culture that focuses on social interactions, social factors might have an even greater influence on learning than these academic orientations [17]. Cultural interaction is an inherently social process between people with different cultural identities. While culture may be largely unconscious, it becomes more salient when interacting with someone of another culture who is then categorized as a member of an “outgroup” [13]. Such cross-cultural contact can exacerbate ingroup-outgroup biases and lead to social goals like the desire to be seen as distinct from and positively compared to the outgroup [16]. These motives may be detrimental to learning about a new culture. On the other hand, social goals such as a need for affiliation or the desire to conform to social rules, may promote learning. It is an open question how such goals can be promoted in a way that improves learning of intercultural competence in environments (such as BiLAT) in which learners interact with virtual characters from a different culture.

In this paper we describe an empirical study that investigates student motivation in an educational game for learning to negotiate in a cross-cultural context. We attempt to answer the following question: when learners are given a social goal as a part of a game-based experience, what is the impact on their learning? We present results from a first study in which students played a game with or without the addition of a social goal, and a discussion of the emergent subgroup of the population that expressed these types of goals. This work contributes to understanding whether students who approach virtual characters as culturally distinct social beings increase their learning over those with a task focus, and will develop improved ways to support intercultural learning through technology.

**Game Context**

The context we use for our investigation is BiLAT [7], a game-based simulation for practicing bilateral engagements in a cross-cultural context. BiLAT was designed to address learning objectives related to negotiation generally as well as the specific cultural knowledge and skills [see 3 for a description of cultural learning objectives] that support more effective negotiations in that particular culture. A primary learning objective is considering the counterpart’s interests in order to achieve “win-win” results. Scenarios presented to the student drive the game experience. The initial scenarios are set in an Iraqi town, and the student is put into the role of a U.S. Army officer tasked with meeting with members of the town in order to accomplish specific tasks. The student is given these concrete, negotiation task-related goals related to each meeting such as “Learn why the market is not being used.”

To play, the student begins by preparing for a meeting in the “prep room.” Here, the student learns about the character from a variety of different sources of varying degrees of trustworthiness. The student then moves into the meeting (see Fig. 1). The

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1 The BiLAT architecture is built on Unreal Engine 2.5 and integrates research technologies such as virtual human characters and intelligent tutoring support.
student communicates with each BiLAT character by selecting from a menu of hand-authored communicative actions such as “Discuss [Hassan’s] favorite authors and literature”, or “Complement your host on his generosity”. Characters’ responses depend on a number of factors, including the current meeting phase, the trust level, and a virtual dice roll. Each action entails a possible change to the trust variable of the character. The dice roll is intended to simulate uncertainty in human behavior – cognitive and emotional modeling techniques can be used to simulate these reactions in more principled ways [7]. The character responds to the actions in both text and synthesized speech as well as non-verbal behaviors such as gestures.

![Images of BiLAT interface and character portraits](image1.png)

**Figure 1.** At left, a meeting in BiLAT with police captain Farid, with the goal of solving a problem with a market in an Iraqi town. At right, meeting partner Na’ema, a doctor.

**Experimental Study**

We ran a randomized controlled study to test the effect of giving learners a social goal as a part of a game-based experience. Our hypotheses were: 1) the social goal group would perform better than the control on overall learning measures, 2) the control group would perform better on task-related items while the social goal group would perform better on social items, and 3) the social goal group would perform better on cultural transfer measures.

**1. Method**

Participants were 59 students, mostly undergraduates, recruited from two institutions. They were compensated $40 for a two and a half hour session. Each student began by watching an introductory video about the concepts and skills related to the cultural learning objectives. The student then took a number of pre-tests (described below). Next, they entered the game and met with two different characters. A set of measures relating to the information learned in the “prep room” (described below) was administered. The student then met with the character until an agreement on the negotiation was reached. If the student did not come to an agreement when the allotted time ran out, the experimenter moved the student along. After the student met with both characters, he or she closed the game and took the post-tests.
Students were randomly placed into one of two conditions. The control condition played BiLAT with its standard task-related goals, e.g. “Learn who is responsible for enforcing the tax.” Success in achieving these goals was clearly defined, and they were clearly related to progress through the task. The social goal condition received an additional objective in each meeting which was labeled “Come to understand your partner’s point of view,” which was intended to encourage them to focus on the interpersonal aspects of the interaction. Only the social goal condition received this explicit social goal in the game.

2. Measures

Assessment of intercultural competence is not a trivial task. It is an ill-defined domain; there is not always a clear distinction between right and wrong answers, and even experts at times may disagree. A number of measures have been developed that may be used in different situations. We assessed the cultural and negotiation learning objectives with a Situational Judgment Test. This assessment asks students to rate the appropriateness of various actions based on situations related to the learning objectives [10]. This test has been used previously to collect data with students playing BiLAT. As a measure of transfer, we introduced a selection of questions from the Cultural Assimilator [4]. In this assessment, students read a scenario about people experiencing a foreign culture and chose the best of four possible cultural explanations for the events in the scenario.

Additionally, the students were administered a learning assessment related to the specific scenario and characters. Prior to and after meeting a new character, we asked students to rate the truth of various items relating to the task or to the character (e.g., “Farid could be described as a family-oriented man”). These items were taken from the information students received in the “prep room”. Students evaluated the items as true, false, or “I don’t know”. The goal of this measure was to assess a student’s ability to develop an accurate model of the character and the scenario. A successful student would be able to elicit information while meeting with the character and integrate this knowledge with the information from the sources in the prep room. We called this measure information integration.

Finally, we wanted to determine whether our manipulation had the desired effect on students’ goals in the game. We therefore asked them to list their goals in free text after meeting with a character.

Results

While 59 participants completed the study, we dropped 3 students from the analyses due to computer error and 2 students who demonstrated a complete lack of attention or engagement. In our final analyses, we compared 25 experimental students who received the additional social objective presented at the beginning of each meeting to 29 control students playing with the standard game objectives. To evaluate the success of our conditions, we coded students’ responses to the manipulation check into 2 categories, “no social goals” and “social goals”. Students who reported no social goals tended to write out the task goals they were given verbatim, such as “Learn why the market is not being used”. Two independent coders rated anything that focused on
social interaction with the virtual character in the “social goals” category, such as “Learn more about my partner” or “Better understand my partner.” Table 1 has the results of this coding. A chi squared test showed that the number of students with social goals was significantly influenced by condition ($\chi^2(1, N = 54) = 5.868, p = .015$). However, because almost a third of the students did not report their goals as expected, we examined all of the learning results in this light.

Table 1: Number of students by condition and reported goals

<table>
<thead>
<tr>
<th>Given Condition</th>
<th>Reported goals</th>
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<tbody>
<tr>
<td></td>
<td>No social goals</td>
<td>Social goals</td>
<td>Total</td>
</tr>
<tr>
<td>Control</td>
<td>20</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>Social Goals</td>
<td>9</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>25</td>
<td>54</td>
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To analyze the data we conducted repeated measures ANCOVAs on students’ pre and post scores with condition as the between-subjects variable and reported social goals as the covariate. On the Situational Judgment Test, we observed no significant differences between pretest and posttest for either condition. It may be that watching the introductory video was sufficient to hit ceiling on this test; mean correlations with experts were around .8 on both the pretest and posttest. Next we looked at the information integration items. On these items, students were given a point for each item that matched a subject matter expert’s rating of the information. An ANCOVA showed that condition significantly influenced learning ($F(1,49) = 5.307, p = .026$); the control condition learned more than the social goals condition (see Figure 3 for learning gain means).

![Gain Score](image)

Figure 3: Mean information gain scores by condition and reported social goals

We then divided the information integration items into task-related items, such as “The U.S. must set up checkpoints to increase security in the market,” and social-related items, such as “Farid is a family man and is good with children.” On the social items, an ANCOVA showed that reported social goals ($F(1,49) = 3.979, p = .052$) and condition ($F(1,49) = 3.285, p = .076$) fell just short of statistical significance; the control condition learned more than the social goals condition and reported social goals.
learned more than no reported social goals (see Figure 4). There was significant overall learning from pre to post \((F(1,49) = 9.213, p = .004)\). The ANCOVA on the task items showed no difference between conditions, but there was significant overall learning from pre to post \((F(1,49) = 13.552, p = .001)\). See Figure 5 for gain means.

Finally, an ANCOVA model of the culture assimilator transfer test showed that condition significantly influenced student learning \((F(1,47) = 11.873, p = .001)\), as did reported social goals \((F(1,47) = 8.314, p = .006)\). The control condition outperformed the experimental and reported social goals outperformed no reported social goals (see Figure 6 for a comparison of gain score means). Also, there was significant overall learning from pre to post \((F(1,47) = 4.582, p = .038)\).
Discussion and Conclusions

The results did not directly confirm our hypothesis – in fact, the group given only task goals performed significantly better on most measures. However, students with self-reported social goals, regardless of condition, learned more. This provides suggestive evidence that social goals and interactions are critical in learning cultural negotiation, although the study manipulation was an ineffective means of integrating social considerations into the learning experience for students who do not have them spontaneously. Explicit presentation of such goals may even be detrimental. There are several viable hypotheses about why these results occurred. An additional goal may have caused more cognitive load which divided students’ focus, students may not have understood how to achieve the goal, or perhaps the addition of extrinsic motivation may have reduced intrinsic motivation to be social.

Next steps in this work include a program of research to understand the role of various types of social goals (integrative and self-assertive goals) in learning cultural negotiation, and how to promote them. We know that some students arrive at the intervention already holding social goals. We will develop a model of how social goals are influenced by and interact with learner characteristics such as social intelligence and personality traits. Then, we will investigate how social goals can be promoted without interfering with their pre-existence. We will design a scaffold for a cultural discussion embedded in the game that implicitly primes students to focus on social goals. This will allow us to manipulate students’ goals in BiLAT to empirically examine how and when social goals are beneficial or detrimental to learning intercultural competence.

Recent research has been investigating how people interact with virtual humans. This work will provide a better understanding of how people interact socially with virtual humans in a cultural learning context, and will develop improved ways to support intercultural learning through technology. It will increase understanding of how social goals influence learning in the context of a cross-cultural negotiation task, and how they can be promoted in a way that is beneficial to learning. This work contributes
to understanding whether students who approach virtual characters as culturally distinct social beings increase their learning over those with a task focus.

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References