

Designing Multicultural Cooperative Learning Groups in Computer-Mediated and Online Classrooms: Implications of Avatar Selection and Preferences

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Abstract

This paper reports on a study designed to investigate diversity and ethnic differences within cooperative learning groups in collaborative virtual worlds for distance learning. Within virtual worlds, users represent themselves with a graphical personification called an avatar. Previous studies have shown that avatars provide enhanced social interaction between participants using online virtual environments, build and sustain group commitment and performance in collaborative projects, and reduce uncertainty. The sample for this study was drawn from first-year Chamorro and Filipino undergraduate students at a public U.S. university located in Micronesia. We developed a web-based instrument to investigate reasons for choosing avatars for self-representation and to measure willingness to collaborate in online class activities with avatars of various ethnicities. The results for reason to choose an avatar were consistent with previous studies, showing that avatars for self-representation are chosen primarily based on similarity to self. Results of ANOVA tests indicated a significant difference in collaborative distance in virtual online activities, with participants more willing to collaborate intimately with avatars exhibiting Filipino physical characteristics, and less willing to collaborate closely with avatars exhibiting Micronesian and European physical characteristics. We discuss possible reasons for the differences in collaborative distance within and between groups, and recommend future studies to investigate other aspects of prejudice and diversity in the virtual classroom.

1. Background

Many schools and universities around the world have begun to investigate the use of collaborative virtual worlds, such as Second Life and Active Worlds, as distance learning environments. Within virtual worlds, users represent themselves with a graphical personification called an *avatar*, which is a visual character that the classroom participant is allowed to choose from a list or create from simple prototypes. Avatars can take the form of humans, animals, robots, or other objects (Annetta, Klesath, & Holmes, 2008); often the user is provided the ability to customize the avatar with changes to the appearance through the addition of accessories (Nowak, 2004) such as clothing and hair style. Previous studies have shown that users of online games and virtual collaborative environments have a propensity to choose avatars that resemble themselves; with a tendency toward human avatars, and those matching their own gender (Nowak & Rauh, 2005).

There are many important reasons for using avatars for self-representation in online learning. Studies have found that virtual images, such as avatars, provide enhanced social interaction between participants using online virtual environments (Garrison, Anderson, & Archer, 1999). Presence in a communication medium is defined (Garrison & Anderson, 2003) as “the ability of

participants in a community of inquiry to project themselves socially and emotionally, as real people” (Annetta & Holmes, 2006). The existence of behaviorally realistic avatars has been shown to increase the sense of social presence (Nowak & Biocca, 2003). Interactions between avatars have been found to build and sustain group commitment and correlate with better performance in group projects. In collaborative virtual environments, the avatar is used to provide a means of identifying and evaluating others in order to reduce uncertainty (Bente, Ruggenberg, Kramer, & Eschenburg, 2008). As uncertainty decreases, it had been found that there is an increase in verbal communication, nonverbal communication, emotional intimacy, and increase in liking (Nowak & Rauh, 2005).

No research to date has addressed the issue of prejudice in virtual worlds, related to the willingness an online student would feel towards collaborating in a virtual learning environment with avatars of various races and ethnicities (from here on, the term *ethnicity* will be used to represent both). The importance of avatar choice and the effects of visual embodiment on social interaction within multicultural cooperative groups utilizing this medium are crucial areas of investigation. In Micronesia, these issues are vital, as colleges and universities in the region investigate technologies to link islands spread across great expanses, where “courses taught in distance learning formats provide islanders with opportunities to further their education without requiring them to leave the islands” (Rao, 2007).

There exist negative attitudes and prejudices in and among those residing in the islands making up the greater Micronesian region. For example, as a result of the Compact of Free Association in 1986, emigration from the Federated States of Micronesia (FSM), made up of the states of Chuuk, Kosrae, Pohnpei, and Yap, increased greatly to the islands of Guam and Saipan in the Mariana Islands (Dobbin & Hezel, 1996). Due to the economic boom related to tourism on Guam and the Northern Mariana Islands at the time, a majority of emigrants from the FSM moved to these larger Micronesian islands to find employment. In the twenty years since, along with the surge in population due to immigration from the FSM, Guam has seen a rise in prejudice among the Chamorros of the Northern Mariana Islands and immigrants from the Philippines and other Asian countries, directed at the Micronesian groups who have recently settled on Guam (Rubinstein, 1991).

This study aimed to investigate self-representation and willingness to collaborate with avatars representing various ethnic groups in virtual environments within a Micronesian sample. The research questions were:

- RQ1: Do students in virtual classrooms prefer avatars for self-representation that resemble their physical selves?
- RQ2: Is there a difference in willingness to collaborate in online learning groups with avatars of different ethnicities?

2. Method

2.1. Participants

The sample for this study was drawn from first-year undergraduate students at a public U.S. university located in Micronesia, who were of either Chamorro or Filipino ethnicity. Data were collected from 24 undergraduate students, 22 women and 2 men, aged 18 to 26 years ($M = 20.92$, $SD = 2.73$).

2.2. Instrumentation

The researchers developed a web-based instrument to collect demographic data, assess reasons for choosing avatars for self-representation, and to measure willingness to collaborate in online class activities with avatars representing various ethnic groups. Demographic information collected were age, ethnicity, and gender. A single question was used to assess participants' reason for selecting their own avatar, with two possible answers ("it looks like me" and "it allows me to be someone different").

To develop the avatar images, we recruited students of various ethnic groups at the university to pose for photographs. These students all indicated their primary ethnicity, and signed waivers to release their photographs for use in the study and subsequent publications. Using technology from Cyber Extruder (*AvMaker*), these two-dimensional digital photographic images were superimposed onto three-dimensional avatar faces in the Second Life virtual world. This provided a set of avatars with much more realistic ethnic facial features than those that could be produced using the general avatar customization controls in Second Life. Screen shots of the avatars from Second Life provided male and female images for the following four ethnic groups: Chamorro, Filipino, Micronesian (FSM), and European (used instead of "Caucasian" to represent descents from European ancestors), shown in Figure 1.



Figure 1. Samples of the avatar images used in this study: (1) Chamorro male, (2) Filipina female, (3) Micronesian male, and (4) European female.

In order to measure participants' willingness to collaborate in online class activities with avatars of various ethnicities, we developed a Collaborative Distance Scale based on the Bogardus Social Distance Scale, designed by Emory Bogardus to measure prejudice toward racial and ethnic groups (Bogardus, 1933). Social distance, in the original instrument, is a measure of how willing participants are to associate with members of a designated group (Wark & Galliher, 2007). The Collaborative Distance Scale, used in this study, modified the Bogardus Social Distance Scale with statements related to willingness to collaborate in virtual online class activities ranging from intimate collaboration (direct partners), to more extended collaboration (small groups and whole-class activities), and unwillingness to collaborate at all with an avatar in an online classroom. As in the Bogardus instrument, participants who choose to collaborate at a specified distance are assumed to refuse more intimate contact. Table 1 outlines the statements and scores related to the Collaborative Distance Scale used in this study; a lower numeric score indicated willingness to collaborate at a closer distance with the avatar ethnicity in question.

Table 1. Collaborative Distance Scale

How would you feel about having members of the following groups:	Score
As my direct partner in a class project	1
As a collaborator in a small group project	2
As a collaborator in a whole class activity	3
I'd exclude them from the class	4

2.3. Procedures

Participants individually completed the web-based instrument in a computer lab during a designated time. The web application first instructed each participant to input demographic information. Pictorial examples were provided of online classes in virtual environments to define and demonstrate the use of avatars. Participants next were asked to click on an avatar to be their self-representation in an online classroom and indicate the reason for selecting this as their own avatar. Lastly, images representing both male and female avatars of the four ethnic groups chosen for this study were shown to participants along with the Collaborative Distance Scale to be completed for each avatar. Data were collected and stored by the system for each participant, and exported in a Microsoft Excel spreadsheet format for analysis in Minitab statistical software release 15.

3. Results

3.1. Results for Avatar Self-Representation

In order to determine whether participants in this study preferred avatars for self-representation that were similar to themselves, we used questions from the instrument that dealt with gender of the avatar chosen and reasons for choosing this avatar. Descriptive statistics revealed that all participants (100 percent) selected an avatar of the same sex. In addition, a majority indicated the reason for choosing their avatar because "it looks like me" (83 percent) rather than "it allows me to be someone different" (17 percent). These results, from a Chamorro and Filipino sample, are consistent with previous studies (Nowak & Rauh, 2005) showing that avatars for self-representation are chosen primarily on same gender and similarity to self.

To investigate possible differences in the ethnic backgrounds of participants related to reason for choosing the avatar, we used a one-way ANOVA with participants' ethnicity and reason for choosing as factors. A summary of the ANOVA is presented in Table 2. There was no significant difference ($p = .591$) found between Chamorro ($N = 15$, $M = 1.27$) and Filipino ($N = 9$, $M = 1.44$) groups, related to their reason for choosing a particular avatar for self-representation.

Table 2. ANOVA Summary for Ethnicity and Reason for Choosing Avatar

Source	DF	SS	MS	F	P
Ethnicity	1	0.178	0.178	0.30	0.591
Error	22	13.156	0.598		
Total	23	13.333			

S = 0.7733 R-Sq = 1.33% R-Sq(adj) = 0.00%

3.2. Results for Willingness to Collaborate with Avatars of Different Ethnicities

The second research question related to willingness to collaborate in online class activities with avatars of various ethnicities. Scores for the Collaborative Distance Scale were averaged for two (female and male) avatars representing each ethnic group and tested for differences in means using a one-way ANOVA. Results of this test revealed a significant difference ($p = .009$) in collaborative distance related to avatar ethnicity. A summary of this ANOVA is presented in Table 3. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Filipino avatars ($M = 1.38$, $SD = .45$) was significantly lower than for Micronesian avatars ($M = 1.96$, $SD = .62$). Lower scores on the Collaborative Distance Scale indicate a willingness to work more closely with avatars of an ethnic group. Overall, participants in this sample indicated a preference to work in closer collaborative relationships with Filipino avatars than with Micronesian avatars.

Table 3. ANOVA Summary for Collaborative Distance and Avatar Ethnicity

Source	DF	SS	MS	F	P
Factor	3	5.029	1.676	4.10	0.009
Error	92	37.656	0.409		
Total	95	42.685			

S = 0.6398 R-Sq = 11.78% R-Sq(adj) = 8.90%

We sought to investigate possible differences between Chamorro and Filipino participants' willingness to collaborate with avatars representing the four ethnic groups (Chamorro, Filipino, Micronesian, and European). One-way ANOVAs were used to test the mean scores for each. The first, testing Chamorro collaborate distance with avatars of ethnic groups resulted in a significant difference in means ($p = .020$), shown in Table 4. Tukey HSD post-hoc comparisons revealed that the mean score for Filipino avatars ($M = 1.53$, $SD = .48$) was significantly lower than for European avatars ($M = 2.20$, $SD = .86$). These results showed a willingness within the Chamorro group to work more closely with Filipino avatars than with European avatars.

In the Filipino group, a one-way ANOVA tested the mean collaborate distance scores with avatars of the four ethnic groups. There was a significant difference found in mean scores ($p = .029$), summarized in Table 5. In this group, post-hoc comparisons using the Tukey HSD test indicated that the mean score for Filipino avatars ($M = 1.11$, $SD = .22$) was significantly lower than for Micronesian avatars ($M = 1.72$, $SD = .57$), which indicated a willingness within the Filipino group to work more closely with Filipino avatars than with Micronesian avatars.

Table 4. ANOVA Summary for Chamorro Collaborative Distance and Avatar Ethnicity

Source	DF	SS	MS	F	P
Factor	3	4.746	1.582	3.53	0.020
Error	56	25.067	0.448		
Total	59	29.813			

S = 0.6690 R-Sq = 15.92% R-Sq(adj) = 11.41%

Table 5. ANOVA Summary for Filipino Collaborative Distance and Avatar Ethnicity

Source	DF	SS	MS	F	P
Factor	3	1.833	0.611	3.42	0.029
Error	32	5.722	0.179		
Total	35	7.556			

S = 0.4229 R-Sq = 24.26% R-Sq(adj) = 17.16%

Results of these tests indicated an overall preference for both Chamorro and Filipino participants to collaborate more intimately in virtual online classroom activities with avatars exhibiting Filipino physical characteristics. These tests further revealed that there are differences in collaborative distances between the two sample groups, with Chamorro participants significantly less willing to collaborate closely with avatars exhibiting European physical characteristics, and Filipino participants significantly less willing to collaborate closely with avatars exhibiting Micronesian physical characteristics.

4. Discussion

Differences were found in this study within the willingness to collaborate closely in online cooperative groups with avatars exhibiting physical characteristics of various ethnic groups. Overall, in this study of Chamorro and Filipino participants, there was a significant preference to collaborate more intimately with Filipino avatars. A difference was found to exist between the Chamorro and Filipino groups, with respect to which ethnic group was least liked, in terms of willingness to collaborate. The Chamorro group was less willing to collaborate closely with European avatars, and the Filipino groups less willing to collaborate closely with Micronesian avatars. Possible reasons for the difference in these two ethnic groups might be that the Chamorro group harbor feelings of resentment toward mainland white (of European ancestry) residents, associated with the U.S. military and government presence in the region, who are felt to disregard "Chamorro indigenous rights to control their island's destiny, land, and borders" (Dobbin & Hezel, 1996). These feelings toward the mainland white residents may be more negative than those toward the Micronesian immigrants, leading to less willingness to collaborate closely with avatars that resemble Europeans.

Although there appear to be differences in willingness to collaborate along ethnic lines, we hesitate to say that this is a result of racial or ethnic prejudice. There are several limitations to this study which could impact these inferences. For example, the sample size was small and there were very few male participants in the study. Collaborative distance within groups could differ as a result of a study employing a larger sample with an equal number of male and female participants. Therefore, we recommend that this study be replicated in that fashion, and to test individual male and female avatars of each ethnicity for differences in willingness to collaborate based on variables such as avatar gender and perceived attractiveness.

Furthermore, this study did not employ a means to measure participants' reasons for willingness to collaborate. Therefore, we recommend future studies seek to obtain not only a score for collaborative distance, but also the reason one holds for willingness to collaborate closely with one avatar as opposed to another. This study also did not allow participants to choose which ethnic group to associate each avatar. The results show that Chamorros in our sample rated Chamorro avatars with higher scores in collaborative distance, indicating less willingness to work closely with those avatars than with Filipino avatars. This could be a result of finding one avatar more attractive than another, or it may indicate that the images used for Filipino avatars were more ethnically homophilous for Chamorros than the avatars created of a Chamorro male and female; in other words, Chamorro participants may have identified more closely with the appearance of the Filipino avatars than the Chamorro avatars. In this population, people often have ancestors from many ethnic groups, so future studies should allow participants to choose which avatar represents each of the ethnic groups, without having those labeled for them or left unlabeled entirely, as in this study.

In collaborative learning in virtual environments employing avatars for self-representation, we recommend that schools and universities allow students a wide range of customization options,

including choices for ethnic appearance and customization. This study found that students do significantly prefer avatars for self-representation that resemble their own physical characteristics and gender. In addition, studies show that among competitive, individualistic, and cooperative types of value systems employed in a learning environment, each imposes an inherent set of values. These values influence whether diversity in the classroom results in positive or negative outcomes (D. W. Johnson & R. T. Johnson, 1999, p. 17). A principle benefit of cooperative learning situations is that they allow learners to “perceive that they can reach their learning goals only if the other students in the learning group also do so” (D. W. Johnson & R. T. Johnson, 1999, p. 17). Therefore, within collaborate virtual learning environments with diverse student populations, we recommend the incorporation of cooperative learning activities to foster positive outcomes within groups to achieve mutual goals.

References

- Annetta, L. A., & Holmes, S. (2006). Creating presence and community in a synchronous virtual learning environment using avatars. *International Journal of Instructional Technology and Distance Learning*, 3(8).
- Annetta, L. A., Klesath, M., & Holmes, S. (2008). V-learning: How gaming and avatars are engaging online students. *Innovate*, 4(3). Retrieved April 30, 2008, from <http://innovateonline.info/index.php?view=article&id=485>.
- AvMaker. Newark, NJ: CyberExtruder. Retrieved April 30, 2008, from <http://www.cyberextruder.com/avatars.aspx>.
- Bente, G., Ruggenberg, S., Kramer, N. C., & Eschenburg, F. (2008). Avatar-mediated networking: Increasing social presence and interpersonal trust in net-based collaborations. *Human Communication Research*, 34(2), 287-318. doi: 10.1111/j.1468-2958.2008.00322.x.
- Bogardus, E. (1933). A social distance scale. *Sociology and Social Research*, 17, 265-271.
- Dobbin, J., & Hezel, F. (1996). Micronesian migration since World War II. *Micronesian Counselor*, 19. Retrieved April 30, 2008, from <http://www.micsem.org/pubs/counselor/frames/micmigfr.htm>.
- Garrison, D. R., & Anderson, T. (2003). *E-Learning in the 21st Century: A Framework for Research and Practice*. New York: Routledge.
- Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2-3), 87-105. doi: 10.1016/S1096-7516(00)00016-6.
- Johnson, D. W., & Johnson, R. T. (1999). Cooperative learning, values, and culturally plural classrooms. In M. Leicester, S. Modgil & S. Modgil (Eds.), *Classroom Issues: Practice, Pedagogy and Curriculum III: Education, Culture and Values* (3rd ed., pp. 15-28). London: RoutledgeFalmer.
- Nowak, K. (2004). The influence of anthropomorphism and agency on social judgment in virtual environments. *Journal of Computer-Mediated Communication*, 9(2). doi: 10.1111/j.1083-6101.2004.tb00284.x.
- Nowak, K., & Rauh, C. (2005). The influence of the avatar on online perceptions of anthropomorphism, androgyny, credibility, homophily, and attraction. *Journal of Computer-Mediated Communication*, 11(1), 153-178. doi: 10.1111/j.1083-6101.2005.tb00308.x.

- Nowak, K. L., & Biocca, F. (2003). The effect of the agency and anthropomorphism of users' sense of telepresence, copresence, and social presence in virtual environments. *Presence: Teleoperators and Virtual Environments*, 12(5), 481-494.
- Rao, K. (2007). Distance learning in Micronesia: Participants' experiences in a virtual classroom using synchronous technologies. *Innovate*, 4(1). Retrieved April 30, 2008, from <http://innovateonline.info/?view=article&id=437>.
- Rubinstein, D. H. (1991). The future of Micronesian migration to Guam. In *XVII Pacific Science Congress*. Micronesian Area Research Center, University of Guam.
- Wark, C., & Galliher, J. (2007). Emory Bogardus and the origins of the social distance scale. *The American Sociologist*, 38(4), 383-395. doi: 10.1007/s12108-007-9023-9.