Introducing Avatarification:  
An experimental examination of how avatars influence student motivation

Rabindra Ratan  
Dept. of Media & Information  
Michigan State University  
rar@msu.edu

RV Rikard, Celina Wanek, Madison McKinley, Lee Johnson, Young June Sah  
Michigan State University  
rvrikard@msu.edu, sahyoung@msu.edu

Abstract

While gamification has been studied, applied, and sometimes contested within a variety of contexts (especially education and business), the concept of avatarification — the utilization of virtual self-representations within a mediated environment — is relatively new and has great potential for enhancing learning contexts. Building on previous work which suggests that people behave consistently with their avatars’ characteristics, the present research aims to develop an understanding of how avatars can be integrated into student communication in ways that increase performance motivation. In a field experiment conducted with an undergraduate class, 229 participants used avatars to communicate over a 15-week period about class material. Results suggest that using an ideal-self avatar or superhero-student avatar augmented student performance motivation during the avatar-use task, but the superhero-student avatar unexpectedly hindered performance motivation in a task unrelated to avatar use. This suggests novel theoretical and practical implications for avatar use in education.

1. Introduction

Gamification, a term and concept that many research communities have largely embraced (e.g., HICSS minitrack titles), “is bullshit,” according to well-known games scholar, Ian Bogost, whose piece on this topic is entitled the same [1]. One of the major points in this critique, which seems to represent a popular attitude in the game development community, is that the use of gamification techniques does not require an understanding of what makes a true game [2]. Instead, gamification involves the application of mechanisms that are associated with games (e.g., points, badges) with the intent of modifying user behavior, regardless of whether the modified product is indeed a game.

The present research also involves applying a common feature of games — avatars (i.e., users’ virtual self-representations; [3]) — in order to modify user behavior, but we do not consider this to be gamification research. Although avatars are often playful, they alone do not transform a context into a game.

Instead, an appropriate term would be “avatarification”, which we define as the utilization of virtual self-representations within a mediated environment in order to facilitate interactions in that environment. Avatarification has not been formally defined in previous academic literature, though the term has been used colloquially (e.g., in social media). Still, we consider this to be the introduction of avatarification as a concept that has origins in the notion of gamification, but is distinct in its focus: the self. Just as avatars serve as visual and behavioral representations of the self (to varying degrees; [3]), avatarification is essentially the ability for individuals to represent themselves through visual and behavioral characteristics that are displayed within the virtual environment. These visual characteristics may be chosen to reflect the user’s unique identity just as the avatar’s behaviors may be used to reflect the user’s individual intentions. In other words, to avatarify a mediated environment is to allow users of that environment to embody a visual and behavioral self-representation.

While avatarification is a relatively new concept, a growing body of experimental research suggests that an avatar’s characteristics influence user behavior, even beyond the avatar use context [4-6]. Further, research
suggests that avatars used in the context of education potentially enhance student engagement [7], creativity
and fun [8], critical thinking [9], and ease of communication [10]. Given the relative novelty of these
topics, the methods of such research have been mostly exploratory, offering limited generalizability. The
present work extends these research areas, offering a quantitative examination of the effects of avatar
characteristics on user behavior in educational contexts.

More specifically, this research examines how avatar design guidelines influence student engagement
in communication through these avatars as well as performance motivation outside of the avatar use
context. The remainder of this paper describes the theoretical foundations for expecting an influence of
avatar design guidelines, a field experiment within which these expectations were examined, the patterns
that emerged from this study, interpretations of such patterns, and implications for using avatars in
educational contexts.

2. Avatar use effects

Avatar characteristics have been found to influence the avatar user’s behaviors and attitudes both during and
beyond the mediated context of avatar use, a phenomenon coined the Proteus effect [2]. Avatar
height and attractiveness have been found to influence confidence in negotiation style and social interaction,
respectively [6]. Avatar clothing color has been found to influence aggression [11]. Avatar body size has been
found to influence subsequent eating [12]; and exercise [13]. Avatar gender has been found to influence math
performance [14-16].

The mechanisms responsible for such effects are somewhat debated. Some researchers posit that using
an avatar aligns the user’s self-perception with the behavioral expectations associated with the avatar’s
characteristics, thereby compelling the user to conform to those expectations [6]. Other researchers have argued
that the effect is due to the priming of schema associated with the avatar’s characteristics [11]. In our own work,
we have suggested an approach that falls between these explanations, positing that the simultaneous priming of
self-related and avatar characteristic-related schema creates associations between the schema that then
influence self-perception and thus performance [17]. But regardless of the causal mechanisms, the extent to
which the avatar is perceived as relevant to the self has been found to moderate the strength of such effects [18].

The present research does not contribute to this debate about the theoretical mechanisms underlying
such avatar use effects, but instead extends our understanding of how such effects may be harnessed to
promote positive outcomes in educational contexts. Most of the studies in the previous research described
above utilized experimental manipulations of specific avatar characteristics. This is somewhat infeasible in
real-world applications of avatar-based activities. For example, although research has found that using a male
avatar leads to better math scores [14-16], it would be stereotype-reinforcing and likely offensive if math
students were disallowed from using female avatars for classwork.

Instead, a more promising approach would be to allow students freedom to customize their avatars within
a framework of avatar-design guidelines that are known to influence students in positive ways, e.g., by
increasing motivation and thus learner achievement [19]. To this end, the present research draws from the
psychological concept of possible selves [20], which suggests that people hold in their minds different
versions of “the self” (e.g., ideal, future) that may serve as motivators and de-motivators of certain behaviors.

Avatars should be able to influence the user depending on which version of the self the avatar
represents. Previous research supports this claim, finding that using an avatar that represents the ideal self
(i.e., facets of the self the user would ideally like to possess) — compared to the actual self (i.e., facets of
the self the user actually possesses) — leads to greater psychological well-being [21], more positive selfperceptions [22], and enhanced psychological connections to the avatar and virtual environment [23].

In the education context, we would also expect ideal-self avatars to be associated with positive effects,
given that thoughts of the ideal self are more likely to motivate positive behaviors than thoughts of the actual
self [20]. This suggests that students who are guided to design an ideal-self avatar will be motivated to perform
well in the class. Consistent with previous research on avatar use, we examine these effects both during and
beyond avatar use. In other words, we expect that the effect of the avatar design guidelines (e.g., ideal or
actual self) will manifest both during avatar use as well
as within course-related activities that do not involve avatar use. Thus, we posit the following hypothesis:

**Hypothesis 1:** Students who use an ideal-self avatar will exhibit greater performance motivation A) within an avatar-based interaction task and B) in class-related performance that does not involve avatar use.

Avatars are often used in video game contexts that immerse the user in entertaining and often heroic narratives. Avatars used in educational contexts may also offer a connection to such narratives as a means of engaging the user in the learning experience. Further, using a heroic avatar may also influence the user’s self-concept, thereby compelling more positive behaviors in the classroom context. Recent research supports this claim. In one study, participants who used a heroic avatar exhibited more prosocial behavior (i.e., sharing chocolate sauce) and less aggression (i.e., sharing chili sauce) compared to participants who used a villainous avatar [24]. Similarly, participants in a virtual reality simulator who were given a superpower (i.e., the ability to fly) exhibited more prosocial behavior (i.e., helping the experimenter clean up some dropped pens) than participant who did not have this superpower.

Based on these findings, we would expect that using an avatar designed to represent a superhero-student would increase the user’s motivation to interact with other students through the avatar as well as to perform well in the class in general. Thus, we posit the following hypothesis:

**Hypothesis 2:** Students who use a superhero-student avatar will exhibit greater performance motivation A) within an avatar-based interaction task and B) in class-related performance that does not involve avatar use.

### 3. Methods

In order to test our hypotheses, we conducted a field experiment in an undergraduate student class at an American university. The course, an introduction to the history and significance of media and communication-related topics, included approximately 300 students. Although the course instructor was involved in this IRB-approved research, the potential for coercion into participation was minimized. Students’ data were only included in this analysis if they provided consent. Further, the list of consenting students was not available to the instructor until after the semester had ended and grades were finalized. Thus, the instructor’s assessment of the students could in no way be influenced by their choice to participate in this research. The students were aware of this. Of all students, 144 men and 85 women consented to being included in this study.

The class met in person twice per week for lectures from the instructor. Outside of class, students were required to engage in weekly online group discussions within a group of approximately six classmates (randomly assigned). The assignment required students to use a Voki.com avatar (Figure 1). Each week, students would create a scene of their avatars speaking a response to that week’s lectures. They were prompted to respond to the questions, “in what way does something you learned in class this week relate to your own life?” and “what was the ‘muddiest’ point this week? In other words, what was least clear?”

Students would post a link to their avatar scenes in a text-based forum accessible only to their group members. After these initial lecture responses were due, students were required to view all group members’ avatar scenes and then post a text-based response within the forum to at least one person (Figure 2). They were prompted to respond to the questions, “What about the response do you agree with?” and “what can you suggest about the person’s muddiest point?” The class met on Tuesdays and Thursdays at 8:30am, the initial lecture responses were due on Thursdays at 5pm, and responses to group members were due on Fridays at 11pm.

![Figure 1. Avatar design interface on Voki.com](image-url)
The semester was split into three five-week segments. Students were randomly assigned to design and use one of three avatar types (actual-self, ideal-self or a superhero student avatar) at the beginning of each segment of the semester. Examples of the avatars that students created (Figure 3) illustrate that there was a wide variety of avatar customization preferences. Student groups were homogenous for avatar-type, i.e., students within the same discussion group were told to use the same avatar type. Avatar type was balanced and rotated throughout the semester to reduce the potential for order effects or unequal distribution of benefits to students. In other words, during each segment of the semester, each third of the class was assigned to one of the three avatar types. Further, students were assigned to one of the six possible avatar assignment order.

4. Measures

As a reflection of performance motivation within the avatar-based interaction task, we measured the average number of discussion topics that each student posted per week. Although students were required to post a minimum of one topic per week, approximately 32% of the students posted fewer than once per week and approximately 3% posted more than once per week. The mean posts per week was .85 (SD = .28).

As a reflection of performance motivation outside of the avatar use context, we measured whether students posted study guides for their course exams. This was a particularly appropriate measure of student motivation because although the assignment included a small incentive (a 4% extra credit boost on the related exam), it was optional and most students did not post one (68% across all exams). Grading of these study guides was lenient. Course assistants examined student posts and gave credit to all except those who clearly posted only

superhero is ‘a benevolent fictional character with superhuman powers, such as Wonder Woman or Superman.’ In other words, make this avatar as a benevolent, fictional character with student-related superpowers.”
information that was not useful (e.g., comments such as “you should study for this exam”). Thus, posting a study guide indicated a willingness to put in a minimum amount of extra effort in order to succeed in the class, i.e., motivation to perform well.

We should note that these study guides were posted in a forum that was available to the entire class, so in addition to the motivation for personal gain, some students may have posted a study guide in order to help their fellow classmates. However, based on feedback from students, the primary motivation for posting study guides appeared to be the improvement of their own grades.

After each segment of the semester, students completed a survey with attitudinal and psychological measures (e.g. learning motivation, self-efficacy, and helping orientation), but most of these data are not within the purview of the current analysis. However, student gender, as indicated via responses of “male”, “female”, or “other” to the survey question, “What is your gender?” was included as a covariate in the analysis (note: no students chose “other”). The reason for including this covariate is that women have been higher achievers in this course historically and so controlling for this difference increased the accuracy of the tests of the avatar-type effects.

5. Results

In order to address the hypotheses, we conducted a series of mixed linear model analyses with avatar type (i.e., actual self, ideal self, and superhero) predicting the number of threads posted per week and the number of study guides posted per exam. The models included the avatar type variables dummy coded for ideal-self and superhero-student avatars and a binary student-gender variable as the independent variables. Interaction effects between these variables were not a focus on the present paper and also were non-significant when included in the models, so they were not included in the models examined here.

As described previously, the semester was split into three segments, with students assigned to a unique avatar type in each segment and the order balanced and rotated. The dependent measures of threads and study guides posted were calculated for each of these three segments. The two models — one for each dependent measure — included the semester segment as a repeated factor. Thus, the analysis included both between-subjects comparisons (within each segment) as well as within-subjects comparisons (across all three segments).

Given the potential for the influence of student discussion groups on individual student behavior, we calculated the degree of within-group interdependence for both dependent variables. The intraclass correlation coefficients (ICC) for number of threads posted and number of exam study guides posted were both less than 0.09. This suggests that group-level behavior was not a major influence of students’ individual behavior with respect to these measures. Thus, we conducted our analyses at the individual-student level.

Results of both analyses, represented in Table 1, suggest that avatar type influenced both the threads per week and study guides posted. Regarding the former, the directionality of the statistics suggests that students who used an ideal-self avatar posted more threads than participants not in this condition, with a small effect size. This difference is also reflected in the descriptive statistics as split for gender (Table 2).

Similarly, though marginally significant (p = .05), students who used a super-hero student avatar appeared to post more threads than participants not in this condition, with a small effect size. These results provide support for Hypothesis 1a and 2a, i.e., that using an ideal-self avatar or a superhero-student self avatar (respectively) leads to greater performance motivation within an avatar-based interaction task, though the small effect size should be noted.

Regarding performance motivation unrelated to the avatar use task, the directionality of the statistics suggests that students who used a super-hero student avatar posted fewer study guides than participants not in this condition, with a small effect size. Using an ideal-self avatar did not have a significant effect. Thus, these results contradicted Hypothesis 1b and provided no support for Hypothesis 2b.

Overall, these results suggest that avatar type influenced performance motivation, though the effect size was small relative to other factors (e.g., gender).
6. Discussion

The present research examines how avatarification — the utilization of virtual self-representations within a mediated environment — in education contexts influences student motivation both during the avatar-use activity and in other class-related performance that does not involve avatar use. Results suggest that when students in a large undergraduate course used an ideal-self or superhero-student avatar, they were more motivated to engage in the avatar-based communication task. However, using an ideal-self avatar did not influence performance motivation outside of the avatar-use context (i.e., exam study-guide posting). Further, using a superhero avatar unexpectedly reduced student motivation on this activity. Overall, these findings suggest avatars can be integrated into education contexts to enhance student motivation outside of the avatar-use context.

6.1. Theoretical Considerations

The theoretical foundations of the present research are derived from previous examinations of the Proteus effect phenomenon [5, 6, 11] which suggests that avatar identity characteristics influence the user in ways that compel the user to behave in accordance with expectations related to those characteristics. The present findings with respect to the avatar-based (thread-posting) task are consistent with these foundations. Specifically, using an ideal-self or superhero-student avatar would have encouraged students to think about the characteristics associated with these archetypes. These characteristics would have likely included increased engagement in school-related activities. Thus, when reminded of these characteristics while using the avatar during the avatar-based communication tasks for the class, students in these avatar-type conditions would have likely been more motivated to engage in the task.

However, outside of the avatar-use task, the students would have been less likely to consider their avatars’ characteristics during their class-related behaviors and hence the avatar-type’s effect on their behavior could have dissipated. This is consistent with previous research on the Proteus effect which suggests that the salience of avatar characteristics to the user

---

**Table 1: Mixed Linear Model Estimates for Threads per Week and Study Guides Posted**

<table>
<thead>
<tr>
<th></th>
<th>Threads Per Week</th>
<th>Study Guide Postings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>Std. Error</td>
</tr>
<tr>
<td>Ideal-self avatar</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Superhero-self avatar</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>Gender</td>
<td>0.10</td>
<td>0.02</td>
</tr>
</tbody>
</table>

**Table 2: Descriptive Statistics Split for Gender**

<table>
<thead>
<tr>
<th></th>
<th>Threads Per Week</th>
<th>Study Guide Postings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male Students</td>
<td>Female Students</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Ideal-self avatar</td>
<td>0.83</td>
<td>0.28</td>
</tr>
<tr>
<td>Superhero-self avatar</td>
<td>0.81</td>
<td>0.31</td>
</tr>
<tr>
<td>Actual-self avatar</td>
<td>0.80</td>
<td>0.30</td>
</tr>
</tbody>
</table>
dissipates at different rates depending on the context (e.g., virtual or physical; [6]) as well as the user’s previous psychological experience during avatar use [18]. In the present study, such dissipation may be responsible for the lack of a relationship between using an ideal-self avatar and posting exam study guides. Although the students had been reminded of (and thus influenced by) the avatar’s characteristics during the weekly avatar-based assignment, when the time came to potentially post an exam study guide, the avatar’s characteristics were simply no longer salient enough to influence the user’s behavior.

However, the relationship between using a superhero-student avatar and posting fewer exam study guides is likely not explained by dissipation alone. Instead, we posit that some of the characteristics associated with the superhero-student avatar had dissipated while others were still salient in students’ memory, thereby influencing the students’ exam study guide posting behavior. Specifically, when not using the avatar, the students would have been less capable of recalling the full avatar design instructions and instead recalled only the most unique and exciting element of the avatar design: it was a superhero (of some form). The loss of “-student” in this recollection would have had significant implications. Superheroes are often portrayed as athletic and physical, not scholastic and intellectual. Just as priming an athletic identity in a lab context reduces academic performance [25], students who associated their superhero-student avatars with athleticism—because their recollection of the association to student-related heroism had dissipated—would have likely held reduced expectations of their own performance in the class, i.e., reduced motivation to post a study guide.

We should note that there is an alternate explanation for this finding that is distinct from the dissipation explanation. Namely, superheroes often do not need to work to gain their super powers. Instead, they tend to be born with them or to receive them in a single event. If students internalized this element of being superhero with respect to the superhero-student avatars, they may have developed an attitude of overconfidence. In other words, they may have felt that they did not need to expend much effort in order to succeed.

Although this explanation seems to make sense with respect to the reduction in study-guide posting, it does not align well with the finding that superhero-student avatar users were more engaged in the weekly avatar-based thread posting assignment. If superhero-student avatars led to overconfidence, then the users would likely have engaged less in the avatar-based assignment as well. Still, we have noted this explanation here because of the potential for a third factor that we did not consider or measure that may have somehow facilitated these effects of using a superhero-student avatar that appear to be in opposite directions.

7. Theoretical and Practical Implications

This research contributes both theoretical and practical implications to the discussion of avatar use effects. First, while most research in the area has relied on lab-based studies in which participants are assigned to use avatars with specific characteristics, the present work illustrates that avatar characteristics influence the user’s behavior even when the user is given the freedom to customize the avatar within a larger avatar-design framework. Given that there was a wide variance in customization preferences across the avatar types (see Figure 3), this suggests that it is not just the avatar’s characteristics, but also the user’s perception of those characteristics that influences the user’s behavior. This also suggests that in practice, avatar-based activities can be designed in ways that allow users the freedom to customize their avatars (as they would in many avatar-use scenarios) within a framework that directs the users toward some intended goal. In other words, avatarification is a viable approach to meaningfully influencing user’s attitudes and behaviors.

Within education contexts, more research is necessary to identify the specific avatar assignments and types that maximize student learning and motivation. The present findings imply that ideal-self avatars are beneficial to students, at least during avatar-use, while superhero-student avatars are not and may even have detrimental effects. The differentiating factor in both findings may be the dissipation of the avatar’s salience to the individual over time.

Future research could contribute to this question by examining which types of avatars people hold in their memory most accurately as well as methods of reminding people of their avatar’s characteristics even when they are not using them on a specific assignment. For example, perhaps if the students in the present study
were asked to paste a picture of their avatar in their exam study guides, then those students who had used an ideal-self avatar would have been more likely to post one.

Further, future research should examine different avatar-types. For example, by examining the effects of a “student-superstar” avatar (or “a student super-avastar”) would provide a useful contrast to the superhero-student avatar in the present study. This could potentially help refine an understanding of the causal mechanism in the present study (e.g., determining if the word “super” leads to negative effects in other contexts).

While such future research will likely contribute clarity to this relatively nascent area of inquiry, the present study still does fundamentally suggest that avatars can be introduced into education contexts to improve the student experience. Although practitioners should be cautious about encouraging superhero-related avatars for the time being, ideal-self avatars appear to boost performance motivation or at least do no harm. Further, educators should feel free to avatarify students’ work and experiment with other types of avatar customization assignments. If there is an open channel of communication for students to provide feedback about the experience, the instructor should be able to guide the students’ avatar use in ways that facilitate increased engagement and enjoyment in the class.

8. Limitations

The implications of the present study should be considered with the caveat that alternate explanations may exist and that more research should be conducted. For example, we interpreted the findings using previous literature on avatar use effects. Another explanation may exist within fields such as ludology, given that using an avatar and experimenting with identity are both playful acts.

Further, as described earlier, the present research does not address many psychological aspects of avatar use that may play a role in these effects. For example, differences in the specific ways students design their avatars (within conditions) may have also played a role in the effects of the avatars’ characteristics. We are currently conducting a follow-up study to this end, coding the individual avatars for characteristics such as attractiveness and gender. We hope to continue that research as well as other extensions in order to complement the present work in future papers.

Another important limitation is the avatar environment within which the research was conducted. This was not a typical virtual world where users could customize photorealistic avatars and navigate them through a 3-dimensional space. Instead, we used a web browser-based application within which users customized cartoonish avatars, defined what the avatars say, and shared html links to the avatar speaking. Thus, the results must be interpreted within this context and may not apply within a more typical virtual environment. However, we are confident that the theoretical foundations of this work are applicable across all mediated contexts of avatar use. As such, we hope to conduct research to replicate and extend the current findings to more immersive virtual contexts as the ability to integrate such technologies into education environments becomes more feasible.

9. Conclusion

Overall, this work offers a novel investigation of the concept of avatarification within an education context. The findings suggest theoretical implications that extend the current discussion of avatar use effects as well as practical implications that support the use of avatars in education contexts. While more research is certainly necessary in order to elucidate the many questions that remain open, the present work appears to support the general claim that avatars can be integrated strategically within learning contexts to enhance student motivation and performance. While gamification may be developing a negative reputation (at least within some communities) for being somewhat duplicitous and inaccurate, avatarification is worth reasonable consideration, especially when applied toward meaningful ends such as improving education.

10. References

This work was made possible by the Lilly Teaching Fellows Program at MSU. Special thanks to Deb DeZure, Rand Spiro, and Johannes Bauer for their support of the Lilly program and this work.
11. References


