

# Teaching Her, Him ... or Hir?

## Challenges for a Cross-Cultural Study

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This paper discusses some cultural considerations that we stand before in developing and exploiting an agent based educational software for use by Swedish and American students, age 11-14. The reported cultural challenges arise in software development, study designs, and decisions on actual pedagogical use in the two cultural settings.

The software in the study is an educational game for basic mathematics [1] using Teachable Agents (*TAs*), an educational technology based on *learning by teaching*. In brief, a TA is a computer agent that is taught or trained by a student, where AI techniques guide the agent's behaviour based on what it is taught [2]. The TA in the math game both asks the student to explain game related math questions and enters a chat-like conversation on a broader set of topics. An important rationale behind the latter, more socially oriented conversation, is to enable additional pedagogical interventions regarding, among others, math attitude, math self-efficacy. The two conversational modes are linked by the persona of the agent: 11-year old, going to school, learning math in the game, having various interests such as music and film.

The actual cross-cultural study takes place within a larger 3-year project. One project theme concerns the pedagogical effect of a *visually androgynous* TA as compared to a *visually gender stereotypical* TA. Gender stereotypes have been shown to have a considerable impact within STEM education, where manipulations of these stereotypes influence students' learning outcomes as well as attitudes. A previous study [3] with ambassador or presenter agents targeted Swedish high school students and university educations. A more gender neutral female ambassador agent evoked considerably more positive attitudes and utterances on females within the computer engineering domain than did a more stereotypically feminine female agent. As to female students' declared interest in choosing a computer engineering university education, the two female ambassador agents had an equally positive effect. An overall research goal is – besides contributing knowledge about the importance of cultural contexts for the design of learning games – to show how more gender neutral or ambiguous characters can have positive effects: in short terms by not associating students with a category standing for weakness or incompetence and in longer terms by not reproducing such stereotypes over time. The now planned study has some similarities with the former in that both mathematics and computer engineering are male domains according to cultural images or stereotypes, and that both projects target student attitudes. However, the agent in the present case is not an ambassador or presenter but instead a digital tutee, somewhat younger than the student. Thus,

phenomena like role modelling may be less pronounced or work differently. At the same time, the character – and specifically its gender – is not without effects. Observations on children, age 9-10, using the same software with more obviously gendered agents shows that some of the boys may protest when their TA is a girl and insist that they cannot teach her much since she is female and thus not very capable.

Another important difference is that the former study made use of *relatively gender neutral*, yet clearly female or male characters, whereas the present study makes use of a visually *androgynous* character. With this, the present study approaches two issues: (i) “How does an androgynous vs. a gender stereotypical character affect students’ attitudes towards their TA as their tutee?” and (ii) “How does an androgynous vs. a gender stereotypical character affect the chat conversation and the students’ attitudes towards it?”

In the present study all participants interact and chat with two different TAs, one a girl or a boy character and the other visually androgynous, yet assigned a gender (the same as that of the other TA that they interact with).

Before study off-set, it is essential to ensure that the androgynous character is perceived as such *by the students that are to use the software*. For Swedish students this test has been carried out with a total of 38 students, with 17 of the students holding the character to look more like a female than a male, 10 holding it to look more like a male than a female, and 11 stating that they could not choose one before the other. Furthermore, the three TA characters must not differ in any substantial way as to attractiveness, which also has been pre-validated for the Swedish target group. However, before conducting studies in the US, similar pre-validations have to be carried out with US students as it is uncertain whether the result will diverge or not. It is possible that the characters have to be redesigned to for use in the US study, since the goal is to explore the pedagogical effects of androgynous TA characters in the two cultures – not to evaluate the effects of a specific set of characters.

This goal is aligned with an *overall goal* of achieving pedagogically powerful software for different cultural settings, and a conviction that this requires far more than working this out for one cultural setting and then “translate” the software for another. Most obviously, the TA conversation, including anecdotes with cultural references, talk of school, etc. cannot simply be “translated”. But neither can, as discussed above, visual aspects.

Furthermore, when conducting studies and drawing conclusions on how software can be used to achieve pedagogical goals, still other cultural differences must be taken into account. In this case, the stricter curriculum in the US requires the use of other study designs than would have been needed for a project within Sweden only.

## References

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