[1] (Devine, Patricia G et al. “Long-term reduction in implicit race bias: A prejudice habit-breaking intervention.” *Journal of experimental social psychology* vol. 48,6 (2012): 1267-1278. doi:10.1016/j.jesp.2012.06.003)

[2] (Stone, J., Moskowitz, G. B., Zestcott, C. A., & Wolsiefer, K. J. (2020). Testing active learning workshops for reducing implicit stereotyping of Hispanics by majority and minority group medical students. Stigma and Health, 5(1), 94–103. [https://doi.org/10.1037/sah0000179](https://psycnet.apa.org/doi/10.1037/sah0000179)

[3] Forscher, P. S., Lai, C. K., Axt, J. R., Ebersole, C. R., Herman, M., Devine, P. G., & Nosek, B. A. (2019). A meta-analysis of procedures to change implicit measures. Journal of Personality and Social Psychology, 117(3), 522–559. [https://doi.org/10.1037/pspa0000160](https://doi.apa.org/doi/10.1037/pspa0000160)

Do you think your design will achieve the above learning goals (evaluating evidence for and against and describing how your thinking has developed since late March)?

**Arguments for:**

Given the summary of responses you obtained from EPFL Computer Science students, we are positive that the set learning goals can be obtained. This is based on the premise that implicit bias is like a habit that can be reduced through “a combination of awareness of implicit bias, concern about the effects of that bias, and the application of strategies to reduce bias.” [1]. Research also finds that the approach proposed, becoming aware of your own implicit biases and then receiving advice and training in managing them, can make a significant impact. A gender bias study [7] at the University of Wisconsin-Madison found that when at least a quarter of the faculty in a department attended only one interactive workshop on the topic of gender bias, there were significant increases in self-reported actions to promote gender equity at three months. Having the whole class participate on a weekly level is expected to bring satisfying results in terms of raising awareness of implicit bias, and further leading to its reduction. Additionally, the suggested Interactive way of teaching is evaluated as one of the best approaches for teaching ethical issues in CS in [6].

We obtained the surprising information that about half of the CS students at EPFL do not even know what implicit bias means. So, a big leap forward would be to just get them aware and thinking about the concept and effect of the implicit bias. Furthermore, about 90% of the students declared that they are wiling to address their own biases, which is the main goal of our project, eliminating implicit bias by increasing awareness among the students. Again, when asked if engineers need to become aware of their own implicit biases the vast majority agreed (only a small 5% disagreed).

As tested here [2] we believe that interactive training (through workshops, talks, ethics exercises…) can reduce the implicit bias.

About 57% of CS students (strongly) agreed with this - stating that implicit biases can be corrected with training. The majority of the students showed concern about the effects of the engineer’s implicit bias, (70% of students) by stating that reducing this bias among developers will benefit the users, giving them a more equal experience, and more than 82% agree that the engineer’s implicit bias might be translated into the algorithm they will create.

**Arguments against:**

One difficulty would be to tackle the diversity among groups of students working as a team, as groups would be created based on students’ nationality and gender. A perfect balance among groups would be very dependent on the class demographics and might be impossible if the minority groups are underrepresented. An example on lack of gender diversity can be found within our questionnaire results, where more than 77% were male participants.

We might encounter the problem of lack of participation needed for a productive debate, as students, unaware of their own implicit bias or the importance of overcoming them, might not feel incentivized enough to take part in the debates, considering they need to focus primarily on their technical skills.

A lot of the students do not see the importance of eliminating implicit bias among developers, as only 33% believe that it is as important as teaching CS algorithms, and only 30% strongly feel the need for an integrated Ethics CS course in their curriculum.

We are also unable to assure that the awareness and knowledge developed in this course will remain with these future software engineers when they will be building new products. As this meta-analysis from about 500 studies on implicit measures shows [3], the effects of the implicit bias change are often relatively weak and short-term only. Furthermore, they found that “changes in implicit measures are possible, but those changes do not necessarily translate into changes in explicit measures or behaviour.”.