

Project results: SuSPECT: Scaffolding Student PERSpectives for Critical Thinking

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Project period

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Overview

Many educators consider problem-based learning (PBL) to be one of the most innovative instructional methods in education. PBL is an instructional method that initiates students' learning by creating a need to solve an authentic problem. A common motivation for applying PBL to education is to enable students to take ownership for their own learning. Learners in these settings, with the support of a facilitator, inform their own learning and independently seek additional resources. This is largely a positive development, and these learners can make the best out of the rich availability of online resources to support their opinions and arguments.

However, there has also been a surge in the number of resources online that are misleading or false. These sorts of sensationalized resources are often widely shared, and the issue of "fake news" in particular has received a lot of attention. Stopping the proliferation of unbalanced information is not just the responsibility of the platforms used to spread it. Those who consume online resources also need to find ways of determining if what they are reading is true. SuSPECT therefore addressed ways of helping learners not only assess the veracity of online resources, but also develop more nuanced and balanced thinking. Concretely, it addressed the far-reaching objective of *helping learners develop more balanced thinking for material they find online*.

Implementation

Aim: Develop an explanatory interface, to help learners understand arguments and counter-arguments.

Rbutr-viz: We developed a searchable online tool that visualizes the existing online arguments in the system. It allows for a number of search and filter functionalities, suitable for finding arguments on specific topics: <http://rbutr.com/rbutr-viz/>

Rbutr-summarizer: We developed a tool that summarizes several pages in an argument graph. This work has resulted from a student project in masters course.

https://github.com/nsalminen/ir_rbutr

Aim: Improve an existing tool to mitigate cold-start for new information.

Rebuttal finder tool. This is a tool that for a given website searches for potential websites that argue against it. This makes it easier for users to find and add new information to the rebuttal system: <https://github.com/shanness/rbutr-rebuttal-finder.git> (currently a private repository)

Aim: Evaluate the augmented tool on learner understanding, and learner outcomes.

- A debate-based learning element was developed at two university courses at CEL universities in the year 2017/2018. These courses were developed jointly with the team delivering the two courses:

- Ethics, culture, and biotechnology (5000MRI14), Leiden University. Lecturer: Rob Zwijnenberg, Q1 (Nov-Dec 2017). Topics e.g., Organ Trafficking, Human Patenting, and Genetic Modification of Human Embryos
- IT & Values (WM0388TI), TU Delft. Q3 (Feb.-April 2018). Topics e.g., encryption backdoors, the right to explanation, the right to be forgotten
- The implementation at Leiden University was more condensed, with two debate groups (n=18, and n=19), over two sessions, using a flipped classroom approach.
- The implementation at TU Delft was 6 weeks long with three debates per student, and a larger cohort (n=100).
- Reports from each implementation are attached as separate appendices (Appendix A Leiden, Appendix B Delft).

Summary of outcomes

The argumentation of the students was comprehensive, well-balanced and nuanced, but we cannot conclusively say whether students were able to develop these high-quality arguments by working with Rbutr, or due to the debate itself. This mostly has to do with the fact that many students did not clearly show whether they actually used the tool.

The subjects covered in the course are very complex and difficult to get to grips with in a single session. This might have left them with less time and space for exploring another new resource, namely the Rbutr-tool.

After running the course at Leiden, we expected to see a difference in the implementation at TU Delft, since the course at TU Delft attracts more computer science students. We hypothesized that more technically trained students might engage more with online tools (such as Rbutr). Additionally, this course allowed students more time to collect arguments than in the first implementation. However, students in the second course reported that Rbutr did not suggest relevant high quality articles.

In the second course we also planned to examine the extent to which the debates influenced students' opinions. However, at least one member of each group declined to allow their data to be used for research purposes, so further analyses are not possible.

Despite the limited support of the benefit of using the Rbutr tool itself, the intervention on the whole has had a positive impact on two courses. Both of the involved courses have integrated the debate element into their courses, positive reviews from both students and staff. We saw that stronger opening arguments led to better debates, and that syntheses tended to receive higher grades than opening arguments or rebuttals. *This lends further credence to the value of adversarial collaboration in the classroom.*

In this project we also developed several tools which will be beneficial for users of Rbutr outside the university and less traditional forms of education.

Publications

This project also indirectly motivated a number of research collaborations resulting in the following publications in international, peer-reviewed venues.

- Nava Tintarev, Emily Sullivan, Dror Guldin, Sihang Qiu, and Daan Odjik. "Same, same, but different: algorithmic diversification of viewpoints in news". In *UMAP workshop on Fairness in User Modeling, Adaptation and Personalization, in association with UMAP'18*. 2018.
- Adrian Holzer, Samuel Bendahan, Shane Greenup, and Denis Gillet. *Digitally Scaffolding Debate in the Classroom*. Proceedings of the 2018 CHI Conference Extended Abstracts on Human Factors in Computing Systems.
- Nava Tintarev, Shahin Rostami, and Barry Smyth. "Knowing the unknown: visualising consumption blind-spots in recommender system". In *ACM Symposium On Applied Computing (SAC)*. 2018.

Other outcomes

- Collaboration with EPFL (Adrian Holzer): Effects of Collaborative Social Media Debate on Controversial Beliefs.
- Attended the Royal Society's workshop on filter bubbles in London on the 19 July
- Keynote at the workshop on [Surprise, Opposition, and Obstruction in Adaptive and Personalized Systems \(SOAP\)](#) in conjunction with the UMAP Conference.
- 8K grant Delft Designing for Values (with Mark Alfano, TPM, Delft)
 - Designing Artificial Advice Givers that Consider Perspective and Affect in Reasoning