AUTOMATE WHAT? EXAMINING THE POTENTIAL OF SOCRATIC CHALLENGE FOR LEARNING AND TECHNOLOGY

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THEORY AND RESEARCH

Socratic Challenge is a pedagogical approach developed in high school philosophy classes (Flammia, 2023). Drawing on Socratic brachylogy (Ford, 2008), it uses dialogue made up of short questions and answers, where teachers can interrupt long student responses to expose reasoning errors. Socratic Challenge differs from many established dialogue models that emphasize the importance of extended student contributions to enhance learning (Lin et al., 2015; Soter et al., 2008). In contrast, teachers in Socratic Challenge aim to slow down and break down interactions to highlight weaknesses in student talk. Socratic Challenge also relies on counterintuitive arguments that contradict students' common sense (Upal, 2010) in order to provoke cognitive dissonance (Lee & Kwon, 2001). A recent qualitative study found that this approach has potential for promoting students' critical thinking, particularly with regard to dealing with errors from the logical-argumentative and emotional perspectives (Flammia, 2023). The structure of Socratic Challenge and the preliminary results suggest that this approach can be effective for enhancing the quality of argumentation and for developing Intelligent Tutoring Systems for teachers and students.

WHAT NORMATIVE DIALOGUE CHARACTERISTICS WOULD WE LIKE THE A.I. TO SIMULATE?

TO PROMOTE CRITICAL THINKING, THE TRUTH-SEEKING DIALOGUE IS AMONG THE MOST SUITABLE →

COMMONLY VALUED FEATURES OF PRODUCTIVE DIALOGUE:

- *INCREASED STUDENT PARTICIPATION,*
- *USE OF REASONS AND EVIDENCE*
- *DISCUSSION OF ALTERNATIVES*

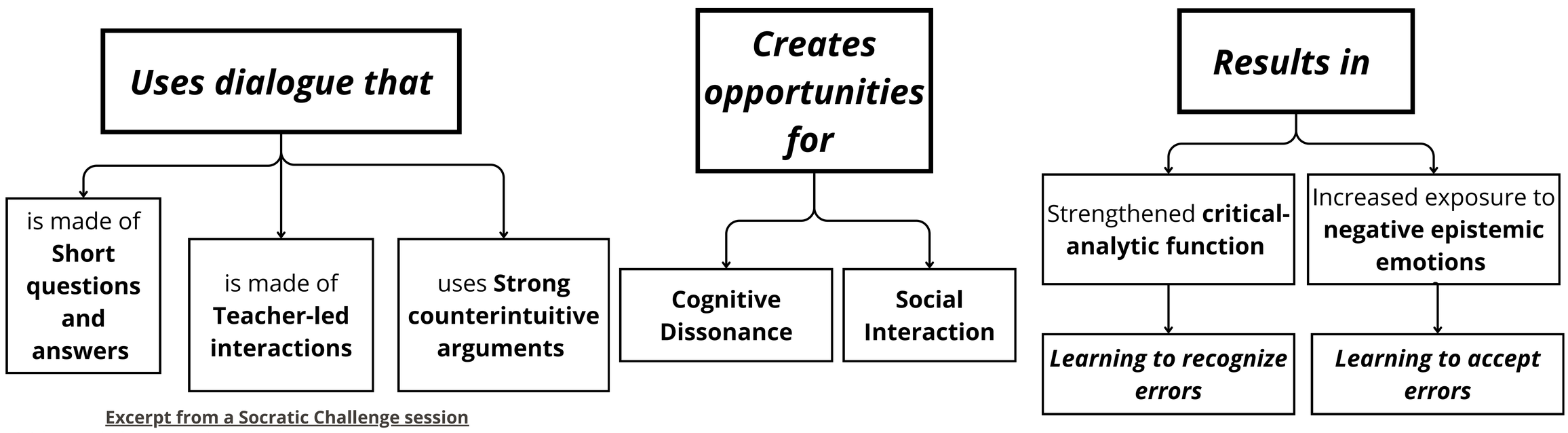
→ ***HOWEVER, THE MERE PRESENCE OF THESE FEATURES MAY NOT BE ENOUGH*** →

PSEUDOARGOMENTATION: when students engage in uncritical sharing of ideas (McNeill et al., 2016) .

HOW WE DEAL WITH THE RISK OF PSEUDOARGUMENTATION?

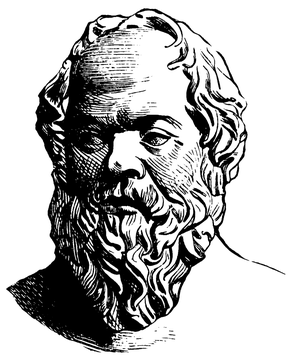
SOCRATIC CHALLENGE

Socratic Challenge differs from most other dialogue-based approaches, which emphasize students' agency and view long, elaborated student responses as the primary mechanism for learning (for reviews, see Bouton & Asterhan, 2023; Hennessy et al., 2020; Howe et al., 2019; Reznitskaya & Gregory, 2013; Soter et al., 2008)



Excerpt from a Socratic Challenge session

Student 1: *I disagree, the future cannot be predicted...*
Teacher: *I didn't say it can be predicted, but that it is as if it is already written.*
Student 1: *But it is not, anything could happen...*
Teacher: *Give me an example, in respect to the two people throwing the ball in two parallel universes.*
Student 1: *Anything could happen that changes everything.*
Teacher: *Like what? Give me an example.*
Student 1: *A pigeon goes by and moves the ball.*
Teacher: *Okay, but a passing pigeon doesn't just appear out of nowhere, it must have started somewhere, right?*
Student 1: *Sure.*
Teacher: *And when did it start? In the past or in the future?*
Student1: *Well, in the past –*
Teacher: *But if the past of the two universes is the same it means the pigeon either left some other place or it didn't leave in both, so there can't be any difference.*
Student 2: *Okay, but you don't know if the person decides not to shoot anymore. I mean, you are not in the person's head, one can choose –*
Teacher: *Okay, sorry to interrupt you. I don't know what happens in the person's head, but what happens in the brain still obeys the laws of physics and chemistry. Is that true?*
Student 2: *Yes...*
Teacher: *The brain is a natural thing that obeys the laws of physics and chemistry anyway, so whatever happens, it must have a cause, do we agree on that?*
Student 2: *Yes...*
Teacher: *So, since the cause is always in the past, what happens after that is as if it is already established.*
Student 3: *Okay, but it could be that that cause starts during the throw, that is, in the ball's course.*
Teacher: Okay, but will that cause have its own cause?
Student 3: *Well... that I can't say –*
Teacher: *Could it be that something happens without a cause?*
Student 3: *Mm... no...*
Teacher: *Then the cause that you were talking about will also have its own cause, right?*
Student 3: *Uh, yes...*
Teacher: *And by proceeding cause by cause, don't you end up in the past?*
Student 3: *Unfortunately, yes.*
Teacher: *And didn't we say that the past of the two universes is the same?*
Student 3: *Unfortunately, yes.*



Challenges

- Research on this approach is in its early stages; more studies are needed to test its potential in different contexts
- Implementation challenges: Teachers may struggle to recognize and address weaknesses in students' arguments, as shown in different research (Juzwik et al., 2012; McNeill & Knight, 2013; Reznitskaya & Wilkinson, 2019)

Potential

- Promotes critical thinking: Offers an approach distinct from traditional dialogue methods, favoring short student responses and strong teacher engagement and aiming to create cognitive dissonance that in theory should remove the risk of pseudo-argumentation
- Technology integration: highly suitable for artificial intelligence-based intelligent tutoring systems to support teachers' learning of argumentation and facilitation practices.