Dear University Teacher!

Welcome using the *Reflection Compass* in research ethics and integrity teaching!

The *Reflection Compass* application is designed to support teachers in teaching about research ethics and integrity, and to support students in reflective engagement with research ethics/integrity learning tasks.

Many courses have elements of research ethics and integrity integrated in them – like research seminars, methodology courses, academic writing, peer reviewing or publishing seminars. In addition, reflection is an important aspect of becoming ethically sensitive. Research ethics and reflection skills may be challenging to evaluate pertaining if and what the students are learning. Moreover, students may rely on AI tools to get assignments done – which is often fine, but if done without own thinking and reflection, it is questionable what students have truly learned. Teachers may wish they could avoid unwanted use of AI and maintain a connection with the students' learning process without being overloaded with assignments to read.

What does the application do?

We are introducing a research-based tool for university teachers who cover research ethics/integrity in their teaching. The application is developed by research ethics experts and pedagogues to help teachers to

- find out what the students are learning and if their teaching is effective;
- monitor how their students understand the ethics/integrity-related content covered in a course;
- implement formative assessment and provide feedback to students during a course;
- encourage students to think about their learning and support the development of students' reflection skills;
- support students in learning to evaluate their own understanding.

How does the application work?

The application guides the teacher to set up a course with assignments of topics that require student reflection. After setting up the course and assignments (it is a good idea to include several assignments in one course, the assignment time will indicate when students can do them), the teacher then copies an invitation to be shared with students. Teachers can also duplicate their courses and assignments and use them in the coming semesters (courses will have unique IDs that will help distinguish between different years and groups).

Students sign in using their credentials and can go to the assignment that the teacher has indicated in the invitation link. Students do two tasks – they first reflect on the topic indicated in the assignment by writing a paragraph following the task 1 description. After that they read five statements and pick the one that best describes their understanding of the topic they had just reflected on. After submitting their response, they will see automated feedback describing the level of understanding they had picked. The application encourages students to think if the reflection they submitted matches the level of understanding described in the feedback. Students have a chance to go back to their response and edit either their written paragraph or their level of understanding.

The application analyses the indicated levels of understanding and provides results as a pie-chart to the teacher (see figure 1).

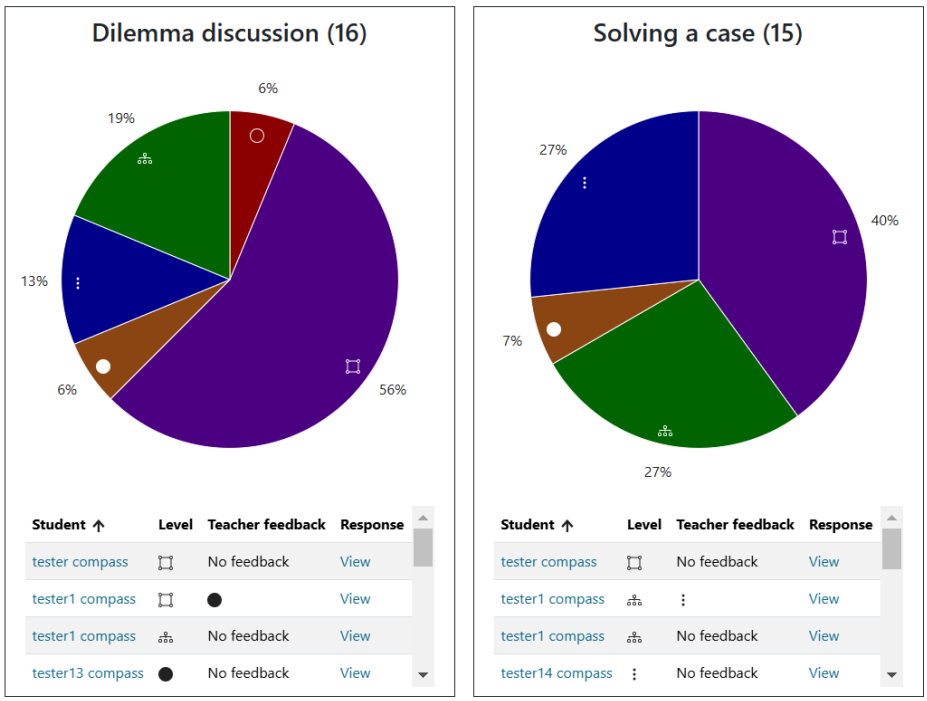

Figure 1. Pie-chart with the assignment results.

Moreover, both the teacher and students can see learning progress on the linear graph (see figure 2).

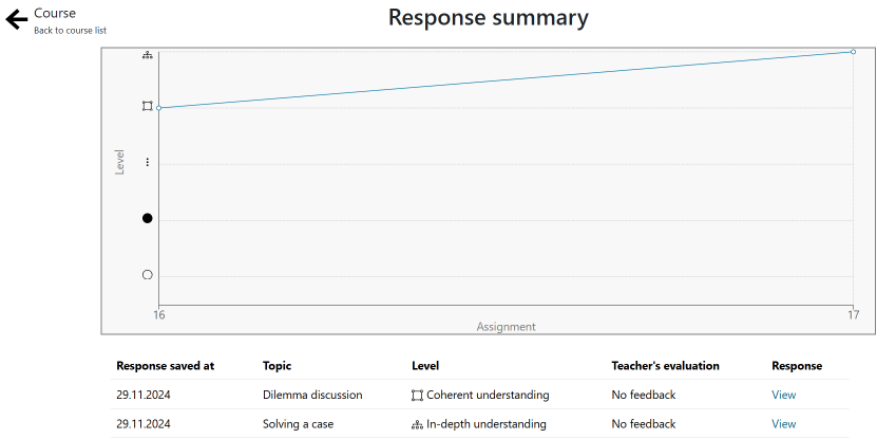

Figure 2. Linear graph with student progress in two assignments.

In addition to the automated feedback, the teacher can also provide more personalised feedback in the form of written text or by indicating the teacher's estimation of the level of understanding displayed in the paragraph written by the student.

While using the app mainly supports students' reflective learning and formative assessment during the course, the graph displaying the individual student's learning process serves well as a foundation for a subsequent 'reflection journal'. The graph functions as a prompt for students as they summarise their learning process in the reflection journal. The reflection journal can be used for the purpose of summative assessment, that is, as a graded assignment contributing to the final assessment in the course, usually the grade.

Repeated use of the application provides teachers insights on how the students are progressing, which topics seem to be more challenging and which ones have been mastered. Students can also see their own progress on the graph, and by reading the feedback provided by the application and the teacher, can work on their reflection skills.

Levels of understanding based on the SOLO taxonomy:

Symbol  indicates a need for help to understand. To improve their level of understanding the learner can improve their ethical competence by consulting relevant codes of conduct, and to discuss with experienced researchers how they think about making right choices in research.

Symbol  indicates emerging understanding. The learner is encouraged to think of related questions, or new questions which may follow the initial issue, it is a good idea to map who are concerned by a situation, and what kind of different questions they would raise about the situation.

Symbol  indicates moderate understanding. The learner should try to see connections between different ethical aspects in research and think of examples to describe those connections.

Symbol  indicates coherent understanding in which relationships between concepts are understood. The learner is advised to apply their knowledge in various contexts and provide help to others.

Symbol  indicates in-depth understanding. The learner may have thought about themselves as a role model in promoting good scientific practice in the research community more broadly, and in helping to create an ethically sustainable research culture.

What background is the application based on?

Reflection Compass is built on research and design principles and utilizes the *Structure of Observed Learning Outcomes* (SOLO) taxonomy to provide solid grounding to the results. By combining the results of the application, monitoring the student work in class and work submitted at different timepoints of the course, the teacher can get a holistic picture of the student development and effectiveness of the training.

If you are interested in finding out more about the SOLO taxonomy or the research behind the application, please visit the following links:

SOLO taxonomy: https://www.johnbiggs.com.au/academic/solo-taxonomy/

Article: John Biggs (1999) What the Student Does: teaching for enhanced learning, Higher Education Research & Development, 18:1, 57-75, DOI: 10.1080/0729436990180105

Link to the article: https://www.tandfonline.com/doi/pdf/10.1080/0729436990180105

Research about the development of the reflection application:

Article: Anu Tammeleht & Erika Löfström (2024) Learners' self-assessment as a measure to evaluate the effectiveness of research ethics and integrity training: can we rely on self-reports?, *Ethics & Behavior*, 34:8, 575-596, DOI: 10.1080/10508422.2023.2266073

Link to the article: https://www.tandfonline.com/doi/pdf/10.1080/10508422.2023.2266073

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Link to the application: https://reflection-compass.it.helsinki.fi