

A REVIEW OF STUDENT THOUGHTS ON REFLECTIVE PRACTICE

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ABSTRACT

Reflection is generally considered a key part of learning, enabling the student to clarify their understanding, embed knowledge and identify gaps in proficiency. In this regard it is also a potentially important tool to support lifelong learning. Reflective practice is however often an assumed competence, not always explicitly taught or encouraged. In this work we investigate student attitudes and experiences of reflective practice.

Two groups of students were asked to identify why they feel reflective practice should (or should not) be part of the curriculum while also identifying hurdles to implementation, together with tools and tips to support students in adopting reflection. This was achieved via debate and guided small group work.

Results showed students generally appreciated the benefits of reflective practice. There was however concern that it might add to the student workload and that less motivated students would not engage. Debates on whether the technique should be compulsory and assessed produced mixed results.

Interestingly, the students interpreted reflection in a very wide sense and wider than might be expected in conventional academic discourse, going beyond reflecting on immediate academic content to reflecting on mindsets, well-being and learning environments. Students expressed concerns however over reflection being another topic to learn, adding load into the curriculum and one difficult to adopt among students otherwise preoccupied with technical methodologies.

1 INTRODUCTION

With an increasingly rapid evolution of the engineering profession, future engineering graduates need to be committed to continuous or lifelong learning and need to be able to take responsibility for their own professional development. It is undeniable that continuous development of skills and competences is essential for fostering their employability and career perspectives (Kövesi and Csizmadia 2016). Consequently, to have a successful professional life, they are required to improve their learning effectiveness through their future career (Martinez-Mediano and Lord 2012). Despite its importance, reflective practice is often considered as an inherent or implicit competence so generally not explicitly taught and implemented in the engineering curricula. In the present work, we aim to investigate students' perception about

- (1) the implementation of reflective practices into their curriculum and
- (2) the possible supports for teaching and learning reflective practice in the most efficient and adapted way.

2 THEORETICAL BACKGROUND

We consider reflective practice as a central element of continuous learning allowing engineering students and graduates to transfer their current practice into different situations or to develop it into future practices. Accordingly, we define reflective practice as “practice which involves the development of learning and understanding through self-review to help determine progress against goals and future learning needs” (Thomson and Kövesi 2023.1). To ensure future engineering graduates have the ability to meet future learning needs, it is particularly important to put emphasis on the development of reflective practice.

We distinguish, based on the work of Bailie et al. (2021), four different interpretations of reflective learning by educators concerning the development of students' (1) professional practice, (2) professional identity, (3) critical consciousness and (4) critical view on the course content. These qualitatively different conceptions indicate the relevance of reflective practice both in educational and professional context in the view of a long-term perspective. According to the empirical study of Baruah et al. (2017), reflective practice is essential for engineering students' personal and professional development. On the one hand, this gives a better understanding of their career aspirations (by the development of professional practice and identity). On the other side, it is useful for identifying eventual competence gaps resulting in a better engagement in their courses (by the development of critical consciousness and critical view on the course content).

As mentioned earlier, despite its widely recognised benefits (Menekse et al. 2022, Howell 2021), in most engineering schools reflective practice is not traditionally implemented in engineering curriculum (Sepp et al. 2015). We notice that even if reflective practice is usually integrated into human and social sciences disciplines' curriculum, it is increasingly being implemented in STEM curriculum (Boswell 2023) during the last decades. For Badenhorst et al. (2020, p. 12), integrating reflective learning into engineering curricula allows engineering students to enlarge their vision “to bridge the more technical aspects of their work with a more socially aware professional identity as it expanded their notions of what it is to be an engineer”. The main obstacles for the implementation of reflective practice are at the institutional level, related to the lack of space in the current curriculum or/and the

lack of time for the development of new innovative programmes. In addition, it often requires reformulating the traditional curriculum and finding a new balance between the practical and theoretical training (Miranda et al. 2022). We notice also that the implementation of reflexive practice could be challenging for educators (Baillie et al. 2021), especially in STEM disciplines where educators have mainly technical and scientific background and teaching reflective thinking could cause difficulties (Nilsson 2013). For educators, it is not evident to engage and preserve (i.e. avoid their disengagement) students in the reflective activities, to help them to make a link between theoretical and practical knowledge or to find the right balance between students' guidance and autonomous work (Miranda et al. 2022).

Even with a strong technical interest and focus on their engineering studies, students have widely recognised the usefulness and various benefits of implementing reflective practice into engineering curriculum (Howell 2021) as well as they were aware of the importance of being able to reflect in their future professional life. However, the empirical results of Eshuis et al. (2022) indicate an interesting contradiction with students' perception concerning the more frequently used reflections activities (e.g.: journals, reports, essays, portfolios, logs,...) which are considered less worthwhile or meaningful in the educational context. This contradiction raises the question about the more adapted and meaningful tools or dispositives to support reflective learning. This is an interesting question in the context of an increasing digitalisation as the development of new and innovative tools (like e-learning or AI tools) and supports could be a good solution to this contradiction (Baruah et al. 2017).

3 METHODOLOGY

To elicit student views on the theme of reflection as part of the learning process a mixed approach involving small group work on key questions was supplemented by a more open debate type approach.

3.1 Participants

We recruited two sets of students for this work on based on their interest in the topic and motivation to learn more about it.

The first group was recruited in parallel with the European Students of Industrial Engineering and Management (ESTIEM) meetings held in Budapest in November 2023. This group consisted of 15 participants from ESTIEM with a background in Industrial Engineering, 6 male and 9 female. These were drawn from various European countries including Austria, Spain, Italy and Portugal.

The second set were drawn from students of the Budapest University of Technology and Economics (BME) within the framework of the Environmental Economics course. These students were drawn from a mix of engineering, business and management disciplines and consisted of 21 students, 10 male and 11 female. This group composed a mix of Hungarian, American, French, German, Turkish and Italian students.

For both workshops, participant recruitment and selection were on voluntarily basis. For the ESTIEM group, students could choose from various parallel programs including the reflective practice workshop. For the second group, the participation

was encouraged by exempting them from submitting one of course requirements. All participants verbally consented for the workshop results to be used in our research.

3.2 Approach

The workshops followed a procedure initially developed to solicit views and opinions among teaching staff on reflective learning with their students (Thomson and Kövesi 2023.1). The workshop began with a 15-minute introduction to the topic of reflective practice (e.g.: definition, applied methods, evaluation, etc.) building on Bloom's cognitive taxonomy. For the guided discussion, student sets were broken down into groups of 3 to 5 students who were then asked to discuss and suggest answers to:

- Why they feel reflective practice should (or should not) be part of the curriculum
- What hurdles are there to implementation
- What tools could support the adoption of reflective practice
- What tips could they suggest to support students in reflection.

To support this, guidance sheets and post-it type notes were provided to the groups to enable free flowing collation of thoughts and ideas (Figure 1).

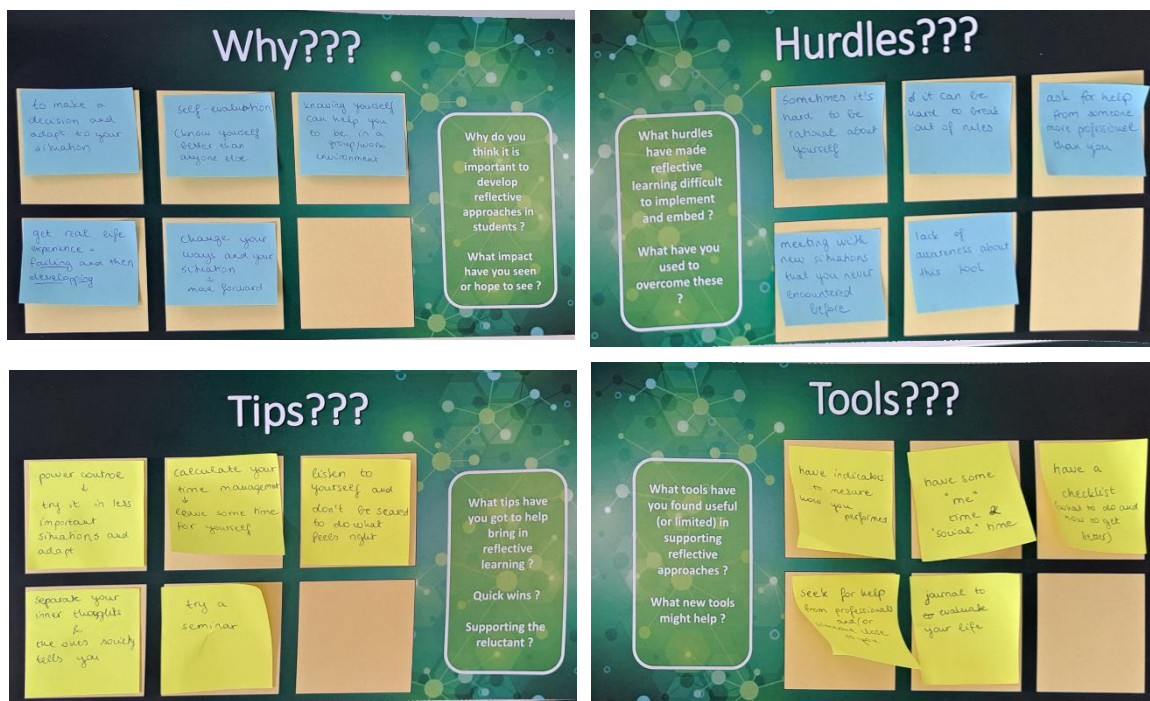


Fig. 1. Exemplar guidance sheets completed by a student group as part of this work to highlight their thoughts on reflective practice.

The student were also encouraged to debate the topic within their larger sets. These debates were set-up with the more general titles of “Should we formally evaluate (mark) reflective practice?” and the closely related “Should we make reflective practice obligatory?”. Out of the four teams, two were assigned the same question - one team to argue in favour, one to argue against it. Each team had the time to present their arguments then they could engage in a discussion with the other team. The debate was followed by a voting process using Kahoot platform where the

observing teams voted who won the debate and why. The workshop concluded with feedback round for closure.

3.3 Data analysis

Data was collected through notes, photos and sound recordings taken during the workshops. The recorded discussions were transcribed, and the coding of tables was independently carried out by the authors. The results were discussed, and the differences resolved collectively at the end.

4 RESULTS

4.1 Worksheet result

Results of the work on the worksheet questions can be seen summarised in Figs. 2-4.

Within the tools section (Fig. 2) students single biggest resource in relation to self-reflection tools was to talk to others with notes recorded such as *“Ask for feedback from people close to you”*, *“Talk to someone (who knows you or the topic)”*. It was notable from some of the responses that the interpretation of self-reflection by the students went beyond that related to understanding of the topic at hand and into a wider and more holistic approach to the learning process. This can also be seen by the relatively high numbers of self-care notes recorded and comments such as *“be good to yourself”*, *“self-compassion”*. This wider interpretation was not something noted to the same extent in work on reflection with academic staff considering their engagement with students on this topic Thomson and Kövesi (2023,1 & 2).

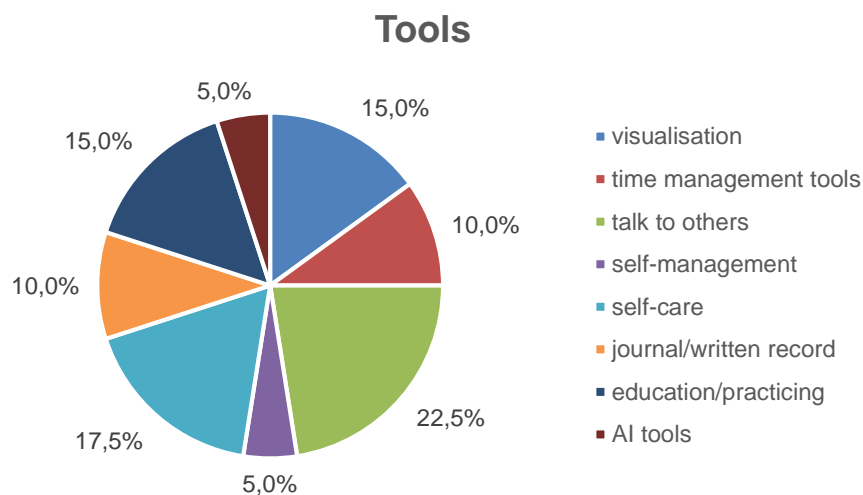


Fig. 2. Tools which students feel would aid reflective practice.

A number of issues were identified by students as hurdles inhibiting the take up of reflective practice (Fig. 3). The most common comments related to finding the time and motivation in an already dense curriculum – *“students unwilling to learn , focused in other areas, tiring routines, no interest in subject”*. The other key issue was reflection being seen as opening up personal weaknesses and worries to themselves or others

– “Afraid to face the truth”, “Don't want to hear judgements of other people”, “Emotions”.

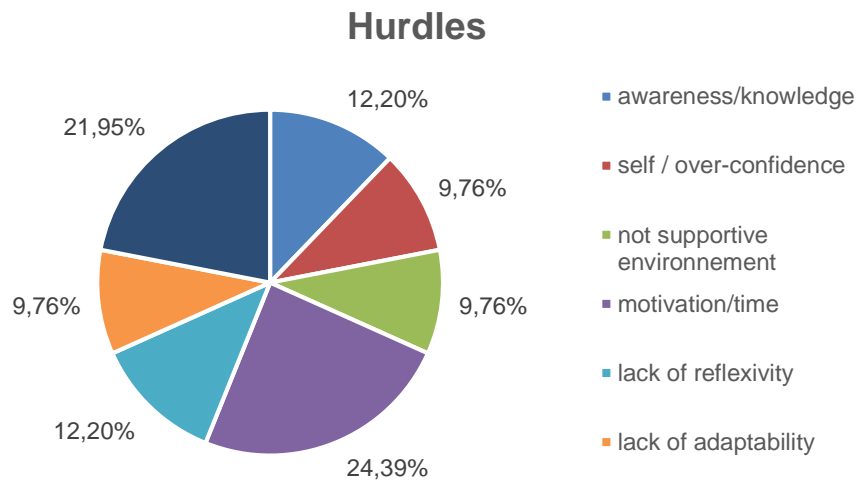


Fig. 3. Hurdles which students feel inhibit reflective practice.

Students had a number of tips to support peers in their uptake of reflective practice (Fig. 4). Again, the students raised the importance of the wider learning environment. Comments included those related to both how physical environments support a positive approach - “Clean the environment around you to clean your mind too” while others addressed anxiety about reflection being associated with self-criticism “Don't be too hard on yourself”.

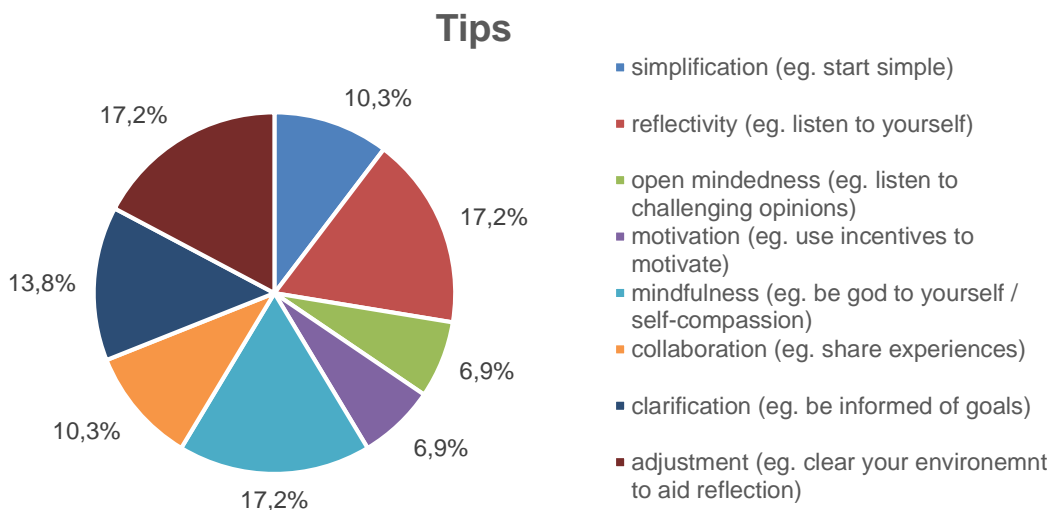


Fig. 4. Tips which students feel support reflective practice.

Students were also asked about whether they felt the need for reflective practice and there was generally a positive response to this from those taking part in the work. Comments included, “Positive change in professional environment”, “Self-evaluation (know yourself better than anyone else)” and touched on lifelong learning - “questioning our future works for better outcomes” and “deep learning, lifelong knowledge”. As noted elsewhere long term well-being was among the points raised

to develop reflective competence - "*Avoid burning out and overwhelming*" and "*finding your path*".

4.2 Student debates

Within the debates students reflected similar thoughts to those in the small group activity.

The most common arguments for making reflective practice obligatory in both workshops revolved around its impact on personal growth and professional enhancement. Students emphasized that reflective practice could enhance self-awareness and promote a deeper understanding of goals and personal identity. Those who opposed making reflective practice obligatory argued that reflective practice requires inner motivation and a positive learning environment. They discussed that voluntary engagement fosters involvement and results in better outcomes. Furthermore, the negative impact of pressure on creativity was emphasized.

Students in both workshops who supported the introduction of formal evaluation of reflective practice argued that evaluation could enhance motivation and responsibility resulting in better outcomes from reflective practice. According to them, assessment could improve giving and accepting constructive feedback, promote honest reflection, and facilitate personal growth. The most common arguments against the idea of assessing reflective practice pointed out that it cannot be easily measured, by nature it is subjective, and the evaluation may put an increased pressure on students. They argued that a teacher driven evaluation could affect the personal aspect of the reflection.

The audience assessed the debates using Kahoot platform. Most voting rounds had balanced results except for one where one team's argument was much more structured and logical as per the votes.

The students tended to agree on the importance of reflective practice being introduced in the curricula as a useful method for their self-development, but not as something the teachers should evaluate the students on due to its subjective and generally non-comparative nature.

5 SUMMARY

In summary students appeared to value and to recognise the benefits of reflective practice, in line with the work of Menekse et al. (2022) and Howell (2021), in their programmes in STEM disciplines. Despite their general recognition, they were concerned that it might be seen to carry additional workload and this may be off-putting because the lack of time as it was pointed out by Miranda et al. (2022). A continual theme among the students and one not generally present in staff views of reflective practice previously reported was that the reflection should extend beyond self-appraisal of the extent to which the specific academic material was becoming embedded but to look at reflection as a tool in a much more holistic manner. Students' extended vision of reflective practice indicates that they consider the beneficence and usefulness of it in the view of a long-term perspective not only in educational and professional context but also in personal context as outlined by Baruah et al. (2017). Consequently, this would extend to bringing in mindfulness,

self-care and uncluttered physical learning environments in order to create a more caring and productive overall experience and generating an enlarged vision for students (Badenhorst et al. 2020). It therefore should be the case that when developing approaches to reflective learning that we should work together with students and develop reflective practices courses in co-construction to address their concerns and ensure a much broader approaches to reflection. This course design development in co-construction, viewed as a possible improvement of future practical implication, would be also useful for making adjustments as the student thoughts are likely to evolve with the generations and approaches to reflective learning should be continually evolved to match the needs and expectations of current students. Finally, we would like to confirm the possible adaptation of our work in other contexts with some adjustments (for example for the debating session) by taking into consideration the discipline and institutional aspects. As a future perspective, it would be interesting to compare students', educators' and other stakeholders' (ex.: industry representants, policymakers, etc.) perception about the implementation of reflective practice in engineering education at different level.

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