'Finally studying for myself' - examining student agency in summative and formative self-assessment models

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Promoting student agency has been seen as the primary function for new generation assessment environments. In this paper, we introduce two models of self-assessment as a way to foster students' sense of agency. A socio-cultural framework was utilised to understand the interaction between student agency and self-assessment. Through a comparative design, we investigated whether formative self-assessment and summative self-assessment, based on self-grading, would offer students different affordances for agency. The results show that while both models offered affordances for agentic learning, future-driven agency was only presented by the students studying according to the summative model. Our results shed light on the interplay of student agency and self-assessment in higher education.

Keywords: self-assessment; agency; summative self-assessment

Introduction

Educating students who would prefer critical engagement with learning rather than just repeat-and-memorise given practices is not a new goal for educational institutions; after all, this idea was already addressed by Kant's Enlightenment. This purpose has especially been advocated in higher education. For example, the Finnish Universities Act (558/2009) asks the universities to educate students to 'serve their country and humanity at large' rather than just teaching them to remember an accustomed set of skills. Therefore, the notion of *student agency*, one's capacity to act purposefully and autonomously (Emirbayer and Mische 1998), is crucial in higher education; it challenges the pedagogical practices to reflect the noble goals written in pedagogical documents.

Since assessment plays a large role in students' studying and learning, its effect on agency is worth examining. Promoting student agency has even been seen as the

primary function of those 'new generation' learning and assessment environments whose design would reflect the important skills of the 21st century (Charteris and Smardon 2018). Nonetheless, the notion of agency is rarely considered when designing assessment in higher education; teacher-led assessment practices still dominate in universities, allowing little room for student agency (e.g. Beaumont, O'Doherty, and Shannon 2011). Torrance (2007) argued that assessment practices completely dominate the learning experience since students are encouraged to achieve higher grades. Likewise, Boud and Falchikov (2006, 403) were worried that students would be seen as the subjects of assessment; 'they are recipients of actions of others, not active agents in the assessment process'.

To address these issues, the Assessment for Learning movement has tried to frame assessment as activating practices that promote students as 'the owners of their own learning' (Black and Wiliam 2009, 8). Boud (2000) has argued that assessment practices should be judged according to whether they effectively equip students with the skills of lifelong learning. So why have assessment methods not changed? It seems that there is a need not only to promote agency but also to understand better how agency is enacted within various assessment environments. This is especially true in terms of self-assessment, which has been advocated as promoting student agency (e.g. Bourke 2018) but the exact process of how this happens has been paid little attention.

The present study introduces self-assessment as a way to promote students' sense of agency. Here, we answer a previous call to investigate socio-cultural aspects related to self-assessment (Panadero, Jonsson, and Botella 2017) by investigating the interplay of self-assessment and student agency. We utilise a socio-cultural framework for agency by seeing it as not residing in the students themselves, but in the affordances that assessment offers to agentic learning. We introduce two models, formative and

summative, to undertake self-assessment (see Nieminen, Rämö, and Asikainen 2019).

Our aim is to examine whether summative self-assessment, based on self-grading, offers

a new kinds of affordances for student agency compared to formative self-assessment.

Introducing two models for self-assessment

Student self-assessment involves learners making judgements about their learning and

monitoring their own work (Panadero, Brown, and Strijbos 2016). However, the term

refers to a vast array of practices. For example, Andrade and Du (2007) distinguish

between the concepts of self-*assessment* and self-*grading*, based on whether students

have a chance to affect their grades. Next, we introduce the two self-assessment models

(formative and summative) and their interplay with agency.

Formative self-assessment

Formative self-assessment involves students taking part in self-assessment practices

during their learning process to reflect on their learning and studying (Panadero et al.

2016). Therefore, formative self-assessment acts as a tool to promote learning and not

as a summative tool to define grades (Andrade and Du 2007). Formative self-

assessment has been conceptualised as a calibration process; during self-assessment,

students collect feedback on their learning and reflect on whether their self-evaluation is

in line with the given criteria (Panadero et al. 2016). Effective use of formative self-

assessment has been connected with larger feedback cycles (Beaumont et al. 2011);

students should be given a chance to practice self-assessment and engage in the process

(Panadero et al. 2016).

During recent years there has been a considerable amount of research

confirming the positive connection between formative self-assessment and students'

self-regulation (see Panadero et al. 2017). For example, it has been suggested that

formative self-assessment practices should be implemented in education to promote self-regulation 'for the sake of students' empowerment and self-sustained learning' (Panadero et al. 2017, 39). Much less attention has been given to the socio-cultural perspectives such as the notion of student agency. Bourke (2018), using the concept of agency, argues that formative self-assessment would make the students take more responsibility on their own work. To conclude, there is wide consensus that self-assessment, when used in a formative way, positively affects students' control over their own learning - whichever concept is used to conceptualise this control.

Summative self-assessment

While various forms of formative self-assessment are regularly reported in the self-assessment literature, there have been calls for students to participate in the process through self-grading practices (Taras 2016; Strong, Davis, and Hawks 2004). This means that the students would not just compare their skills and knowledge against a set of criteria, but that they would also have power over the grading process.

The educational benefits of formative assessment have been widely reported, so we have conceptualised summative self-assessment as an extension of a mere self-grading act. We see it as a 'process within a process, in which many thoughtful and fair decisions have to be made according to pre-established and reasonably set criteria' (López-Pastor et al. 2012, 454). Therefore, summative self-assessment builds on the model of formative self-assessment, allowing students to practice self-assessment through constructive feedback on both their performance and their self-assessment skills. At the end of the summative model for self-assessment, students set their own grade.

Whether self-assessment should be counted towards students' grades has been an ongoing discussion. In his seminal work, Boud (1989) identified the principles that

needed to be fulfilled in the educational context for self-grading to be successful. For example, he stated that the environment should be based on high level of trust and that students should have opportunities to practice self-assessment. Nowadays, the self-assessment literature is more imperative: self-grading practices are not recommended (e.g. Andrade and Du 2007). Bourke (2018) states that self-grading would result in a 'focus on the grade' (828). Perhaps for this reason, self-grading practices are rarely reported; a recent meta-analysis on self-assessment literature (Andrade 2019) only identified one study in which students' self-graded marks counted towards 5% of their final grade (Tejeiro et al. 2010). What was found out was that self-graded marks tended to be highly overestimated due to the students wanting to obtain the highest possible grades. Andrade (2019, 2) refers to this with the notion of 'as you might guess'.

However, neither Tejeiro and colleagues (2010) or Andrade (2019) elaborate on cultural aspects of self-assessment like those elaborated in Boud's article (1989). If results such as those in Tejeiro and colleagues' article were obtained, instead of focusing on student characteristics it might be beneficial to observe the assessment environments and the kind of agency they promote - if they do at all. We take a socio-cultural perspective on self-assessment by conceptualising summative self-assessment through previous research on sustainable (Boud 2000) and future-driven (Tan 2007, 2008) self-assessment. Future-driven self-assessment teaches skills beyond the context of the classroom. It has been argued that self-assessment can be future-driven only if students participate in the grading process (Taras 2016). Tan (2007, 2008) highlights that future-driven self-assessment sees students as active agents in their own learning. Even though Tan does not draw his work on self-grading, we wanted to find out whether asking students to take responsibility for their own grading might lead to a kind of agency other than formative self-assessment.

Towards an ecological view on student agency

Most of the recent literature on promoting students' control over their own learning has drawn on psychological and individual perspectives (see Harris et al. 2018). However, there is the call by Charteris and Smardon (2018) to move beyond the sovereign view of agency to understand contemporary assessment environments. Following their typology, we have taken an *ecological* standpoint on student agency. This perspective changes the viewpoint from agency being an individual feature to understanding it as a feature of the environment.

Understanding agency from the ecological perspective makes it possible to 'understand why an individual can achieve agency in one situation but not in another' (Biesta and Tedder 2007, 137). There are always affordances and constraints to agency associated with every assessment environment that are tied to their social and cultural contexts (Charteris and Smardon 2018). Some students might make use of these affordances while others might not. Biesta and Tedder (2007) conclude that the ecological view sees the students acting *by means* of their environment, rather than simply *in* an environment. Therefore, the task of understanding the interaction between agency and self-assessment becomes a task to understand which self-assessment systems are 'more conducive to developing the different modalities of agency' (Emirbayer and Mische 1998, 1005). The present study utilises the concept of agentic orientations (Rajala and Kumpulainen 2017); i.e. orientations students display in their experiences of self-assessment.

Emirbayer and Mische (1998) introduced the temporal framework that considers the socio-cultural aspects of agency. Its three dimensions highlight that students' perceptions of assessment are always tied to their past experiences, but also to the contexts of the present and the future. The *iterative dimension of agency* deals with how

students' agency is affected by their past experiences; in the present study, this refers to students' earlier experiences of mathematics assessment. The *projective dimension* refers to '*the imaginative generation by actors of possible future trajectories of action, in which received structures of thought and action may be creatively reconfigured*' (Emirbayer and Mische 1998, 971). This refers to the trajectories that the students describe for their future use of self-assessment. Finally, agency can only ever be acted out in the present. The *practical-evaluative dimension of agency* is connected with the present enactment of agency. In the current study, this dimension refers to students' experiences of self-assessment in the studied course.

We reinforced the ecological perspective of the temporal student agency with the notion of *how the students use their capacity*. This was conceptualised by dividing agentic orientations into three types. First, students might show their agency by *adapting* to self-assessment practices, such as by monitoring their own learning and taking more control over it (see Panadero et al. 2016). However, even though it is often assumed that agentic orientations during self-assessment practices would be directed towards academic growth, students might show their agency through *maladaptive ways* (Harris et al. 2018). For example, assessment dishonesty is seen as the reason for using self-assessment only in a formative way (Andrade and Du 2007). Finally, students might even show *lack of agency* during self-assessment if they would feel helpless or unable to respond critically to these practices.

Self-assessment and student agency

Literature on the interaction between self-assessment and student agency in higher education is scarce, even though both self-assessment and promoting student agency have been seen as important factors in modern assessment environments (Charteris and

Smardon 2018). In one of the few articles we found, Bourke (2018) uses the activity system framework to show how self-assessment might act as a mediating tool for student agency. This is achieved when self-assessment raises ontological awareness of assessment structures. Bourke states that formative self-assessment 'enables the development of self-regulated learners with a greater sense of agency in *both* learning and assessment' (2018, 837).

Taras (2016) uses the framework of *power* to observe self-assessment, framing the promotion of student agency as a part of the empowerment process that self-assessment might lead into. Here, agency in relation to self-assessment relates to the ideal of 'active, proactive learners' (Taras 2016, 847). This paper addresses the issue of different self-assessment models evoking different kinds of power relations and asymmetries, yet the relationship between these models and student agency is left unclear. Neither Bourke or Taras tie their concept of student agency to any framework nor define the concept through citations.

Finally, Milne (2009) studied self-grading through the concepts of power and agency. Even though the study does not use any specific theoretical framework for student agency ('feminist interpretations of agency' are mentioned yet not elaborated), it connects self-grading with an increased critical awareness of the structures of assessment. This notion of student agency resembles Bourke's (2018) concept of ontological awareness and Taras' (2016) ideal of self-assessment that questions the principles and processes of assessment and develops an understanding of them. To sum up, there seems to be a research gap in terms of i) observing agency in relation to self-assessment, and ii) using an already-existing framework to understand this interplay.

The objective of the study

We empirically compared students' agentic orientations in formative and summative self-assessment models by observing how agency was indicated in students' accounts while reconstructing their self-assessment behaviour. The research question was constituted as follows: What agentic orientations do the students studying with the formative and summative self-assessment models display in terms of temporal dimensions (iterative, practical-evaluative, projective orientations) and types of agency (adaptive, maladaptive and lacking agency)? Were there any specific features in agentic orientations in relation to the summative model?

Methodology

Context of the study

The broader context to the study is Finnish higher education, where grades in general do not determine students' educational paths. Exams can often be taken multiple times. Teachers have autonomy on their teaching and assessment methods - in fact, the Finnish Universities Act (2009) provides academic freedom for that. Also, the present study was conducted in the context of undergraduate mathematics, that has been shown to be an exam-driven culture in which students want to be assessed through traditional methods (Iannone and Simpson 2015). In Finland, no studies have investigated how assessment is usually conducted in undergraduate mathematics. However, a recent Finnish report highlighted that at the secondary and basic levels of education, mathematics is mostly assessed through traditional assessment methods such as individual examinations (Atjonen et al. 2019). In the same national report it was found out that according to the teachers, mathematics scored the lowest of all of the school subjects in the use of self- and peer-assessment. Even though the present study was conducted in higher education, the report by Atjonen and colleagues characterises the culture of mathematics

assessment in Finland and pictures the general assessment environment the examinees of this study have been part of.

The course design

The present study was conducted in the Digital Self-Assessment (DISA) project at the University of Helsinki (see Nieminen et al. 2019). In this project, a digital Moodle environment for self-assessment was created to the context of large classes. This environment was utilised in the 5 credit point undergraduate linear algebra mathematics course that lasted for seven weeks. The course is typically one of the first ones that mathematics students take, but it is also largely taken by students majoring in other subjects. Of the 426 participants who were enrolled in the course at the beginning, 313 actively engaged and passed it. The course was graded on a scale from 0 ('fail') to 5. Teaching was based on the student-centred Extreme Apprenticeship Model, which is a form of Flipped Learning (Rämö, Reinholz, Häsä and Lahdenperä 2019).

The course utilised a rubric to communicate the learning objectives. Some topics in the rubric were content-specific while others concerned generic skills, such as 'reading and writing mathematics'. The criteria were given for grades 1–2, 3–4 and 5 with detailed mathematical examples provided (for examples of the criteria, see Nieminen et al. 2019).

At the beginning of the course, the participants were randomly divided into two groups and informed about their placement. Half of the students attended a course exam at the end of the course (*formative self-assessment group*), while the other half decided their own grades (*summative self-assessment group*). The groups only differed in terms of the final summative assessment method; otherwise, they experienced identical learning environments. Both groups attended the same lectures and had the same teacher, and both of them had a similar access to the open learning space (described in

detail below). During the course, both groups took part in the same formative self-assessment tasks. Also, both groups were motivated to reflect on their learning during the course by telling them that self-assessment skills are important for the future and that the students should use the opportunity to self-assess to learn for themselves, not for the teacher.

The formative self-assessment model

Reflecting the idea of self-*assessment* (Andrade and Du 2007), the formative self-assessment model built on the idea that self-assessment tasks would be practiced during the course, but these tasks would not count towards the grade. The final grade was determined with a course exam.

The students completed two compulsory self-assessment tasks during the course. In the first task, the students were shown all the learning objectives that they had worked on so far. For each objective, they stated whether they felt they had mastered it (1) well, (2) partially or (3) not yet. The students were also asked to comment in writing about their reflections about their competence and what goals they were aiming for in the course. In the second self-assessment task, the students had to decide what grade they would award themselves for each topic in the rubric; they had a chance to justify these judgments in writing. Again, questions concerning the students' reflections and goals were included. It should be noted that neither of the formative self-assessment tasks during the course included any mathematical tasks. Instead, the students were asked to reflect on their earlier work based on the rubric.

A lot of feedback was offered through the digital learning environment. First, digital feedback on students' self-assessment tasks was offered. Each of the mathematical assignments in the course was linked with the learning objectives it was supporting, and based on the number of the tasks completed, the students received a

computed index that indicated how well their self-assessment was in line with their work. It was explained to the students that these indices were calculated in a rather simple way, and that they might not represent their real skills; they were encouraged to reflect on this in writing. Feedback was also offered from the mathematical tasks of the course. Each week, new topics were introduced through scaffolded tasks. There were digital mathematics tasks offering automatic, constructive feedback. Also, constructive feedback on pen-and-paper tasks was offered, and students were able to revise their solution twice.

During the course, students were offered guidance in an open drop-in learning space by student tutors who were trained for effective teaching methods. The open learning space offered an opportunity for social interaction and for peer feedback. It was accessible any time during the office hours (for further details see Rämö et al. 2019).

The summative self-assessment model

The only difference between the two self-assessment groups was the final summative assessment method on the last day of the course. In addition to the practices conducted in the formative self-assessment group, the summative self-assessment group took part in a self-grading process. At the end of the course, the students in the summative self-assessment group self-graded themselves based on the rubric in the same manner as in the second self-assessment task. For each grade, students could reflect on why they chose that specific grade. After this they awarded themselves the final grade. No instructions were provided on how the students should arrive at the final grade. Since there was no final exam, all the digital mathematics tasks were re-opened to revise the course material.

The digital feedback system, normally used to offer feedback on students' self-assessment, was utilised at the end of the course to check the self-graded marks before

their final validation. This was done to ensure that students would not assess themselves with a very low grade and to prevent obvious cheating. At the beginning of the course, all of the students were told that the validation system would only be used to prevent obvious cheating and not for reducing their power over their own grades.

Data collection and participants

After the course, all 313 participants were emailed an notice about the interview study. Twenty-six students from the summative and 15 students from the formative self-assessment group volunteered to participate. These students represented a heterogeneous group (14 different majors; ages varied between 19 and 49), but there were no major differences between majors or ages between the two self-assessment groups. It is notable that only two students described having experiences of self-assessment in mathematics. The students were labelled S1-S26 (summative self-assessment) and F1-F15 (formative self-assessment).

The semi-structured interviews (24-62 minutes, 39 on average) concerned students' experiences of self-assessment. The students were asked, for example, how they felt about assessing their own skills and whether they felt that they benefited from these practices.

Analysis

The interview transcripts were reduced by coding the parts in which the students reconstructed their experiences of self-assessment. This process was based on *in vivo* coding (Saldaña 2016), letting the students' own voice be heard in the process. The next phase consisted of a theory-guided qualitative content analysis (Schreier 2012) during which the agentic orientations of the students were identified. The practical-evaluative dimension was indicated in the students' reconstruction of their self-assessment

behaviour in the course, while the projective dimension was identified in accounts about future self-assessment intentions. The iterative dimension was excluded from the analysis, since students in the two randomised groups did not differ in their past experiences. The types of agency were coded as follows:

- maladaptive: accounts of agentically engaging with maladaptive behaviour such as cheating

- adaptive: accounts of agentically engaging with self-assessment to enhance learning

- lacking: accounts of not being able to critically respond to self-assessment

After the first author had analysed the transcripts of the first 20 interviews individually, both researchers went through these findings and discussed the unclear analysis units. The second author randomly chose participants to recode them and check the internal validity of the first author's analysis. After all the transcripts had been analysed, the unclear analysis units were again discussed, and the second author conducted more random checks of the coding. After this, the first author recoded the whole dataset. Finally, the results were *contrasted* (Schreier, 2012) between the two self-assessment groups to find out whether there were differences in terms of agentic orientations. It should be noted that as a method, contrasting aims to identify qualitative differences between two data sources rather than to point out quantified differences.

Findings

Agentic orientations in the two self-assessment groups

Tables 1 and 2 present a descriptive overview of the data, based on two approaches to quantifying the results of the analysis. After this, we present a careful examination of

the similarities in the self-assessment groups, and the special characteristics of the summative self-assessment group.

The grand level of the data shows some differences between the students in the two self-assessment groups. It is notable that the students showed considerable inconsistency in their accounts; every student had experiences of at least three different agentic orientations.

Adaptive-practical-evaluative orientation

In both self-assessment groups, the great majority of the students reported that they connected self-assessment with agentic attempts to promote their own learning. As seen in Table 2, almost every student shared these kinds of experiences. These accounts consisted of experiences of being able to monitor their learning process. The students reported that self-assessment helped them to become more aware of their own learning, and therefore it allowed the students to control their learning and studying.

> S13: You could follow your own learning by realising that hey, I've completely ignored this thing over here. You could kind of control your own learning better.

> F14: You become more conscious about the learning process because, well, just like in any sport, you constantly follow your own performance.

Maladaptive-practical-evaluative orientation

Accounts concerning stress and haste in studying related to maladaptive assessment behaviour during the course. Self-assessment skills and self-reflecting were portrayed as important for learning but there was no time to engage with learning these skills. Some students described making an agentic choice of not engaging with self-assessment, justifying this by referring to their busy schedules. Completing the self-assessment tasks quickly without engaging in reflection was the most common description of

maladaptive behaviour.

> F1: I confess that I completed them [the self-assessment tasks] without spending too much time on them. Maybe it was more like concentrating on the fact that they needed to be done, and then you just did it like click click click.

> S19: I think that this reflection thing is something that might be beneficial. But this time I only wanted to try how it felt briefly. This is because of I'm a bit busy. Or, actually, very busy.

Lacking-practical-evaluative orientation

Most of the students described accounts reflecting the lacking-practical-evaluative orientation; they described at least one account of being unable to critically shape their own responsiveness to self-assessment. Self-assessment was predominantly seen as a new and weird kind of an assessment method. The usual exam-based assessment culture was identified as a factor that caused lack of agency. One student explained how hard it is to suddenly try to assess one's own work through 'someone else's eyes' (F3).

> S18: The teaching culture has never before guided towards self-assessment, so I can't say it would have felt natural.

The novelty of self-assessment was reflected in those accounts in which students described socio-emotional barriers related to assessing themselves. These accounts, concerning feelings of helplessness, were especially connected with being unsure about one's skills. Even when the learning objectives were clearly identified in the course rubric, some of the students felt they were unable to be objective in observing their own knowledge.

> Interviewer: Do you think you were able to assess your own mathematical knowledge?

> F9: I believe so. I mean, I can kind of see the level of where I am. But it is another thing whether I can admit that level to myself. That is very challenging.

On the other hand, students in both self-assessment groups described accounts of lacking agency in relation to the fact that this was one of their first courses at university. When everything else was new, this new form of assessment just increased the feeling of not being in control of one's own learning.

Lacking-projective agency

The accounts of lacking-projective agency mainly concerned the same issue in both self-assessment groups: even though self-assessment skills were seen as important in the future, how could they be promoted without a proper rubric? The difficulty of moving from assessing one's skills with the teacher-produced rubric into reflecting one's learning *in real life* was a major theme in the whole dataset. As one student (F2) pointed out, 'there are no rubrics in life'.

> S15: This kind of self-assessment is based on previously-set learning objectives that can be linguistically defined into sentences. This requires an external expert who has already mastered the content. To me, it is extremely hard to try to learn something new with my own terms, so that I would set those clear goals for me, by myself. So, I wouldn't be able to produce a rubric. I couldn't assess my own skills with this kind of a mechanism.

The characteristics of the summative self-assessment group

Adaptive-practical-evaluative orientation

A frequent theme in the students' accounts of adaptive-practical-evaluative orientation was 'studying for myself'. The students largely felt that they were able to study linear algebra to gain the personal knowledge that they would need in the future. Many described this as a new experience that allowed them to show their agency. The content

of this agentic orientation was largely different between the two self-assessment groups; similar accounts were not identified from the formative self-assessment group.

> S12: Maybe my attitude wasn't that I would study in this course to be assessed. More like, my attitude was that I am here to build knowledge to myself through these tasks. It [self-assessment] changed my stance in terms of the assignments.

> S13: When I was doing those self-assessment tasks, I felt like now I'm finally studying for myself.

> S21: If I'm studying for an exam, I often feel like now I'm studying for that exam. And for the fact that I would get a good grade. Now I felt more like I would have been learning to be able to use these skills in the future.

Another frequent theme within the adaptive-practical-evaluative orientation was engaging in the process of progressing in self-assessment skills. Similar accounts about engagement were not found in the formative self-assessment group. Many students described how they were unable to evaluate their own skills objectively at first, but they learnt that during the course and were later on able to show their agency.

Interestingly, some of the accounts reflecting adaptive agency were closely related to accounts about lacking agency. This was seen in how some students thought that it was important that they were 'forced' to take part in summative self-assessment. The example of one student (S18) highlights this finding:

> S18: It [summative self-assessment] forces you to have a different approach to your own learning. When completing a course is not only based on completing an exam.
> * * *
> S18: *Well, it hasn't quite become instilled in my daily life, as a habit. Like it would not happen without external guidance, 'assess yourself now'.*

The interplay of adaptive and lacking practical-evaluative agency was identified in

students' accounts about being able to control their own studying. Often, the students described how they learnt to monitor their studying, which indicated adaptive agency. However, these accounts also consisted of feelings of external control. Many students described that taking part in summative self-assessment *forced* them to study more and control their work; these accounts reflected lack of agency.

> S15: I think it [summative self-assessment] acted as a kind of whip. You'd know that you don't have the option of not concentrating on the assignments during some weeks, that you would just cram for the exam.
> * * *
> S15: *I had the impression that in this self-assessment group, it was made clear that you can't just give yourself a 'five' grade out of every learning objective, that you would need some evidence. So, it encouraged me towards a regular weekly rhythm.*

Lacking-practical-evaluative orientation

An 'extreme' form of lacking agency was found from those accounts that described a complete loss of agency through utmost feelings of helplessness. These accounts reflected the usual assessment culture of mathematics. When the exam was replaced with self-assessment, what was the goal for learning?

> S25: I would have learnt and studied more if I had been in the formative self-assessment group. You would have had a specific goal and a reason to study for.

Many students pondered whether they had been given too much responsibility over their own learning, even when they took part in adaptive agentic orientations. To highlight these contradictory accounts, the example of one student (S22) is presented. The student described engaging in an active self-assessment process:

> S22: The fact that I was given the responsibility over my own learning clearly encouraged me to think that well, now I'm in charge, I have all the power and responsibility over this thing!

Interestingly, in the end, the same student did not want to award their own grade. They explained that in the final self-assessment form, they typed in that the teacher should decide their final grade.

> S22: Well, I mean it [summative self-assessment] loads the whole responsibility for learning on you.

Because there was no course exam, some students felt unable to revise the course material at the end of the course just for the sake of their own learning. If a student described understanding the importance of revising, yet still chose not to engage in that, these accounts would have been coded as 'maladaptive agency'. However, many students simply described feeling helpless, as if there had been no option for them to revise the material by themselves. Interestingly, this kind of behaviour was also described by the students who said that they were 'learning for themselves, not for the exam' (S10).

> S10: On one hand, it was nice that we didn't have to do an exam. But on the other hand, that was one learning option left unused. Had I revised the course content carefully one more time, studied even more, I mean that would have deepened my learning.

Adaptive-projective orientation

Finally, we will open up the special characteristics of the summative self-assessment group in terms of the adaptive-projective agentic orientation by contrasting it with the same orientation in the formative self-assessment group. This contrast became evident during the analysis, and the 'specialty' of this orientation in the summative self-assessment group was only created in contrast to the formative self-assessment group. While Tables 1 and 2 show that the quantitative differences between the two groups were not dramatic, major differences were found when the content of the analysis units

was opened. Every analysis unit reflecting adaptive-projective orientation from both self-assessment groups were further observed to see how the students described their intentions to use self-assessment in the future.

In the formative self-assessment group, seven students reported that they would not assess their own skills in the future. Three of them added that they might do this if it were required by the teacher of a course. Similar statistics were not found from the summative self-assessment group. Twenty students from that group reported that they saw self-assessment skills as valuable and they would therefore engage in assessing their own skills in the future as well. Of these 20 students, ten connected projective agency with the context of university courses. They described that they intended to continue paying attention to reflection while they continue studying.

> S5: I've continued to do that [self-assessment] in this other course as well. When we're working in a group, I'm comparing my work with the work of everyone else, seeing how I could have changed my solution. Then we check the differences between our solutions. It makes you realise that there is not only way of doing something but many ways of thinking.

The other ten students reported that they understood how important it is to observe and control one's own learning in everyday life. Future intentions related to assessing one's skills in working life, but even more often it was understood as a useful future skill. This *future-driven agentic orientation* was only identified from the summative self-assessment group.

> S1: I assume you always need to do that [self-assess]. I mean, I've always thought that I'm not going to apply for this job because I don't have all these skills. But if I could produce a data-driven approximation, that would be more convincing. And when you're more convinced about your own skills, you are more convincing when you show these skills to someone else.

Discussion

As the literature in the field of assessment and agency is scarce, the present study fills several gaps in the research. We investigated whether students studying with formative and summative self-assessment models would show different kinds of agency in terms of temporal aspects (Emirbayer and Mische 1998) and types of agency (see Harris et al. 2018).

Students in both self-assessment groups largely reported accounts of adaptive-practical-evaluative orientation. The formative self-assessment tasks were connected with monitoring one's studying that has been largely reported in the self-assessment literature (e.g. Panadero et al. 2016). Overall, even though some maladaptive behaviour was identified from both groups, it was the accounts of lacking agency that raised issues in our results. In both self-assessment groups, accounts of lacking agency were reported almost as often as accounts of adaptive agency. This reflects the exam-driven assessment culture of the study (see Atjonen et al., 2019; Iannone and Simpson 2015); the students explained that they were not used to showing agency during assessment, and none of them had encountered self-assessment in their previous mathematics studies. Maybe because of the novelty of self-assessment, more support would have been needed for both student groups to promote their agency. Engaging with the self-assessment process demands resources such as time and energy. For example, feeling stress about studying was connected with both maladaptive and lacking agentic orientations, underlining the importance of supporting students' studying skills in general to promote agentic behavior in self-assessment.

We analysed whether there were qualitative differences in agentic orientations between the self-assessment groups. 'Studying for myself, not for the exam' was a frequent theme in the summative self-assessment group. What was especially identified

only from this group were accounts of *future-driven* adaptive-projective orientations. We connect the projective dimension of agency with the concepts of future-driven and sustainable self-assessment (Tan 2007, 2009; see Boud 2000). This result suggests a tangible way for self-assessment to offer an affordance for future-driven orientations. Why didn't the formative self-assessment model offer the means for such affordance? Agency is always mediated through a learner's own perceptions (Rajala and Kumpulainen 2017), and our results indicate that the students in the formative self-assessment group saw self-assessment tasks primarily as learning tasks conducted for someone else rather than as a tool to evolve their own learning. Therefore, the *means* of self-assessment were different (Biesta and Tedder 2007). Also, perhaps the projective, future-driven dimension of agency raises students' awareness about their own lack of agency, as suggested by our results (see Taras 2016).

An 'extreme' form of lacking agency was identified from the summative self-assessment group, highlighting that an adequate support system to scaffold students' sense of agency is needed when agency is promoted through alternative assessment practices. Our socio-cultural framework addresses this as an environmental issue; clearly the earlier assessment environments of mathematics have not been able to promote these students' agentic development. Following Taras (2016) and Milne (2009), the notion of power might offer an interesting way to analyse these issues further in the contexts of both higher education and mathematics. We strongly encourage future studies on self-assessment to consider the scaffolding processes for student agency. Our results imply that the learning and assessment environments in this study were not able to scaffold every students' agentic behavior in an appropriate way. Future studies could examine the affordances that face-to-face support systems (such as the open learning space in the present study; Rämö et al. 2019) and online materials

(such as the digital feedback offered for the formative self-assessment tasks in the present study) offer for supporting students' agentic behavior during the self-assessment processes.

While self-assessment has been largely connected with psychological concepts such as self-regulation (Panadero et al. 2017), the socio-cultural view sheds light on the affordances that self-assessment offers for students' control over their own learning. It could be asked: Why does teacher-led assessment still dominate in higher education, despite the vast amount of research on self-assessment? After all, Boud had already discussed these topics back in 1989. Based on our findings, we encourage researchers to challenge the usual norms and paradigms of assessment research. Socio-cultural aspects should be considered to offer new perspectives for self-assessment research (see Panadero et al. 2016). In the present study, the socio-cultural approach supplemented earlier psychological studies on self-assessment and self-regulation (such as Panadero et al., 2017). For example, our results imply that learning how to monitor one's studying, which could indicate increased self-regulation skills, might actually result from *lacking* forms of student agency rather than adaptive ones. It is not enough to simply state that self-grading would not be possible in higher education (see Andrade and Du 2007; Bourke 2018) without addressing how agency could be promoted through teacher-driven summative assessment practices. We argue that if critical self-assessment skills are to be promoted through assessment, the notion of agency must be considered. Sending mixed signals about self-assessment - *it is important to learn this, but you are not sovereign to do it yourself*! - might even lead to maladaptive agency.

As it has been claimed that assessment dominates learning in higher education (Torrance 2007), it serves as a fruitful field for research on agency. Following Charteris and Smardon (2018), we call for socio-cultural frameworks for further examination of

this field. But how is agency constructed through the affordances of self-assessment practices? Summative self-assessment does not gift anyone with agency; rather, agentic behaviour is only manifested through students' agentic orientations (Rajala and Kumpulainen 2017). We acknowledge the somewhat simplistic way of conceptualising the types of agency as maladaptive, adaptive or lacking; however, this typology acts as a game opener in understanding how different self-assessment models interplay with the development of student agency. The students' accounts often reflected various orientations, especially in terms of both adaptive and lacking agency. Understanding the interplay of different agentic orientations in relation to assessment offers an interesting field for future research. We note that future studies should carefully tie the concept of agency to a certain theoretical framework.

Various limitations of the present study should be acknowledged. First, only 41 students were interviewed from the overall population of 313 students. Also, the size of the two student groups was unequal. Even though the research method was based on qualitative contrasting rather than on quantitative comparing (Schreier 2012) it might be that a larger variety of different agentic orientations might have been identified from a bigger student group taking part in formative self-assessment. Also, large-scale future studies should utilise mixed methods approaches to understand the interplay of self-assessment and agency. Similar studies in different contexts should acknowledge students' earlier experiences of self-assessment; in the present study, there was no information about the students' self-reflection skills. Therefore, we can only interpret our results in the light of previous studies that paint a picture of exam-driven assessment culture of mathematics (Atjonen et al. 2019; Iannone and Simpson 2015). Finally, the qualitative approach utilised here does not aim for generalised results. However, the degree of transferability of the results can be discussed. We argue that outside the

context of undergraduate mathematics, the results might be transferable to other exam-driven assessment cultures. Maybe summative self-assessment would need less agentic scaffolding in contexts where assessment is generally based on active and student-centric practices. We strongly recommend the future studies on self-assessment and agency to be conducted in different kinds of educational contexts.

If student agency is to be the main feature of the new generation assessment environments (Charteris and Smardon 2018), there is a need to rethink teacher-led assessment practices. According to our results, summative self-assessment offers an affordance for supporting future-driven agentic orientations. But how can agency be supported through assessment in contexts where summative self-assessment is not possible? Future research might focus on observing how formative self-assessment practices could promote agency. However, we call for alternative approaches through research aimed at transforming higher educational assessment environments - and summative assessment practices in particular. Otherwise, we might end up writing about the same issues repeatedly, still citing Boud's article from 1989 in twenty years' time. Who will take care of 'humanity at large' (Finnish Universities Act 558/2009) while we're waiting for that?

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