

## RESEARCH ARTICLE

## Culture of engagement: Students as change agents before, during, and after an examination-focused partnership

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## ABSTRACT

Students can influence their education through evaluations and as representatives in university decision-making bodies. A way to give them more power is through participation in course development as equal partners. In this study, the relationship between the outcome of a student-teacher partnership and a culture of student influence and engagement is explored. This is done through specifically targeting examination, an area where formal power rests far away from the actual partnership. The partnership outcome was evaluated through post-project surveys and group interviews, together with post-course evaluations. The students in the project, most of them with significant experience as student representatives, emphasized their ability to make meaningful change. At the same time, the students taking the revised course appreciated the implemented changes. A culture of engagement positively affected the outcome of the partnership, while the partnership itself strengthened students in their roles as change agents.

## KEYWORDS

students as partners, student influence, co-creation, open inquiry, conceptual understanding,

Examination plays a decisive role for student learning. Already in the 1970s, studies showed that examination controls what the students devote themselves to, how much and when they study, and in what way they do it (Snyder, 1971). The examination constitutes a hidden curriculum (Snyder, 1971), and if you want to influence student learning, you must adapt the examination. Research has since confirmed and nuanced the results (Joughin 2010), for example, highlighting the conditions under which examination best supports learning (Gibbs & Simpson, 2005; Boud, 2007), the function of formative assessment (Bennett, 2011), how feedback can be given effectively (O'Donovan et al., 2016), the importance of increased collegial collaboration around examination (Jessop et al., 2014), and the various considerations that must be made to achieve sufficient quality (Price et al., 2011).

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The large impact of examination is however not matched by a corresponding level of student influence. One solution is to involve students as partners through student-teacher partnerships in which “all participants have the opportunity to contribute equally, although not necessarily in the same ways” (Cook-Sather et al., 2014). Here, both students and teachers are recognized as experts in learning, with unique but complementary perspectives. The ways students are involved in partnerships varies but can be classified into four different roles: (a) consultant, discussing perspectives on learning; (b) co-researcher, collaborating with staff on research; (c) pedagogical co-designer, with responsibility for the design of learning; and (d) representative, contributing to decisions at the university (Bovill et al., 2016). A growing body of literature on student-teacher partnerships suggests that giving students a direct route to influence their education bears the benefits of increased student responsibility, motivation, and improved results. In addition, many studies also report an increase in student self-confidence, self-efficacy, and sense of belonging to the community (Mercer-Mapstone et al., 2017). Meanwhile, teachers also develop as they get new insights into the learning process from a student perspective (Bovill et al., 2011; Cook-Sather, 2014).

While co-design with a focus on assessment is still relatively rare (Deeley & Bovill, 2017), various ways, such as peer and self-assessment, formulation of assessment criteria and tasks (Ní Bheoláin et al., 2020), as well as collaborative course design (Delpish et al., 2010; Bovill, 2013), have been proposed. Engaging students in collaborative work on assessment design supports their assessment literacy as well as their learning (Meer & Chapman, 2014; McKeivitt, 2016; Deeley & Bovill, 2017; Andrews et al., 2018). The assumptions of how learning ought to be assessed might be contested in staff-student partnerships, with a stronger focus on the process of learning rather than testing accumulated knowledge (Deeley & Bovill, 2017).

Despite significant potential benefits, assessment-focused partnerships can be challenging to realize. Assessment is recognized as a heavily staff-dominated curriculum area as teachers are ultimately responsible for ensuring fair and accurate grading (Croft et al., 2013). Student partners have often limited prior experience with assessment development (Cook-Sather et al., 2014) and may therefore actively choose to refrain from it (Bengtson et al., 2017). Partnerships risk being less productive if student partners lack the power to make real changes (Robinson, 2012; Bovill et al., 2016). Conceivably, the reluctance to work with assessment may be further accentuated by lengthy regulatory procedures (Woolmer et al., 2016). Formal decisions about course syllabi, including the forms of examination, are often made at levels above the teachers in the partnership.

Even partnerships with substantial student influence may face challenges. For instance, student representativeness may be questioned. Student-teacher partnerships tend to attract a relatively small group of already engaged students, but the outcome needs to be beneficial for all students (Cook-Sather, 2018; Marquis et al., 2018, Bovill, 2020; Mercer-Mapstone et al., 2021, Smith et al., 2021). In this contribution, we link a recent student-teacher partnership targeting examination to a culture of student influence and engagement that goes beyond their own learning and performance. We do this by formulating three research questions regarding the interconnection of engagement and partnership outcomes:

- How do previous student experiences of acting as change agents in the form of representatives affect the quality of the partnership? We are interested in the connection between engagement, representativeness, and project results.
- How can power be shared equally in a partnership working with examination, a heavily regulated area where formal decisions are made far from the partnership?
- How do the students' experiences in an examination partnership affect their future engagement and academic identity? This is related to the first question, but here we look in the opposite direction and explore the effects of the partnership.

Together, these three questions look at how partnerships fit into a culture of student-teacher exchanges at different levels of the university. This was explored by forming a long-term partnership where a small group of past students (i.e., students that have already taken the course) worked together with teachers as pedagogical co-designers and co-researchers to revise the syllabus and examination forms of a single course. The project was evaluated through questionnaires and semi-structured interviews with students in the project, and the outcome was measured by post-course evaluations from students taking the revised course.

## METHODS

### Project implementation

The student-teacher examination partnership was established for Physics for Chemists, a second-year course in the Bachelor of Chemistry program at Uppsala University. The course runs in the Fall semester and corresponds to 3 weeks of full-time studies. It had previously been revised through a partnership carried out in 2015 (Bengtson et al., 2017; 2018). In that project, the students were free to choose areas to develop, which led to high motivation. However, none of the participants chose to work with examination as it was considered too complicated. Due to the central influence of examination on learning, a teacher-initiated proposal to form an examination partnership was submitted to a university pedagogical development fund in 2018. After approval of the partnership project, an open invitation was sent out to all students in the bachelor program in chemistry via email, just after the completion of the 2018 edition of the course. To encourage wide and diverse participation, the invitation highlighted financial compensation and a flexible working schedule (Bovill et al., 2016; Mercer-Mapstone & Bovill, 2020). Two students volunteered and then organized a recruitment campaign, resulting in a total of five students who signed up. Together with three teachers, the team consisted of eight members.

The whole group (always at least six participants) met a total of eight times during Spring 2019, each time for 1 hour during lunch. After four joint meetings, three working groups were formed to develop specific areas. The subsequent joint meetings were used to report progress from the working groups, discuss results, and decide on proposed changes. The average working time for students was 25 hours, and they were paid an hourly wage financed by a pedagogical development grant. Wages show that the work is valued and can make participation attractive compared to other part-time work (Cook-Sather, 2014).

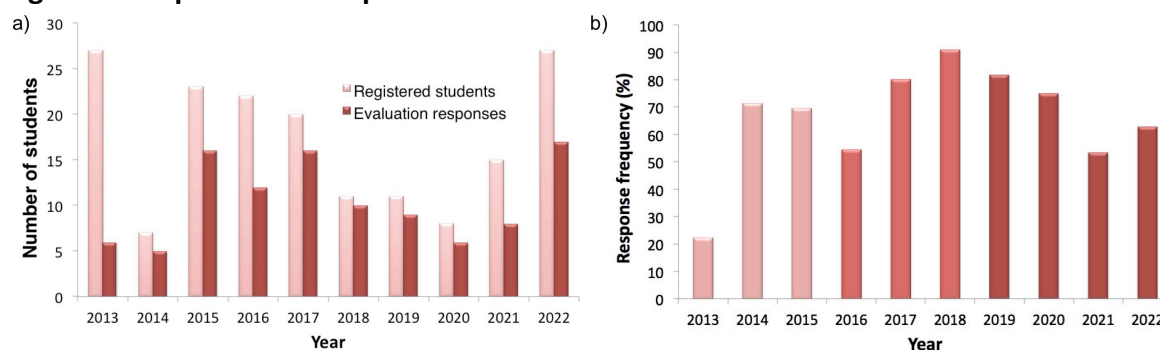
### Data collection and analysis

In addition to their role as pedagogical co-developers, the students in the partnership have also been involved as co-researchers in the pedagogical inquiry. All eight authors, both students and teachers, were thus involved in the project. The dual roles that the students took in the partnership highlight the valuable and varying perspectives they can provide (Mercer-Mapstone et al, 2017; Luo et al, 2019). Two of the teachers have been directly involved in the course, Marcus Lundberg (ML) as teacher and course leader (since 2015), and Antonia Kotronia (AK) as a doctoral student teaching in the course. Among the students, Nathalie Proos Vedin (NPV) had participated in the first partnership and worked as a student teaching assistant. After the completion of the second partnership, she has continued teaching as a doctoral student. Victor Hellgren (VH) worked as a student teaching assistant after the project.

In direct connection to the partnership (Spring 2019), participant views were anonymously collected through two written reflections during the project and a post-project evaluation. In the final evaluation, the students were asked about their expectations of the project, the dynamics of the student-teacher group, and how much they could affect the project outcome. They also had the opportunity to provide general comments and suggestions for improvement. This evaluation was answered by all five students, as well as two teachers. The anonymous student responses are labelled using letters (Students A–E).

In a later step (Winter 2023), student views were collected through two teacher-led semi-structured group interviews, with one group of three students on site, and another group with two students through Zoom. The interviews elaborated on the questions in the post-project survey. The students were also, among other questions, asked how the project had affected their views on examination and what they had gotten out of the project on an individual level. The interviews were transcribed and analysed by AK and later approved by all respondents during the writing of the manuscript. Comments from the interviews are identified with numbers (Students 1–5).

The different editions of the course were evaluated through post-course questionnaires, filled out anonymously on a voluntary basis. The response frequency was typically between 60 and 80% (see Figure 1). For the 2022 edition of the course, separate evaluations were performed of the open project and the newly added oral examination, answered by 21 out of the 25 students (84%) who participated in the laboratory part and 10 out of the 12 students (83%) taking the oral exam.

**Figure 1. Responses to the post-course evaluation**

a) Number of students and responses; b) Response frequency.

## RESULTS

### Recruitment and student motivation

All five recruited students had previously taken the course. Four of them were still in the bachelor program, two in the second year and two in the third, while one of them was studying at the Master's program in chemistry. Most of the students had previous experience of engaging in student and academic affairs at Uppsala University. Four were, or had been, active in the Uppsala student chemistry section (IUPAK). Three had been student representatives in the chemistry department board, and one had also been a representative in the council for the Master's program in chemistry. In addition, many had additional roles as student ambassadors and course representatives. Only one of the students had no previous experience of being engaged in student affairs.

The main motivation for the students' involvement in the partnership was to contribute towards an improved course for future students. The work format was highlighted as a concrete and direct way to influence the course design, as opposed to traditional course evaluations. Pure curiosity and the desire to learn about course design were other recurring themes among the students' responses. Students mentioned that they would like to "get more insight into the work behind the scenes on courses" and "see a course from a different point of view" (Students A–D). Interestingly, student responses indicate that the decision to participate was also influenced by the fact that Physics for Chemists was already a well-structured course.

The recruitment strategy was important. Above all, students wanted to know what the project would mean for them in terms of time commitment, as their primary focus would still be their studies (Students 4, 5). Payment was not deemed to be the main reason for participation (Students 2, 4). However, students agreed that receiving a salary provided proof that their "efforts and time were valuable and recognized by the university" (Students 2, 5). In addition, being paid forced them to undertake a serious and professional approach and ensured that the project was prioritized over other activities (Students 2, 3, 5).

### Project group proposals and implemented changes

A guiding principle for the project was to create constructive alignment between learning outcomes, activities, and examination. In the first step of the course design process, we determined new learning outcomes. In a second step, we developed examination forms specifically adapted to the new goals, including an oral examination as a complement to a final written exam. Before the project, the course had four learning outcomes that corresponded to important content areas. The outcomes were individually examined through separate sections of the written exam. All group members came up with suggestions for revised outcomes via a digital notice board, which were then discussed during several meetings. Finally, eight new outcomes were proposed, focusing on the ability to use physics to understand chemistry, for example, to “discuss relationships between macroscopically observable and molecular properties in chemical systems.” New outcomes dealing with scientific skills were also added, such as being able to “plan, carry out, and evaluate an experimental project that tests fundamental theories in classical physics.”

After that, the project focused on different components of the examination. The work was divided into three working groups: laboratory exercises, project, and final examination. The laboratory group designed new experiments with a clearer connection to chemistry, recorded an instructional video to explain a particularly difficult section, and introduced new questions testing conceptual understanding. The project group wrote new guidelines and introduced a grading template for an open inquiry project, where students test a physical concept and then present their results. In the exam group, an oral exam was suggested in addition to the written one. New exam questions were also developed to test conceptual understanding. The students’ guiding principles were that assessment should be designed in a “student-friendly” way, which meant including formative elements and providing fair evaluation by testing different types of knowledge in different formats (Students 1–5).

Whilst most of the proposals were accepted in the full group, exam forms were more thoroughly discussed and contested. Adding an oral exam would lead to an increased teacher workload, and a teacher counterproposal was to replace the written exam with an oral. Most of the students wanted the anonymous written exam to remain, as it was considered fair and transparent. Also, having more examination forms allows for different ways to show mastery. The compromise was to keep the written exam, with the introduction of a voluntary oral exam where the students had a chance to get higher grades. The proposed grading scheme was 20% from the individual project, 60% from the written exam, and 20% from the oral exam.

Suggestions that did not require revision of the course syllabus were implemented during Fall 2019. This included the revisions of the open inquiry project, new content and structure of the laboratory exercises, and more conceptual questions in the written exam. The introductions of new learning outcomes, a separate pass criterion for conceptual questions, and the introduction of the oral exam all required a new syllabus. Syllabus revisions must first be approved by the Chemistry Bachelor Program Council, before a final decision by the Educational Board for Science. The proposed syllabus was however rejected by the program council. The motivation was that there were too many separate learning outcomes for a relatively short course and that it would be difficult to individually examine all eight of them in a fair and transparent manner. After a focus on COVID-19 adaptations in 2020 and 2021, a revised syllabus was proposed by two of the teachers (ME and ML) in early 2022. However, this was

done without new input from the students, as they were no longer enrolled and the timeline for revision was short. The new proposal reduced the number of learning outcomes to four, partly by merging outcomes from the original partnership proposal. The new outcomes were problem solving, theory/concepts, microscopic/macroscopic relationships, and project. The program board accepted the new proposal, and the corresponding changes were implemented in the 2022 Fall edition of the course. Additionally, the grading scheme was slightly modified from the partnership proposal, with reduced impact of the alternative forms of examination due to their novelty and uncertain outcomes. The following grading scheme used was instead: 10% project, 80% written exam, and 10% oral exam.

### **Power relationships and student influence**

In contrast with their main motivation to participate (i.e., to make a meaningful contribution), the students' initial expectations of impact were rather modest. They expected "to make minor changes and fine-tune the course curriculum" (Student D) and "that the project [would] be guided by the teacher participants" (Student A). Another student said they "had no expectations since there was a lot of uncertainty surrounding the extent of student influence" (Student E). The expectation of a teacher-dominated project appears to have been largely based on examination being regarded as an off-limit area for student influence (Student A). However, the students reported that they were surprised by the amount of freedom they had during the project (Students A–E).

An important aspect for successful implementations of student-teacher relationships is to safeguard student influence while ensuring high-quality output. Most student participants mentioned that the composition of the student-teacher team, with students in the majority, was a key factor for student influence (Students 1, 4, 5). Interestingly, involving three teachers was also perceived as beneficial because the teachers were not always in agreement, which made the students understand that "devising the learning outcomes and examination is not self-evident" (Student 3). The students were also aware of their unique perspectives as they had recently experienced the course and had expert knowledge regarding difficult concepts and the examination experience (Students 1–5). They could also see how the course related to the entirety of their study program and what types of training (e.g. projects, oral presentations) were missing from their studies (Students 2, 3).

Another factor that affected the level of student influence was the project design, where all members could influence its direction through an extensive revision of the learning outcomes. Students expressed that everyone felt welcome to participate in the discussions. While "not everyone thought the same" (Students A, B) the students perceived that "everyone listened to each other's thoughts and opinions" (Students A-E). This created a sense of responsibility and self-imposed pressure, as "the teachers were expecting that the course modifications would be based on the students' propositions" (Student 5). The students even expressed that they thought more guidance could be provided. The "current project could have been less successful in terms of output if even more freedom had been given to the students" (Student 3) and "in future projects, the objectives and plan [of the project] should be decided on the very first day" (Student 1).

While the discussions were appreciated, participation in decision-making consolidated the feeling of influence. A key moment was when the group decided on the exact language of

new learning outcomes (Students 1–3, 5). It provided an acknowledgment of everything that had been discussed and ensured that all team members were on the same page. Several participants experienced that the decision related to learning outcomes also set clearer limitations to the project (Students 1–3, 5). As all of the outcomes had to be examined individually, they gave direction to the rest of the examination design.

Efficient communication, transparency, and accessibility to edit all working documents enabled contributions from everyone. Main group meetings during lunchtime ensured that all participants had the opportunity to attend. The eventual division of the working group into smaller teams (3–4 participants) was also appreciated as it allowed students to work on the issues they were most interested in and caused them to take additional responsibility (Students 2, 4). The smaller groups were perceived as more “efficient” and accelerated the production of new course material:

I appreciated the work in the smaller groups even more. Sometimes it is difficult to work when 10 people [*sic*] are present in the meeting; the flow of ideas is smoother during the smaller meetings where we can focus on specifics. (Student A)

According to the students, a major challenge was to keep the best interests of the student collective in mind, rather than basing decisions on personal opinions (Student 3). The vivid discussions were, however, indicative of varying opinions among the students in the working group, reducing the risk of a too-narrow perspective. The fact that they had already finished the course, instead of being involved during the course, made it easier to work towards a better learning experience and reduced the risk of working for personal gain such as an “easier examination.” It also reduced the pressure that could have originated from peers and grading teachers (Students 1–5).

Still, some students experienced that the examination design was inherently harder to influence than learning outcomes and activities (Students 3, 4). One student thought that “the work with concrete examination elements could have been initiated slightly earlier” (Student 5), while another stated that it is “natural that some aspects of the exam are left to the teacher to take care of” (Student 3). Students proposed that “to further improve the project, more time could have been spent in educating the student participants and looking at research on examination” (Student 5) and in “[investing] time to learn about how examination works and [getting] familiar with the university guidelines” (Student 4).

### **Effects of the partnership on participating students**

The project invoked changes in the participants’ views on both course objectives and examination forms. They had not earlier understood the importance of well-thought-out, clear course objectives and their close relation to examination. Neither had they realized the challenges associated with examination, nor the difficulty in achieving a flawless course:

I was previously unaware of how difficult it is to prepare a fair exam. I also had not considered the time expenditure for the teacher to correct written exams, hold oral exams, or even create a lab instruction or write the exam questions. (Student A)

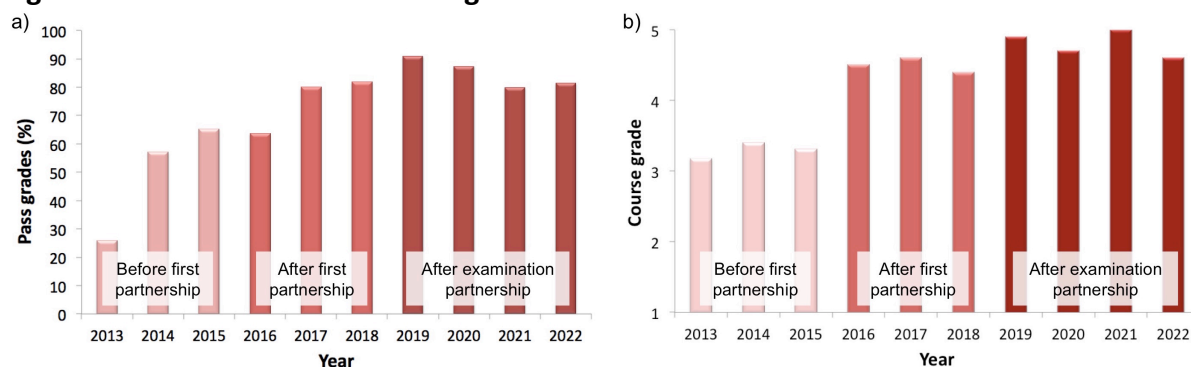


Participating in the project was found to strengthen the academic identity of the students. The course development project provided tangible evidence that students could commit to collaborative projects and deliver high-quality products. Students reported improved communication with lecturers in future courses, an enhanced feeling of community and a sense of achievement as student representatives. After the project, students continued to be active in the student organization, and two of them had roles as student representatives in program councils and department boards. Three of them later enrolled in doctoral studies at different universities.

### Evaluation of the revised course

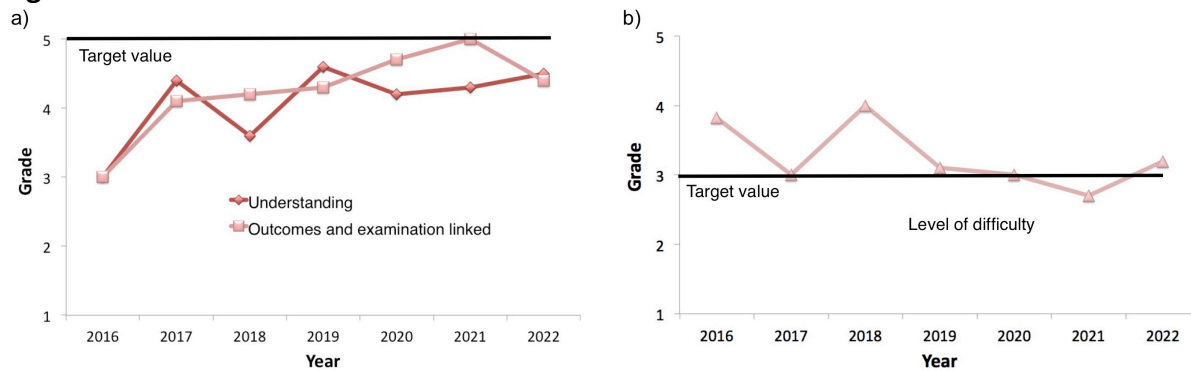
To evaluate the effects of the project, we looked at student satisfaction in the post-course evaluation as well as the examination results. Results are shown for the last ten years, which include three editions before the first partnership, three editions after the first partnership, and four editions after the second partnership. Note that the changes to the learning outcomes and the structure of the final examination were made only for the latest (2022) edition. The proportion that passed the first exam has been over 80% in the last 4 years, slightly higher than previous 3-year periods (see Figure 2a). In 2022, the students were informed of their scores in the written exam and given the opportunity to participate in the oral exam. Twelve students signed up, all of them with a chance to improve their final grades. Nine succeeded with this, with two of them reaching a passing grade.

**Figure 2. Results for students taking the course**



a) Percentage of registered students receiving a passing grade in the examination held directly after the end of the course (i.e., not including exam retakes); b) Grade from the post-course evaluation for the statement "I think this is a good course."

The overall student satisfaction increased significantly after the first partnership (Bengtson et al., 2017) and remained at a high level (>4.5) or even increased after the examination partnership (see Figure 2b). The students in the course largely agreed that the examination required a thorough understanding of the course content and that learning outcomes, teaching, and examination were aligned (see Figure 3a). They also considered the level of difficulty to be appropriate (see Figure 3b). The specific questions about the examination were included after the first partnership, and the results stabilized at better levels after the examination project.

**Figure 3. Results from the course evaluation**

a) Grades for the questions “The examination required that one had really understood the course material” and “The learning outcomes, teaching, and examination were clearly linked”;  
 b) Grades for the question “How did you experience the difficulty of the written exam in relation to the level of the course?”

The evaluation of the project gave a mean satisfaction of 3.2. The students wrote that it “is probably good to have, but difficult when it’s so free and a bit unclear what to do” and that it was “a lot of fun, but hard with such an open project.” The evaluation of the oral exam showed high satisfaction (mean 4.6). Five out of ten respondents wrote that they appreciated the extra chance, expressing, for example, that it was “nice of you to give us another chance to improve our results.” Four students commented on improved learning and wrote that “it felt good to go through what I did not fully understand at the exam and get a better understanding” and that “I learned a lot in those 20 [sic] minutes.”

## DISCUSSION

Here we revisit the three research questions, which touch upon the connections between a student culture of engagement and productive partnerships, as well as the distribution of power in an examination partnership.

### Culture of engagement and partnership outcome

As shown by the course evaluation and examination results, the students taking the revised course responded positively to the ideas proposed in the partnership. The new focus on conceptual questions in the exam design, introduced already in 2019, strengthened the link between learning outcomes and examination. This is because the values that are communicated throughout the course, for example, the importance of conceptual understanding, are now better reflected in the examination. The new exam also stabilized the perceived level of difficulty. This seems to contradict observations that students perform better on algorithmic than conceptual questions (Cracolice et al., 2008). However, Zoller (2003) showed that in a hypothetical situation, students show a preference for questions that test cognitive skills. This has been recognized both by students in the project and students taking the revised course. We think that, in contrast to numerical questions that can appear

impossible to solve, conceptual questions can always be answered in some form, even if the actual answer turns out to be incorrect. The opportunity to do an oral exam, which was introduced in the 2022 edition of the course, was also well received. While many students saw it as a chance to enhance their grade, they also recognized the benefits of presenting knowledge in different ways and the examination as a learning opportunity.

The open inquiry project remained problematic even after the partnership. Open projects are challenging from a cognitive perspective, and require well-adapted levels of teacher guidance (Kirschner et al., 2006; Zion & Mendelovici, 2012). We noticed that the student comments about the open project resemble those of the students in the partnership, both pointing to the difficulties of balancing student independence with clear expectations. One possible reason for why this was not resolved by the partnership is that open projects lead to large individual variations. The students in the partnership would then have less representative experiences for this part compared to other aspects of the course.

The importance of shared experiences illustrates how student recruitment is directly linked to partnership outcomes. In this project, the recruited student group was diverse in some aspects, such as being at different stages of their education and with varying subject specializations. However, most student partners shared a past track record of extensive engagement in student affairs and thus were not representative of the student collective (Cook-Sather, 2018; Marquis et al., 2018; Mercer-Mapstone et al., 2021). This is in line with earlier studies showing the importance of previous experience and social networking as facilitators for entering partnerships (Marquis et al., 2018). Possibly, the lack of specifics in the partnership invitation deterred students that did not have the self-confidence others had cultivated through previous experience as student representatives (Cook-Sather & Luz, 2015; Jackson & Bridgstock, 2021).

However, as the partnership proposals were beneficial to a majority of the students later taking the course, we argue that experiences as representatives positively affect students in their roles as pedagogical co-designers. In the interviews, the students in the partnership explicitly stated their ambitions to represent the larger student collective. We believe their success in fulfilling these ambitions is at least partially due to them being comfortable in their roles as student representatives, as it enabled them to centre discussions on what they perceive as the overall student interest rather than their personal opinions. A culture that fosters students to act as consultants and representatives thus trains students for roles as pedagogical co-designers. We also note that student propositions are formed by their previous experiences at the university, which can lead to inertia to enact changes to the curriculum outside of the forms currently in place at the university. This further shows the importance of a culture of engagement, where both student and teacher engagement connect strongly to the way partnerships can transform education.

### **Power balance in examination partnerships**

In partnerships, a major challenge is to overcome the initial uncertainty often experienced by the student partners (Marquis et al., 2016). Based on the interview material, giving the student-teacher partners enough time to define the project together and recognize their unique roles for its outcome helped overcome said threshold. Presenting the students with the opportunity to exert significant influence over assessment led to them approaching the task with

professionalism and a sense of personal responsibility. The student partners' recent experiences of taking the course and their insights into the relation to the rest of the program allowed for the examination to be reshaped in a way that targeted existing shortcomings. For instance, the shortage of variation in assessment was identified and tackled via oral examination and conceptual questions. Similarly, the teachers could provide valuable input regarding which of the proposed changes were feasible. The following concrete actions are thought to also have been beneficial to establish a democratic process guided by important core values (Healey et al., 2014): (a) letting student partners be in numerical superiority; (b) allocating sufficient time for in-depth, project-defining discussions in the group; (c) ensuring communication was honest, respectful, and transparent, and (d) initiating decision-making activities early on. For the first point, we note that having a student majority does not in itself imply power, as a single teacher often controls an entire class. However, compared to their usual roles as representatives, where students are always in the minority in decision-making bodies, numerical superiority is a way to shift the power balance in the direction of the students (Mihans et al., 2008).

In the post-project survey, the students expressed that they had real influence. However, the changes proposed by the partnership at that stage were not fully implemented, partly because of resistance to the proposed learning outcomes by the program council. This can be interpreted as a sign of institutional resistance to change (Bovill et al., 2016; Healey et al., 2019). Here the regulations put in place to protect educational quality and student rights can limit student influence through partnership. To increase student influence over the final product, it would have been beneficial to involve the institutional actors much earlier in the syllabus approval process, leading to increased transparency (Bovill et al., 2016). This includes the director of the program council, but also the council's student representatives. In retrospect, we can see that the more detailed encoding of the learning outcomes proposed originally would have limited the freedom to design examination, and thus would have decreased potential student influence on assessment during the course. We also observe that institutional support of the project through a pedagogical development fund was instrumental in running the partnership project in the first place.

In addition to the changes in the syllabus, the teacher responsible for the 2022 edition of the course (ML) decided to postpone the implementation of the grading scheme until the open project worked better. Despite these key changes, the students in the partnership still expressed satisfaction over their level of influence, as shown by the interviews that were conducted after these post-partnership changes. At least two factors were important to achieve this: a high level of trust built up during the partnership, as discussed above, and that the final changes still adhered to the general principles established by the partnership.

### **Partnership influence on student identity and future engagement**

As discussed above, previous experiences of student engagement as representatives had positive effects on the outcome of the partnership project. At the same time, delivering on the partnership objectives as co-designers gave the students increased self-confidence in their ability to influence their education. The course development project provided tangible evidence that students could commit to collaborative projects and deliver high-quality products. This increase in confidence aligns well with a systematic literature review showing an increase in

student confidence as a common outcome (Mercer-Mapstone et al., 2017). Students also reported how they have started thinking in new ways and thus change the feedback they can give in future courses. Their ability to see things from a teacher's perspective also led to improved communication with teachers in future courses. Their role as pedagogical co-designers thus strengthens them in future roles as consultants and representatives. Partnership projects can thus positively affect a student culture of engagement at the university, which in turn enables more productive student-teacher collaborations.

Contributing as co-researchers further strengthened the academic identity of the students. Partnerships give students increased agency (Cook-Sather, 2011), which affects their ability to have a positive impact both in educational settings and beyond (Cook-Sather, 2018; Lubicz-Nawrocka & Bovill, 2021). We note that a majority of the participants have continued with doctoral studies, although this reflects both the academic interest of the students joining the partnership and the impact of the project itself.

To handle the risk that partnerships further separate the super-engaged students from their peers, it is important the partnerships explicitly take inclusion into account. At the most basic level, participants must make sure that their suggestions are in line with the principles of inclusive teaching. At the next level, the partnerships should themselves be inclusive, either through specifically recruiting students from underrepresented groups (Mercer-Mapstone et al., 2021) or taking a whole-class approach where all students in the course are participating (Bovill, 2020). This can put more students on paths as consultants and representatives in a culture of engagement.

## CONCLUSIONS

We have formed a student-teacher partnership through which we co-created new assessment forms and content for the course Physics for Chemists. Implementing the proposed changes led to high student satisfaction levels in post-course evaluations. The students in the revised course appreciated that they were allowed to show different types of knowledge in multiple ways, including written and oral examinations. We believe that the addition of conceptual questions to the exams led to a stabilization of the perceived difficulty. The partnership shows that an overall positive outcome can be achieved even if the student partners are not representative of the larger student group in terms of level of engagement. Rather, highly engaged students already had experience acting as student representatives and change agents, which enabled them to approach this project not merely based on their own intuition, but with the best interests of the entire student collective in mind. At the same time, successful participation in the partnership gives students knowledge and confidence to influence other aspects of their education.

We also acknowledge barriers to transcending traditional roles and engaging in meaningful collaboration. We believe that some steps are particularly useful for overcoming these barriers: (a) letting the student partners be in numerical superiority, (b) having a group of teachers that are not always in agreement, (c) inviting student partners to participate in all aspects of the project design, (d) letting the students and teacher work together in smaller groups with concrete activities of their choice once a clear plan is established, and (e) including relevant institutional actors at an early stage.

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