Students´ Experiences of Participation in a Research Team: Evaluation of a Research-based Teaching Activity in Higher Education

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In Sweden as well as internationally the teaching and research nexus has been described as the defining characteristics of higher education promoting generic skills such as information analysis and critical reflection. Vertically Integrated Projects has been proposed as one educational strategy where research and teaching are linked by inviting students to take active part in actual research projects. The strategy is well aligned to Scholarship of teaching and learning enabling the transition from a teacher-centred accepted knowledge to a student-centred perspective where students are invited as producers of knowledge. The aim of the current study was to explore students' experiences of participation in a research-based learning activity with academia and industrial partners, designed as a qualitative explorative study using focus group interviews. Findings describe not only factors students find motivating for learning, but also their experience of being part of professional life with its benefits and challenges.

INTRODUCTION

In Sweden as well as internationally the nexus between teaching and research has been described as the defining characteristics of higher education and what separates it from schools and vocational education. The purpose of integrating teaching and research is to prepare students for either using research or conducting research by increasing the opportunities for teaching and research to meet in a university setting(Griffiths, 2004; Healey, 2005; Jenkins & Healey, 2010). Further, Griffiths (2004) categorized the teaching-research nexus as four dimensions: a) research-tutored teaching where students have the opportunity to write and discuss research papers; b) research-led teaching implying that current research is integrated into lectures; c) research-oriented teaching with students carrying out own research projects for example in the form of student projects, and d) research-based teaching where students participate in current research projects. Healey (2005) suggests that the linkage between research and teaching can place activities as teacher-focused with students as receivers or student-focused with students as participants. Thus, the activities can be seen as a continuum ranging from transmission of knowledge by teachers to students to generating new knowledge by students with teachers (table 1). Further, Kinchin (2009) discusses that scholarship of teaching and learning where teaching and a research-appropriate approach are aligned should include a level of uncertainty for teachers and students alike. Uncertainty is thereby seen as a driver for inquiry as teaching and hence learning may take different routes from the transferring of teacher-centred accepted knowledge to personal understanding with students as producers of knowledge.

Several benefits of strengthening the research-teaching nexus have been proposed as ways for students to acquire a better understanding of their discipline, to become more engaged in research and thus more motivated to pursue a research career. Healey (2005) introduces inquiry-based principles for linking teaching and research where first-hand experiences as an intern through work-based learning was suggested as one strategy to engage students in authentic learning experiences. Consequently, this strategy will not only enable students to develop new knowledge, but also contribute to solving real-world problems (Xia et al. 2015). Wessels et al. (2020) present research-based learning as a means for acquiring cognitive and affective-motivational research dispositions. The development of cognitive dispositions is well described in previous studies, for example Visser-Wijnveen et al. (2016) as well as Böttcher and Thiel (2018) who argue that, by linking research and teaching, generic skills such as information analysis, problem solving, effective communication and critical reflection can be developed. On the contrary, the effect of research-based learning on the affective-motivational dispositions is not as extensively studied. Wessels et al. (2018) explain that this domain is about handling uncertainties, the ability to work under stress and frustration as well as emotions about the situation at hand and can be discussed in terms of self-ef-

Table 1. **Dimensions of research-teaching links and level of student activity (Griffiths 2004; Healey 2005).**

Dimensions	Level of student activity
Research-led teaching as in learning about current research in the field	Researchers use their own research as examples in lectures and tutorials with students as recipients of research results
Research-informed teaching as in engaging in research discussions	Guided acquisition of research results with students partly engaged in the process
Research-oriented teaching as in developing research and inquiry skills	Emphasis on understanding the research processes and teaching of inquiry skills so that students can apply these skills
Research-based teaching as in undertaking research and inquiry	Students as active partners by participating in research projects. The student activity can be organized as inquiry-based activities, for example Vertically Integrated Projects (VIP).

ficacy meaning a person's beliefs in his/her capability (Bandura, 1997). In their following study (Wessels et al. 2020) concluded that research-based courses were effective when the instructors showed a true and honest interest in students' work and when students found the courses useful for their future careers which was connected to students' feelings of joy in research. Other studies have presented benefits for students as *learning to be* a professional (Garnett, 2001) and *learning to do* by inquiry-based learning through participating in research and create new knowledge (Healey, 2005). However, there are not only benefits for students, Xia et al. (2015) continue by presenting how work-integrated learning, that is collaboration between academy and industry, provides opportunities for the industrial partners to convert the knowledge created by students not only into business products, but also as a means for developing knowledge and capabilities of individuals i.e. the human capital of an organisation. Nevertheless, there are challenges with linking students – academy – industry, and some of these are presented in a study by Xia et al. (2015). For example, despite industrial partners expressing an initial interest in students, the work pressure meant they could not provide timely feedback to students. Moreover, project requirements could be changed along the way making it difficult for students to plan their work and thus meeting the deadlines. All these challenges can be minimized if there are clear goals and firm project structures from the start discussed and negotiated between all partners (Xia et al. 2015). The importance of introducing clear goals and offer prompt feedback are well in line with previous research by Marton and Morris (2002). Clear goals and feedback are presented as critical conditions in order to support high quality learning.

As suggested by Healey (2005), learning by doing and active learning are effective ways for students to adopt a deep approach to learning. Deep learning can be explained by an approach to learning focusing on understanding the meaning of content in terms of causes, effects and implications rather than a more superficial surface approach intent on memorizing facts (Marton & Säljö, 1976) proposing that students engaged in research-based activities may develop more abstract levels of thinking and intellectual development. In comparison, Wenger and Nűckles (2015) discuss knowledge as acquisition versus participation. On the one hand, acquisition describes knowledge as an entity with learners receiving the knowledge that the teachers provide. On the other hand, knowledge as participation explains what a person can do. It is a situated culturally embedded and socially mediated practice suggesting that learning is best acquired through an acculturation process into communities of practice (COP) which occurs in real life situations (ibid). Further, Böttcher and Thiel (2018) describe how creating opportunities for research-based teaching facilitate development of specialized knowledge within a field. Specialized knowledge consists of two parts, 1/ declarative knowledge as in understanding facts and concepts and 2/ procedural knowledge as in "know how to do something". Vertically Integrated Projects (VIP) as described by Sonnenberg-Klein et al. (2018) has been proposed as one educational strategy to support learning where students can develop and use declarative and procedural knowledge by participating in current research projects. Further, VIP is a transformative approach linking teaching and research in higher education by engaging undergraduate and graduate students as active participants in interdisciplinary project teams. Teams of students from various disciplines and educational levels work with faculty in their areas of scholarship and exploration. Thereby, participating in a VIP activity provides an opportunity for students to practice professional skills, for example plan their workload to deliver tasks on time, collaborate with other team members and complete discipline specific tasks (Sonnenberg-Klein et al. 2018).

It seems as if most research on VIP has been conducted solely between academia and students[1], particularly in the United States within engineering education (VIP consortium). In addition, initiatives that also include industrial partners seems less common. Industrial partners in its original meaning in a VIP context can be found in a description by Coyle et al. (2006) where they use the concept of project partners that is supportive engagement from organizations within a university, funding agencies or companies providing financial support. Xia et al. (2015) argue that collaborating with industrial partners when linking research and teaching creates increased opportunities for students to transition from higher education to professional work. How this is experienced by students is not well documented and concurrent with the idea of scholarship of teaching and learning (SoTL), as proposed by Prosser (2008), teachers need to critically reflect on practice to improve practice in their own learning contexts. Hence our point of departure is consistent with how Trigwell et al.(2000) describe SoTL as improving student learning by investigating our own teaching placing emphasis on the student rather than the teacher. Therefore, the aim of the current study was to explore students' experiences of participation in a research-based learning activity designed in collaboration between academia and industrial partners in two different disciplinary contexts. In the current study, industrial partners provide research laboratories, expertise and supervision.

METHOD

The study was designed as a qualitative explorative study using focus group interviews for data collection as a means to capture interactions between participants who share experience and perspectives, and was therefore was suitable to illuminate the social reality of being a student in a research team (Freeman, 2006). Moreover, using the focus group technique is also recommend by Collins et al. (2016) as a means to expand previous results from studies using surveys to capture students´ experience of participating in VIP-projects.

Setting and Participants

A convenience sampling strategy was used with students recruited from two different cohorts at Malmö University, Sweden. From the first cohort of 15 students, studying Media and Technology at the Faculty of Technology and Society, five students participated in the focus group interviews. The faculty is the forerunner to the VIP-model at the university. The model was implemented in 2019 as two VIP-courses, each comprising 7.5 ECTS, after researchers had encountered the model at Georgia Institute of Technology, US. These courses focus on research that is closely connected to the IT-strong industry involving researchers from the academy but are still fairly small with regards to participating students. There are four teams at the Faculty where students can participate in research directly related to the senior researchers' ongoing research activities. In the case of three of the teams, these tasks were linked to industry partners. In the fourth team, the team's organizational and work setup was mirroring that of a small to middle sized enterprise with a focus on agile work processes. All

students followed the same course structure with elements of team building, team and individual achievement, as well as reflection over individual work efforts as part of the course assessment. Students were assessed on the basis of their abilities to work in teams, plan individual work, level of participation and their written work documentation and reflection, rather on actual outcomes of the work. The emphasis on learning and collaboration rather than on goal-oriented fulfilment of specific research tasks as the basis for course credits is a core feature of the VIP model. This includes learning from failures, and being able to re-organize the work process to move the research and knowledge production forward. The four teams at Faculty (name withheld during review) had specific and mutually distinct research directions: Machine intelligence, Internet of Things technology for a smart campus, Digital transformation for Value Creation in industry, and Hybrid gaming experiences. The students who have participated in the teams thus far range from first-year students to Master students. The cohort has also included international exchange students. The teams were led by senior researchers and also included in one instance (Hybrid gaming experiences) a junior faculty member who facilitated the design and development work of the team's student members.

The second cohort of students were again recruited through convenience sampling from the department of Biomedical Science at the Faculty of Health and Society. The reason for recruiting from this cohort was that as a pre-cursor to a full-scale VIP-development a small pilot with eight students was implemented in the second year of the master course Artifical Biointerfaces 15 ECTS. Out of these eight students, four agreed to participate in a focus group interview. The aim of this course is to give the theoretical background and practical experience required to explain the role of surfaces in living systems, and to create, control and measure surface chemical properties of biological and artificial interfaces. The activity of biological interfaces is investigated in projects that focus on immunoassays, enzyme activity, the development of biosensors, cell migration and wound healing. The learning outcomes were examined through a written examination, participation in seminars and project discussions and written project report, as well as a final project report and oral presentations. During this course the students are assigned to a research team comprised of researchers from the department of Biomedical Science and their industrial partners. The industry is represented by biomedical and biotechnical companies in the region of Southern Sweden. The teams had ongoing research within the biomedical field with a focus on Biofilms, Topical formulation, Broken biobarriers, Ex vivo tissue models, Microbiota in biobarriers or Biomedical sensing. All students from both departments had a designated faculty member or industry researcher as supervisor to turn to for guidance and support.

DATA COLLECTION

Three focus group interviews were held with in total nine students, six women and three men aged between 23 and 33 years of age, as we wanted to facilitate active interaction and thus explore students' opinions on research-based education in line with an interpretative epistemology valuing human perceptions (Kidd & Parshall, 2000). The interviews were moderated either by the last author (KE) or the third author (ME), the second author (MS) acted as observer during all interviews and the fifth author MMS) additionally observed the interviews with the Biomedical students. The students were encouraged to elaborate upon their experience as members in actual research teams, and the discussions started with the question: How did you experience being part of a research group? During interviews, follow-up questions were asked when the discussions raised issues that needed to be clarified. For example, students were asked: Can you tell me a bit more? Can you please give an example? During the interviews the observer took field notes as a means for adding richness to the recorded interviews. At the end of the interviews the moderator and observer made a summary of the discussions and invited the participants to add new information, clarify or refute parts of the summary. The interviews were held and recorded via ZOOM (Zoom Video Communications, Inc, San Jose, CA, US), a web-based video conference tool, and lasted between 60-87 minutes. All participating students took part in the interviews with their cameras on.

DATA ANALYSIS

The interviews were transcribed per verbatim followed by an initial reading by the last author. The interviews and the field notes were treated as one unit of analysis, and in line with conventional content analysis (Hsieh & Shannon, 2005) the inductive process of analysing started by line-by-line reading thus, identifying meaning units which were sorted into codes and initial subcategories (table 2).

Table 2. **Example from the analysis process**

Meaning units	Code	Subcategories
So I all the time talked with everybody, so this made me feel like a part of the team more than being only in contact with the supervisor	Part of a team	Being invited as a team-member
To feel that the supervisor trusts you and that you can trust the supervisor	Mutual trust	Trustful and safe relationship

This first phase was followed by the first author reading the tentative analysis, the interviews and the field notes, thus continuing the analysis by reviewing the codes and sub-categories, clarifying the meaning of each subcategory and further sorting them into categories. This resulted in three categories with sub-categories (Table 3). To ensure scholarly rigor, the emerging results as well as the interpretations have been checked and discussed among all authors until consensus was reached. Credibility was ensured by presenting data by verbatim quotes and explained by the authors' interpretation. When presenting the results the biomedical students are anonymized as S1-4 and the Media and Technology students as S 5-9, FG stands for focus group.

Table 3. Overview of categories and sub-categories

Motivation to learn	Being a real researcher	Significance of the supervisor
Inclusive learning environment	Independence and trust	Supervisor´s interest creates engagement and supports learning
Reflection and discussion facilitate learning	Being invited as a team-member	A safe relationship
Benefits of multi-disciplinary teams	Gaining real life experience Experiencing competition	

ETHICAL CONSIDERATIONS

This study did not explore sensitive issues (e.g., political, sexual or religious) and was part of a voluntary course evaluation and therefore no formal ethical application was needed according to Swedish law (SFS 2003:460). None of the authors have been involved in grading or assessing the students with the participating students. Students were assured of confidentiality and that their participation could be terminated at any time during the interview without any consequences for their studies. As the group of interviewed students is small and it might therefore be easy to identify individual students the quoues only indicate from which educational program (Biomedical or Media and technology students) the quotes stem from.

FINDINGS

The findings disclose how students experience their participation in research teams and are presented as three categories and corresponding sub-categories illustrated in italics below. The narratives describe not only factors students find motivating for learning, but also their experience of being part of professional life with its benefits and challenges. Thereby, the significance of support from the faculty supervisor seems to be of utmost importance.

Motivation to learn

Students voiced their opinion that one benefit of participating in research-based learning was that the research environment was a strong motivator for learning. The dialogue with the supervisors and other researchers challenged the students to develop their arguments and reasoning skills to prove that their ideas were worthy and valuable to the projects. This was viewed as an *inclusive learning environment* where their ideas could actually be implemented.

> Every time that I am in a project, everyone ask for my opinion, So I am somehow part of it and this makes me actually work better (S1), Yes I agree I do not think there is a single lecturer here that did not help us during our project (S2) [FG Biomedical students].

The inclusive learning environment was perceived by students as a student-friendly zone where they could ask for support of any person in a team and where you felt that you were not dependent solely on the supervisor's time and efforts 'no matter if they are your supervisors or just people that works there... they are usually very helpful (S 4) [FG Biomedical student]. Moreover, when students were invited to express their thoughts in a group exchanging knowledge with a more experienced researcher it motivated them to return to the literature, read more and thus develop their understanding of the subject at hand. Thereby, *reflection and discussion facilitated learning* which was further supported by some of the students writing logbooks each week as a means to deepen their understanding of the ongoing research processes.

> Reflecting over what I have done the past week by writing in my logbook is really important, not only for myself, but also to show my supervisor to help us plan forward (S 6) , Yes, I think so too, to have these kind of discussions with the supervisor as well (S7) [FG Media Technology students]

Yet another motivator for learning was the expressed *benefits of multidisciplinary teams*. At first some students found the environment with people from different disciplinary backgrounds as frightening which made them slightly hesitant and nervous. But with time, the nervousness was replaced by a sense of inspiration.

> We are all seeing the same problem but we are all seeing it in a different way with different mind-sets and that leads to the most interesting conversation (S4), I have a different experience as I at first was very scared because I felt the odd one out and everyone else have similar backgrounds, but as time went by, I realized that this is actually very good (S1). [FG Biomedical students].

Being a real researcher

The opportunities to experience research in real life allowed students to develop an understanding of the research world not only as inclusive and welcoming but also as a very competitive environment with emphasis placed on individual as well as team accomplishments. To be shown *trust* from the team and thereby gain *independence* in their work and thus be able to deliver on expected outcomes was perceived as crucial for students

> Well, responsibility and consequences are underestimated aspects of learning, the feeling that this is for real, you do not have to be too specific as a supervisor, let us try, make it difficult but be clear with what the outcomes should be (S 5); You really have to trust yourself and be trusted by the supervisor, it is your responsibility; I agree, there is no road map, you have to make decisions throughout the entire project (S 6) [Focus group Media and Technology students].

An additional part of being able to gain independence was to *be invited as a team-member* by for example; invitations to different meetings, sharing articles and practice project management and that their opinion mattered.

> I really feel part of something bigger; it is not an assignment that you are expected to hand in to your professor, rather something real, something that we create together, this is not for your grades, it is larger than that (S 9) [Focus group Media and Technology students].

Nevertheless, there were stories about exclusion when students had experienced unfriendly approaches and the environment as a hostile place. These feelings made it difficult for them to engage in the research as they did not feel comfortable and instead *experienced competition.* Students explained how they realized the competitive atmospheres in the research environments and described research as a race where each researcher wanted to be first and not help and support others.

> There was competitiveness between the groups and also within the groups because it is very important to publish, you need to do these things (S 3); yes you almost have to be a bit arrogant and stand out of the crowd and prove that you are the person everyone else should listen to (S 1) [Focus group Biomedical students].

On the other hand, participating in real research was considered as a means *to gain real life experience* and viewed as a thoroughly positive experience. Students shared their stories on how they got to learn the hard way when no one gave them ready answers or distinct goals to work towards. In contrast to well-known classroom learning, being part of research-based learning was considered to be learning the hard way, learning how to deal with contradictory views and people not agreeing. Students also

pointed to the value of "test-driving" their skills and abilities in preparation for the future careers.

> This is a great chance to test what I have learnt, what is it really like, being a project-manager and working in a team (S 8); For me personally it is much better if I can do things for real, I know that I perform so much better then (S 9) [Focus group Media and Technology students].

Significance of the supervisor

For students to achieve the goals set for each research team the support from the designated supervisors was seen as an invaluable resource which *created student engagement and supported their learning.*

> My supervisor was maybe not that interested in what I was doing, so it was a bit stressful (S 4); Well, I experienced the opposite as my supervisor actually helped me and listened to my opinion, that was good (S 2) [Focus group Biomedical students].

It was important that the supervisors were present and available when students needed their support, but it was also stressed by the students that they preferred situations when the supervisors were not controlling and overlooking each single step of what they were doing.

> It is really good when they listen and actually help us either improve the ideas that we have or tell us why it is not good to implement them and things like that but they do not have to stand beside you at all times (S3) [Focus group Biomedical students].

Feedback was seen as positive and necessary, and was clearly desired by the students who wanted their supervisors to be honest when things were about to go wrong. The students acknowledged that they usually knew what they needed to improve and feedback was a way for them to be able to understand not only what to improve but also how to improve. However, for the feedback to be helpful, students needed to *feel safe in the relationship* with the supervisor.

> It has been so easy to contact my supervisor, that has been really helpful and more than I hoped for, I could ask him at any time and he was there when I needed him (S7). [Focus group Media and Technology students].

DISCUSSION

This study, a qualitative explorative study with focus group interviews, explored students' experience of participation in teams of researchers from academy and their industrial partners within the IT and Biomedical sectors. In the words of Boyer, (1990) scholarship of teaching and learning aims to "develop knowledge, skills, character, mind and abilities in others" (quoted work pp 23-24). Further, Boyer suggests that, for students to become active learners and critical creative thinkers, pedagogical strategies have to be attentively planned, examined and not least directly related to the taught subject. Following Boyer´s arguments, we propose that our study encompasses scholarship of teaching and learning by disclosing the importance of learning from the experience of being in a real contextual research team without immediate interference from a teacher or a supervisor as in traditional class-room learning. Nevertheless, the relationship to the designated supervisor in the team was crucial to feel acknowledged and rewarded which in turn contributed to independent work and feelings of being a real researcher. Healey et al. (2016) introduce the idea of learning and working in partnership, for example by inviting students as active participants in research as a pedagogically robust strategy that facilitates the development of generic and subject-specific skills. They present a conceptual model for *engagement through partnership* (quoted text page 9) explaining how partnership implies a way of actively doing rather than focusing on a set outcome. The VIP activities that students in our study were part of specifically enabled the doing. This was in particular evident when students described how they gained independence by contributing with their knowledge at team meetings, sharing articles and being invited to practice project management which is comparable to findings by Xia et al. (2015) who highlighted how students learned project management skills in class and later applied these in real world projects. Moreover, being acknowledged as a team member is similar to findings by Coyle et al. (2006) who argued that the VIP blurred traditional hierarchical structures as team effort and contribution were recognised to be valuable to the success of a team. In our study, students experienced it as positive to be able to gain real life experience and an opportunity to test their ideas and prepare for future careers, even if this at times was learned the hard way as no one gave them a ready answer or distinct goals to work towards. A key feature from a constructivist theory point of view on educational methods is that learning should be active, allowing for problem-solving of real problems by group interaction during which the teacher or supervisor is there to guide and facilitate learning (Hrynchak & Batty, 2012). Thereby, it seems as if VIP initiatives are beneficial for learning not only as exemplified in the current study, but also from a more theoretical perspective. This is an important lesson to learn for educators who are interested in building curricula where activities engaging students as partners (Healey et al. 2016) are truly incorporated. Moreover, it seems as if being valued as an active partner in one's own learning facilitated a deep learning approach (Healy, 2005; Marton & Säljö, 1976) when students pointed out the value of being able to reflect and discuss their thoughts and ideas in a group with more experienced researchers. These discussions encouraged them to go back to the literature, read more and thus develop their understanding of the subject at hand. Interestingly, similar findings were reported by MacDougall (2012) from a teacher perspective reporting that when students participated in research activities teachers experienced how students progressed from obtaining knowledge from an instructor to a more reflective stance. For this reflective process to be successful and supportive for students' learning it is vital that supervisors and students engage in feedback concordant to findings by Sargent et al. (2022) indicating that remote mentoring through digital workshops was most effective together with encouragement from primary mentors suggesting the importance of a personal relationship. Boud and Molloy (2013) present the *Feeedback Mark 2 model* which address the importance of student activity to facilitate self-regulated responsibility in the feedback process. This model entails input on how students have performed, but more importantly how comments from the supervisor can be used for improvement and development and involves a dialogue between student and supervisor. This is concordant to the current study when the students expressed a need for feedback on what and how to improve which in turn required a trustful relationship with the supervisor. In contrast, Winston et al. (2017) in their qualitative study, disclosed some

poignant barriers to effective feedback. One being the use of academic jargon distancing oneself as a provider of feedback instead of supporting students by transferring a clear message.

Thereby, there are some interesting insights to be drawn from our study aligned to the theory of self-efficacy (Bandura 1977, 1997). First, self-efficacy is reliant on vicarious experiences which means that observation of others guides new actions by an individual which in our study is represented by students' experiences as being part of a research team interacting with senior researchers. Second, feedback or in Bandura's words "social persuasion" is the action when an individual is persuaded verbally that they have what it takes to succeed which is particularly powerful when it is provided by a significant other, for example a supervisor who is seen as an expert and therefore the feedback is considered to be credible. Nevertheless, the research environment was also considered a very competitive arena and students conceptualised research as a race with each researcher working for their own benefit which instigated feelings in students of being excluded which decreased their motivation to learn. The impact of the learning environment on students' motivation to learn and specifically their approach to deep learning and integration of theory and practice is previously described in studies by Lizzio et al. (2002) and Stigmar (2010) concluding that generic academic and professional skills are best developed in learning environments characterised by teachers who support and engage active students and provide them with opportunities to work independently. One way to support such learning environments are thus by inviting students in existing research groups as presented in the current study and supported by MacDougall (2012) who concludes that creating a realistic research environment truly significant to a department is a fundamental requirement for engaging students in mutual knowledge construction.

In summary, based on the findings from the current study it seems that VIP initiatives, described in our study as research-based activities, have the potential to provide a learning environment where students learn generic and specific skills and prepare them for the reality of professional life. However, we still need to explore how the researchers themselves experience their mutual roles as supervisors and researchers, more research also needs to focus on the opportunities of developing models for collaborative learning during VIP-activities.

LIMITATIONS

We acknowledge the small number of participants in each group as four to twelve participants are usually preferred with an optimal size of five to ten to be large enough to create discussion without preventing members from sharing ideas (Kidd & Parshall, 2000). Nevertheless our experience from conducting these smaller groups are that the discussions were lively with all members sharing and being heard, which yielded rich data, and analysis will continue as the development of the VIP-project expands. Having said this, it needs to be noted that only the students studying Media and technology participated in an established VIP-course whereas the biomedical students took part in a pre-cursor to a full VIP-course. However, both groups shared the experience of being invited to on-going real research projects and when analysing the interviews it became evident that the experience was similar between the groups. Further, as the interviews were conducted via ZOOM (Zoom Video Communications, Inc, San Jose, CA, US), all students had the opportunity to speak without being interrupted while at the same time the moderator facilitated the discussions in such a way that the discussions ran freely. Moreover, to ensure credibility the transcribed text has been read independently by the authors and the identified codes were compared and discussed until we reached an agreement on the final analysis of the data (Lincoln & Guba, 1983; Nowell et al. 2017). Confirmability refers to the congruence of data to the analytical assertions made by the researchers, which we have illustrated in our results section through presenting a transparent integrated analytical narrative supported by quotes from interviews, with each cohort represented equally (six quotes from Biomedical students and five from Media and Technology students). Finally, we acknowledge that this current study is limited to a Swedish educational context. However, we believe that there is potential for transferability. As explained by Lincoln and Guba (1985) transferability occurs in the decision making process of those researchers/ practitioners seeking to transfer study findings to their own setting.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared due to participants not agreeing to the data to be shared publicly.

NOTES

1. https://www.stonybrook.edu/commcms/vertically-integrated-projects/about/;
http://www.vip-consortium.org/institutions;
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