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CURRICULUM & TEACHING STUDIES | RESEARCH ARTICLE

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*Corresponding author: Tamara van Woezik, Radboud Institute for Health Sciences, Radboud University Medical Centre, Geert Grooteplein 21 (route 133), Postbus 9101, Nijmegen, HB 6500, The Netherlands
E-mail: Tamara.vanWoezik@radboudumc.nl

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Exploring Open Space: A self-directed learning approach for higher education

Tamara Van Woezik^{1*}, Rob Reuzel¹ and Jur Koksma²

Abstract: Higher education tries to comply with a societal need for lifelong, self-directed learners, for which suitable learning formats are needed. Here, we consider Open Space Technology (OST) as a format for self-directed learning in medical education. It involves a voluntary meeting in which students explore topics of their own interest, related to the overall course theme, and divide themselves over small groups accordingly. After having studied for almost two years in a curriculum with a fixed course format comprising daily mandatory group meetings, OST provided a new education environment. We used qualitative methods to investigate how students experience a transition to OST. We coded audio transcripts of student group discussions and short interviews with teachers. This led to a final set of 30 codes further categorized into 6 themes. While increased autonomy motivated students and gave them a sense of freedom, having to structure their own learning brought about initial insecurities. Relatedness to teachers, a positive atmosphere and interaction with peers helped students deal with these insecurities and use them as a starting point for critical thinking. We conclude that OST is a valuable aid in the development of self-directed learning.

Subjects: Lifelong Learning; Educational Research; Higher Education; Teaching & Learning

Keywords: collaborative learning; educational development; open space technology; innovation; self-directed learning



Tamara van Woezik, Rob Reuzel and Jur Koksma

ABOUT THE AUTHOR

Tamara van Woezik is a PhD candidate working on the topic of self-directed learning in collaboration with dr. ir. Rob Reuzel, and dr. Jur Koksma, who are both lecturer and learning researcher at Radboudumc Nijmegen. They explore and create innovative education methods for medicine and biomedical sciences. The current manuscript reports on a pilot study that was conducted in preparation for a new curriculum, to explore the mechanisms of entering an open education environment and to prepare teachers and policy makers for this change. The larger PhD project focuses on self-directed learning in higher education, including mechanisms in the transition to university, between student and teacher, in team learning and in the organization. Philosophy of education, transformative learning and affective learning are key themes in our projects.

PUBLIC INTEREST STATEMENT

A major challenge for higher education is to help students become lifelong, self-directed learners. To face that challenge, higher education is in need of suitable learning methods. Here, we consider Open Space Technology (OST) to promote self-directed learning in medical education. In OST, students explore topics of their own interest. We investigated how students experience a transition to OST. The open environment and increased autonomy motivated students and gave them a sense of freedom. However, they felt insecure about having to structure their own learning. Relatedness to teachers, a positive atmosphere and interaction with peers helped students deal with these insecurities. In the end, students could use their insecurities as a starting point for critical thinking. We discuss these mechanisms and conclude that OST is a valuable education method in the development of self-directed learning.

1. Introduction

In educational discourse one often encounters the rationale that educational change is warranted given the dynamics of professional fields. Exponential growth of knowledge and technologies implies that higher education should be the start of a lifelong learning journey. The consequence is a felt urgency to reform curricula, aiming to support learners' development as adaptive, reflective practitioners. Notwithstanding the logic of all this, making the actual transition is a delicate and difficult matter. More research on this transitional stage may yield useful insights for institutions intent on embracing new educational philosophies and forms (Delany et al., 2016).

In the field of medicine, the call for educational reform is particularly strong, driven by an abiding patient movement and appeal to rebuild medical practice (Koksma & Kremer, 2019). The authors of an already canonical publication in the *Lancet* (Frenk et al., 2010) make a plea for rebuilding educational programs according to changing professional needs and incorporating self-directed learning (SDL) to educate lifelong learning professionals. To incorporate SDL means that, as teachers and educationalists, we should work on three major challenges: First, we should allow students to organize their own learning (Knowles, 1975; Sandars & Walsch, 2016). Second, we should give them early access to professional practices to create a sense of urgency and bring about spontaneous reflection on what they are doing and how they are doing it (Falk, Falk, & Jakobsson Ung, 2016). Third, SDL implies that students have a chance to direct their learning based on their own questions and interests (Abd-El-Fattah, 2010; Garrison, 1997).

Ample evidence suggests that SDL increases responsibility and motivation, making learning more effective and sustainable (Lee, Mann, & Frank, 2010). However, evaluations of new education methods tend to show inconsistencies regarding SDL outcomes (Murad, Coto-Yglesias, Varkey, Prokop, & Murad, 2010; O'Shea, 2003). This may be explained by context-dependency, such as poor implementation (Dolmans, De Grave, Wolfhagen, & van der Vleuten, 2005). To better understand this phenomenon, we believe that it is of interest to scrutinize the processes involved when learners enter an SDL learning environment for the first time. In this study, we do so by describing Open Space Technology (OST), an SDL-based working format virtually new to higher education.

1.1. Barriers for self-directed learning

Self-directed learning (SDL) is defined in this study as an approach where learners gradually assume personal responsibility and control of the cognitive (self-monitoring) and contextual (self-management) processes in constructing and evaluating meaningful and worthwhile learning outcomes (Garrison, 1997). According to this definition of Garrison, self-monitoring addresses cognitive and metacognitive processes. The learner takes responsibility for the construction of meaning from the learning materials. Self-monitoring is dependent upon both internal and external feedback, so it builds from a collaborative process. Self-management involves shaping the contextual conditions in line with goal-directed actions. This is a collaborative process, in which teachers and peers are involved. It is also a complicated process, and as such the development of SDL has some barriers related to the student, the organization, the teacher-student interaction, and the role of the teacher.

First relating to the student, SDL involves both taking responsibility and having control over the learning process and conditions (Stockdale & Brockett, 2011). The dilemma here is whether responsibility precedes control or vice versa. It is difficult for learners to feel responsible for their own learning without feeling control over the educational transaction. However, by just having control, the sense of responsibility is not necessarily engaged (Garrison, 1997). That is, the student might feel incompetent or insecure, and as a consequence hesitant to assume responsibility over a task. The self-determination theory (SDT) indeed indicates that for a student to feel motivated to pursue a task, not only autonomy but also competence and relatedness need to be in place. Therefore, it should be emphasized that development of SDL takes place in relation to peers and teachers. They help instill feelings of competence and relatedness, by giving feedback and by establishing a relationship.

This brings us to the second barrier, relating to the organization, which is the conflict of remaining autonomous and responsible in relation to SDL. Mezirow (1985) pointed out that students can only choose among objectives if all possible objectives are known. Full autonomy in SDL, if it is at all possible, should not become an *idée fixe*. The ideology of autonomy in SDL perhaps even hampered its conceptualization and implementation in educational settings (Candy, 1991). That is, students understand faculty has set goals and they want to know about these goals. In this respect, it is important to distinguish between SDL as a method of learning and the attainment targets of a curriculum, which may be reached through SDL (Mifflin, Campbell, & Price, 1999).

As Candy (1991) points out, it is important to take care to create a supportive climate for learning. This is not something easily captured in guidelines. Of importance are the learner's perceptions and expectations of particular learning situations. Research shows that learners adjust and adapt themselves to what they believe are the instructor's expectations, and what they anticipate will be required in tests and assessments at the end (Biggs, 1999; Wormald, Schoeman, Somasunderam, & Penn, 2009). Such expectations determine learning strategies that students pursue. Because of this, instructional settings are inherently restrictive of learners' abilities to be fully self-directing.

The third barrier, regarding the teacher–student interaction, is that guiding students in the process of developing SDL is a delicate balance. Myles Horton stressed the importance of making sure that students remain in control of this process. Teachers should not take too much out of their hands, to make sure students experience productive levels of control (Horton, Freire, & Bell, 1990). Recent research points out that this level of autonomy varies between students and depends on context (Levett-Jones, 2005). Moreover, when there is too much autonomy, it may lead students to consider SDL equal to “self-teaching” (Shanley, 2007) or a “lack of support”, like in some PBL curricula (Dornan, Boshuizen, King, & Scherpbier, 2007).

This brings us to the fourth barrier, which is the role of the teacher. Candy (1991) notes that commitment to autonomy sometimes leads to forms of false democracy in which adult educators feel they have no right to stand for any agendas they feel are important. Horton sketches a caricature image of the teacher as a facilitator: “There's no such thing as just being a coordinator or facilitator, as if you don't know anything. What the hell are you around for, if you don't know anything. Just get out of the way and let somebody have the space that knows something, believes something” (Horton et al., 1990). This quote reveals a frustration some teachers in SDL may have experienced. What is important to learn from this, is that a teacher as a facilitator has to have a deep disciplinary background in order to be able to properly guide the learning process (Sandars & Warsch, 2016). However, the main focus of interest should be with the learning process of the student, and not with the ego of the teacher who needs to showcase his or her knowledge (Brookfield, 1994).

So, indeed, we can identify some barriers for engaging in SDL pertaining to the organization, student, teacher–student interaction and role of the teacher. However, even an experienced, competent, and motivated learner, who has successfully learned other things in the past, may still have problems with SDL. It could be because of societal rules and norms, distance between the learner and teacher, or competence of the learner to exercise choice (Candy, 1991). Knowles (1985) identifies some elements of a supportive climate: low threat, unconditional positive regard, honest and open feedback, respect for the ideas and opinions of others, approval of self-improvement as a goal, collaboration rather than competition. The learner needs to be free to experiment with alternative conceptions and perspectives before making a commitment to a new or revised framework (Knowles, 1985).

1.2. Open space technology

With this concept of self-directed learning in education in mind, we deemed many educational methods unfit for promotion of a sense of autonomy, authenticity, and responsibility. The problem of education formats that aim to support self-directed learning is that they still involve some form of control by the teacher, as we see in for instance team-based learning and problem-based learning. Looking at the theory above, a format is needed in which control and responsibility can gradually be transferred to the learner.

In such a format, self-directed learners will benefit from having learning materials and teachers available at their request. Online open sources and e-learning modules may provide materials (Hammarlund, Nilsson, & Gummesson, 2015), but teachers, who have responsibilities in patient care and research, cannot be available all the time. Therefore, we need creative solutions to design programs that simultaneously stimulate SDL, feature scheduled learning experiences, and offer opportunities for monitoring learning processes. Open Space Technology (OST) may offer such a solution (Owen, 2008).

OST has a broadly articulated purpose. It provides a “marketplace” where participants move freely between “workshops” and shop for ideas, knowledge, and inspiration. Initially, a meeting has no agenda. Participants propose topics by posting them on a bulletin board, and workshops are formed around these topics. Participants can suggest new workshops or join workshops initiated by others. The meeting develops according to five, somewhat unorthodox, guiding principles: 1) whoever comes is the right person; 2) whenever it starts is the right time; 3) wherever it happens is the right place; 4) whatever happens is the only thing that could have happened; 5) when it is over, it is over. Importantly, the “law of two feet” reminds participants of the right and responsibility to go someplace else if they feel they are neither learning nor contributing (Owen, 2008). The general idea is that you work on things you want to work on, with people who share your needs and ambitions at that point in time.

An OST environment is thus very informal, which means that discussions have another form than in traditional education settings. Discussions in an OST setting will change over time, in line with the idea of change that Holman proposes (Holman, 2007). Initially, ideas will appear unorganized, there will be confusion and it is then important that participants remain open to each other’s views, ask questions and discuss ideas. A second phase will involve the emergence of a sense of community, as participants discover common interests. People will start to group around shared interests and viewpoints. In the end, conclusions and decisions can be made by way of convergence of ideas, interests and personal relationships (Pereira & Figueiredo, 2010).

OST is a common working format at conferences (Palmer, Dunford, & Buchanan, 2017), but its effects are largely unclear (Bryson & Anderson, 2000; Bushe & Marshak, 2009). OST is still a novelty in education. First pilot studies in education show promising results regarding involvement in the course, as students spend more time and show more effort to complete their assignments. They also tend to appreciate OST (Patton et al., 2016; Pereira & Figueiredo, 2010). What we do not know is how processes in an OST course develop, and how to help students in OST make the transition to a new way of learning. This study will seek answers to these questions.

1.3. Aim and hypotheses

The aim of the present research is to explore a learner’s transition from regular education to an OST guided course. This is the first time these students encounter an SDL learning environment in formal education. Although one could argue that SDL takes place all the time in other situations, a transition to an open learning experience probably has different mechanisms in formal education. Indeed, the research we outlined above shows varying results with the implementation of SDL in formal medical education. We therefore believe research in a transformative environment in formal education is needed to understand the specific mechanisms at work. We do so by analyzing the behavior of the students and their reflections on OST, making use of qualitative research

methods. We recorded students conversing and working together and recorded scripted mini interviews with teachers. This research thus explores how students learn in an OST environment, how they experience this, and which factors influence the process and outcome of OST.

As said, this study focuses on what it is like to experience a more self-directed learning environment for the first time. The study does not aim to show that students have become more self-directed or that the OST format is more effective to achieve certain learning goals. However, even though the study lacks adequate quantitative methods to scrutinize these issues properly we do also report (1) study results, (2) study time spent, (3) overall appreciation, and (4) motivation of the students. We do not have very strong hypotheses regarding these questions since we focus mainly on the qualitative description of student behavior of any kind.

2. Method

2.1. Design

In 2015 and 2016, we evaluated OST in the course “Ethics and philosophy of Biomedical Sciences” at the Radboudumc, Nijmegen, The Netherlands. The course was scheduled in the second year of a Bachelor’s program in Biomedical Sciences. It was a four-week, full-time course, at the end of which students completed a theoretical test featuring open-ended questions and wrote an essay on a topic of choice related to the course. Normally, the course featured 12 group meetings of 2 h with one teacher. During these meetings with obligatory attendance, 12–15 students discussed self-study assignments under the supervision of their teacher.

The course was divided into seven core parts, which were presented as such to the students in the lectures and assignments. Working groups would follow the line quite strictly, whereas in the OST environment, students could decide for themselves what they would work on and when. Topics were: integrity, medical technology, epistemology, concepts of sickness and health, animal and human research, utopia and dystopia, and the scientific community. Sixteen main learning goals of the course were predefined in terms of the societal context, philosophical context, and ethical context. Examples for each respective context are: “You can illustrate the influence of societal notions about sickness and health on biomedical research”, “You can determine your position regarding philosophical theories about health, in particular descriptivism and normativism” and “You can recognize and analyze relevant ethical aspects of biomedical research, especially regarding dilemmas and temptations”.

For this study, instead of attending the regular group meetings, an OST-group of 30 students maximum engaged in seven non-mandatory meetings without predefined content, during which two teachers were in the room. Students could come and go as they pleased in the scheduled 3 h. Students of the OST group wrote down at what time they entered and left the meetings, which was only intended for research purposes and was communicated as such. They had access to a closed Yammer group (a local social network for businesses; in 2015), or Facebook group (in 2016) that was established specifically for them to extend the learning community with a digital space. They could use it to exchange materials and thoughts, set agendas for OST meetings, or make appointments outside the scheduled OST meetings. All students had access to the 12 lectures and the 15 self-study assignments that were delivered during the course.

2.2. Procedure

In 2015, students participating in the course were randomly allocated to the OST- or the regular group and then given an opportunity to opt out as was required by the ethical review board of the Netherlands Association for Medical Education (NVMO). In 2016, we wanted to provide all students with the opportunity to join, so we gave students a choice to participate in either the OST- or the regular group.

Two iPads with the mobile version of Atlas.ti® installed were used during all OST meetings to make audio recordings of conversations between small groups of students, or between students

and the teachers. The researcher or teachers would start the recording and made sure that the iPads switched to another group of students after a maximum of 30 min. We also gathered reflections of the students on their learning as it was taking place, as the teachers would ask the students about their learning process during the OST meetings. At the end of the course, OST students were asked to write a brief reflection on the course and what they had learned from it.

All students took the same final test, which consisted of 10 open-ended questions that were each graded by the teachers that had formulated them. Immediately after the course, all students received an online questionnaire containing questions about the time spent on learning activities, the student's self-image, self-estimated test scores, and the overall evaluation of the course (see Appendix A).

Students signed informed consent for participation in the experiment and use of audio recordings, results of the evaluation, and study results. For ethical approval of the experiment, we had to promise the ethical review board we would compensate the OST-group students in case of lower study results. This study was approved by the ethical review board of the NVMO – file number 409.

2.3. Analysis

As the OST was considered as a complex intervention, we wanted to describe the processes as fully as possible. To do so we used multiple outcome measures, both quantitative and qualitative, in line with the advice of Craig et al. (2008). They argue that to understand complex interventions both quantitative and qualitative methods are needed to understand the outcome as well as the mechanisms involved. Furthermore, we used a complementarity mixed design, by which we underline that the qualitative results are more than a necessary addition to the quantitative results and crucial for obtaining an understanding of the phenomena that is as rich as possible (Sale, Lohfeld, & Brazil, 2002). We used quantitative measures to triangulate and frame the qualitative results. For analysis of the quantitative background information, SPSS® Statistics version 23 was used to compare scores on the theoretical test and the quality of the essays, as well as the data obtained by way of the questionnaire. We employed an independent t-test to compare groups with respect to Likert-items. An $\alpha = 0.05$ was used as an indicator of statistical significance.

Qualitative results cover audio recordings of student learning behavior and reflection in a new learning environment (*i.e.* OST), which were analyzed based on a constructivist paradigm (Bunniss & Kelly, 2010). Atlas.ti® 7 software for qualitative data analysis was used to analyze transcriptions of the audio recordings. For this purpose, the first author (TW) selected 26 recordings of sufficiently high audio quality. As a selection criterion, all students had to be represented and at least one recording for each OST-meeting was included. Audio covered a broad range of topics, including students working together and students reflecting with the teachers on how they fared in an OST learning environment.

For analysis, we used the method described by Baarda, de Goede & Teunissen (2005), which is a method that makes use of the principles of grounded theory. By way of open, axial and selective coding the researchers iteratively developed a framework for the interpretation of the qualitative results. Transcripts were initially open coded, labeling fragments that varied from one sentence to multiple sentences in order to capture the essence and meaning of the quotation. After that, axial coding was started to categorize the codes. Three transcripts were then analyzed independently by all authors, the results of which were compared and discussed in two meetings to establish agreement on the relevance and definition of emerging codes and concepts and develop a final codebook. This codebook was used for analyzing all transcripts and the reflections of the students. On this basis, overarching themes were identified (Baarda, de Goede, & Teunissen, 2005).

2.4. Reflexivity

Two of the researchers (JK and RR) taught the OST group. They were experienced teachers of the course “Ethics and philosophy of biomedical sciences”, having taught the course in the standard

format during four and six previous years, respectively. They came up with the idea to try OST methodology in this course, because they thought it would be a fitting setting to try the methodology. As they were strongly involved in the design of the new curriculum, they were anxious to try new methods of education.

Knowing this may lead to positivity bias or wishful thinking, an independent researcher (TW) led the data gathering, analysis, and interpretation. Right after the course finished, TW interviewed the two OST teachers about the experiential accounts to save keep their impressions. Both teachers explained they were quite enthusiastic to try this new methodology and about the learning atmosphere of the OST course. Also, they felt confident about their teaching style and ability to connect with students. Both teachers were positively surprised about teaching a class with two teachers instead of one. They found out that they complemented each other well, having somewhat different coaching styles.

The authors understood that new experiments in education of any kind tend to result in an enthusiastic response from students. They also knew from experience that this course was well appreciated by the students for years on end, particularly because students appreciate the opportunity to bond with one teacher, whom they meet with on an almost daily basis. Thus, they considered the Hawthorne effect, which implies that anything that gets attention will improve, was regarded as less of an issue, and also because the study was conducted in a rich environment (A. Falk & Heckman, 2009). All authors have a background in philosophy, alongside beta science (JK and RR) and social science (TW) degrees and hold a constructivist or perspectivist view.

3. Results

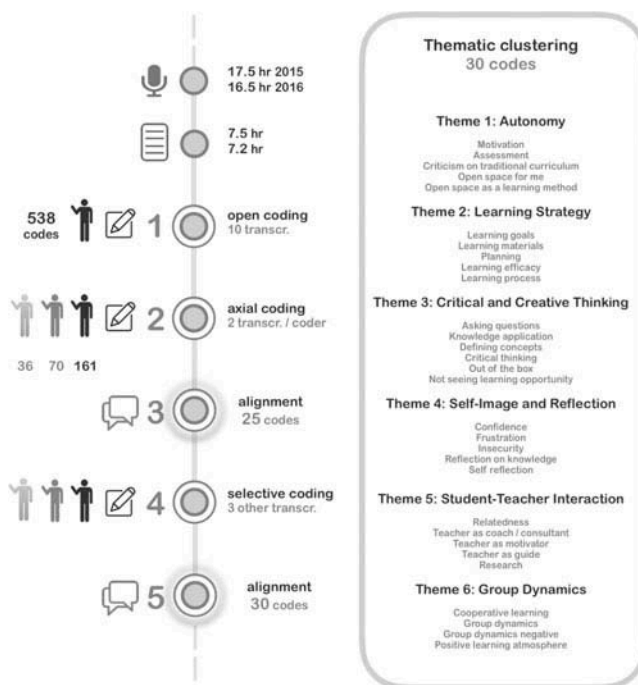
In 2015, 25 students participated in the OST-group after randomization and the opportunity to opt out. This left 77 students in the regular group in 2015. Of those, 23 and 43 students, respectively, consented to fill out the questionnaire and use of their grades. Some conversations with students who opted out gave the impression of them being somewhat reluctant to experiment (Comber & Brady-Van Den Bos, 2018). In 2016, students had a choice to participate in either the OST-, or the regular group. This resulted in 24 students participating in the OST-group, out of 131 students participating in the course. Eventually, 18 students of the OST group and 29 students of the regular group consented to fill out the questionnaire and use of their grades. When we asked students why they participated in the OST, we received very diverse answers. Some were in for a change, others opted for the course schedule that offered them more freedom and hardly knew what they chose for.

Analysis of 13 recordings from 2015 and 13 recordings from 2016, as well as the individual reflections of the students, resulted in a team-developed codebook (see Figure 1). The codebook contained 30 codes and 6 overarching themes: 1) autonomy, 2) learning strategy, 3) critical and creative thinking, 4) self-image and -reflection, 5) student-teacher interaction, and 6) group dynamics. Below we will give a thematic description of the transition to OST, using quotes from the transcripts.

3.1. “Super happy and free”—Theme 1: autonomy

All 25 students were present at the first OST meeting. The OST meetings took place at a location that was new to students and some distance away from their regular classrooms, to underline the departure from the regular course format. The room used to be an operating room and is now home to the hospital’s innovation department. Operating lights are still hanging from the ceiling. Like the setting, the OST method was very different from what students were familiar with, since they normally would be provided with exactly what, when, and how the course content was to be studied. Now they were expected to organize their own learning right from the very beginning. After getting to know one another and a quick introduction about OST, the teachers told them to

Figure 1. Description of analysis for qualitative data.



start using their time together as they saw fit. One student, somewhat dumbfounded after finding out the next step was up to him, shook his head and asked:

Student: "So, the people in the regular work groups have 168 hours of well-structured education, and we have this?"

Teacher: "I guess so."

"So, what do I do now," the student asks, "how should I start?"

Teacher: "I can't tell you, it's your start, perhaps talking to others about it helps?"

Students seemed to need time to get used to the new method of education. Although being able to make their own planning and having their own choice over what to address was valued from the start, some students say they needed more support to learn to do so: "Open space was introduced as something that made me feel being thrown in the deep." Besides not knowing how to start, the course period of four weeks they were used to, suddenly seemed a vast amount of time to organize for yourself: "In the beginning we were like, you know, like, what on earth are we going to do the next four weeks?" Very quickly students found a mode of operating in the OST format, working in small groups, discussing topics that were set beforehand or moving from one topic to another. What remained throughout the course were feelings of insecurity as to whether they would be well prepared for the final exam. They were used to knowing exactly what to study and what would be included in the exam and kept on thinking about what the students in the regular group were doing: "I feel we are missing things." But they also seemed to appreciate the OST meetings and the opportunity they had been given to structure their own learning: "They [students in the regular group] spend their time less useful." The students claim they like OST, perhaps because of its form or contents, or simply because it marks for a change:

For me it's ideal. I can manage my own time, which makes me feel super happy and free and then I like it better and do more.

When asked by the teacher how they are doing, they start to spontaneously comment on how they normally experience work group meetings: “A regular work group you just sit it out and then you leave.” In regular work group meetings students must sign an attendance list both at the beginning and the end of the two-hour meetings, which makes some students say things like: “In a work group I feel like I am in prison.”

OST students did not have the daily work group meetings to function as a backbone for their study planning, but only two OST meetings a week. The total time spent during OST-meetings was about 11 h per student on average, compared to 24 h in the regular group. However, OST students arranged their own meetings on other days and engaged in sufficient self-study. Standard course evaluation shows that total time spent during the course did not differ between both groups of students (2.05 vs. 2.20 OST and regular group, respectively ($T(109) = -0.742, p = .460$) on a 5-point Likert scale ranging from less than 145 h to more than 175 h.

3.2. “Dive deep at the right places”—Theme 2: learning strategy

Of course, each student has their own, personal, strategies to regulate their learning. Making the transition to OST challenged them to reconsider their strategies. We discerned three overall strategies or combinations thereof. First, there were students who made a study plan for the whole month based on the assignments that the students in the regular course make. Basically, they borrow the normal course format as a means to an end: to be prepared for the final exam. Second, there was a group that tries to “learn in a different way” and who initially discussed the course learning objectives together, to see how they could explore course themes on that basis. During the first two meetings, students talk to one another about their strategies and form groups based on strategic preferences: “Are there any of you who rather start from the assignments in the manual instead of the course learning objectives like we are going to?” Then, thirdly, there are many students who seem not to worry about overall strategies too much, but just meander a bit, trying several different things, developing strategies along the way:

Teacher: “Did you make a sort of planning, indicating when you want to do what?”

Students: “No.”

Teacher, smiling: “You are just exploring space?”

Student: “What I do is, I’m thinking ‘Oh there is another OST meeting coming up’ and then I think about what I want to do during that meeting and start to search and read and watch.”

In the beginning, this included some confusion on where to find and place all the information, but as a general phenomenon, it seemed to feed into more critical thinking (see next theme). Another effect associated with how they maneuvered within the OST frame is that they started to associate the different course themes. This associative behavior may also have to do with the relaxed atmosphere and a lot of diversion during the meetings, with students leisurely talking about their weekends and about Plato’s cave, or about the new largest prime number and whether they would bake pancakes that night.

When one of the teachers talked to students about studying more freely, they responded: “I do wonder how you would make sure people do not only get some global idea, but really dive deeper and also dive deep at the right places.” What we noticed is that many students, about a week before the final exam date approached, changed strategy:

So I think I am going to make the assignments after all. I am a bit afraid of the exam. Because I see some of the others making them, and then I start to worry that I miss things they do know [.] I wanted to really do it differently this time.

3.3. “Things that seem reasonable”—Theme 3: critical and creative thinking

In general, groups of students have faith in learning by discussing topics together. Sometimes they would even surprise themselves: “Funny how last time you would still be talking about what it meant, and now you use it in another conversation like that is totally normal.” Because students started to constantly hunt after confirmation of their ideas, they also searched for alternative modes of looking at the same situation. This critical attitude stimulated certain creative thinking modes such as divergent thinking and idea selection.

I just allow myself to be led by my curiosity. I just follow that trail until I think: ‘Oh, that’s interesting’ and wonder how that works and whether somebody else has said something about it. Then you start to Google search that and you find all those other people. In the end I can definitely say that I have obtained, well, a ‘broader view’ or something like that, of how you could look at it from different angles.

Thus, students seem to appreciate the advantages of having to critically reflect on what they are learning, but some still point out they need the teachers to check their progress:

Student: “If there is no teacher around you will just go for things that seem reasonable, you need a teacher for that.”

Teacher: “But don’t you have an antenna for that, informing you whether you are sure or whether you are still in doubt?”

Student: “I think that that is difficult because we are doing this for the first time.”

After the exam, students indicated that they had not been able to answer all questions. They seem to disagree with one another as to whether this would have been the case otherwise, or whether it is bad that there was a mismatch between the exam and what they had learned. However, some students explain that they felt better prepared for the exam. They also feel that they will be able to retain the knowledge much longer than usual:

I found it interesting not to be guided along the topics by this standard list of questions, but to have a choice to study what you think is important. As a result, I presume to have learned more than I would have in a workgroup.

After the course, students indicated that they have more insight into their level of understanding, and deal with that purposefully. Some students indicated that what makes the course both interesting and difficult, is that many things can be true at the same time. “We learned to be critical about things we used to think of as certainties.”

3.4. “I thought I could do it”—Theme 4: self-image and self-reflection

What became apparent from the analysis was that students start to reflect on themselves. On the one hand this has to do with feeling competent or not, with starting to realize that you have learned something or are still in the dark. Students said things like: “No, I haven’t really thought about it, I’ll admit that. It is kind of, I have the idea that I’m really bad indeed.” Group discussion seems to play a pivotal role in gaining or keeping confidence, which students mention a lot:

You really had the feeling like after all that we have done and discussed... It doesn’t make you dumber, if you know what I mean. All those concepts, you really understand them.

Occasionally, student reflections touch upon self-image, the view they have of themselves in broader and more personal terms:

What I have learned about myself is that, even though I always pleaded for more freedom in education, that it is actually pretty hard work if you have to decide for yourself what you’re gonna do. And that, well... that it makes you uncertain. I thought I could do it, but apparently, I couldn’t.

3.5. “You make us feel we are going to make it”—Theme 5: student-teacher interaction

New roles developed in OST. Students asking their peers to elaborate. Students asking teachers to help them answer questions. Both student and teacher had to get used to a new role, where the student would be allowed a chance to experience self-direction, but that it would not backfire:

Student: “Would you correct us if we said things that were wrong?”

Teacher: “That depends.”

Student: “Because, uh, we are not going really well?”

Teacher: “I wanted you to draw that conclusion yourself first and talk it over.”

What helped a lot in keeping this balance could be a sense of relatedness that emerged between the students and teachers from the beginning of the course. The teachers invested in this by asking students how they feel and how they are doing. They appreciated this so much that one of them came up with some spontaneous advice: “Actually all teachers should do research on their own practice.” What is it that students like about the teachers and consider useful for their learning?

You have a genuine interest in how we are doing. You don’t dominate the classroom, but you show your trust in us, make us feel that we are going to make it. And you really stimulate us to think outside the box. Other teachers don’t do that. Of course, it doesn’t help if you see them only once. You can’t blame them for it.

3.6. “And then it comes from within ourselves”— Theme 6: group dynamics

Students developed a sense of community. They indicate that the interaction with other students is valuable during OST: they learn much from one another by discussing topics and completing assignments together. “When I was ahead of others, or lagging behind, I was always able to find others like me to team up with and discuss topics.” We saw that in all subgroups of students: they offered to help each other out, for instance by doing peer review.

This sense of community is linked to a good group atmosphere: “I had expected it to be entirely different—in fact, it turned out to be a 100% better. Nice, interesting topics, and a lot of fun sharing and discussing our ideas.” It also relates to a certain sense of responsibility for how they fare as a group, for instance regarding being prepared for meetings: “And then it comes from within ourselves. I think it’s difficult if you come in and don’t know about the concepts. You need to be prepared.” Still, some students had higher expectations: “If everybody would come here with the same intention to learn, it would be even better.”

Especially the Facebook group in 2016 was used to extend the physical community to the online community. Students in the regular group did not use the Blackboard environment as a forum, but solely as a source of information. Facebook (used in 2016) worked better than Yammer (used in 2015) according to the total number of posts “seen by everybody” (320 vs. 196) and the average number of posts per student during the four weeks (16,8 vs. 8,5). Even though there was quite some variation in forum activity among students, more students participated in the Facebook group than on Yammer (with half of the posts posted by 32% and 17% of the students, respectively). We saw the online platform being used for both planning and discussion. Students could feel more prepared and knew what they would be able to do in the OST meeting.

3.7. Test results and results of the course evaluation

Overall, the average score of the written exam was 6.18 in the OST-group and 6.30 in the regular group, which is a non-significant difference ($T(95) = -0.621, p = .536$). We have tried to separate questions of the written test that were targeted at knowledge retention from those that required insight, critical thinking, and argumentation. As regards the overall perception of the course, students in the OST-group graded the course 7.37 and the coaching 7.78, whereas the students in the regular group yielded 6.67 and 7.99, respectively ($T(109) = 3,352, p = .001$ and $T(109) = -0.941, p = .349$).

The motivation to participate in the OST group may have caused some differences we found between the groups, so we compared both groups with regard to several relevant parameters. OST- and regular groups did not differ significantly as to the students' gender and pre-education (see Table 1), nor with respect to their self-image (see Table 2). As we found in the interviews, students who participated in the OST-group felt a stronger desire for directing their own learning (4.05 vs. 2.30), valued structure in the educational program less (2.76 vs. 4.00), appreciated the time schedule for OST working groups better (3.99 vs. 2.64), and felt less uncomfortable being involved in an experiment (1.51 vs. 2.66), see Table 3.

Furthermore, students seemed to make a clear distinction between what they learned during OST, how they appreciated that and their expectations for the test:

I don't know whether I'll do better at the test, but I like the course better for sure.

4. Discussion

By implementing Open Space Technology (OST), a self-directed working format in a "traditional" biomedical curriculum, we explored processes that surface when students settle in a new didactic approach. We aimed to explore how students experience the transition to the OST environment. To

Table 1. Research population characteristics. None of these differences is statistically significant below the $\alpha = 0.05$ level

	Regular (95% CI)	OST (95% CI)
Sex (% female)	66 (51-81)	67 (47-87)
> 1 Year experience in previous higher education (%)	19 (10-29)	29 (15-44)

Table 2. Difference in self-image between students participating in the regular program and the program featuring OST. None of these differences is statistically significant below the $\alpha = 0.05$ level

	Regular (95% CI)	OST (95% CI)
Curious	4.33 (4.18-4.49)	4.24 (4.00-4.49)
Independent	4.17 (3.99-4.34)	4.24 (4.03-4.45)
Creative	3.43 (3.21-3.65)	3.22 (2.84-3.60)
Critical thinker	4.04 (3.86-4.22)	4.02 (3.77-4.27)
Looking for challenge	3.90 (3.72-4.09)	3.76 (3.51-4.00)
Sensitive to authority	3.17 (2.95-3.38)	3.12 (2.79-3.45)
Self-confident	3.47 (3.29-3.66)	3.15 (2.83-3.46)
Idealistic	3.32 (3.09-3.55)	3.41 (3.12-3.71)
Team player	3.65 (3.45-3.85)	3.41 (3.12-3.71)
Analytic	3.72 (3.54-3.90)	3.95 (3.66-4.24)
Feedback-seeking	3.44 (3.20-3.69)	3.34 (3.01-3.68)
Socially committed	3.47 (3.25-3.70)	3.46 (3.15-3.78)
Eager to learn	4.22 (4.04-4.40)	4.15 (3.95-4.34)
Assuming responsibility	4.21 (4.06-4.36)	4.20 (3.95-4.44)
Self-reflective	3.51 (3.28-3.74)	3.63 (3.26-4.01)
Taking initiative	3.56 (3.35-3.76)	3.37 (3.04-3.69)
Easily managing resistance	3.51 (3.32-3.71)	3.56 (3.32-3.81)
Having communicative skills	3.79 (3.58-4.00)	3.68 (3.41-3.96)

Table 3. Research population characteristics: motivation to participate in OST

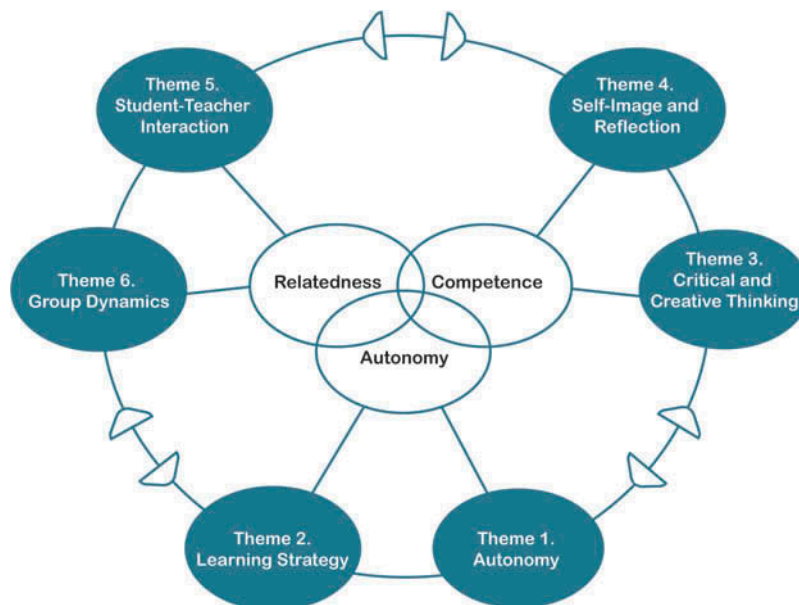
	Regular (95% CI)	OST (95% CI)	T-score and p-value
Desired more autonomy	2.30 (1.94–2.66)	4.05 (3.68–4.42)	T(86) = 6,831; p < 0.000 *
Learning formats suited better	3.09 (2.71–3.46)	3.46 (3.08–3.84)	T(86) = 1,430; p = 0.156
Needed structure in program	4.00 (3.71–4.29)	2.76 (2.39–3.12)	T(86) = -5,410; p < 0.000 *
Valued way of coaching better	3.26 (2.90–3.61)	3.59 (3.22–3.95)	T(86) = 1,292; p = 0.200
Schedule suited better	2.64 (2.19–3.09)	3.88 (3.50–4.25)	T(86) = 4,185; p < 0.000 *
Didn't want to be subjected to experiment	2.66 (2.20–3.11)	1.51 (1.23–1.80)	T(86) = -4,167; p < 0.000 *

* p < 0.05

summarize the themes, we created a model that shows how students need teachers, self-reflection, and group dynamics to learn autonomously in an Open Space environment. When these needs are met, they are able to use the learning strategies of their preference, and will show critical and creative thinking in this process. The model is displayed in Figure 2. In what follows, we will further explain the mechanisms, and show how this relates to Autonomy, Competence, and Relatedness.

Initially, students were struggling to find an effective way of learning in the OST format and some mentioned feeling insecure or frustrated. We found that such insecurity led to feelings of incompetence, but also triggered reflection and asking critical questions. Previous research shows that negative affect can have various effects on students (Magno, 2010). Teachers tried to convince students that such feelings are bound to occur and made them feel they believed in them finding their way. When teachers succeeded in doing so, it gave students the courage to embark on their journey. In other words, it was important for teachers to explicitly relate to (the feelings of) the students to set in motion a positive spiral towards autonomous learning.

Figure 2. Model of self-directed learning in Open Space education



Entrusting students with control over their own learning process, while not taking it completely out of their hands, aligns well with the idea mentioned in the introduction that teachers have an important role in the development of self-directed learning, as expressed by Horton et al. (1990). In this sense, OST helped provide an environment in which teachers create liberty for students to have control and responsibility over their learning. At the same time, students can reach out to teachers when they have questions, and teachers do provide them with information or knowledge. The main difference with other educational methods is that the knowledge of the teachers is predominantly accessed when the students ask for it, which means that the control and responsibility over learning remain with the student. An issue here is that students need to feel competent and related to the teachers and peers in order to even understand and make use of this interaction.

The influence of competence and relatedness on the experience of increased autonomy fits well with the Self-Determination Theory (SDT; Ryan & Deci, 2000). SDT indicates that autonomy, relatedness, and competence need to be balanced for people to feel motivated to perform a task. We think the influence goes beyond motivation and relates to learning effects as well. In line with previous research, we found that teachers need to have empathy, listen to students, and help students when they feel a lack of competence, for an innovative learning method to be effective (Comber & Brady-Van Den Bos, 2018). Nonetheless, OST will always require different approaches for different students, depending on their level of competence. The fact that the OST format allows for this type of attention, particularly with two teachers present, is one of its strengths.

Looking at the results of our study, we started to scrutinize these feelings of insecurity and incompetence. Perhaps one can also look at them as a driver for learning. We hypothesize that allowing for feelings of incompetence to occur might spark critical thinking, given a safe enough learning environment. That is, we see that learners in the OST environment started to use the critical attitude they have towards themselves, in a way that they project it on texts and information or arguments of their peers. As the course progressed, students started to make use of their critical attitude in a more and more productive way. This mechanism is reflected in the stages of becoming critically reflective, as explained by Larrivee (2000). The model explains how it is necessary to go through a stage of insecurities and fear, to transform to a more critically reflective professional. We would argue that the same mechanism takes place for students in OST.

Initial insecurity may have been the prerequisite to explore another form of learning, but in itself, it cannot be the motor for learning for long. Once students have regained sufficient feelings of competence, the motor is a combination of autonomy and critical thinking. By the end of the OST course, students acknowledged that they gained more profound knowledge, which they will remember longer, even though they were not always confident about the exam. More work on affect in learning shows the importance of taking emotion into account in learning processes (Maiese, 2017; Picard et al., 2004). In the last week, the impending exam made students change strategy, starting to rehearse old exams.

During the OST course, students started to appreciate freedom, as increased autonomy gradually became motivating. Students came and went as they felt best for their learning process. This made them think of the OST meetings as highly efficient and students were pleased that they could allocate time to the parts of the course they considered most important to them.

In terms of relatedness, being able to socialize during the OST meetings and not having to focus on content constantly contributed to a positive atmosphere from the outset. Humor was an important part of this, initiated by both teachers and students. A positive atmosphere provides the freedom and confidence to explore tough questions, stimulates relatedness, and helps students to make the transition to more autonomy in learning. In line with the suggestion of Patton et al. (2016), that OST in education provides ample opportunity for creative thinking, we found many examples of critical and creative thinking in the audio transcriptions.

Part of the group dynamics is a need for reciprocity. We saw students take on responsibility, for instance as they spend time on the course even outside the OST meetings. The online platform was used as a tool for planning and discussion. This virtual space was important to enhance collaboration, which is in line with previous results (King, 2016). As a result, students do seem to spend as much time on the course as the students in the regular group, even though they spent less time in the OST meetings themselves. This finding corroborates with previous research showing that students tend to organize more learning instances when there is no clear structure to the learning process (Verkoeijen, Rikers, Winkel, & Hurk, 2006).

We found minor differences between test results of the regular group and the OST group. Given these differences, we conclude that the students in the OST-group neither benefited from OST, nor needed engaging in the regular learning activities in order to successfully complete the exam. Also, they have not performed better or worse at answering specific types of questions. Although we anticipated that OST students would not fail the test, we do think this result is important. It shows that students are able to gather enough knowledge, even when they are learning in an environment that is not primarily designed to prepare them for this type of theoretical test.

4.1. Practical implications

In an ideal SDL course, students evaluate their own learning goals and choose their own method and content of the examination. This avoids a constraining effect on critical and creative thinking. In addition, the opportunity to define their own learning goals and processes within a course could help students develop a sense of ownership and leadership (Sonderer & Koksma, 2017). Even though the implementation of such formats is difficult, it might yield better results regarding life-long learning (Boud, 2000).

Perhaps a design-based research approach will prove helpful for the implementation of OST, as this will provide the opportunity to continuously reflect on and adapt the method of education and implementation strategies (Joseph, 2004). With design-based research, all stakeholders are on board during the process of reflection and development of the educational method (Barab & Squire, 2004). This will also ensure that teachers have time to experience OST and appreciate it as a good learning opportunity for themselves (White et al., 2016).

4.2. Limitations and further research

As an explorative inquiry, this study has some limitations. First, to establish the effectiveness of OST as an educational method, mixed methods research is needed. This study was conducted at one institution, limiting the external validity of the results. However, this did provide the opportunity to have a rich description of the context, which we think has its own merits. Future research could focus on investigating whether OST also improves SDL, and how OST compares to other methods in terms of learning outcomes. Moreover, we believe it is relevant to further scrutinize the differences between students in how they make a transition to SDL. For instance, by investigating how self-image, in relation to concepts like growth mindset and SDT, moderates the effects of OST.

5. Conclusion

We found that students can study in a self-directed way in an OST guided course. In terms of the course test results, we know that the students in the OST-group neither benefited from OST, nor needed engaging in the regular learning activities to acquire good grades. This shows that students can obtain sufficient knowledge, even when they are learning in an environment that is not primarily designed to prepare them for this type of theoretical test, and that OST offers a sufficiently safe format for educational organizations to use when making a transition to more self-directed learning. Our research provides evidence that OST is a valuable educational activity that encourages students to employ deep learning strategies and thus aids learning in terms of both standard knowledge tests and reflection. Moreover, OST makes effective use of time for both students and teachers, while it increases motivation and appreciation.

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Author details

Tamara Van Woezik¹

E-mail: Tamara.vanWoezik@radboudumc.nl

ORCID ID: <http://orcid.org/0000-0003-1380-5070>

Rob Reuzel¹

E-mail: Rob.Reuzel@radboudumc.nl

ORCID ID: <http://orcid.org/0000-0002-7810-231X>

Jur Koksmas²

E-mail: Jur.Koksmas@radboudumc.nl

¹ Radboud Institute for Health Sciences, Radboud University Medical Centre, Nijmegen, the Netherlands.

² Radboudumc Health Academy, Radboud University Medical Centre, Nijmegen, the Netherlands.

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Consent

Students received information about the research project and informed consent was obtained. This study was approved by the ethical review board of the Netherlands Association for Medical Education (NVMO-ERB), file number 409.

Cover image

Source: John Felise on Unsplash, text by author.

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Appendix A. Questionnaire OST

As you know, during this course we ran an OST group, next to the regular group meetings. With this short questionnaire, we want to ask some questions about you and how you experienced the course in the regular group or the OST group.

Besides the evaluation of OST, we want to use this questionnaire for research purposes. Tamara van Woezik, PhD student in the area of Self-Directed Learning, wants to gain insight into the motivation for Open Space Technology and the influence of the educational method on motivation and professional attitude. This questionnaire will be presented to all students who are signed up for the course 5OMB5. The data will be gathered anonymously, the student number is needed to know in which group you participated during the course. Also, the results of the exam will be related to this questionnaire. You can indicate whether we can use your responses for research in the next question. If you answer the question with “no”, we will not use your responses in research. If you answer the question with “yes”, we will record your answers in the file. Your student number and other identifying information will not be included in this file.

Your participation in this research is important for us, as well as for all students who participate in the new curriculum of Biomedical sciences.

1. Do you agree that we use anonymous information of this questionnaire for research purposes?

Yes/No

2. What is your student number?

3. Did you follow at least one year of other education on HBO or WO-level before starting Biomedical sciences at the Radboudumc?

Yes/No

4. Are you the firstborn child in your family?

Yes/No

5. How much leisure literature do you read?

Very little/Little/Average/Reasonably much/A lot

6. To what extent do you see yourself as

	Not at all	Not much	Average	Quite	Highly
Curious					
Independent					
Creative					
Critical					
Seeking challenges					
Sensitive to authority					
Self-confident					

(Continued)

(Continued)					
	Not at all	Not much	Average	Quite	Highly
Idealistic					
Prone to collaboration					
Analytical					
Prepared to ask feedback					
Socially involved					
Eager to learn					
Responsible					
Prone to self-reflection					
Taking initiative					
Good at dealing with resistance					
Communicative					

7. To what extent did the following reasons apply with regard to your reasons to participate in the OST groups or not?

	Not at all	Not much	I don't know	Quite	Highly
I wanted more self-direction, self-management					
The method suits my style of learning					
I care about structure in education					
The method of coaching by the teachers appealed to me					
The schedule was better for me					
I didn't want to be a test subject					

Other (please explain):

8. What effect did the small group meetings or OST meetings have on your motivation to actively participate in this course?

Very demotivating/A little demotivating/No effect/Motivating/Very motivating

9. How much time did you spent on this course?

<145 hours/145–155 hours/155–165 hours/165–175 hours/>175 hours

10. How many lectures did you attend?

1/2/3/4/5/6/7/8/9/10/11/12/13

11. Did you participate in other learning activities and/or examination during the 5OMB5 course?

Yes/No

If yes, which course?

12. Do you understand the learning goals of this course?

No, not at all/No, barely/To some extent/Yes, reasonably/Yes, completely

13. Have you achieved the learning goals of this course?

No, not at all/No, barely/To some extent/Yes, reasonably/Yes, completely

14. Did you work on personal goals next to this?

Yes/No

If yes, which ones?

15. What grade do you think you got for the written exam?

1/2/3/4/5/6/7/8/9/10

16. How sure are you about this?

Not sure at all/Not very sure/Average/Reasonably sure/Very sure

17. What grade do you think you got for your essay?

1/2/3/4/5/6/7/8/9/10

18. How sure are you about this?

Not sure at all/Not very sure/Average/Reasonably sure/Very sure

19. To what extent did your opinion of Biomedical sciences change due to this course?

Not at all/Barely/To some extent/Reasonably/Completely

20. On a scale of 1 to 10, how did you appreciate the guidance during the regular group meetings or Open Space meetings?

1/2/3/4/5/6/7 8/9/10

21. How relevant to your education do you think this course is?

Very irrelevant/A little irrelevant/Moderately relevant/Reasonably relevant/Very relevant

22. *To what extent did your interest in the themes of this course change?*

Very declined/A little declined/No change/A little increased/Highly increased

23. *What grade would you give this course as a whole?*

1/2/3/4/5/6/7 8/9/10

24. *Do you have any remarks on the course and/or the research that you want to mention?*



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