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Productive online interactions for developing the impact of continuous learning

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ABSTRACT

This study investigated the possibilities of productive interactions during knowledge creation exercise in facilitated knowledge-artefact-mediated online workshops. The workshops were organised for health and social sector professionals by adhering to COVID-19 restrictions. The analysis focused on the discussion of the impact of professional specialisation education programmes, which was the object of development activity to enhance continuous learning in working life. Multi-professional online discussions from three workshops were analysed by applying the categories of productive interaction (Damşa, C. I. (2014). The multi-layered nature of small-group learning: Productive interactions in object-oriented collaboration. *International Journal of Computer-Supported Collaborative Learning*, 9(3), 247–281. https://doi.org/10.1007/s11412-014-9193-8) based on the knowledge creation (KC) approach. Different types of productive interactions were explored. Particularly, generative collaborative actions for expanding the understanding of the impact of education programmes were developed through the speaking turns. The facilitator's role and the knowledge artefact mediation were found to be crucial for productive interaction. Online work, even for the development of demanding objects of activity, can thus be productive and capable of generating ideas across professional borders.

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1. Introduction

Professional specialisation education programmes are a form of continuous learning offering education to practitioners who have a degree and wish to enhance their professional development. In Finland, these programmes have been organised by Higher Education Institutions on work-life-oriented and research-based principles since 2016 (Rauhala & Urponen, 2019). Assessing the impact of work-related education (e.g. Turnbow & Zeidman-Karpinsk, 2016) is important. Projects have been started to gather the "user" perspectives on the programmes. Generally, multi-professional knowledge creation (KC) for continuous learning is timely, due to the reform of the Finnish health and social service system, operative from January 2023, and the future challenges of responding to the healthcare needs of the population (e.g. Gjellebæk et al., 2020; Juvonen et al., 2022). This study therefore examines a project (SOTETIE), in which "KC workshops" were

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designed inviting education and working life parties to discuss the impact of professional specialisation education programmes (in short, "impact of education") from different perspectives of work, education, and studying. The workshops, conducted through video conferencing system, because of the pandemic, offered a forum for participants to share their expertise and knowledge.

Workshops are a typical forum for sharing multi-professional experiences and creating future scenarios of work (e.g., Alsaeed et al., 2016; Cornwall et al., 2000; Juvonen et al., 2022; Norrie et al., 2022; Stevanovic et al., 2022). Online workshops among multiple participants are a demanding setting both as the way of organising and mediating discussion and in terms of producing complex knowledge. To fulfil the demands, workshops use various material representations and visualisations that we call "knowledge artefacts", to support collaborative work. Research of online training faces the classical challenge of adult education research, which is related to the fact that the form and the contents of education are mutually connected and to be analysed interlinked (Jarvis & Griffin, 2003). We see that researching the interaction in online video-conferencing workshops (form) with the intention of developing the impact of continuous learning (content) is the case in point.

Online education has become more common with the help of enabling technologies and their pedagogic applications. During the COVID-19 pandemic, face-to-face learning events migrated online where the roles of facilitation and mediating knowledge artefacts were even more highlighted (Rodríguez & Pulido-Montes, 2022). However, the findings of pedagogical interactions in online work are, to some extent, divided (Adedoyin & Soykan, 2017; Berger & Paul, 2021; Greenhow et al., 2022; Zhang et al., 2022). Many studies have focused on hybrid forms that include both face-to-face and virtual interactions (Damşa, 2014; Muukkonen et al., 2010; Vartiainen et al., 2022; Vuojärvi et al., 2019). Though online work can be productive and capable of generating ideas across borders, a better understanding of the novelties of online learning and collaborative work demands more research. This article is a study of the productive interactions (Damşa, 2014) in an online knowledge creation exercise mediated by a shared knowledge artefact, the "canvas". Our presumption is that the development of the ideas about the impact of continuous learning is possible as far as productive interactions between the participants emerge and are supported. The evaluation and improvement of the currently run education programmes remain outside the scope of the analysis.

The research question is:

> RQ: To what extent and how do different types of productive interaction emerge in an online discussion on the impact of professional specialisation education programmes?

The next section discusses continuous learning, the KC approach, knowledge artefacts, and productive interactions (Damşa, 2014; Paavola & Hakkarainen, 2005). The research design, setting, and findings are then presented.

2. Theoretical background

2.1. Need for continuous learning in working life

The notion of continuous learning has been highlighted on the agenda of Finland's educational policy and educational research in order to target the learning possibilities in working life (Oosi et al., 2019). In the health and social care, the integration of separate service systems, digitalisation, demographic changes, and the shortage of staff are accelerating the demand for systematic and responsive competence development (Ahonen et al., 2017; Nummela et al., 2019; Rajalahti et al., 2020). While undergraduate and graduate education provides students with broad capacities to conduct independent work, the offerings of continuous learning are expected to maintain and improve the quality of care, employee resilience, and readiness to face upcoming challenges (Catton, 2020; Konttila et al., 2019). Learning opportunities increase work satisfaction and involvement and decrease the need for external control over staff's work (Guglielmi et al., 2013; Kwon & Cho, 2020). Moreover, continuous

learning and education, we argue, are especially important to master changes and improve practices in work communities. Workplace learning and knowledge-building have been found to be productive when connected to the experiences and activities that occur during collaborative work and knowledge-sharing practices (e.g. Littlejohn et al., 2011; Mariano & Awazu, 2017).

Learning at work is further enhanced by organisational commitment and members' readiness to learn and share knowledge, which can be supported by developing mutual trust and building learning environments (Jun & Joo, 2011). Moreover, digital tools at work enhance knowledge-sharing and workplace learning (Lemmetty et al., 2022). In sum, past studies have indicated that the benefits gained from continuous learning programmes depend on the organisation-level understanding of the dynamics of work-life education and learning.

Professional specialisation education for graduates is a new educational form of continuous education offered by higher education institutes. Universities of Applied Sciences deliver programmes in their fields of education, such as nursing, social sector work, and engineering. Professional specialisation programmes are built on bachelor level degrees aiming to update expertise in topical areas, for example, multidisciplinary expertise in digitalised care, and expertise in multicultural interaction, to name a few. Students can attend programmes alongside their work having both distance and contact studies. The minimum scope of training is 30 credits (Lähteinen & Matthies, 2021; Rauhala & Urponen, 2019).

2.2. Knowledge artefacts

We argue that knowledge artefacts play a central role as the mediators of interaction in workshops' KC exercises. Mäkitalo-Siegl (2008) studied a small group of university students who achieved shared understanding and knowledge-building in an online learning environment by utilising tools, such as online chat and shared documents. The study by Engeness and Edwards (2017) highlighted that digital material tools and task designs were crucial in supporting peer collaboration and teacher's intervention to enable learning. Technology-mediated interactions online can be challenging for participants, especially when engaging in non-routine tasks with others previously unknown to them. Mediating artefacts are meant to support KC by materialising ideas and making them visible and enabling participants to express, explain, evaluate, and reformulate ideas—both orally and by using other symbolic representations (Hennessy, 2011; Paavola & Hakkarainen, 2005; Säljö, 1995).

Enhancing KC in organised workshops is based on two assumptions: that guided collective elaboration on shared knowledge artefacts enables learning (Hong & Sullivan, 2009; Paavola & Hakkarainen, 2005), and that building a common understanding is a precondition of productive collaboration (Bittner & Leimeister, 2014). Drawing on the sociocultural theorising of mediating artefacts (e.g. Conole, 2013; Säljö, 1999), knowledge artefacts mediate the relations between individuals and between individuals and their operational environments (Paavola & Hakkarainen, 2005). The *trialogical* approach to KC and learning presents an alternative to inter-subjective *dialogic* approaches by highlighting knowledge artefacts both as mediators of collaboration and as material tangible outcomes of collaborative KC processes (Paavola & Hakkarainen, 2014).

Along this line of thought, Crina Damşa (2014) used the KC concept knowledge object "as an externalization of knowledge, 'freezing' knowledge at certain moments in time" (p. 255). It is important to make a conceptual distinction between these knowledge objects, or epistemic objects (e.g., Knorr-Cetina, 2001) and the object of activity that in the cultural-historical activity theory is defined as the motive of collaboration (e.g., Miettinen, 2005; Stetsenko, 2005). Though Damşa (2014) refers to this discussion, material representations of the object of activity (the driving purpose of the students' tasks) remained in the background of her analysis. Aware of this discussion and to avoid confusion, we prefer term *knowledge artefact* and use *knowledge object* only when discussing Damşa's research. We reserve *the object of activity* to refer to the task targeted by the participants (the impact of education programmes). The material knowledge artefact canvas is presented in Section 3.

2.3. The framework of productive interactions

We have applied the framework of the types of productive interactions defined as the "joint efforts to co-construct knowledge and the shared epistemic agency expected to emerge when groups are addressing ill-structured, complex problems in a collaboration over time" (Damşa, 2014, p. 247). This formulation emerged from Damşa's study of collaborative learning among undergraduate student groups during a course supported by a technology-mediated online course environment. Productive interactions were considered communicative encounters between students, who interacted to achieve a shared understanding of the concepts and ideas they further elaborated on and developed into knowledge objects. The six categories of productive interaction—four epistemic, one regulative, and one unrelated—in distinguishing between the levels of problem identification and the knowledge created are as follows:

(1) The *creating awareness* category names the subject and concept, around which the participants work and look for solutions. Moreover, it establishes the focus and supports the identification of gaps and missing knowledge.
(2) The *sharing knowledge* category involves sharing information and knowledge from different sources and informing other members about the different sources of information available as well as their possible use.
(3) The *creating shared understanding* category involves creating and structuring explanations for ideas and problematising and framing the focus. The interactions under this category seek to understand and explain the concepts; they also seek definitions and knowledge from various sources to reorganise and refocus.
(4) The *generative collaborative actions* category involves producing new ideas, engaging in idea uptake, and offering critical feedback. The interactions under this category offer possible solutions and formulate explanations and arguments; they offer elaborations and argumentation in favour of novel ideas or challenge co-workers to do so. The participants also build on others' arguments and feedback to offer further explanations and elaborations.
(5) The *regulative actions* category involves defining goals, creating joint plans, and coordinating and monitoring interaction processes and the progress of the object. The interactions under this category reflect on individual and collective actions and seek to organise activities within the group, divide tasks and responsibilities, and discuss the progress of the group work and participation.
(6) The *general social talk* category involves interactions unrelated to the task at hand (Damşa, 2014).

Discussion with other KC scholars led Damşa (2014) to highlight that interactions are fundamental for individual processes situated in historical, physical, and cultural contexts, and that "productive interactions are mostly described at the microgenetic level of knowledge construction as part of the more general social interaction processes and are connected to the moment-to-moment (social) interaction among individuals" (Damşa, 2014, p. 250).

In this study, the emergence of the different types of productive interaction was investigated during the pandemic, which forced development projects to transform their workshops to virtual ones. It is probable that the meaning and quality of knowledge artefacts as mediators become even more important in such a situation compared to face-to-face communication that allows flexibility and *ad hoc* supplementing of the means during discussion. Online facilitation involves tasks such as creating a work environment, guiding the group process, providing a structure for the work, moderating and managing the process, and creating a community (Holt et al., 1998). Effective facilitation engages learners in meaning construction (Gustafson & Gibbs, 2000) and improves their sense of community (Rovai, 2007).

3. Methods and data

3.1. Data collection

The data were collected from three multi-professional online workshop groups. The workshops were conducted through Zoom in May 2020. Three hours long workshops followed the same agenda. They began with the presentation of the participants and the agenda. The facilitators then shared their orienting material on the topic. The material was based on the interviews that two of the facilitators (other than the researchers) had carried out in spring 2020 with the representatives of teachers responsible for the programmes of their institute, students of the programmes, and some informants from working life. After the orientation, workshop participants were divided into small groups which started a facilitated KC exercise analysed in this study. Both the interviews and the workshop exercise addressed the health and social care training programmes of this institute generally rather than having a certain professional group and course in mind.

The small groups consisted of two facilitators and three to five representatives of education institutes, students, and work communities. The facilitators designed, led, and moderated the workshops together to align the communication and actions across the groups. The first author of this article participated in the design and implementation of the workshops together with other facilitators. Because of the technical requirements of the online setting, they also acted as chairs for the small groups' work. In comparison, in face-to-face meetings the small groups usually work autonomously. Active discussion in Group 1 lasted 21 min (it was short because of some technical problems), 32 min in Group 2, and 31 min in Group 3. The discussions were video-recorded and transcribed, and the data excerpts were translated from Finnish to English.

We analysed the transcriptions of video recordings to find out how the groups discussed the impact of education. By watching the video material, we followed how the canvas was used as the conversation proceeded. After conducting a preliminary analysis, we decided that three small groups from two workshops provided data saturation (e.g., Glaser & Strauss, 1967).

3.1.1. Working with canvas

To stimulate the KC exercise, the participants were asked to imagine a fictitious situation five years ahead. They were told a "future story" about an ideal state of the professional specialisation education programmes in 2025. The story described the positive effects of the programmes and highlighted significant progress, efficient ways of working, and excellent developmental ideas as the strengths of the programmes. The facilitators had created the story based on the interview material. The participants were asked to envision what must have happened in five years to bring about the ideal state. The mediating tool was a virtual canvas board, on which the participants started to write sticky notes. After individual working, the group discussed and crystallised ideas. Final discussion where the groups presented their outcomes to other groups as well as silent individual work and sequences of technical challenges ("general social talk") were excluded from the data.

The canvas (Figure 1) steered the conversations towards three perspectives: students (green), work communities (purple), and the education organisation (orange). The questions (in blue) were as follows:

- How has professional specialisation education programmes impacted, and what have been the benefits?
- What new elements of impact have you invented together or individually?
- What happened during the (past) five years, and what caused these changes?
- What changed in the five years? What was done differently?

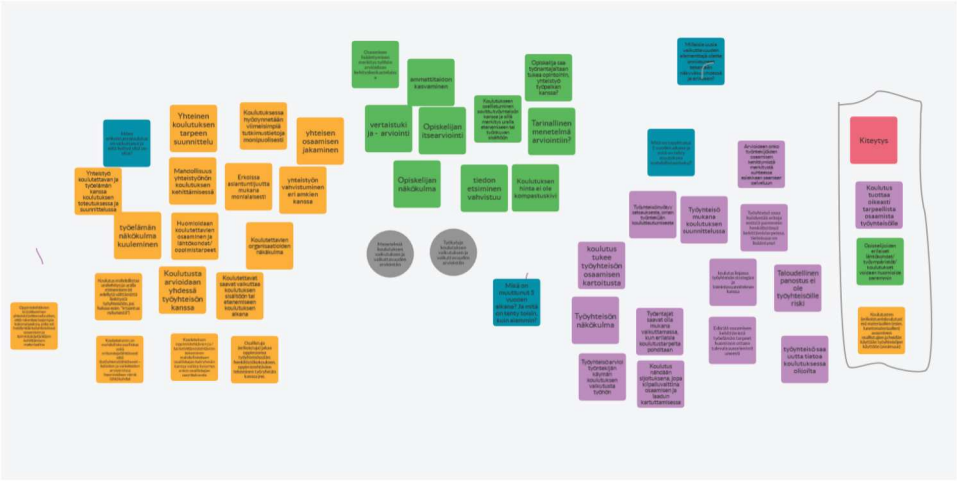


Figure 1. The canvas and the outcome of online work done by Group 3 (see explanations in the text.)

The questions aimed to generate ideas concerning the *methods and tools* for impact evaluation. On the canvas, there are reminders of the task (grey circles) and crystallisations (red title) of each perspective (purple, green, and orange) to summarise discussion. Note that the setting of the canvas shown in Figure 1 is a broad illustration; the text is unreadable (in Finnish; see translated excerpts in Table 3, section 4).

3.2. Method

In the first phase of analysis, we identified thematic episodes from the transcriptions. The episode means a bounded part of the conversation transcript fulfilling the following criteria: at least two participants share their ideas about *the impact of professional specialisation education* by taking one of the three perspectives. The participants could take any of the given perspectives; for example, a teacher could examine the impact of training from the points of view of students and work communities. A change in perspective marked the start of a new episode. In total 13 episodes were identified (Table 1). The length of the voice-recorded episodes varied between 2:50 min and 15:00 min.

In the second phase, we categorised participants' speaking turns (93 in total) embedded in the episodes into the types of productive interaction (Damşa, 2014; Table 2). The number of the speaking turns (93) gives an idea of the size of the research data and offers a basis for comparison across various categories. Individuals' speaking turns are conceptualised as discursive KC actions that construct the discussion. The categorisation answered the first part of the research question: *to what extent do different types of productive interaction emerge*? The second part of the question, *how they emerged,* demanded a more holistic scrutiny of the discursive KC actions embedded in the

Table 1. Number of episodes representing three perspectives in the three workshop groups.

	Perspective/Number of episodes			
Group	Student	Work community	Education organisation	Total
1	1	2	0	3 (21 min)
2	1	6	0	7 (32 min)
3	1	1	1	3 (31 min)
Total	3 (14 min)	9 (55 min)	1 (15 min)	13 (84 min)

Table 2. Number of speaking turns manifesting the types of productive interaction in three small groups.

Productive interaction	Group 1	Group 2	Group 3	*Total*
1. Creating awareness	4	3	0	*7*
2. Sharing knowledge	0	0	2	*2*
3. Creating shared understanding	3	6	15	*24*
4. Generative collaborative actions	7	13	4	*24*
5. Regulative actions	8	15	13	*36*
Total	*22*	*37*	*34*	*93*

episodes. Descriptively analysing the speaking turns of one episode illustrates the second part. The categorisations were carried out by both researchers, first individually, then together by comparing the parallel categorisations and negotiating on them until a shared interpretation of various modes of productive interaction was achieved.

3.3. Research ethics

The participants were informed of the research in writing and orally before the workshop. They were offered the opportunity to ask questions, after which they signed an informed consent form. While transcribing the data, any directly or indirectly identifiable information was removed or pseudonymised for data protection reasons. Only the pseudonymised speakers' professional position is mentioned (for example, *Teacher Sara*).

4. Findings

4.1. Emerging types of productive interaction

The speaking turns were categorised into different types of productive interactions (Damşa, 2014). The division of turns in three small groups is presented in Table 2.

The number of speaking turns was lowest in Group 1 (22) due to a shorter session. Group 2 had more *generative collaborative* actions (13), and Group 3 had more *creating shared understanding* actions (15) than the other two groups. *Creating awareness* and *sharing knowledge* collected only nine turns, the emphasis being on the creative and generative types and, markedly, on the facilitator's *regulative actions*.

(1) *Creating awareness*

Seven turns (in groups 1 and 2) were interpreted as "creating awareness", such as asking how to organise the practices in work communities to best contribute to the development of the professional specialisation education programmes. Five turns were taken by the facilitators, who raised discussion questions, such as the allocation of employees' working time for the tasks involved in the development projects during education.

Example 1So, if we think about an ideal situation, [doing course assignments and development tasks] would have to be somehow differently allocated in terms of working hours. (Facilitator Mike, Group 2)

(2) *Sharing knowledge*

Only two turns (in Group 3) were categorised as "sharing knowledge". Below, a participant describes an attitude change observable in their region.

Example 2(…) people want to be part of the projects, and they [voluntarily] seek them to participate in development. (Teacher Allie, Group 3)

(3) *Creating a shared understanding*

The participants seemed to create a shared understanding of the impact of professional specialisation education programmes by describing their own experiences and positing ideas for discussion (six turns). This entailed rendering their individual ideas visible and shareable. In contrast, collective ideation for new visions was reserved for the fourth type: generative collaborative actions. In some cases, we can see *creating shared understanding* elaborating on the same themes as those of *creating awareness* (type 1), which is illustrated in the following example where the speaker reflects on the working time needed for development as a resource, goodwill gestures, and staff incentives.

Example 3How nice it would be if participation in training or extra development work, assigned or taken voluntarily, would be [somehow rewarded by goodwill gestures] to an individual employee or a group. But perhaps the most important thing is to take this into account in work tasks and give time to development, [be flexible with] basic work. There are so many incentives to offer. (Student Ewa, Group 3)

The third way of creating shared understanding concerned structuring new concepts and discussing the meaning of the ideas (seven turns) the participants posited. Two turns were made by the facilitators, one of which pondered the possibilities of work communities to become *learning organisations*, meaning openness to new ideas created during the professional education programmes and allowing them to be put into practice.

Example 4[Five years from now, what must have been concretely changed] that the great idea presented by a single person or persons is welcomed in the work community; that colleagues and managers have grasped it; the idea of a learning organisation, or, organisation's learning where the learning ideas are implemented in practice and everyday life – so how will it differ from today's organisation? (Facilitator Tina, Group 2)

In general, the participants created a shared understanding of the object of development activity (the impact of education) by formulating the relevant aspects that must be taken into consideration: time and resources, the integration of staff competence development into work practices, multi-disciplinary collaboration, and the digitalisation of collaborative means and tools. Employer values and incentives to accept new ideas were critically mentioned, and having a development-friendly culture in work communities and openness to new knowledge were reframed as criteria to measure the impact of special professional education programmes.

(4) *Generative collaborative actions*

Generative collaborative actions (24 turns) generated new ideas and contributions to answer the questions about the impact of education. The ideas included offering tools and inventing good practices for future specialisation education programmes. One way to achieve this, according to one participant, was to cross the boundaries of workplaces and learn from others.

Example 5Last week, when we had contact teaching days of [certain professional specialisation education programme], the students thought that let's start by getting to know the work of another professional group, let's visit them onsite, let's contact [and ask], can I possibly come to see to better understand your work. And reciprocally. (Teacher Mina, Group 2)

The participants argued for open communication about the plans for development projects in work organisations. Moreover, they held that managers should consider development work from a future-oriented time perspective and should not expect quick results and immediate added value. In addition, having an open work culture was emphasised.

Example 6… hopefully five years from now we see openness [and] value development work that is not always immediately observable in the department's or organisation's activity, [–] also [hopefully] work culture will change to positive [spirit of] doing together. (Teacher Mary, Group 2)

Further, the generative ideas sought solutions to time and resources, urged for implementing new knowledge in the teams and units of work communities and disseminating the learning and development outcomes of education through staff meetings and involving even customers in learning.

Participants came up with ideas for increasing the impact of professional specialisation education and highlighted that organisations, not individual attendants, should take responsibility for the development processes involved in education. An idea for a nominated development coordinator was brought up. The participants expanded the idea of impact assessment by creating links between a professional specialisation education programme, work wellbeing, and employees' careers, and between the planning, implementation, and evaluation of education programmes. They saw the role of educational institutions as central in enhancing the impact of professional specialisation education.

Example 7I think this [on the canvas] is essential and concrete: the strategic development of the unit; the importance of the specialisation education is recognised and it is even acknowledged on the strategic level, that people would get [continuous] education. (Student Ewa, Group 3)

(5) *Regulative actions*

All regulative actions (36) were made by facilitators who helped the groups and linked the discussion to the contents of the canvas. They offered guidelines and technical information, stimulated participants, and led conversations. Their regulative actions included coordinating participants' speaking turns, asking them questions, and monitoring the entire process to ensure that all subtasks were fulfilled in time.

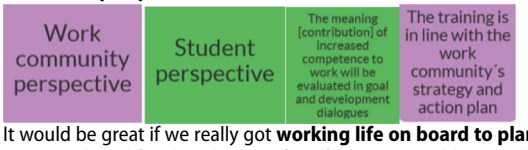
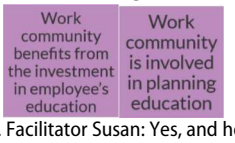
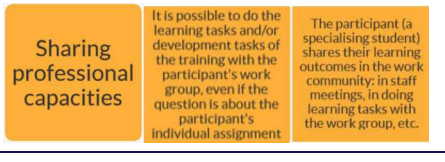
Example 8(…) you may continue sending your ideas to the [online] workspace, but next I'll take a red note and write on it the title "Crystallisation" [Fig 1]. (Facilitator Susan, Group 1)

4.2. Productive interactions of one discussion episode

A closer analysis of one episode (Table 3) illuminates productive interactions as they happen, producing a more holistic view compared to merely categorising interactions. This episode illustrates a part of the discussion in which the participants conceptualised the impact of education from the work community perspective. This was, as highlighted in the first part of the analysis, an extremely topical issue.

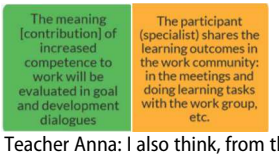
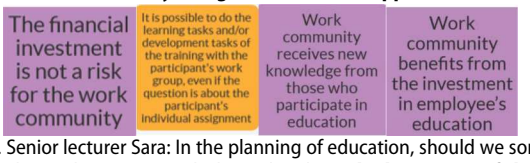
The first finding is that the facilitator's *regulative actions* (turns 1, 3, 7, 8, and 9) formed practically half of the turns and were invariably made with reference to the canvas notes. The facilitator began the episode by directing the participants' attention to the work community perspective (turn 1). She asked the participants to elaborate on their ideas by relating them to the notes they

Table 3. An example episode (Group 1) framed by the work community perspective (purple): the productive interactions as they happened.

Speaking turn	Productive interaction type
1. Facilitator Susan: Okay. We could now go through **the work community perspective**. [**Reads aloud the purple canvas notes** written by the participants.] Very comprehensive description! What do you say? [Silence; the facilitator asks.] What does this evoke in you, Sara?	(5) Regulative action
2. Teacher Sara: Well, I started to think from the student and the work community perspectives (one thing), that the planning and benefits of the education would be observable. (I pondered) whether to write this. Then, about the engagement of a work community, somewhere else, there was about the goal and development dialogue, was not there … that it can be utilised in goal and development dialogues, was it here … [**reads aloud the canvas notes**] (it says) **the capacity building is assessed in goal and development dialogue**. So this is what I talked about a minute ago, that **education would align (both) with the work community and the individual perspectives**.  It would be great if we really got **working life on board to plan**, this is how training would best serve working life. That the benefits of training would not only come to the individual but the whole work community would benefit. That the knowledge **would not only remain inside one work community, but they could think how to share and utilise the knowledge also within (the whole) organisation**. 	(4) Generative collaborative action
3. Facilitator Susan: Yes, and here we have from **an education institution's point of view**, sharing is highlighted here. **Sharing [professional] capacities has gained many comments**. 	(5) Regulative action

(*Continued*)

Table 3. Continued.

Speaking turn	Productive interaction type
4. Teacher Sara: Could it be [in connection with] the goal and development dialogue, where the mapping of individual's capacities could be linked with? And in this way, the supervisor will gain insight into what kind of expertise there exists in the work community and what kind of expertise is wanted more. In this way, the **education needs would be work-community-driven**. We should also think, **how education would be linked to the development of an individual's work and [that of] work community, the methods being something like training others, peer assessments, department meetings and whatever you name it**. 	(4) Generative collaborative action
5. Teacher Anna: I also think, from the employer perspective, they are pretty expensive educations, so the risk always remains: if an employee resigns, what is the benefit for the employer? If the **employer got concrete benefits already during the training, and also some outcomes to the work community**, which would remain even when the employee possibly changes the workplace. So, [an employer] **could participate in the whole process**, but how to get employers committed? It is not easy, but somehow suggesting that training is not only benefitting individual [student] but simultaneously benefits the work community, and this is how **a work community can get involved to support the student**. 	(4) Generative collaborative action
6. Senior lecturer Sara: In the planning of education, should we somehow [design] the tasks so that [the students] start with them already **at the beginning of the training, really engaging the work community cooperatively with an individual student** for developing the work community and new models of operation, et cetera?	(1) Creating awareness
7. Facilitator Susan: Yes. **Do you still want to comment on this, or is there some other topic** that we have not addressed at all? We have **ten minutes of time left**, and next we should produce a **crystallisation to be presented to the other small group**. You may still stay in Flinga [platform] or you may come back to Zoom. I am projecting the Flinga through my Zoom [screen] so that you may continue sending ideation to the workspace. But next, I will take the red card here and write the title "crystallisation". 	(5) Regulative action
8. Facilitator Lena: I must say [that] a good comment appeared [on the canvas] just now, I think, the openness, meaning, **opening the material of the professional specialisation education**, such as lecture material, for participants' and their work communities' use. Could this represent what we just discussed? That, in a way, **training is also training for a work community when the student enters education from the work community,** and this is how the provision of training is not meant for the student exclusively but is shared with the work community as well. **I think this is a good idea**. 	(4) Generative collaborative action
9. Facilitator Susan: Yes, this somehow revises the idea. Like an earlier comment, **was it Helen or Sara, one of you talked about** gaining benefits through the goal and development dialogue? But if this [idea] was marketed to a work community, **would it improve the commitment to education and, thus, also make the impact clearer?** How is this resonating with others?	(5) Regulative action

had produced on the digital canvas. The facilitator monitored the progress of the discussion on the impact of education (turn 3). Towards the end, one facilitator, Susan, requested the group to offer their final comments before crystallisation (turn 7). The other facilitator, Lena, responded by highlighting some innovative ideas on the canvas (turn 8).

The second interpretive notion concerns the emergence of *generative collaborative actions* (turns 2, 4, 5, and 8) in the "highest" epistemic category of productive interactions (Damşa, 2014). The participants responded to the facilitator's questions related to the canvas notes and continued their elaboration by offering new ideas and bringing in points of view and contributing to KC from the work community's perspective. They (in this episode, two teachers) expanded the scope of the impact of education beyond individual benefits to the whole work community and organisation. They envisioned annual goals and development dialogues as a means for connecting the individual and collective benefits of education in work communities. They saw that the early involvement of work-life parties in the planning of education would improve their commitment to their staff's professional education. The turns taken to develop the work community perspective were linked to the perspectives of students and education institutes as well. Turn 8 related to the facilitator's comment when she read aloud an idea written by another participant: that making learning materials openly accessible to everyone expands the impact of education.

The third notion relates to the role of the canvas, which seemed central to all participant contributions and not only to the facilitators' turns. In this episode, only one turn (turn 6, "creating awareness") lacked a reference to the canvas notes. The participants read aloud the notes written by other participants and sought support for their opinions by referring to the notes. They keenly followed the notes that emerged on the canvas and paid particular attention to those that received many reactions from the group members.

5. Discussion

The pedagogy of online education has long been the focus of research. However, the COVID-19 pandemic significantly changed the approach to learning, making it distant, socially distributed, and technology-mediated (Adedoyin & Soykan, 2017). To date, the context of the analyses has predominantly been that of student groups and teaching at educational institutes (e.g., Adedoyin & Soykan, 2017; Engeness & Edwards, 2017; Mäkitalo-Siegl, 2008; Muukkonen et al., 2010; Thorén Williams & Svensson, 2021; Vartiainen et al., 2022). Less attention has been paid to the context of continuous learning and professional development in working life. It was only after the pandemic restrictions that the distant mode began to get comprehensively implemented in working life education and development, challenging generic digital capacities of the workforce in many ways (e.g., Brown et al., 2022).

This study aimed to examine online development work to promote continuous learning. We presumed that the role of knowledge artefacts as well as the quality of facilitation are critical, especially in distant and dispersed communication (e.g., Berger & Paul, 2021; Zhang et al., 2022). Prior research on the requirements for productive interactions in collective KC efforts (Damşa, 2014) highlighted the interconnectedness of the enacted forms of interactions and the construction of knowledge artefacts in and through interactions. Our analysis added the third conceptual element to be interconnected: the object of development activity (Miettinen, 2005; Stetsenko, 2005). Examining the impact of professional specialisation education programmes represented the object and motive to gather together in workshops. The empirical context of the research was a series of multi-professional KC workshops that aimed to examine the impact of education on meeting the future needs of working life and care.

The outcome of the categorisation of the speaking turns emphasised the interaction types *creating shared understanding* and *generative collaborative actions.* We interpret that these creative and generative types signal the potential of working online with demanding development tasks that are "normally" expected to require intensive contact work (e.g., Brown et al., 2022). *Creating awareness*

and *sharing knowledge* were less represented. Conclusions must be modest, but we noticed that facilitators' orienting material at the start of the workshop served shared awareness and knowledge base making the participants ready to further create and develop their ideas.

Of the various types of productive interactions, *generative collaborative actions* were found to be crucial for creating *shared epistemic agency,* which Damşa (2014) relates to "how discussion among group members triggers problems, but also a shared effort to find solutions [illustrating] a knowledge object's potential to elicit more convergent, complex interaction at the epistemic level" (p. 274). We interpret that the participants' creative solutions to improve the future impact of education manifested shared epistemic agency in the context analysed.

The frequency of the facilitators' regulative actions was one of the key findings. Damşa (2014) emphasised the role of explicit orchestration and guidance in making collective working productive, calling for novel efforts in designing supporting pedagogic structures and seeing the potential of designing emerging technologies for collaborative knowledge co-construction. In this study, the facilitators' agency in recognising the generative moments of online interaction and in linking the discussion to the shared knowledge artefact, canvas, seemed to be essential for enhancing the quality of discussions. The canvas was used by all participants and thus mediated KC from each stakeholder perspective. Moreover, like the facilitators' regulative actions, the turns of *creating shared understanding* and *generative collaborative actions* regularly made a reference to the canvas notably expanding participants´ understanding of the impact of education from different stakeholder perspectives.

Finally, through various types of productive interactions, the participants constructed a collective understanding of the object of development activity: the impact of education programmes in question. Several aspects that spurred them into mutual KC can be highlighted from the analysis. Critical questions concerning the work communities' contribution to educational planning, the willingness of workplaces and the incentives needed to encourage staff to join development projects, and the role of a learning organisation in today's working life were among the topics associated with the impact of education. Having interorganisational exchanges and engaging in learning across departments, practising open communication, having a working culture receptive to new knowledge, and coupling the benefits of education with well-being and career development were some of the creative and novel combinations of the separate aspects of work that emerged from the workshop (e.g., Paavola & Hakkarainen, 2005).

6. Conclusion

The study of productive online interactions was limited to workshop discussions with three small groups. However, this selection was drawn from a larger setting of small groups embedded in a longitudinal project set up to gain better understanding of the impact of professional specialisation programmes. The strength of the project work was in the possibility of bringing together education providers, work-life parties, and some students or alumni of the education programmes in question. The needs for continuous learning do vary in different professional contexts, even within the health and social sector. This analysis suggests, however, that the concerns regarding the impact of professional specialisation programmes are not entirely profession- or organisation-specific. The question was set addressing the emergence of the types of productive interaction in an online discussion focusing on the impact of professional specialisation education programmes. The results revealed the participants' epistemic agency in terms of frequent creative interactions for constructing the object of development. This outcome in an online remote workshop was crucially mediated by the facilitators' active role and the shared canvas knowledge artefact. Following this study, the authors wish to gain insights into the various dimensions of impact assessment by studying the innovative ideas of *generative collaborative actions* in greater depth. The quest for sustainable models of continuous education and learning emphasises the need to also extend the research to collective practices and individual careers at workplaces.

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