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## PEDAGOGICAL DESIGN OF INTERACTIVE ONLINE LECTURES: INSTRUCTIONAL INTERVENTION IN DISTANCE EDUCATION

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### ABSTRACT

Interactive online lectures play an important role in distance education aiming at students' active participation and knowledge construction. This study deals with an instructional intervention involving a synchronous online lecture of qualitative research methods for undergraduates in a Finnish Open University course. The metaphor of orchestration offered the framework for teachers' pre-design and real-time activities with the aim of guiding students' cognitive engagement in online interaction. While the core themes of four lectures were kept constant, different activating tasks contributed to enhancing content-related interaction. The design of the orientation phase of the lecture varied along the continuum from the traditional teacher-centred approach to more generated authoritative approach where the teacher was working as a promoter of knowledge construction. In the last case, a triggering event (a research abstract) worked as an advance organiser to integrate conceptual knowledge with students' existing experiences. The interactivity of online lectures was enhanced by the content and order of the activating tasks. The content-related interaction multiplied throughout the course of the lectures in line with the linearity of the structure. The results suggest that the orienting phase of the lecture is crucial for students' cognitive engagement.

### INTRODUCTION

In distance education settings, synchronous online lectures enable the transmission of knowledge to large numbers of students who can ask and answer questions in real time. The lecture-form of instruction, however, easily results in the acquisition metaphor of learning in which students play a passive role, and the transformation of knowledge or facilitation of their active participation seems to be challenging (Hager & Hodgkinson, 2009; Laurillard, 2012). Learning through participation refers to a process of learning by taking part in a dialogue, maintaining social relations with others and utilising conceptual tools (Hrastinski, 2008b). Further, online research has drawn attention to the importance of student-teacher dialogues accompanying deep-level learning processes in distance education (Garrison, 2011; Falloon, 2011; Offir et al., 2008; York et al., 2007). Online lectures that lack social interaction coupled with a clear learning focus contribute to weak engagement with knowledge construction.

Current research has identified different approaches to university teaching showing the relationship between teachers' and students' perspectives towards learning (Entwistle et al., 2000; Prosser & Trigwell, 2014; Struyven et al., 2010). The structural design of university courses can be implemented in many ways. For instance, the traditional teacher-centred approach often supports the demonstration of discipline-based facts and skills with the intention of information transmission, whereas a teacher-generated approach favours the integration of concepts of the discipline with students' previous knowledge (Prosser & Trigwell, 2014; Struyven et al., 2010). Thus, interactive lectures can significantly promote the quality of content-related interaction and make a difference in student participation in general. For instance, Lonka and Ketonen (2012) underline the importance of understanding the cyclical nature of students' learning processes when the goal is to develop lecturing aiming at conceptual change and understanding. Currently, however, there are rather few studies on how interactive online lectures can be developed from an instructional design perspective (Laurillard, 2012).

The present study is a part of an intervention programme titled ‘Interactive Teaching and Learning’ implemented in a Finnish university with the aim of enhancing active student participation in various disciplines (Jääskelä et al., 2016). The programme has identified flexible approaches to the reformative development of university teaching. This article focuses on an intervention concerning four online lectures of qualitative research methods for undergraduates in distance education. The aim of the study is to compare how the orchestration of these synchronous lectures affects the nature of students’ content-related interaction. In the intervention, various activating tasks were used as tools of the pedagogical design.

## ORCHESTRATION OF ONLINE LECTURES

In distance education, the structural design of online lectures has an impact on students’ participation and the quality of their interaction. Online researchers have offered various models of interaction that support the design of courses with the aim to achieve reflective and critical learning. The classical theory of transactional distance by Moore and Kearsley (1996) — defined as a function of dialogue (interaction) and the level of flexibility of the course structure (design) interaction being the crucial factor in distance education—has offered guidelines for later pedagogical designs. The community of inquiry framework by Garrison et al. (2000) integrates three overlapping basic elements: cognitive, social and teaching presence, cognitive presence being the first element of the model. Accordingly, Offir et al. (2008) stress that the online interaction level between the students and the teacher and among the students determines the effectiveness of the teaching method, seeing content-related interaction including surface (explanatory and expository) and deep-level learning processes (cognitive).

The metaphor of orchestration has been offered as a method to conduct teaching that encourages the enhancement of creative learning, that is, from the perspective of teacher improvisation. Although the goal of orchestration has been to support processes of collaborative learning, the concept also offers guidelines for the flexibility of teaching in the context of formal instruction. The main idea of orchestration is to combine the pre-design and real-time teacher activities in the classroom so that pedagogical improvisation refers to structuring and supporting students’ knowledge construction processes and social interaction (Dillenbourg & Jermann, 2010; Hämäläinen & Vähäsantanen, 2011).

In practice, the aim of orchestration is to increase the balance between the instructional support of the real-time activities as well as the contextual nature of learning processes (Hämäläinen & Laine, 2014). The concept integrates the structural design of the instruction with improvisation pertinent to the interactive process including three components: 1) task structures, 2) interactions and 3) resources. Different types of tasks foster different interactions. In particular, tasks that encourage students to consider alternative solutions and make choices based on evidence promote knowledge-construction processes. Further, orchestration is grounded by theoretical knowledge and related to interactions in which the teacher provides explanations and offers complementary information. Students’ previous experiences work as external and internal resources for interaction (Hämäläinen & Vähäsantanen, 2011; Hämäläinen et al., 2016).

A crucial question in online education is how to organise the thematic content knowledge to support students’ active participation. Although the metaphor of orchestration has meant teachers’ flexible activities to facilitate students’ deep learning processes (Hämäläinen et al., 2016), the concept, however, offers fairly broad guidelines for the pedagogical design of online lectures. Conversely, online researchers in distance education have distinguished extensive types of interactions that contribute to different kinds of online interaction. For instance, Moore and Kearsley (1996) presented three interaction types: between students and the content, between students and the teacher and among students. Similarly, in Garrison’s (2011) community of inquiry framework, an educational experience is related to the balance and interaction of cognitive, social and teaching presence, and the deep learning occurring through the interaction of these basic elements. In fact, lecture-based teaching favours cognitive presence, interaction between students and the content, while lectures are meant to support knowledge-construction processes and reflective thinking.

Garrison and Cleveland-Innes (2005) highlight that cognitively directed interaction is qualitative in nature. In their community of inquiry model grounded in experience, the cognitive presence is defined as the exploration, integration, and testing of concepts and solutions (Garrison, 2011). However, lecturing, unlike asynchronous collaborative learning processes, cannot be based on a dialogical or symmetrical relationship between the teacher and the student, due to the former’s authority. In a sense, the authority manifests itself in the ways by which the teacher designs (structures) the thematic content under study. Basically, however, dialogic pedagogy allows the teacher to work as an authoritative agent who is responsible for the mediation of certain theories, concepts, facts or phenomena (Matusov, 2009). Hence, Matusov (2011) suggests that the authoritative teaching discourse can be manifested as teacher-generated dialogic provocations to which students are asked to justify alternative responses. These provocations, such as an assertion, contrasting cases or statements, a triggering event and so on,

offer a common object of learning for students' active participation (Kuutti, 2005; Laurillard, 2012; Matusov, 2009). In a way, the common learning object works as an advance organiser of cognitive engagement, 'as a core organising concept or issue of the knowledge domain being studied' (Garrison, 2011, p. 46). According to Laurillard (2012, p. 109) 'the value of advance organisers is to enable the learner to compare and contrast the new ideas with what they already know (Ausubel, 1980)' and 'to focus on the internal logic of the conceptual structure being learned (Marton & Booth, 1997)'.

Importantly, online course design must be clearly structured and cohesive because the order of activities often determines the nature of cognitive engagement (Dillenbourg & Jermann, 2010). Research has pointed out that the critical dimension in online contexts is to design tasks that guide students towards deep-level knowledge-construction processes (Garrison, 2011; Ke & Xie, 2009; Ke, 2013; Offir et al., 2008). According to Offir et al. (2008), deep-level processing is cultivated through different kinds of questions because they enable students to estimate the extent of their mastery of the learned material and afford an opportunity to review the material. Both the teachers and students can ask these questions. Thematically relevant questions have proven essential in supporting student-focused teaching; the most important point is, however, what kind of interaction follows these questions (Skidmore, 2006). This paper explores, from a cognitive perspective, how the design of knowledge transmitting online lectures enhances content-related interaction in distance education. The flexibility of teachers' activities was compared in the core phases of the lecture course. Our specific research questions are as follows: a) What kinds of activating tasks enhance content-related interaction during the online lectures; b) How does the quality of content-related interaction change during the online lectures?

## METHODS

### Study context and participants

The research was based on an instructional intervention of online lecture and it was conducted at the Open University in Finland. In brief, the course titled Qualitative Research Methods in Education (5 ECTS) provides the undergraduate student with the basic skills required for educational research. The web-based learning environment Optima and video conference application Adobe Connect (AC) were used in this course. AC enabled online lectures, where teachers' voices, faces (video) and PowerPoint presentation slides were shared with the students participating via chat discussion.

The qualitative research methods course consisted of five different parts: 1) the nature of qualitative research, 2) gathering data, 3) analysing data, 4) the evaluation of reliability and ethical questions, and 5) reporting the research. The online lecture 'Evaluation of Reliability and Ethical Questions' was chosen as the target of intervention. The lecture was deviated from the other parts in that it was implemented as a co-teaching experiment. The pedagogical design of this lecture proceeded as an iterative process orchestrated by the research team consisting of two researchers and two lecturers. The basic content (themes) of the lecture did not change, but it was revised with different activating tasks based on the joint evaluation of previous online lectures.

The same lecture was implemented four times with a new group of students participating in each round; with the enrolment ranging from 21 to 38 students per round. Their educational background varied from university to upper secondary degrees. The age range was from 21 to 63 years, and most of the students were females. For research ethical reasons, the students were asked for their informed consent before each occasion (Patton, 2015) so that the recorded online lectures and chat discussions could be used as research data. In addition, the anonymity of the participants was guaranteed. Each online lecture lasted about two hours (Table 1).

**Table 1.** Description of the online lectures: duration and participants

	Online lecture I	Online lecture II	Online lecture III	Online lecture IV
Date	17.11.2011	15.5.2012	13.11.2012	15.5.2013
Length	121 min	119 min	117 min	118 min
Number of students	32	21	38	33
Gender: female	26	20	30	31
Gender: male	6	1	8	2

### Data collection and analysis

The main data consisted of online lecture recordings (8 hours, 27 pages), students' messages in chat discussion forum (50 pages) and teachers' feedback. The transcribed data were analysed qualitatively by identifying different interaction during the component themes of the lectures. The unit of the analysis was a message and/or a chain of messages. The core meanings of the chat messages were classified according to the theme, addressee and function (Patton, 2015). Chat discussions were coded openly, grouping similar ones into the same category.

However, based on the classification of different messages only the student content-related interaction was chosen for the analysis.

At first, the analysis proceeded inductively: no theory was directing the analysis but the classifications emerged from the collected data. After identifying and outlining the main categories, previous studies (Garrison & Cleveland-Innes, 2005; Moore & Kearsley, 1996; Offir et al., 2008) were used in naming the phases of content-related interaction (Patton, 2015). The research team read the data separately and then constructed a common classification from the separate codings. In line with confidence criteria, the analysis progressed through steps of re-reading the transcripts, identifying different components and connections across them and observing how the data related to the theoretical framing of the study. Using analyst triangulation (Patton, 2015), it was possible to compare the findings and discuss unclear cases. In all, there were no great differences between the categorisations, but team discussions were important when deciding on the final classification.

The instructional intervention was grounded in enhancing the sequentiality of the phases of the lecture (Dillenbourg & Jermann, 2010). The students were given various activating tasks with reference to the core themes of the lecture either before or after the concepts were defined by the teachers. Thus, the instructional intervention formed a continuum from deductive approach to inductive approach. The design of the first online lecture was based on the traditional chalk and talk method with three activating tasks to bring some change for the students. During the second and third lectures the students' previous understanding and research experiences were mapped and the amount of activating tasks was increased. The final lecture was designed to follow the principles of guided participation. The triggering research example was offered to orient the students to integrate their knowledge through this common object of learning.

Learning tasks are often classified according to the type of information required, ranging from lowest level of factual recall questions up to highest level of evaluative questions that refer to judgment, evaluation and choice. Various questions focus the students' attention on reviewing the knowledge structure and its context. (Offir et al., 2008.) In this study the activating tasks were meant to support the assessment of the themes of the lecture and tasks were either reflective or evaluative; most were open-ended (tasks 1, 2, 4, 6, 7, and 8), and two were multiple-choice (task 3 and 5). The multiple-choice tasks were based on polling, an activity that has been shown to increase student involvement (Cairncross & Mannion, 2001 cited in Stephens & Mottet, 2008). Task-specific contents are summarised in Table 2.

**Table 2.** The content of the tasks

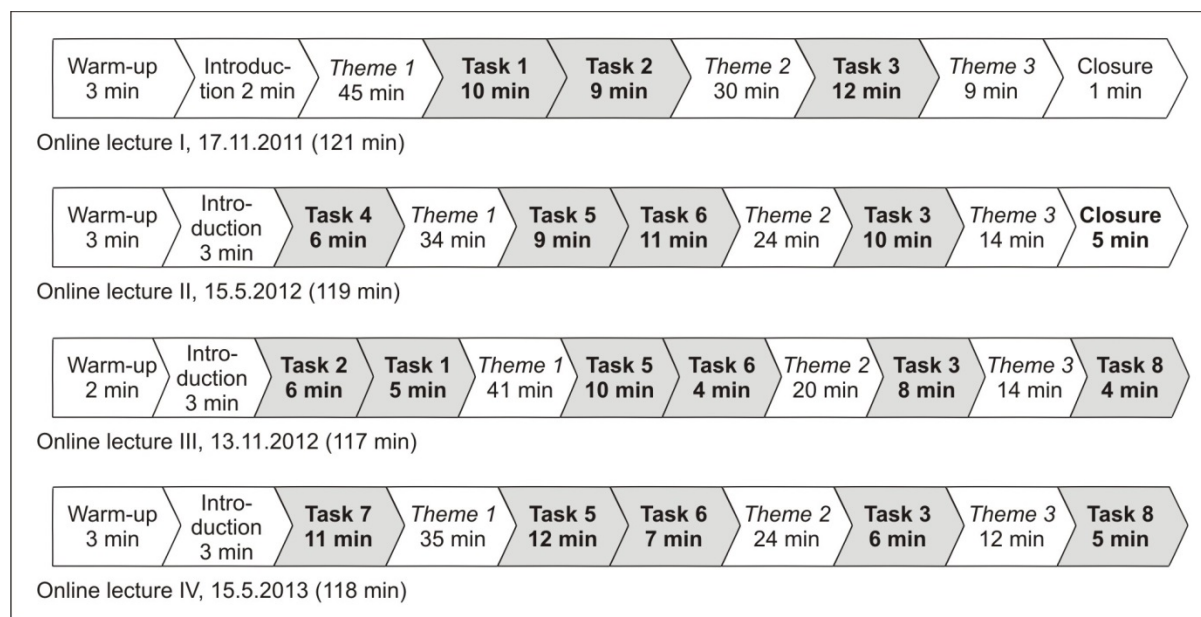
TASK 1. Students discuss (on chat) about which factors weakened the reliability of the research conducted during the course.	Open-ended, reflective
TASK 2. Students discuss (on chat) about which factors strengthened the reliability of the research conducted during the course.	Open-ended, reflective
TASK 3. Students choose which out of the five alternatives most infringes the principles of ethical research. Discussion on the results.	Multiple choice: five alternatives (choose one)
TASK 4. Students discuss (on chat) about which factors will strengthen the reliability of qualitative research.	Open-ended, reflective
TASK 5. Students choose which two alternatives (out of two sets of four) most weakened the reliability of the research conducted during the course. Discussion on the results	Multiple choice: Four alternatives 1 (choose one) Four alternatives 2 (choose one)
TASK 6. Students discuss (on chat) about which reliability issues they will absolutely have to take into account in their bachelor's thesis, to be written in the near future.	Open-ended, reflective
TASK 7. Students read an abstract of a doctoral thesis. They discuss (on chat) about what kind of ethical or reliability issues the doctoral thesis could involve. Discussion.	Open-ended, evaluative
TASK 8. Students answer (on chat) the following questions: What did you learn? What can we do better? Where did we succeed? Was there anything missing?	Open-ended, evaluative



The intention of the tasks (Table 2) was to generate content-related interaction followed by student-teacher, and student-student dialogues during the online lectures. In the analysis of the quality of interaction, attention was paid to the deepening and broadening of the content theme by the students (Laurillard, 2012; Wegerif & Mansour, 2010).

### Instructional intervention: pedagogical design of activating tasks

The pedagogical design (i.e. structure) of the online lectures (such as phases, timing and duration of tasks), their length and the roles of two teachers were designed beforehand. The number and timing of tasks varied across the lectures, and each online lecture was launched differently. As the intervention proceeded, certain revisions were made after each lecture. The sequences in Figure 1 show how the same tasks were located in the course of the lectures and how the number of tasks varied from one lecture to another. Synchronous communication has been found to support student participation especially at the beginning (warm-up) and at end (feedback) stages of online sessions (Hrastinski, 2008a). In the initial phase and during the lecture, a sense of community was promoted through encourage interaction including social and procedural messages (Offir et al., 2008). First, the teachers introduced the lecture outline and themselves. Teachers' encourage interaction included behavioural messages like calling the students by their first names, giving affective feedback or describing procedural instructions. As for further social interaction, also the students' peer-related informal messages (greetings, thanks, exits etc.) were found to be an evidence of the sense of community. The design of the online lectures is illustrated as four sequences in Figure 1.



**Figure 1.** Activating tasks and the structural design of online lectures

The online lecture on the *Evaluation of Reliability and Ethical Questions* was designed so that it consisted of three main themes: 1) The fields and criteria of reliability in qualitative research, 2) The researcher's perspective on ethical choices, and 3) Practical hints concerning informed consent. The first theme was designed as a foundation for further elaboration on the students' previous experiences in conducting research, while the second theme aimed to demonstrate the choices made by professionals in various situations of qualitative research. The third theme dealt with instructions for informed consent. The thematic structure of the online lectures remained stable over the course of the intervention. Between the online lectures I and II, the total number of tasks rose from 3 to 4 with the introduction of Tasks 5 and 6, while two previously converging items (T1 and T2) were combined into Task 4. In lecture III the Tasks 1 and 2 were used again, but their order was changed. Finally, in the fourth online lecture, a new evaluative task (T7) was introduced. While the number of tasks diminished, this allowed more time for their elaboration. In addition, at the end of the last two lectures the students were asked to evaluate the lecture (T8).

## RESULTS

In this chapter, the nature of content-related interaction is discussed to determine how the orchestration of four online lectures contributed to students' participation in chat discussion forum. Students' content-related interaction was designed around the order of activating tasks. First, the connection between various tasks contributing to student participation is briefly described, after which the quality of content-related interaction is compared in three phases of online lectures.

### Student participation

Students' participation was assessed by specifying the number of their content messages in the phases of online lectures (OLs). Here, the students' content messages directly concerned the assigned tasks. In Table 3, the number of content-related messages is given to describe the effect of each task. The abbreviations OL I, OL II, OL III and OL IV refer to the different online lectures; TE1 and TE2 refer to teacher 1 and teacher 2 and ST refers to the student when quoting from the data.

**Table 3.** Quantity of student content messages according to the tasks in online lectures (OL)

Tasks	OL I	OL II	OL III	OL IV
Task 1	29	-	24	-
Task 2	27	-	39	-
Task 3	33	23	47	44
Task 4	-	23	-	-
Task 5	-	3	10	18
Task 6	-	24	43	72
Task 7	-	-	-	79
Task 8	-	-	(35) <sup>1</sup>	(34) <sup>1</sup>
Total	89	73	163	213

*Note:* The evaluation of the online lectures (T8) is not included in the total number of content messages

Overall, students' participation more than doubled from OL I to OL IV (from 89 to 213). Most of the chat discussion took place during the tasks, but the peer-related talk continued during lecturing as well, especially during OL IV. In such cases, the students' messages were included in the number of the preceding lecture theme. There were no significant differences in the amount of content-related interaction for OL I and OL II, keeping in mind that OL II had fewer students. By contrast, during OL III student participation doubled and was at its highest in OL IV. In line with earlier research (Ke & Xie, 2009; Offir et al., 2008), the evaluative task (T7) launched joint knowledge constructive interactions in all phases of the lecture, while reflective tasks seemed to promote surface-level processing (cf. Offir et al., 2008). In the next chapter, the quality of content-related interaction is explored, and authentic excerpts illustrate the nature of participation during the lectures.

### Content-related interaction

In the online and classroom contexts, researchers have separated various phases of teaching activities (see Garrison, 2011; Matusov, 2009; Sidorkin, 1999). In this study, three interconnected phases were distinguished: the orientation phase, the knowledge construction phase and the conclusion phase. The orientation phase is meaningful from the viewpoint of cognitive engagement because it evokes the motivation for the forthcoming thematic content.

The orientation phase was launched slightly differently in each lecture. In OL I, the concept of reliability was initially defined by the teachers, after which students' understanding was mapped in the light of their practice research (T1 and T2). This kind of *authoritarian-oriented* approach favours student activity with the intention of theory-based knowledge integration (Prosser & Trigwell, 2013). All the other online lectures were launched more directly with student activities. In OL II, a proactive question (T4) was used to help the students to discuss the general reliability issues in qualitative research. The assumption was that this kind of approach may favour the *developmental* reflection on the forthcoming conceptual knowledge (Prosser & Trigwell, 2013). Closely related, in OL III, the students' previous understanding (T2 and T1) was again utilised with the intention of *facilitating* their participation. Finally, in OL IV, a research abstract (T7) was defined by the teachers as a common object of learning. Here, the teachers worked more as *authoritative* agents with the aim of getting the students to justify some critical features of the qualitative research (Matusov, 2009). Noteworthy, the authoritarian teaching approach favours the knowledge content to be delivered so that the teacher has authority over that which is to be learned. The authoritative teaching approach favours dialogue, a tension in the relation between authority and liberty (Matusov, 2009, p. 94, p.107). In Table 4, students' content-related interaction is defined and illustrated with examples of their chat messages during each lecture.

**Table 4:** The orientation phase of online lectures I – IV

<i>Task structure</i>	<i>Students' content-related interaction</i>	<i>Teacher as the conductor</i>
<b>Online lecture I</b> (Theme + Tasks 1 & 2)	<b>Discussion about the practice research</b> Naming the reliability criteria of practice research in relation to data collection, analysis and reporting: . <i>too many interviewers and research situations made accurate reporting nearly impossible;</i> . <i>difficult to analyse interviewees' short answers;</i> . <i>the common framework of interviews was good;</i> . <i>the questions were common and clear, so even saturation was distinguished in some questions</i>	<b>Authoritarian</b> Favouring theory-based knowledge integration with previous experiences
<b>Online lecture II</b> (Task 4 + Theme)	<b>Discussion about reliability issues</b> Predicting the reliability of qualitative research: . <i>following the practices of the science community;</i> . <i>open and accurate reporting of research phases;</i> . <i>clear description of the data collection process;</i> . <i>the decisions must be validated and clearly expressed;</i> . <i>the choice and application of a good analysis method</i>	<b>Developmental</b> Promoting cognitive engagement with content knowledge
<b>Online lecture III</b> (Tasks 2 & 1 + Theme)	<b>Discussion about the practice research</b> Naming single issues related to data collection: . <i>many researchers and common questions;</i> . <i>there were the same kinds of answers = saturation;</i> . <i>the interviewees were friends, which may have predicted their answers;</i> . <i>the transcription may not have accurate in all interviews;</i> . <i>leading interview questions/comments</i>	<b>Facilitative</b> Utilising students' experiences of their practice research
<b>Online lecture IV</b> (Task 7 + Theme)	<b>Discussion about the abstract of a doctoral thesis</b> Proposing judgments based on reliability issues: <i>The concepts and their meanings used by children of different ages can deviate from interpretations the researcher has made.</i> Proposing judgments based on the ethical issues: <i>Questions concerning children's right to privacy. Are they all involved voluntarily?</i> Assessing the data collection method: <i>How did they motivate the children to make drawings, or were these spontaneous paintings?</i> Examining the example in a wider framework: <i>Are the findings dependent on the context?</i> Judgment supported by justifications: <i>How did the mother participate in the research?</i> <i>Both are mentioned in the title but in the abstract only the children are mentioned?</i>	<b>Authoritative</b> Constructing an advance organiser as a common object of learning

In the orientation phase of lectures I, II and III, the students' content-related messages consisted of short lists of reliability issues related to the weaknesses and strengths of their practice research, details of the interview process and their own role as novice researchers. The transformations made by the researchers during the intervention did not significantly affect the quality of students' content-related interaction, with the exception of OL II, where the common reliability criteria of qualitative research were concerned. Contrary, in OL IV students' active participation was realised in the quality of their content-related interaction, which was mostly presented as critical comments integrated with the given research example. Here, the choices made by the professional researcher were evaluated by the students in the light of their previous understanding. As an expression of deep-level knowledge construction, the students proposed critical judgments based on reliability issues; they examined the research abstract in its wider context and presented judgments supported by justifications. The advance organiser helped the students to consider both concepts (reliability and ethicality) of the lecture and to focus on the salient features of the concepts from the point of real research practice. The peer-related interaction continued in the chat discussion forum during the lecturing. Here, the triggering example



worked as an external object that opened up creative dialogic space to deepen the degree of reflection (Wegerif & Mansour, 2010) so that the students were able to evaluate the critical features of the qualitative research.

The limited schedule of the online lecture affected the pedagogical design of activating tasks. In the orientation phase, the tasks were meant to motivate the students to the forthcoming themes; thus, the teachers had not reserved much time to deepen the content-related interaction. For this reason, they briefly collected students' comments, like *You discuss your own role and your experience related to data collection. We highlighted the same issues in the lecture; Diverse comments – many on data collection*, or explained knowledge in response to students' questions, such as *The common framework determines the dependability of the situation*. In this phase, the teachers also used encourage interaction, that is, concluding comments or social feedback, like *Somebody nicely brought out the meaning of background data; Very good observations – some of the same as earlier factors; Really good points related to ethical questions*.

The knowledge-construction phase. Starting from OL II, two interlinked activating tasks (Table 2, T5 and T6,) were offered to deepen the content-related interaction. There were no differences in the quality of student interaction during the OL II and III; therefore, their analysis is combined (Table 5). In this phase the teacher worked either in the role of *facilitator* supporting the students' repeating comments on the weaknesses of their previous research or as an *interactive partner* improvising the real-time activities when offering complementary information and explanations for the questions students posed. In other words, new knowledge was constructed and integrated in joint interaction through student-content, student-teacher and student-student dialogues.

**Table 5:** The knowledge-construction phase of online lectures II – IV

<i>Task structure</i>	<i>Students' content-related interaction</i>	<i>Teacher as the conductor</i>
<b>Online lectures II &amp; III</b> (Tasks 5 & 6)	<p><b>The factors that weakened the reliability of the research conducted during the course</b> Repeating the same issues as in the orientation phase: <i>simple, very specific research tasks and too many researchers; All are weak factors until they have been reported closely enough.</i></p> <p><b>Proposing the reliability issues the students will take into account in their forthcoming bachelor's thesis</b> The issues related to the researcher or data collection: <i>the research journal helps reflection as a researcher; the meaning of your own preconceptions; the strong theoretical background; the testing of the questionnaire; the understanding of the interviewee; transferability</i></p>	<b>Facilitative</b> Students' experiences of their practice research as a resource of their reflection
<b>Online lecture IV</b> (Task 5)	<p><b>The factors that weakened the reliability of the research conducted during the course</b> Interaction about the conceptual themes of the lecture: <i>ST1: It was difficult to interview a friend— that's why we should discuss and work together on our concepts etc.</i> <i>ST2: How much does it affect the reliability that the researcher does not have any experience as an interviewer?</i> <i>TE2: This concerns the transparency with which we spoke in the lecture. This question you can reflect upon in the report.</i> <i>TE1: I remember when I wrote my doctoral thesis and interviewed the parent. I was quite inflexible as a researcher regarding those first interviews.</i></p>	<b>Interactive</b> Content-related interaction and joint knowledge construction

In OL II and III, the students' content-related interaction concerned many of the same issues as in the orienting phase. They mainly reflected their personal research skills and the common interview outline and took up some single reliability issues they found important for their forthcoming research. The teachers' interaction concerned direct instruction when they picked up some individual comments and linked them with the concept of reliability, such as *You have largely the same kind of comments as in the opening phase of the lecture; It seems that most students are critical towards their own interview outline; Somebody brought out that the interviews were quite narrow. You can consider the richness of the collected data in terms of credibility etc.* As a result, the chat discussion was directed to the revision of the previous thematic content of the lecture and did not progress into deep level-oriented interaction.

Compared with the previous lectures, the amount of content-related interaction notably increased during OL IV. However, merely a large number of messages does not guarantee real commitment to desired knowledge-construction processes. Here, the anchored object of learning, as constructed in the orienting phase of OL IV, provided a basis for pedagogical improvisation in the form of different types of dialogues. Students asked for conceptual clarification for the problems experienced during the practice research (Table 5). In this phase of exploration, the students searched for relevant information and possible explanations for the problems they may encounter in their future research (Garrison 2011, p. 46). Knowledge integration was to be seen as several student-teacher, student-content, student-student and teacher-teacher dialogues (see Table 6).

**Table 6:** The knowledge-integration phase of online lecture IV

<i>Task structure</i>	<i>Students' content-related interaction</i>	<i>The types of dialogues</i>
<b>Online lecture IV</b> (Task 6)	<b>Proposing the issues of reliability and ethicality to be taken into action in future research</b> Presenting questions about the content of the lecture <i>ST1: Must the reliability of qualitative research be measured through saturation?</i> <i>TE2: I wouldn't say it quite like this. Saturation is related to the criterion of correspondence!</i>	Student-teacher dialogue
	Asking for clarification from the teacher: <i>ST2 (name) This was confusing in the data analysis: the same person first answered and then in the next sentence totally cancelled his answer.</i> <i>TE1: (name) In that case, you should define during the interview what the interviewee means.</i> <i>ST2: Really, but we had those data in which everybody carried out their own transcription.</i> <i>ST2: T1 (name) what about when the interviewee has answered that she 'should do one thing and another'. Is it then possible to interpret it so that it has not happened?</i> <i>ST3: (name) Would the interviewer be able to answer, for instance to say something about the tone of voice of the interviewee?</i>	Student-teacher dialogue
	Handling the criteria of ethicality in a wider context: <i>ST1: The researcher must report impartially on the research subjects, but then the research cannot hurt them. What about when you do research in a foreign culture and there is some tradition that is not accepted or in agreement with norm in another culture? This is a difficult ethical question that I want to ask.</i> <i>ST2: I have the same problem: How to you apply these criteria without breaking the cultural norms and habits?</i> <i>ST3: The distortion of the facts: if it is not possible tell otherwise except when it is shared by the interviewee.</i> <i>ST1: Could I have the teachers' perceptions on my earlier question at the same stage?</i> <i>TE1: (name) the researcher must report the results honestly, but of course you can write about this issue in many ways: you can also share in the report what is allowed in the culture etc.</i> <i>ST2: Earlier, I posed a question.</i>	Student-teacher-student dialogue
	Knowledge integration (practice-theory gap): <i>ST5: As far as I know, it is not good to mix the features of qualitative and quantitative research.</i> <i>ST6: In my master thesis, it worked.</i> <i>ST7: This is exactly the triangulation method!</i> <i>ST8: Triangulation is always preferable if it gives more information about the content.</i>	Student-student dialogue

The final online lecture evoked different types of dialogues between the students and the teachers and among the students. In support of the evidence of deep-level processing were the questions concerning the meaning of certain concepts, the joint reflections on the critical features of practice research, judging the questions of ethicality in contrasting cultural contexts and the integration of the theoretical knowledge with practice. It is generally agreed upon that the level of interaction defines whether the lecture is dialogue- or monologue-oriented (Matusov, 2009). The many authentic questions students posed concerning the alternative choices of a researcher promoted deeper content-related interaction with knowledge-integration processes. Further, as evidence of a reduced transactional distance, the students repeatedly asked for further information from the teachers. Due to the large number of messages on the chat discussion forum, the teachers were not able to respond to all of them.

When requested, the teachers commented on the chat discussion, both by making visible the gap between practice and theory and by providing direct instruction, complementary information and explanations, such as *TE2: About this question that you ST9 asked; I didn't quite catch your meaning ... TE1: Connected to this, I will give you an example. In my graduate group, there was a student who was ... TE2: I have had a similar case, too.* The students' questions in the chat discussion forum also evoked teacher-teacher dialogues when they delivered their own experiences as researchers, like *TE2: The lack of this kind of interview training can also diversify the way of working, or what do you think? TE1: The lack of a theoretical framework surely relates to the practice research and affects reliability.* This finding is consistent with the earlier research in that the students' content-related inquiry must be scaffold by different types of dialogues (Garrison & Cleveland-Innes, 2005; Moore, 2013).

Conclusion phase. The final multiple-choice task (Table 2, T3) was the same for all the online lectures. The students were asked to choose one of the five alternatives they found violating the principles of ethical research. The choice seemed difficult, and many specific questions were asked concerning either the exact meaning of the concepts addressed earlier in the lecture or issues with regard to their forthcoming bachelor's theses. Again, the limited schedule of the lectures prevented the deepening of the content-related interaction in this final phase. Overall, at the end of the last two lectures, the participating students were asked to give feedback on the effectiveness of the pedagogical design. Most found that the activating tasks both helped them to engage with the content themes and deepened their understanding of the concepts, as their feedback indicates: *You can immediately get focused comments from the teachers on the questions asked; A lovely way to design a lecture and a pleasant way to connect it with our earlier exercise; The guiding tasks lightened the lecturing and provided food for thought.* However, you must be slightly sceptical of such positive feedback, as the students could not opt to share their comments anonymously.

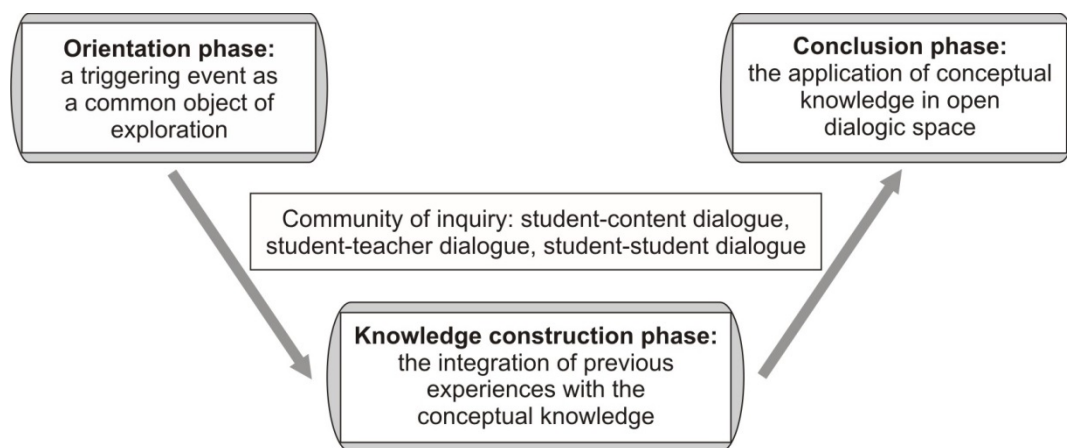
## CONCLUSION AND DISCUSSION

This study adopted a pedagogical perspective on designing interactive online lectures for undergraduates in distance education. An instructional intervention was carried out with a repeated online lecture that was structured through different activating tasks. The real-time activities of the teachers progressed on the continuum from a teacher- or student-centred approach into more teacher-generated content-related interaction. The thematic content of the lecture remained the same each time, while the student groups varied and the design evolved in the course of the intervention covering four occasions of the lecture. The metaphor of orchestration worked as a framework of the predesign and the real-time management of students' content-related interaction and teaching actions (Dillenbourg & Jermann, 2010).

Since the undergraduate students taking part in the online course were in the initial phase of their university studies, the authoritative teaching approach was preferred in this study. The orchestration of the final online lecture was predesigned, enabling the students to compare and evaluate the research practice. In line with prior research, the exploration of the advance organiser seemed to play a crucial role in provoking the content-related interaction during the interconnected phases of the online lecture (Garrison, 2011; Garrison & Cleveland-Innes, 2005). In contrast, the pedagogical design that merely relied on students' internal resources (i.e. their previous research experiences) did not increase the depth of content-related interaction.

Importantly, the idea of orchestration refers to the sequence of the online activities turning discrete activities into a consistent whole (Dillenbourg & Jermann, 2010; Ke & Xie, 2009). In the next ideal model, we describe the linear phases of interactive online lectures in distance education. In the orientation phase, the common object of learning (here a triggering example) engaged the students to explore the critical features of the conceptual theme (Laurillard, 2012). According to the community of inquiry framework by Garrison (2011) and Garrison and Cleveland-Innes (2005), the design of the course has a significant impact on the nature of online interaction. This open-ended activating task defined by the teachers reduced the transactional distance in the teaching-learning

relationship during the knowledge-transmitting lecture. In dialogues between the students and the content, the students and the teacher and among the students, the comments were often built upon the comments of the other (Moore, 2013). Consequently, the students' previous experiences and understanding were integrated with the conceptual knowledge in the knowledge-construction phase. Finally, in the conclusion phase open dialogic space was needed to promote the ownership of learning and the application of conceptual knowledge in further learning environments (cf. Wegerif & Mansour, 2010).



**Figure 2.** The ideal phase model of content-related interaction

Although the thematic content of the lectures remained constant and the student groups had uniform previous research experience, one must be cautious with the generalisation of the findings. In this research setting involving distance education in an open university, the biographical background of the participating students in each online lecture was fairly heterogeneous. It may be that students' participation was dependent on their varying knowledge and skills. The various online courses were not either systematically evaluated by the students themselves. Basically, the transactional distance (composed of structure and dialogue), defined by Moore and Kearsley (1996) as a potential cognitive gap between the student and the teacher, seemed to decrease in the course of the lectures. This was to be seen in the way the interactive lectures engaged the students' attention to the conceptual themes.

From the pedagogical perspective, the tight schedule prevented the full enhancement of content-related interaction. This manifested in all phases of the final online lecture that launched most content-related interaction. If some of the reflective tasks had been assigned beforehand, the teachers might have had more time to select a set of key comments and bring them into greater focus by a deeper critical reflection in the final phase. Likewise, the teachers could have more opportunities to work as improvisers of the knowledge-integration processes if they were able to create more dialogic space for students' open questions and free discussion. In this way, the processes of students' deep-level knowledge construction and integration may have been supported in real-time adaptation.

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