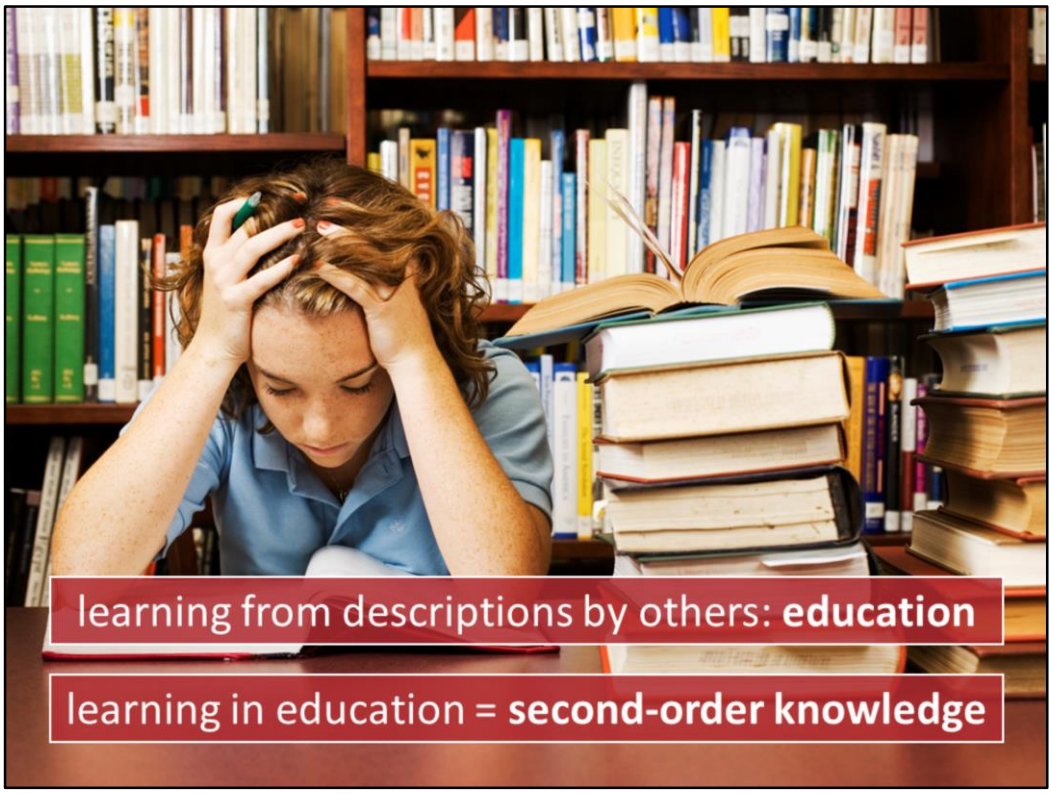
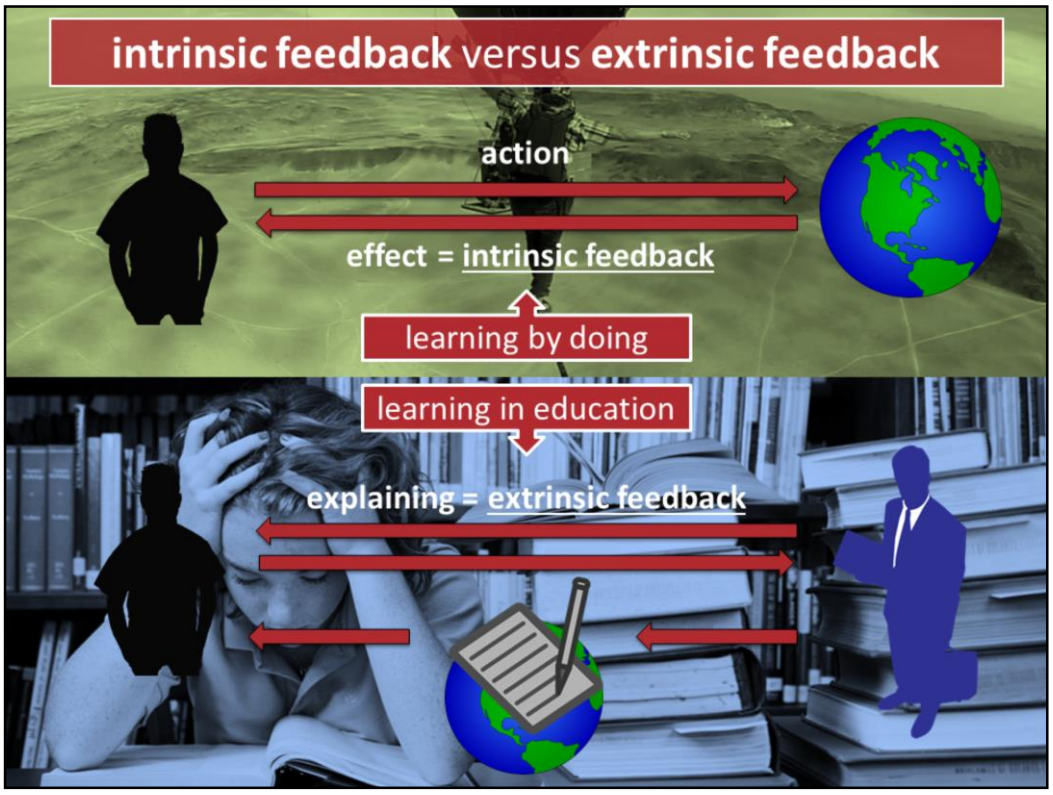
Welcome. I am Jos Fransen, professor at Inholland University of Applied Sciences and head of the Research Centre Teaching, Learning & Technology. It is a privilege for me to present to you some thoughts about using video in higher education.. I would like to explore the potential added value of using video in learning processes in higher education. I will not go into pedagogic roles of video, that is covered well by the work of Tony Bates and Jack Koumi, among others. I also will not reflect on the learning effects of video itself which is the domain of specialists in multimedia learning. During the next 25 minutes I would like to explore with you the complexity of a learning process and try to figure out how video can be used to reinforce learning. And in that perspective, I am not primarily interested in the effects of video itself, but in the effects of an instructional pattern in which video is embedded.

We learn everywhere and all the time, as a result of direct contact with the world. This type of learning can be characterized as 'learning by doing'. A person's action has an impact in the world and generates an effect. If it is not the desired effect, the person will adjust his action. Learning by doing leads to first-order knowledge [experience or tacit knowledge].

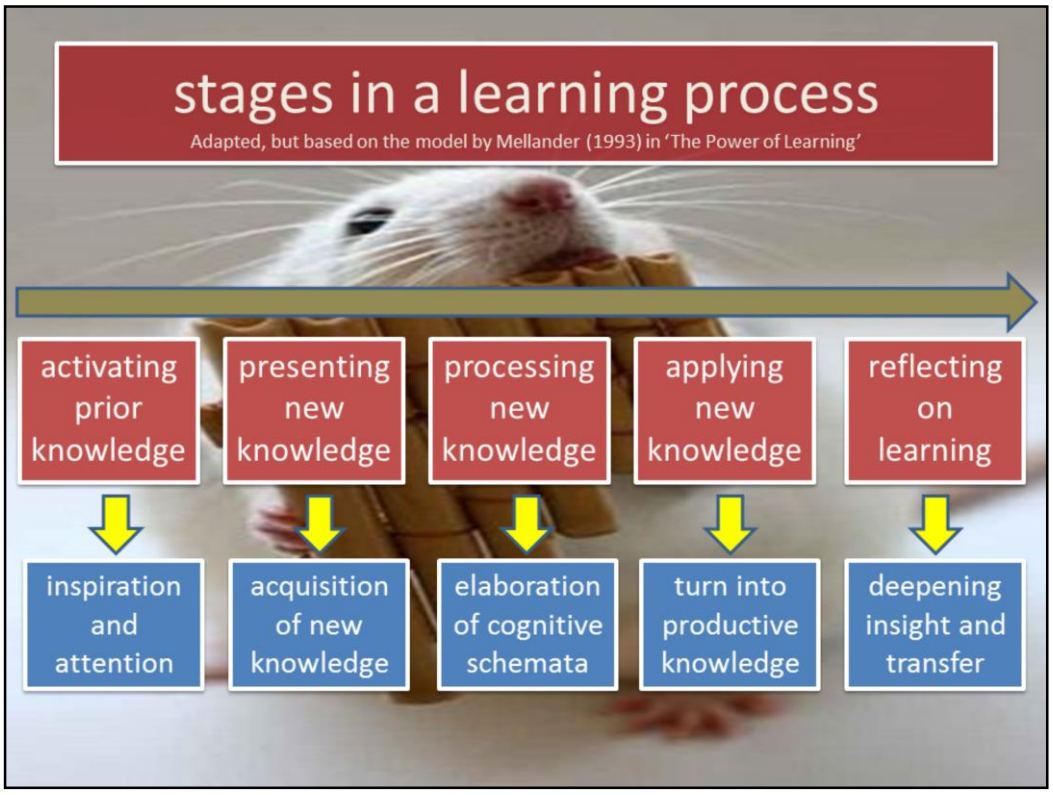


In contrast, learning within formal education is focused on understanding the world through studying descriptions of the world made by others. Formal learning leads to second-order knowledge and is based on communication through language. It is a complex process and requires a teacher as expert, acting within an organized curriculum.



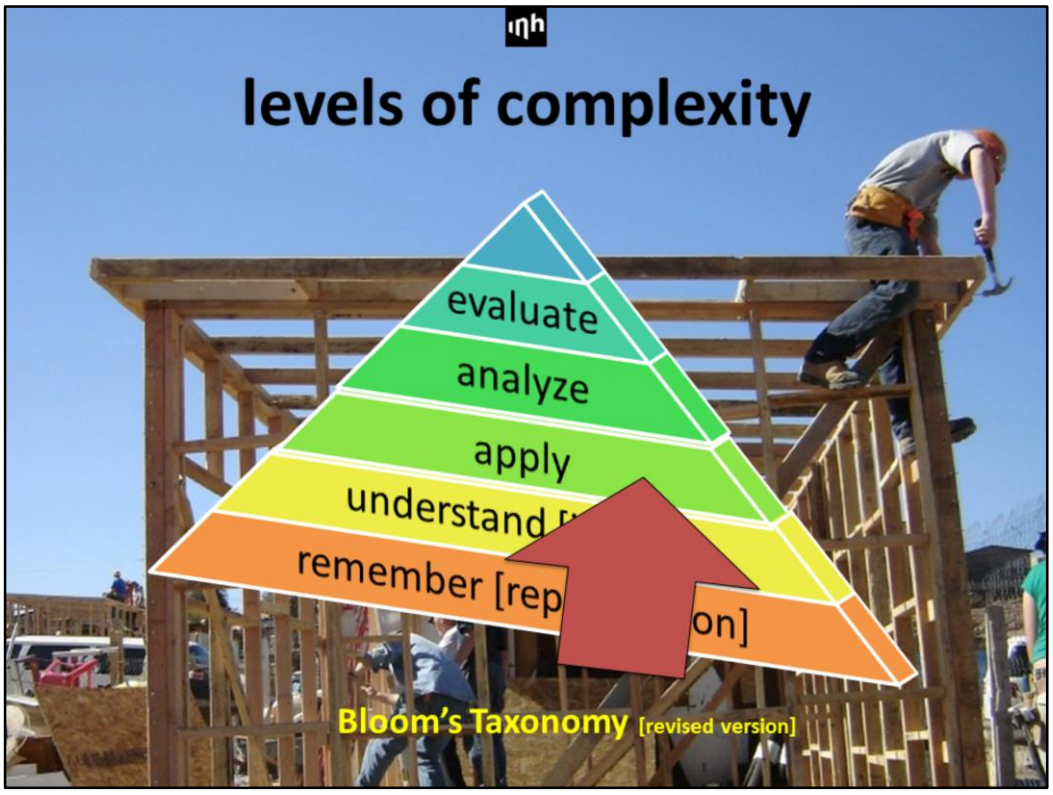
There are two types of feedback connected with both types of learning. In 'learning by doing', the student receives intrinsic feedback from the world through the effects of his actions. [This is effective when the intrinsic feedback triggers the person to adjust his actions.] In learning through studying descriptions of the world, interventions of the teacher are required, such as instruction and feedback. The feedback of the teacher is extrinsic because it is not embedded in the process. The teacher observes if the descriptions are correctly understood and corrects misconceptions.

Not everything can be learned through ‘learning by doing’. In order to reach understanding of complex theory, 'trial and error' is usually not effective. For that, one needs an organized learning process, since in order to draw the right conclusions from experiences, one also requires relevant knowledge. That is why organizing and supervising this type of learning is necessary. It also requires a learning environment with clear descriptions and a teacher supporting the student to acquire the complex knowledge, to reach understanding, and to apply it in practice.

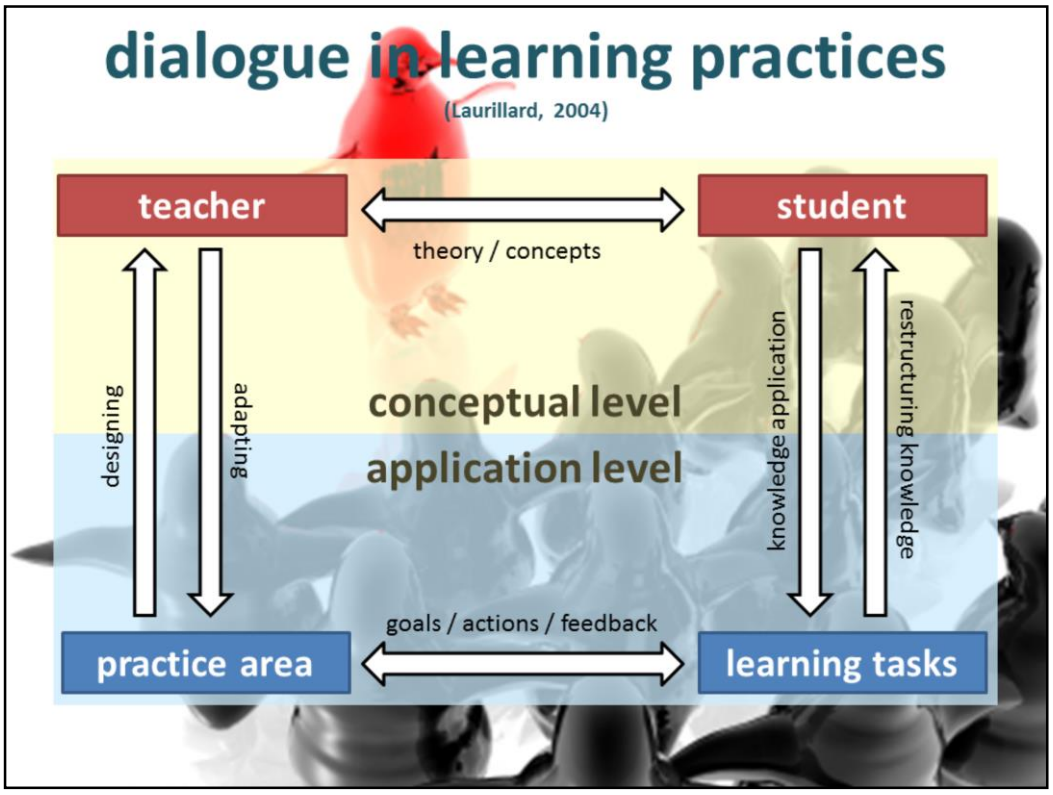


A learning process [in professional training] in higher education can be represented as a series of stages leading to the development of complex expertise. First, the student's attention must be engaged and prior knowledge must be activated. Next, new knowledge must be presented by the teacher. Then, the knowledge must be actively acquired by the student, resulting in the expansion of his cognitive scheme. Additionally, new knowledge must become productive knowledge by applying it in a real-life setting, which also must be practised. Finally, reflection on the results must lead to deeper understanding and transfer. You may start the process in different stages according to a preferred instructional strategy, but all stages have to be completed in the end.

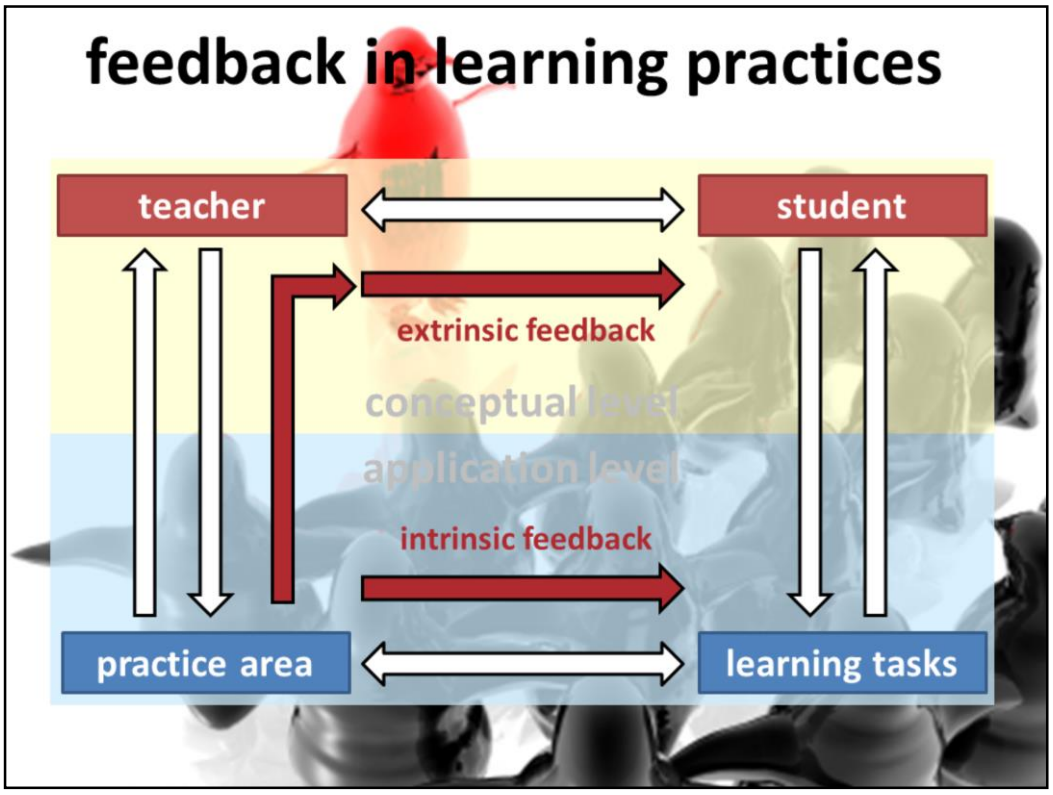
Based on this classification one could already make assumptions about meaningful applications of video. In the first stage, video can be used to inspire, to focus attention, and to offer authentic experiences of the real world. Secondly, video can be used to present new knowledge in different ways, including the way it is usually applied in professional practice. Thirdly, to support knowledge application, video can offer demonstrations and present authentic cases. Video may also play a role in providing just-in-time information to assist students in effectively applying knowledge in learning tasks. Finally, video can play a role in the reflection on learning by presenting worked examples or by discussing questions and answers of an exam. And video can be used as a tool in the assessment in which students show what they have learned and how they have applied this in practice.



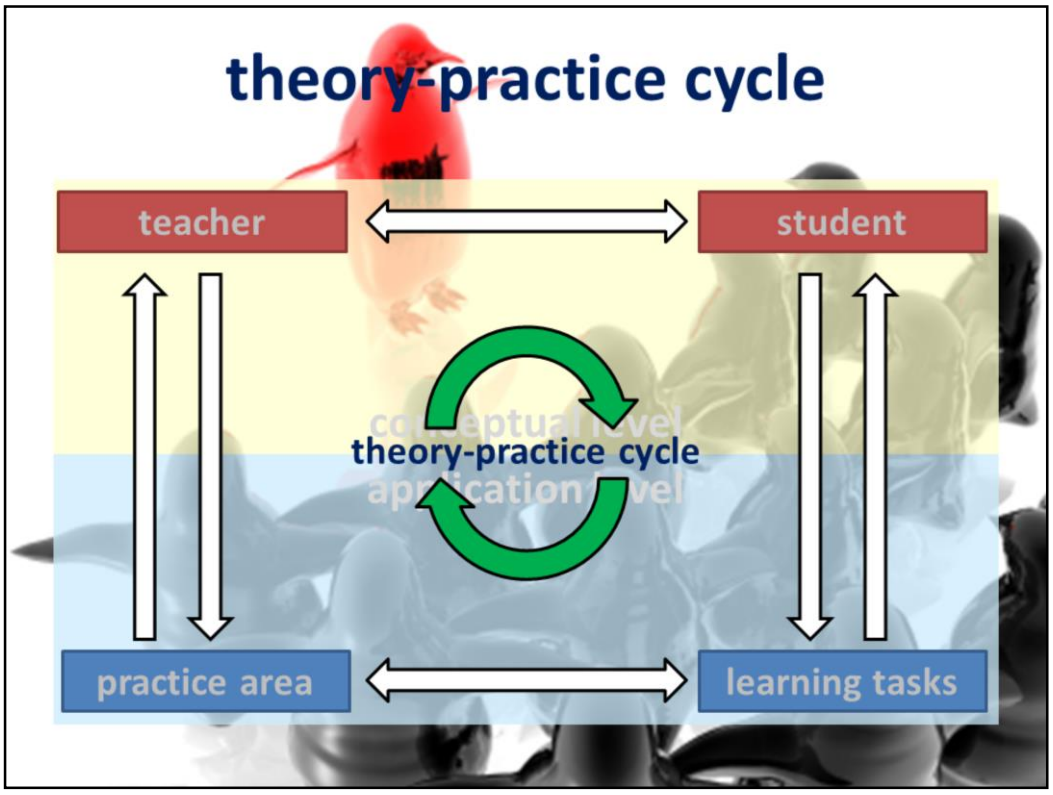
As we know from the work of Jack Koumi, among others, teaching through video focuses mainly on remembering and understanding, and only to a certain extent supports knowledge application, due to the fact that video is in fact the same as lecturing; the communication from one to many. Video can offer experiences from real life and demonstrations of knowledge application, but that information is just being sent to the student. Although video in itself may not be appropriate for realizing these higher order learning outcomes, video embedded in a carefully designed instructional pattern may be effective. In order to decide on how video can be effectively embedded it is necessary to explore the complexity of a learning process. I would therefore like to introduce a slightly simplified model of the dialogue in learning processes, originally developed by Diana Laurillard.



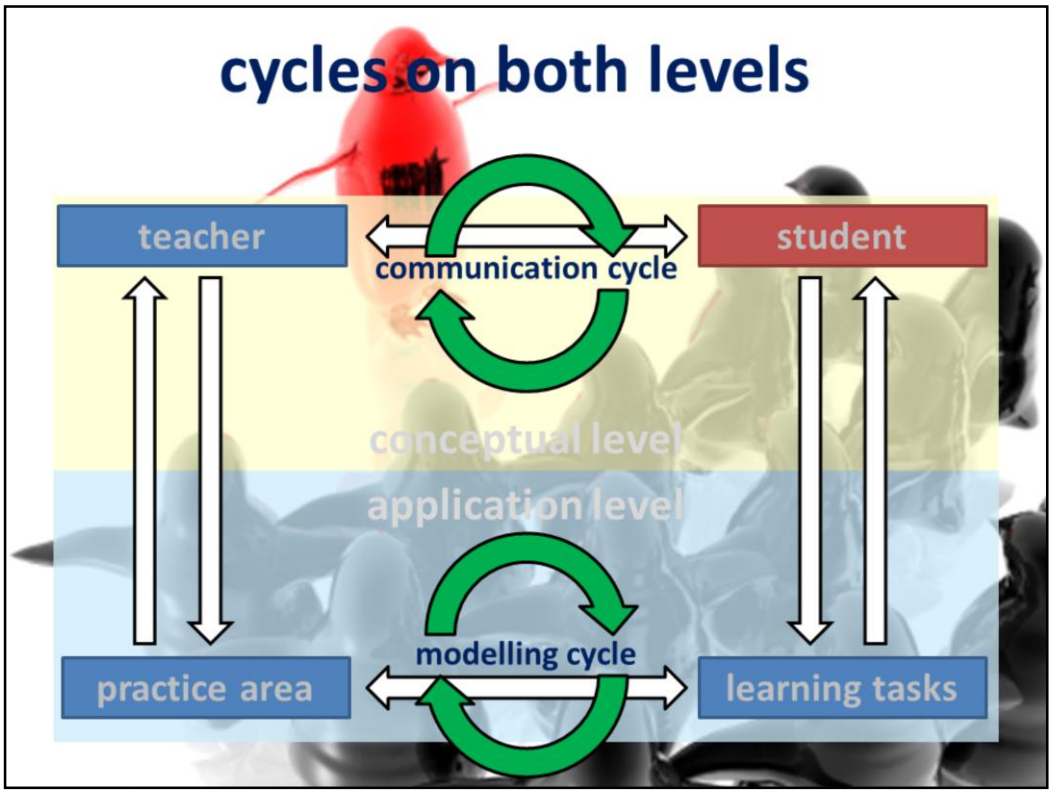
A learning process can be presented as a dialogue between a teacher and a student, consisting of a set of interactions at the conceptual level and the application level. At the conceptual level, interactions are aimed at introducing the student in the knowledge domain, and supporting acquisition and processing the knowledge to reach understanding. These interactions are necessary to check whether correct understanding has occurred and this process is controlled by communication. The teacher inspires and explains, the student provides insight into his understanding, and the teacher corrects misconceptions. At the application level, interactions are focused on supporting knowledge application in learning tasks and practicing this application. The teacher sets goals and provides learning tasks, the student carries out these tasks and adjusts his actions based on intrinsic feedback from the practice area and/or extrinsic feedback from the teacher. Interactions also take place between both levels, because the teacher guides the process through the design of the practice area and adapts the practice area during the process if necessary. The student applies acquired knowledge in a learning task, reflects on the acquired and applied knowledge as a result of the feedback he receives, and restructures his cognitive scheme.



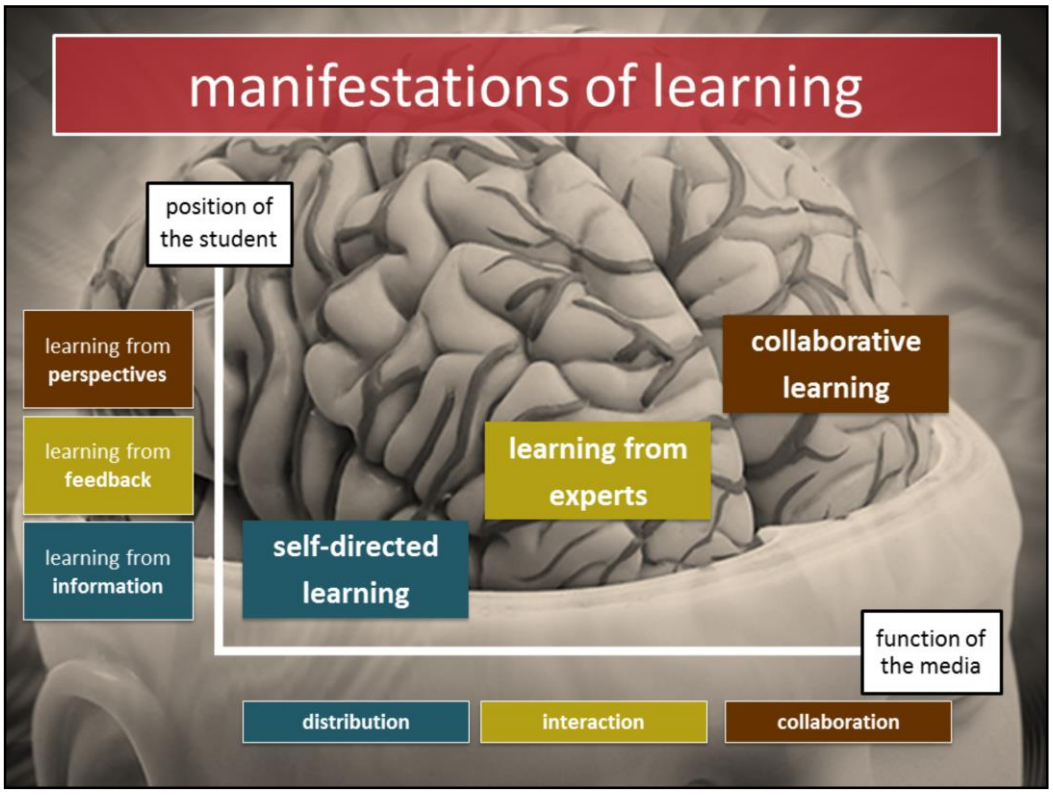
As pointed out before, feedback is extrinsic when the teacher is communicating with the student on the conceptual level, directly after a learning task is completed. The feedback would be intrinsic if it was generated by the actions of the student in the practice area. Intrinsic feedback has the advantage that the student has to reflect on his actions and must independently decide what to do differently in order to achieve the desired results. Through extrinsic feedback the teacher tells the student what to do differently and how to approach the task. Intrinsic feedback is related to 'learning by doing' and to implement 'learning by doing' in a learning process, the teacher must create a practice area that offers intrinsic feedback to a student as a result of completing a learning task.



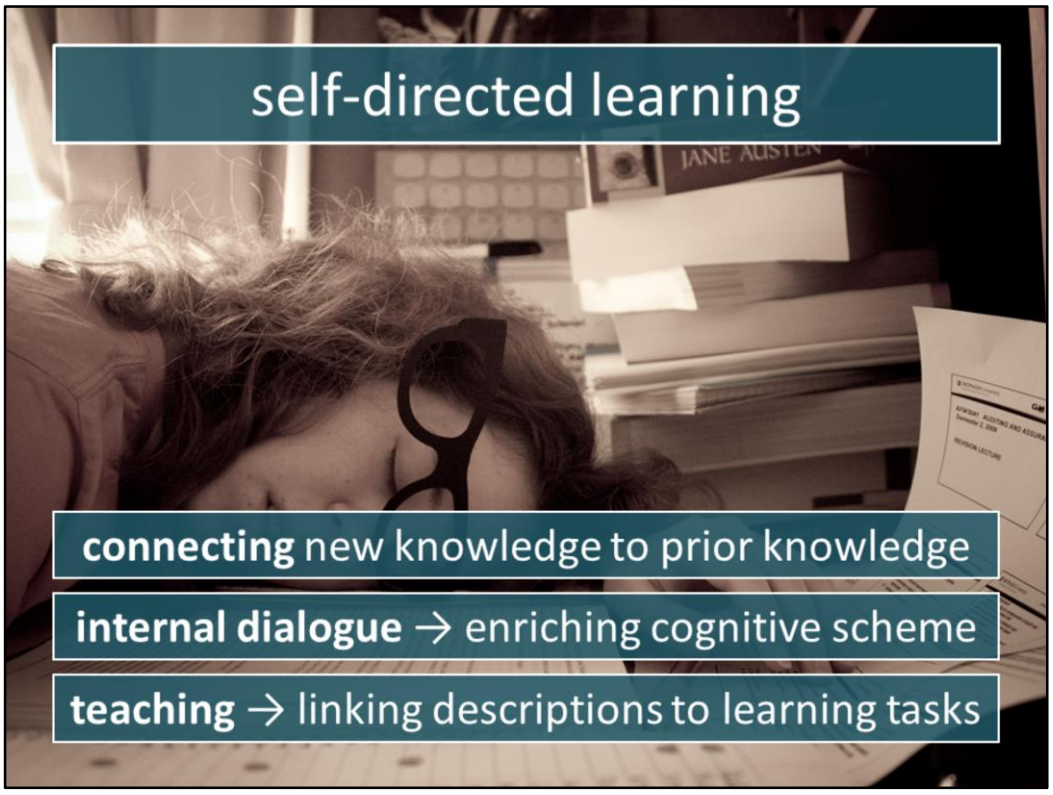
One can project the five stages in a learning process into the model of the dialogue and when the five stages are completed, they form the theory-practice cycle which connects the conceptual and application level. Interactions at the conceptual level are followed by interactions at the application level, and feedback links theory with practice.



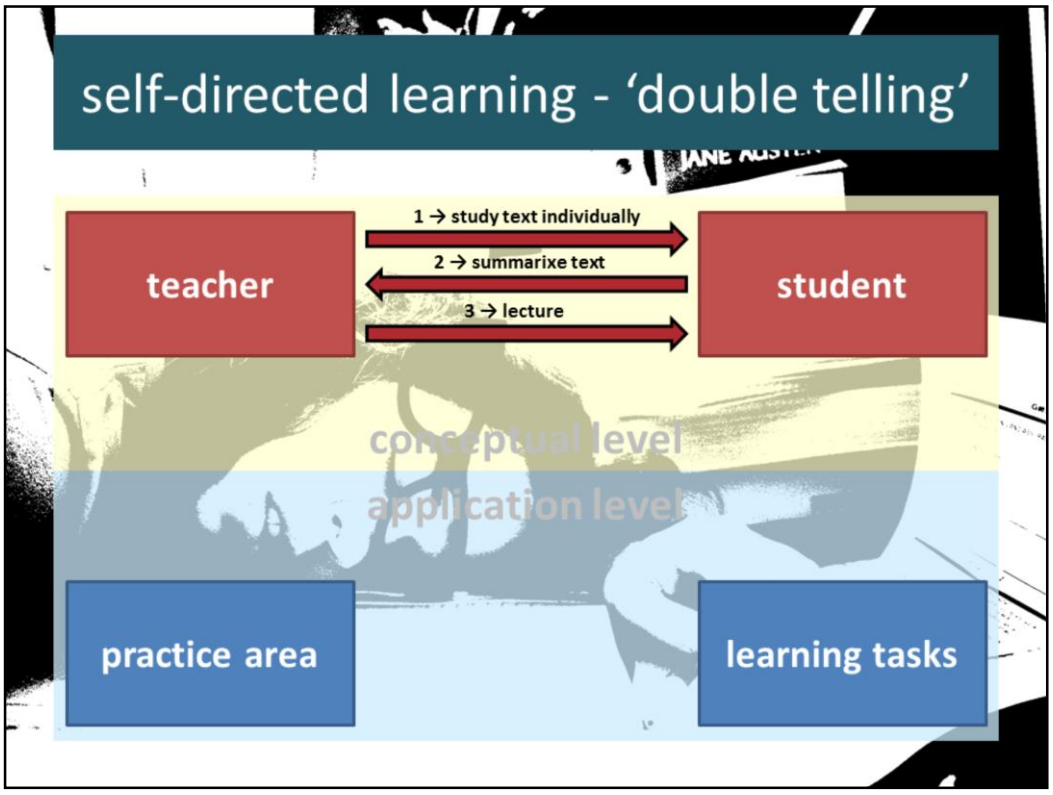
Within the theory-practice cycle one can also distinguish a cycle at each level: a communication cycle at the conceptual level (since the teachers offers instruction and feedback), and a modelling cycle at the application level (since the teacher offers a practice area with learning tasks and ensures that the student gets intrinsic feedback in the practice area when tasks are completed). An effective learning process requires that the cycle on both levels is completed, preferably more than once. The interactions must contribute to the completion of the cycle on both levels at the right time in a learning process. In order to decide on how these interactions can best be supported, I introduce the model on the 'manifestations' of learning.



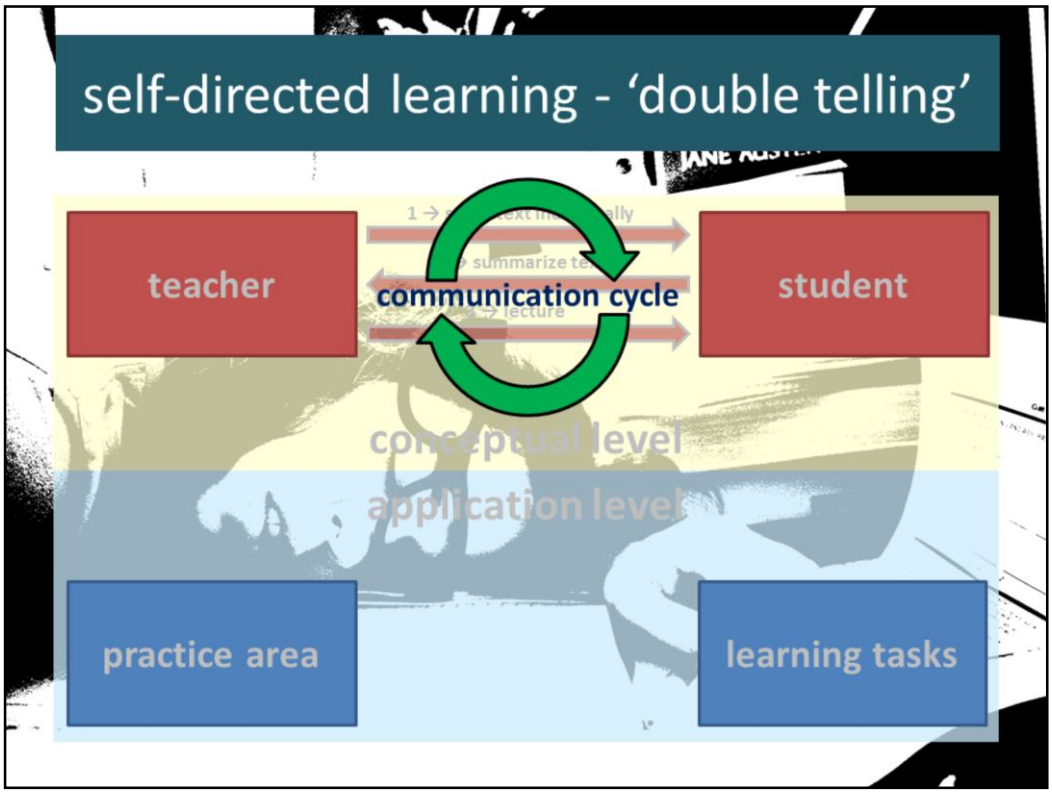
In a learning process one can distinguish between three ‘manifestations’ of learning, characterized by the position of the student in the learning process and the role of the learning environment. Firstly self-directed learning: well-documented knowledge can be acquired by the student without teacher support, which implies that learning materials and additional support must be available in the learning environment. Understanding more complex knowledge and knowledge application requires interactions with experts, which are the teacher and professionals in the field. The learning environment must support all interactions. When confronted with a complex problem that requires knowledge construction to solve, the input from different perspectives may be valuable, which is the purpose of collaborative learning. The learning environment must provide learning materials and support interactions with experts, but must also support communication and exchange of products within the learning team. [Depending on the nature of a learning process, a specific combination may be chosen.]



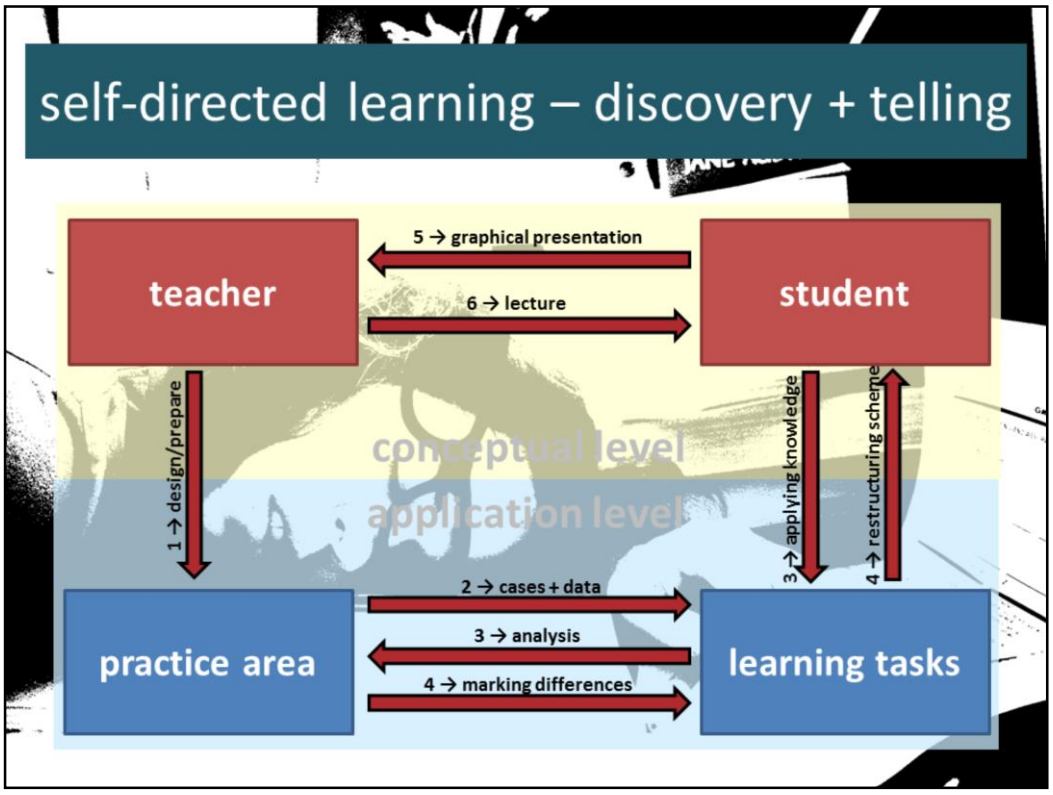
In self-directed learning a student must independently connect new knowledge to his prior knowledge, which implies conducting an internal dialogue regarding the learning content. Through analysis and self-questioning he must reach understanding which results in a change of his cognitive scheme. The learning environment must encourage and support the internal dialogue. The quality of the learning materials must be high to minimize the cognitive load and the probability of developing misconceptions. [Also, knowledge can be presented by different media, providing the student with different views which helps developing understanding.] In self-directed learning the communication cycle is shaped through the supply of materials, but this cycle is not completed and it is not always clear whether the student has developed the correct understanding. That can only be determined if he provides the teacher with insight in his understanding. However, the internal dialogue can be encouraged by the teacher by combining materials with learning tasks in the practice area. Not only can the communication cycle be completed, also a modelling cycle can be added. I will give an example.



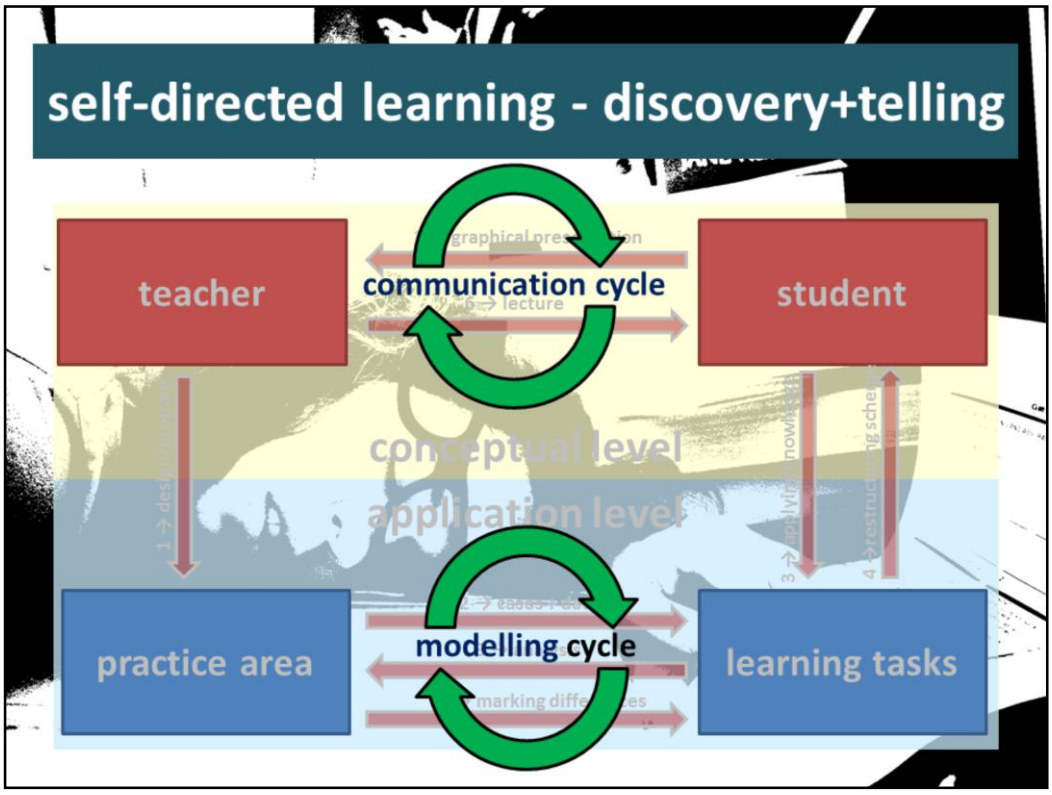
In a study that examined the effects of two interventions aimed at developing understanding, half of the group of students were asked to individually study a text about a topic in psychology, after which they were asked to individually summarize the text. Then they were offered a lecture in which the theory was presented. Finally, they were asked to predict the outcomes of a hypothetical experiment to test to what extent they were able to apply the acquired knowledge.



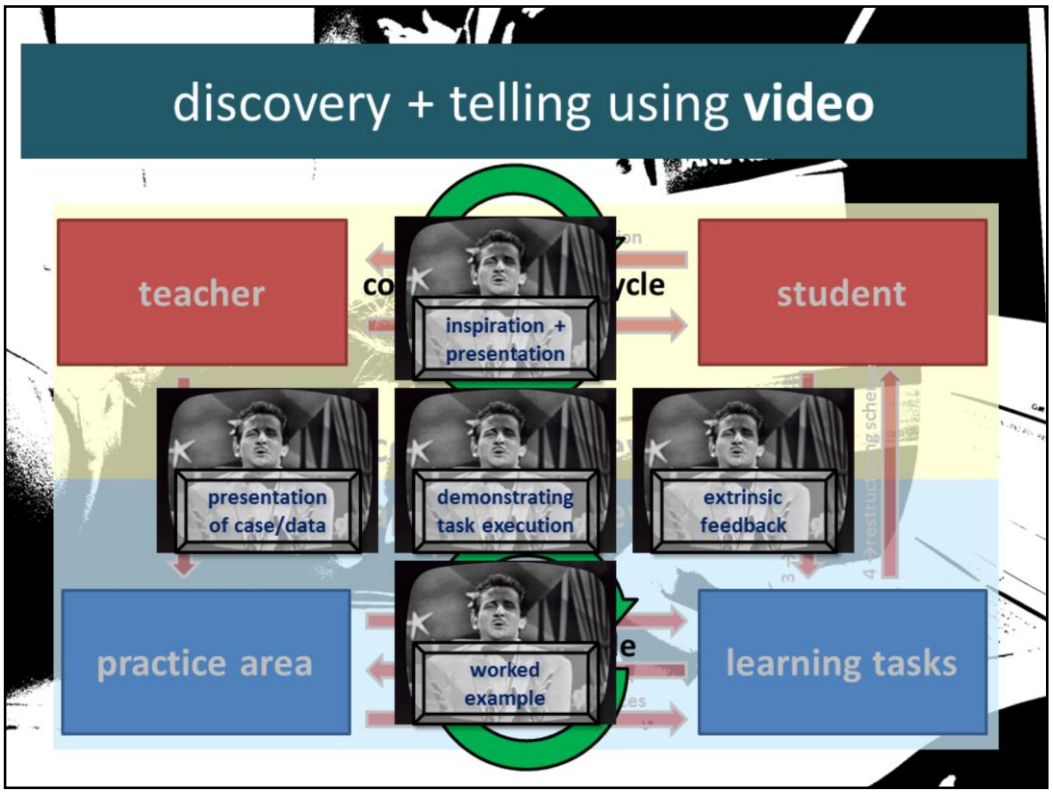
Projecting this in the model shows that only the communication cycle is completed in this setting.



The other half of the group of students received a text with data of contrasting cases of an experiment that was carried out and they were asked to analyse the data to identify differences between these cases and to present their findings graphically. Then they were offered the same lecture in which the theory was presented and they were also asked to predict the outcomes of the hypothetical experiment. The first group was less capable of predicting the outcomes of the experiment than the second group. This was due to the fact that students who only summarize the text are not being challenged to question themselves on correct understanding.



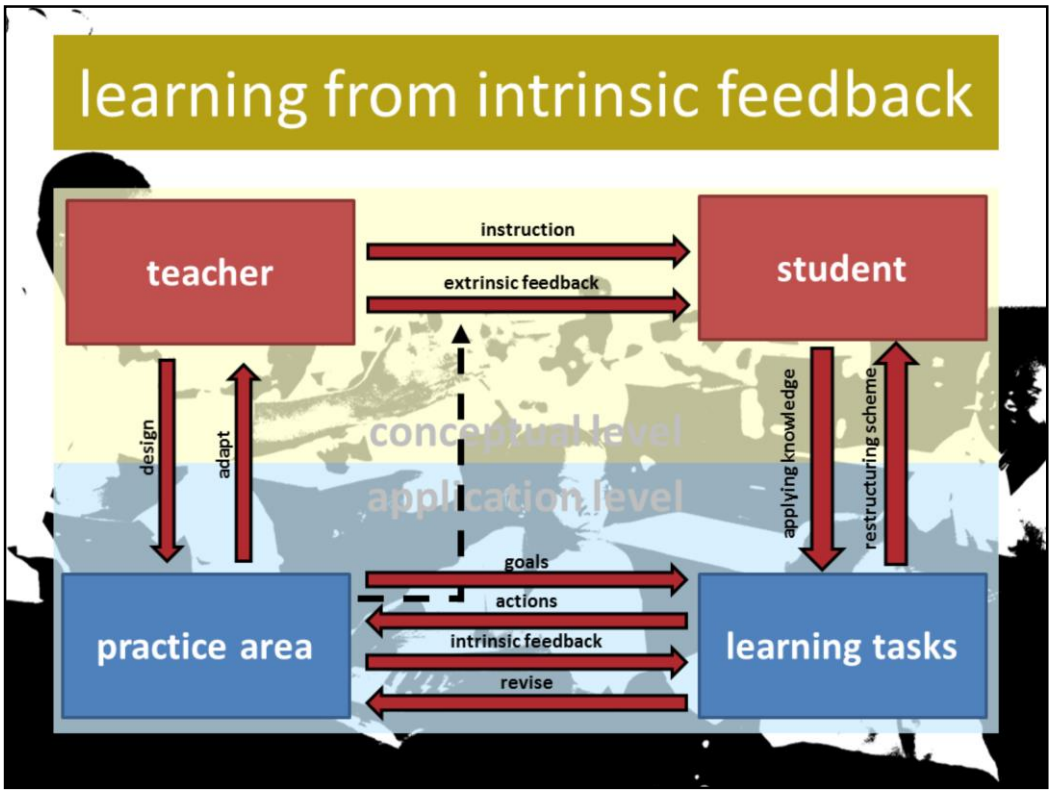
Projecting this in the model shows that in the second setting, a modelling cycle has also been completed. This example shows that self-directed learning can be enhanced by offering a practice area in which materials can be linked to a task to encourage the internal dialogue of the student. The process can also be controlled by the teacher by linking access to a specific learning content to completion of a certain task. For instance: a student has to apply specific knowledge in a given task first before being offered access to a worked example to reflect on his task execution and to determine what he should have done differently.



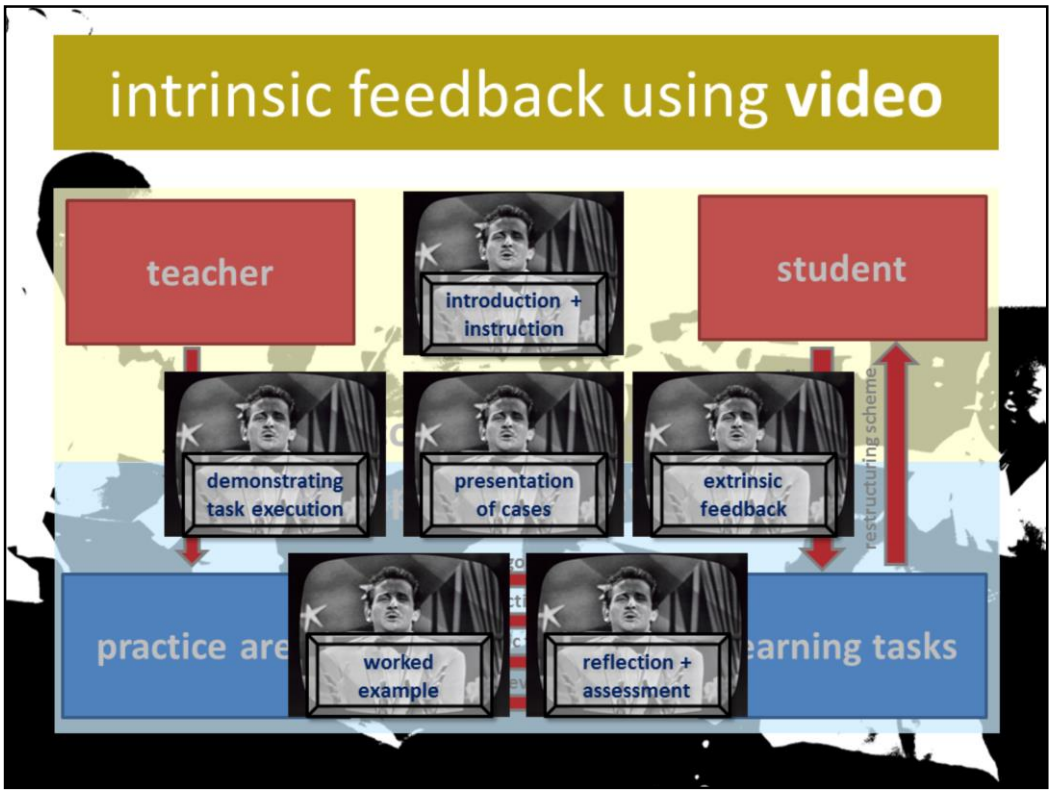
Given the importance of encouraging the internal dialogue by completing the communication cycle and the modelling cycle, let us consider how video may be of help. In the ‘ double telling’ example [just reading a text, summarizing it, and listening to a lecture], only the more traditional application of video comes into view. In the ‘ discovery + telling’ example’ video can be used for presenting the case and data, for task instruction on analysing the data and graphical presentation of the outcomes, for presenting a worked example after task completion, and also for further explaining background theory. However, one cannot achieve these outcomes by video in itself, video must be carefully embedded in an instructional pattern and combined with other learning materials.

Learning from experts should help students to understand how experts deal with complex problems in practice. For that to happen the communication cycle should be completed several times. The expert gives insight into his thinking, the student gives insight in his understanding, and misconceptions can be corrected by the expert. However, understanding does not mean that the student also can apply knowledge. Knowledge application can be supported by incorporating a modelling cycle by offering a specific task and providing intrinsic feedback in the practice area to encourage the internal dialogue. Through 'learning by doing' the student learns to act as an expert through imitation, and based on intrinsic feedback he can adjust his actions. Designing a practice area with intrinsic feedback is simple when it comes to actions that directly affect the environment and generate an immediate reaction. It is less simple when actions do not affect the environment and therefore do not generate an effect, and therefore no intrinsic feedback. I will give an example.

Setting up a practice area that provides intrinsic feedback to a student baking a cake according to a recipe, is easy. During the process he is already facing the consequences of his actions. If he has to separate the egg yolks from the egg whites and fails to do so, the results will force him to adapt his approach in order to prevent more eggs ending up unseparated into the mix. Once the cake is baked and is being tasted, the judgment of others, as well as his own judgment, will likely encourage him to develop plausible explanations for the causes that led to these judgments. Based on that he may consider doing things differently the next time he will bake a cake. Setting up a practice area that provides intrinsic feedback to a student making an analysis of a musical composition, is more complicated. His actions do lead to a result, namely a written musical analysis, but both process and results have no direct effect on the environment and therefore do not generate intrinsic feedback. The teacher has to provide extrinsic feedback on the process and the results. In order to design a practice area that provides intrinsic feedback, the teacher can offer a worked example of the learning task after the student has completed the assignment. He will then be challenged to find explanations for the differences between the analysis he made and the worked example, and through self-questioning he rearranges his cognitive scheme.

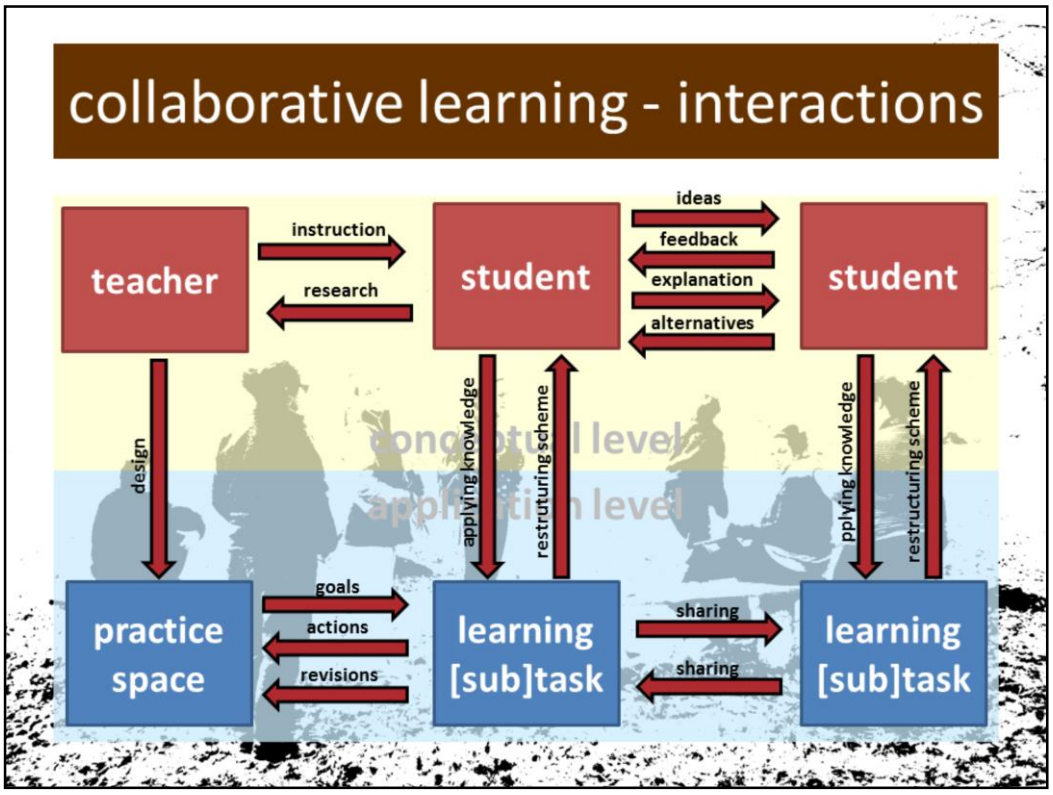


This example shows that the teacher should not only be an expert on the learning content, but also an expert in instructional design, because he must design a learning environment in which both a communication cycle and a modelling cycle is completed. It also implies that the teacher should not be tempted to predominantly provide extrinsic feedback. He needs to invest in designing a practice area and tasks that also provide intrinsic feedback. Too much instruction and extrinsic feedback triggers students to perform a learning task in accordance to these instructions and feedback. It does not trigger self-questioning and does not encourage the internal dialogue and critical reflection on acquired knowledge. Intrinsic feedback forces the student to reflect on the results of his actions and on the application of acquired knowledge. Activating students implies encouraging and reinforcing the student's internal dialogue with regard to the learning content.

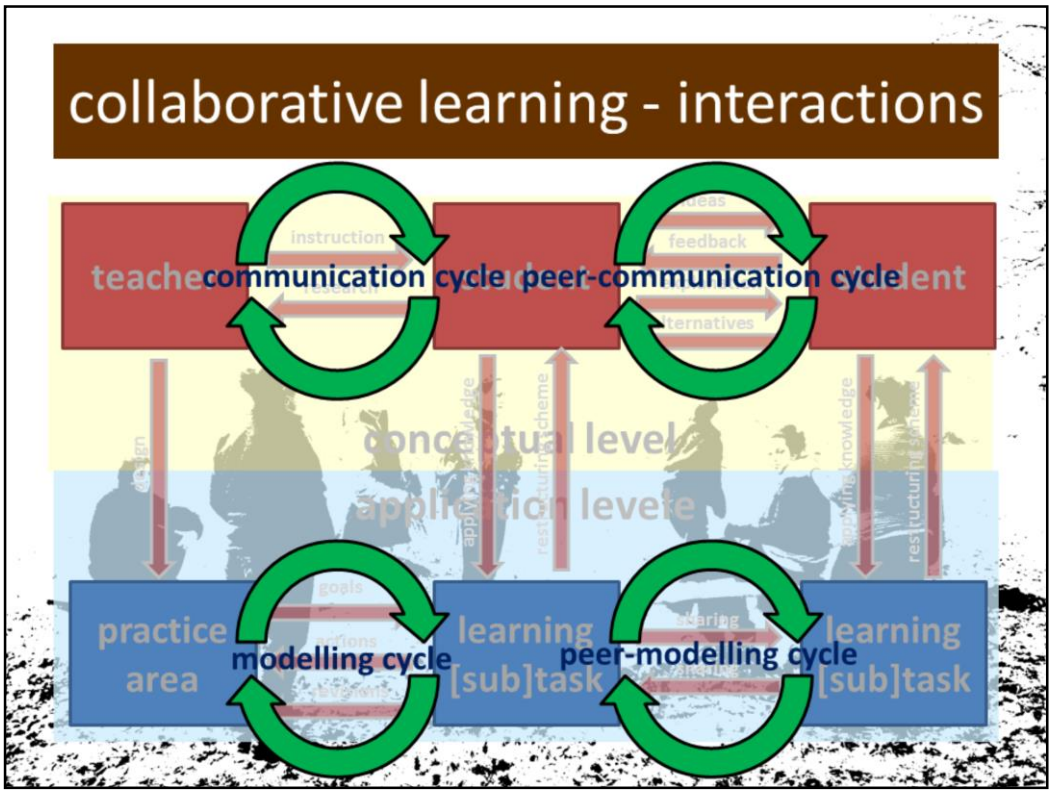


Given the importance of encouraging the internal dialogue within the practice area, let us consider how video may be of help. In the case of 'over-instruction', video will likely be used in traditional ways for presenting information [lecture], instructions for the task, and possibly for offering extrinsic feedback ['live' or 'recorded']. When a modelling cycle is added and intrinsic feedback is offered in the practice area, video can be also be used for supporting the modelling cycle in the practice area. For instance for demonstrating the task [before starting or after completing a task], for providing [recorded] feedback through knowledge clips on concepts, prompted by the outcomes of the student's analysis of his own work by comparing it with the worked example, or for assessment purposes by asking students to record task execution and reflect on it. However, carefully embedding video in an instructional pattern is conditional for improving the learning process.

When students have to carry out a complex professional task, the input from different perspectives can be valuable, which is the purpose of collaborative learning.

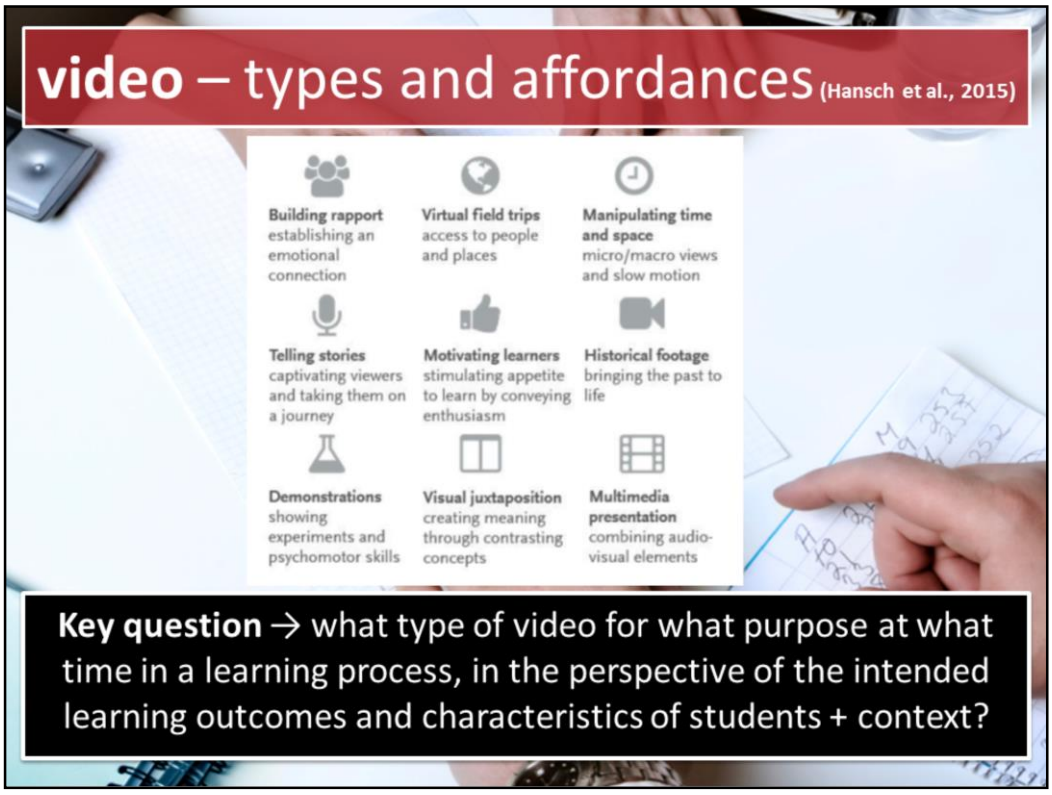


Students exchange ideas and opinions, reflect on each other and share the results of subtasks they performed. The role of the teacher is complex in collaborative learning because he provides instruction, learning tasks and extrinsic feedback at the right time, and he encourages and guides students to collaborate as a team.

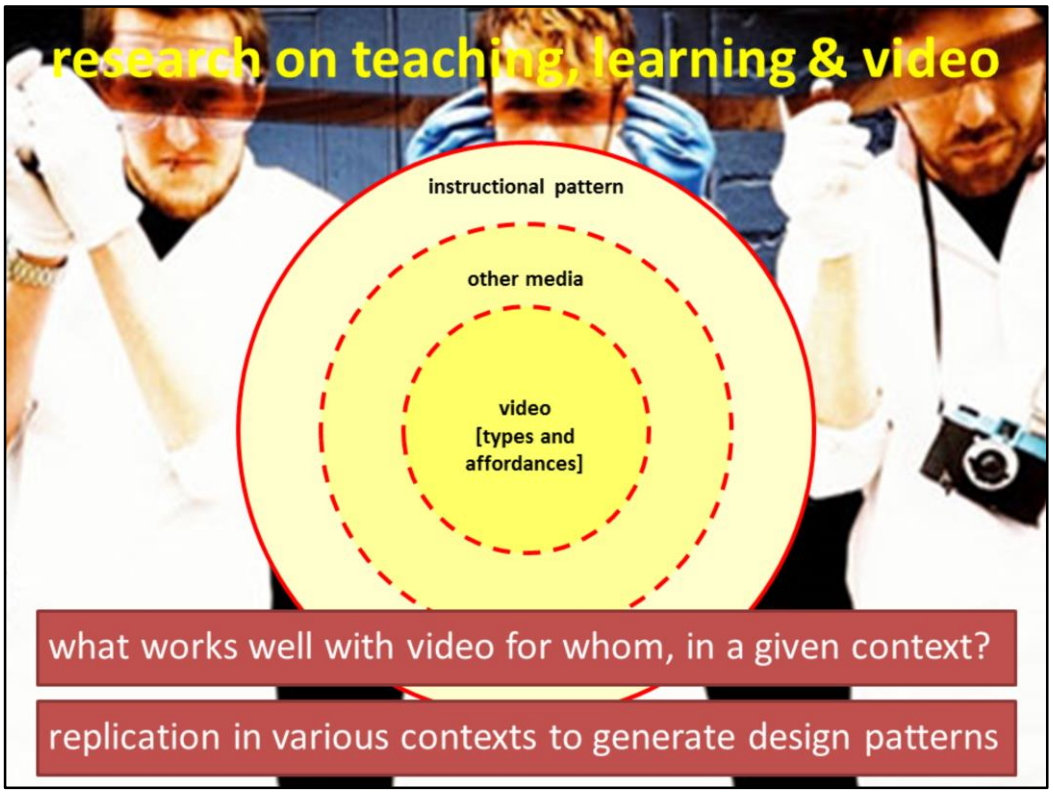


In collaborative learning a peer-communication cycle and peer-modelling cycle are added to the regular cycles. However, students do not spontaneously utilize each other's knowledge in a learning process. To encourage that, the teacher has to work with a script, a scenario to stimulate exchange and knowledge construction. But stimulating the exchange of ideas through scripting does not imply that a student critically reflects on his own ideas and confronts them with the ideas of others. A script must also encourage self-questioning and support the internal dialogue.

Video can support in many ways the completion of a peer-communication cycle and peer-modelling cycle in practices of collaborative learning in many ways. For inspiration [presenting experts dealing with the complex task], for presenting information and task instruction, for providing extrinsic feedback ['live' or 'recorded'] and intrinsic feedback through worked examples, for demonstration of [sub]task execution, and for assessment purposes. Also, communication is important in collaborative learning, both between teacher and students as well as within the team. Video can support communication in different ways and may be helpful if applied at the right time. But again, carefully embedding video in an instructional pattern is conditional for success.



Apart from the pedagogic roles video can fulfil in a learning process [Koumi, Bates], we also have to decide on what type of video can best be applied in a given learning situation. Hansch et al. provided an overview of types of video and their affordances in a learning process that may support the decision process. The key question that we have to answer is: what type of video do we need for what purpose at what time in a learning process to realize the intended learning outcomes, given the characteristics of learners and learning context?



To answer that question there still is a lot of research to be done, because in every situation we have to decide on how types of video can be combined with other media in a carefully designed instructional pattern in order be effective. There is still much to learn and there are many variables mediating the outcomes of the learning process. We need to investigate in a given situation what works well for whom, and by replicating this research in various contexts, we may end up with design principles for using video in all kinds of learning practices.

I hope that through exploring the complexity of a learning process, I have contributed to the discussion on how we effectively can support learning processes with video. I would like to end my presentation with a statement made by Diana Laurillard which, in my opinion, appropriately reflects what I have been trying to share with you today. Thanks for your attention.