

## **Learning situations in Sloyd**

– to become more handy, dexterous and skilful

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*This article provides examples of how students in a teacher training course in sloyd [sw. slöjd] develop their knowledge of sloyd during a workshop in woodturning. Several names from the definition of sloyd may be perceived as relatively the same, but in this article is the focus on three of the meanings included in the concept sloyd; handy [sw. händig], dexterous [sw. hantverksskicklig] and skilful in forming a crafted artefact [sw. konstfärdig]. It is of interest to explore how such skills, usually 'hidden' in the making processes, can be developed in learning processes. The study aims to describe how the sloyd skill develops in interaction with others and with the situations created in the physical environment during sloyd activities. The study, carried out by video documentation and microanalysis, shows that so-called practical knowledge requires support from several multimodal forms of interactions. From the video material, three sequences of microanalysis have been selected for this article. The results show that learning to do sloydwork is not something that takes place by only working on one's own object. The students alternate between standing by and watch, or practice, or demonstrated, their skills when they work on each other's object. Body language and actions have an important role in how shared understanding is created for how for example the suitable handling of a woodturning tool should be implemented. The embedded meanings in the sloyd concept used in this article – handy, dexterous and skilful in forming a crafted artefact – show that knowledge of sloyd includes handicraft knowledge as well as pedagogic aspects.*

Keywords: sloyd, slöjd, microanalysis, woodturning, handy, dexterous, skillful, multimodal

### **Introduction**

The school subject of Sloyd [sw. slöjd] in the Swedish comprehensive school offers all pupils the opportunity of learning to do sloyd work – to make physical artefacts – as one of the oldest forms of knowledge in human experience. For teacher training students learning to be sloyd teachers at schools, workshop sessions are included so that they can improve their handiness and skills, become knowledgeable in their craft and proficient in the work of forming a crafted artefact. The meaning of the word sloyd is multifaceted and the word is mentioned as early as the thirteenth century in the Swedish medieval law known as the Östgöotalagen (Johansson, 2009). The definition stems from the old Swedish word “slöghþ” meaning cunning, diligence, skilfulness, knowledgeableness and wisdom, and also from “slögher”, the characteristics of being handy, dexterous, craftsmanlike, proficient, experienced, skilful, resourceful and inventive (Svenska akademins ordbok, band 28 [The Swedish Academy's Dictionary, the 28th band], 1981). Several names may be perceived as relatively the same, but in this article is the focus on three of the meanings included in the concept Sloyd; handy [händig], dexterity [hantverksskicklig] and skilful in forming a crafted artefact [sw. konstfärdig]. It is of interest to explore how such skills, usually 'hidden' in the making processes, can be developed in learning processes during sloyd activities.

In the research study on which this article is based, empirical data come from a workshop included in the sloyd teacher training course in which students work on learning woodturning on a lathe. Like many other types of sloyd work, woodturning involves practising one's handiness and skilfulness in the meeting with the material and tools, and the material must also be proficiently formed to attain the

desired appearance. The study aims to describe how the sloyd skill develops in interaction with others and with the situations created in the physical environment during sloyd activities. It is interesting to investigate how learning takes place, in relation to become more handy, dexterous and skilful in forming a crafted artefact, since there are very few research studies on how learning actually can be constituted when one learns to do sloyd work, both in teacher training in sloyd and in sloyd teaching in the school classroom.

Initial research on learning in the practice of sloyd in Swedish schools has been carried out by Johansson (2002). The research has shown that school sloyd is a conspicuously communicative subject. Many pupils participate in sloyd activities that develop in interaction with others, the situation and the surroundings. These activities are notable for the way the pupils coordinate their actions with the help of copious verbal and non-verbal interaction as they are making sloyd artefacts with the help of tools and material. The studies showed that persons, situations, tools and materials were mediating resources in these learning processes. Illum (2004) has carried out research in the Danish school context concerning pupils' communication during sloyd and how "the process's dialogue" arises in the meeting between person, tools and materials. Research on the communicative aspects of students' and pupils' learning during sloyd activities has also been developed and reported in interesting articles (e.g. Andersson, Brøns-Pedersen & Illum, 2016; Broman, Frohagen & Wemmenhag, 2013; Illum & Johansson, 2009; Johansson, 2008; Koskinen, Seitamaa-Hakkarainen & Hakkarainen, 2015). Research has been carried out by Westerlund (2015) showing how pupils' pleasure, or lack of pleasure, affects work in the sloyd classroom. Oja, Sjöberg and Johansson (2014) have likewise cast light on how pupils use various communicative aspects as resources for learning, such as for example being polite and helpful during sloyd work, apart from those aspects that can be understood as belonging to traditional sloyd knowledge. How the sloyd teacher's attitude influences teaching situations in the sloyd classroom has been investigated by Hasselskog (2010). Ekström (2012) has studied sloyd teacher training to find out how the students make use of the teacher's instructions in their textile work. The studies mentioned above have provided valuable results about communicative aspects for this current study.

This article, based on students' sloyd work in a teacher training when they practicing woodturning on a lathe, will focus on how learning processes are formed during interaction with persons, tools, surroundings and situations when students develop their knowledge and become more handy, dexterous and skilled. Two research questions will be addressed: How are the students' learning processes developed by conversation and other forms of communication (body language, gestures, facial expressions, actions, etc.) so that they become more skilled in their sloyd work? How are instructions and impressions used in the learning process? These questions are complex and the results presented in this study make no pretence of providing all the answers. They should instead be regarded as a contribution to research on the development of handiness, dexterity and skilfulness in the process of learning to do sloyd work.

### **Interaction and learning**

Impressions while doing sloyd work can occur in various ways, for example via interaction with others in the room, depending on how the room for sloyd is equipped and which situations arise. Learning is situated among the social practices (Lave & Wenger, 1991; Säljö, 2000, 2011), i.e. what is possible to learn with other persons present in the physical environment. Keller and Keller have described how an individual's learning process develops during work with tools, materials, situations and other people in studies on how smiths develop their knowledge and skills (Keller, & Keller, 1996). Handiness and skilfulness are revealed in actions based on knowledge about how tools should be used in the smith's work. The material has to be formed into the desired form while it is still at the right temperature, which is shown by the colour of the material. However, Keller and Keller's studies also show that it was not

sufficient to be familiar with tools and materials; the smiths were also involved in a social system for example through dialogue with each other, while making drawings and sketches, using magazines when conversing with clients visiting their workshop, when the smiths visited museums, or when they discussed experiences with other smiths. Keller and Keller's studies showed that there were abundant communicative aspects to the smiths' own work. In a similar way, the knowledgeable and skilful carpenter Thorstensen (2015) writes notes in his diary concerning how impressions contribute through for example telephone conversations with clients or having a look at the building plans, but also concerning the necessity of visiting and seeing the building site with his own eyes. Thorstensen describes it as "it is like seeing a film playing in my head" (our translation, Thorstensen, 2015, p. 26) in which large and small details fall into place concerning how the work being planned that has not yet been started or eventually be carried out. In relation to think how a sloyd artefact is to be made, something that as yet does not exist, is in the sloyd classroom context also dependent upon how various interactions are combined during learning processes, i.e. an area of research that needs to be explored more.

During interaction, limitations concerning the possibilities for learning are created and recreated. Through language we can store insights and knowledge, individually as well as in a group (Säljö, 2000, 2005, 2011; Vygotsky, 1978, 1986). Vygotsky highlights how thought and language cooperate with each other, a perspective that has been developed by many researchers. Vygotsky (1978, 1986) uses the concept tools as a designation for the psychological and physical resources used by human beings to act in social practices. These tools are historically, socially and culturally linked, mediating meanings through new ways of thinking and acting. Learning sloyd includes the use of verbal and nonverbal language (Johansson, 2002). An extended concept of language includes several multimodal resources that can open up for learning in several ways (Bezemer & Kress, 2016; Selander, & Kress, 2010). Through the various impressions we receive, interpret and compare our knowledge and skills with those of others, based on our own preconceptions, and this leads to new experiences. Knowledge and skills within the group can be 'borrowed' and used as 'our own' by means of language (Säljö, 2000; Wertsch, 2002). Interaction and language also gives individuals the possibility of increased knowledge development through the nearest zone of development (Vygotsky, 1978) which they cannot manage on their own. In social interaction, we gain tools that support our thoughts and actions. Thought and action are not separate, but knowledge and skills are changed and developed by means of experiences. Carlgren (2015) expresses this process as follows: "Acquiring new knowledge and skills is not mainly a matter of learning more things, but of developing a more and more differentiated way of experiencing things. Learning is thus about discovering how to distinguish one thing from another, how to develop specific ways of seeing, doing and being in the world." (our translation, Carlgren, 2015, p. 81). It is interesting to investigate this process of developing specific ways of seeing, doing and being when students are due to practise to become more handy, dexterous and skilful in forming a crafted artefact during their sloyd work.

Molander's means that knowledge only exists in the form of knowledgeable people and not for example in books or computers, although the use of these can help people to become even more knowledgeable (Molander, 1996). Molander uses the concept "knowledge in action" to describe the tradition of practical knowledge when people produce and reproduce knowledge in cooperation with each other. Molander highlights misconceptions about how craft is understood as physical work involving less mental activity, i.e. which is interesting in relation to learning situations in sloyd. Developing knowledge and skills includes reflection. Reflection may occur before, during and after a certain task, and it may also be an ingredient of the task itself, take just a second or even take days. Schön (1983) describes the task of being a reflective practitioner that it is still possible to change a situation in the process of reflecting compared with reflection that follows after the activity. The intention is not however that student in teachertraining of sloyd should develop into skilful crafters, but for trained sloyd teachers to be able to

teach sloyd in schools it is essential to have experienced them selves how one successively learns possible ways of doing sloyd work.

To practice is essential to the attainment of practical knowledge and skills. Hubert & Stuart Dreyfus (Dreyfus & Dreyfus, 1991, 2000) describe human beings as not being born with any innate skills. Practical action and “teaching” are necessary for the development of knowledge and skills. The Dreyfus brothers describe learning from novice to expert where the novice must learn by means of rules and instruction. By carrying out instructions, the novice gains her/his own experiences on which he/she can build further on. For the expert, knowledge and skills have reached a level at which the person is able to act intuitively and holistically. Development can be hastened along if the “teaching” focuses on suitable actions, i.e. if the learner is given the opportunity of observing and imitating the practical actions of a more experienced person. Observation and imitation replace searching at random for a suitable action for the learner. In the apprentice system (Nielsen & Kvale, 2000) observation and imitation are a vital part of how knowledge and skills are passed on from master to apprentice. The master mainly employs instructions by means of actions where the focus is on practical accomplishment as a three-dimensional demonstration (Illum, 2004).

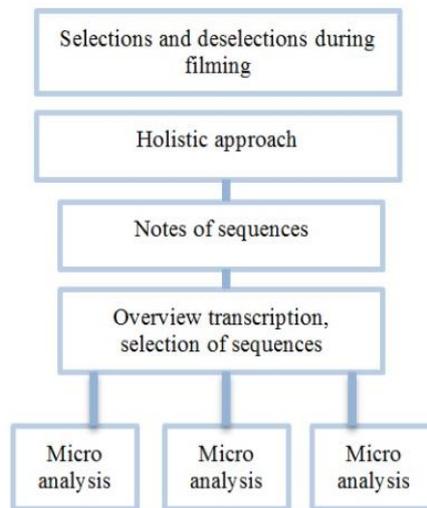
Verbal communication functions are used as a support to the practical aspect, as a complement to what is to be learnt. The use of verbal communication alone is often insufficient when it comes to mediate so-called practical knowledge. Descriptions like ‘slightly’ or ‘not too hard’ need also to be experienced by the body. Body-based knowledge and skills are won through and revealed in action. Research by Illum and Johansson (2009) demonstrates how sloyd pupils in a sloyd classroom learn when a material is soft enough. The pupils observe, comment and learn from each other in action when a sheet of copper is formed into a copper bowl by means of hammer blows. Together, the pupils watch and listen to the variations in the hammer blows against the sheet of copper. The pupils and the teacher comment adjust on their actions, and check the appearance and results, when the material being processed is too hard or soft enough, i.e. interesting results in relation to woodturning. The process of learning to see and feel differences in materials and tools in sloyd lessons has been observed by Johansson (2002, 2008). Even one of the smallest of sloyd tools, a sewing needle, owns ‘inbuilt knowledge’ that gives, or is given, meaning. Needles have been endowed with characteristics by people other than those who use them. When pupils use needles in actual work they come into contact with the tool’s inbuilt knowledge. Differences in the appearances of needles can be perceived as similar, but also as dissimilar, for anyone more, or less, knowledgeable about their different functions with different materials. The way needles offer support to the thinking process and support to reasoning and using is revealed in words and practical actions. The results can be compared when the sloyd students in teacher training is about to learn using tools and materials to be more knowledgeable and skilled during practical actions.

### **Video documentation and analysis**

When choosing a method for the collection of empirical data, it is important to select a method based on its suitability for collecting relevant empirical data in the best possible way in relation to the set of problems to be investigated. When it comes to a context in which so-called practical knowledge is to be learnt by means of sloyd work, this often takes place over time, which means that the method must be able to record ongoing actions (Johansson, 2002, 2011). Video-recording permits the capturing of events and actions during a continuous period of time. It is also possible to see the recorded material several times, which means that anything not noticed the first time can be noticed on another occasion. Video documentation also provides a possibility to secure details of interactions for further analysis (Cohen, Manion & Morrison, 2011). The recordings in this study were made during a two-day workshop on learning woodturning on a lathe during a sloyd teacher training course. Video documentation and analysis have been carried out starting from ethnographically-inspired points (Goodwin, LeBaron &

Streeck, 2011; Johansson, 2011; Knoblauch, Schnettler, Raab & Soeffner, 2009). Two video cameras were used for the collection of the empirical data, one of which was a handheld camera and the other a stationary camera. The task of the stationary camera was to film the whole sloyd classroom while the handheld camera was to film individual situations in more detail.

The work of scientific analysis postulates the significance of the analyser's awareness of her/his own preconceptions when confronting the results (Agar, 1980). But the analysing researcher's own knowledge and physical awareness are also essential for the discovery of different levels of competence in the field under study. Dreyfus & Dreyfus (1991) describes the researcher's background experience and preconceptions in the subject area as being a type of tool in the analysis that contributes to its greater reliability. Below a figure of the study's analysis work:



*Figure 1.* Steps in the analysis work.

The video data should be understood as the result of selection, but also as the result of one or more deselections. The sequences that have been recorded can therefore be seen as a first interpretation of the activities, made by the person who has done the filming. This study about teacher training in sloyd has been carried out in accordance with ethical regulations (Vetenskapsrådet, 2011). All names are fictional and stills on the video-recordings have been made unidentifiable. Stills have been used in video excerpts partly to provide an authentic picture of the situation, and partly as a complement to the video excerpts' texts on what the people shown are doing and saying. From the extensive video material, three sequences of microanalysis have been selected for this article. The selection of sequences was made based on the aim of investigating and describing learning situations in interaction with others and with the situations that are created and recreated when students practicing woodturning. The analysis describes how sloyd knowledge and skills – related to become more handy, dexterous and skilful in forming a crafted artefact – are developed between teacher–student and between student–student.

### **Learning woodturning – to become more handy, dexterous and skilful**

The teacher training course in sloyd includes lectures and seminars as well as practical sloyd work in action. The practical part of the course offers the student the opportunity of developing for example handiness, dexterity and skills via practical sloyd work in various sloyd workshops. During the workshops, the teacher gives both verbal and three-dimensional demonstrations for the students as an introduction to what are supposed to learn. The classroom for hard sloyd is designed to resemble a sloyd classroom in Swedish compulsory schools. This classroom is furnished with six workbenches, machines

and workplaces for metalwork. The walls are covered with tool cabinets containing various hand tools and there is also a rack for wood. In the window niches there are wooden racks for all kinds of hammers and chisels. The sloyd classroom is not normally equipped with wood lathes, but a pair of these is specially put out on each group of benches ready for the workshop on woodturning.

The teacher had planned the lesson to demonstrate the woodturning tools and techniques that he wanted the students to learn, the aim being to produce a sloyd object in the form of a bird. Teaching began in each new field with the teacher demonstrating how he worked when he used the woodturning tools and the lathe, and the technique involved. Both verbal and non-verbal instructions were given during the demonstration. The students stood in a ring around the teacher in order to be able to assimilate in the best possible way what was said and demonstrated. The teacher also invited them to discuss various aspects during the demonstration. When the demonstration was over, the students started their own work by selecting the material for their objects. During the workshop only fresh timber was used, which meant that the students themselves had to cut and cleave their wood into the required lengths and dimensions with the aid of a saw and an axe. Students helped each other in groups, holding the wood that was to be sawn or cloven in place. As soon as the students had prepared their material, they began to use the lathe and woodturning tools. The teacher walked around offering support where needed so that they could get started. In *Excerpt 1* below, the teacher has arrived at Sofia's lathe:

*Excerpt 1. Sofia and the teacher*

(3 minutes, 1 second)

<p>Still 1:1</p> 	<p>Opening situation: Sofia (to the left in the picture) is standing with the teacher [TE] in front of the lathe. On the lathe is an oblong piece of wood that Sofia has started to work on. The teacher has been to Sofia before to show how the rim of the wood's endpiece must be formed to fit the lathe chuck (where the wood's endpiece is fixed onto the lathe). Sofia has tried woodturning on the lathe on her own for a couple of minutes but feels that she needs help. Sofia asks the teacher for help.</p>		
<p>Still 1:2</p> 	<p>Who</p> <p>1:1 Sofia</p> <p>1:1 TE</p> <p>1:2 Sofia</p> <p>1:2 TE</p> <p>1:3 Sofia</p>	<p>Does what</p> <p>Turns the object round slowly with her right hand while pointing with her left to the wood's endpiece on which she has turned.</p> <p>His eyes following Sofia's hand. Picks up the woodturning tool [sw. svarvjärnet] that Sofia has used and starts to turn where Sofia finished.</p> <p>Watches the TE's hands.</p> <p>Turns off the lathe and looks at the result.</p> <p>Looks at the result.</p>	<p>Says</p> <p>(Says something inaudible)</p> <p>There you go!</p> <p>OK</p>
<p>Still 1:3</p>	<p>Who</p> <p>1:4 Sofia</p> <p>1:3 TE</p>	<p>Does what</p> <p>Immediately after the TE has finished turning the endpiece, Sofia looks away from it. Sofia focuses on the next question while pointing to the middle of the object.</p> <p>The TE looks where Sofia is pointing and puts his finger on the object slightly above where Sofia has hers. The TE gets out his pen and writes a</p>	<p>Says</p> <p>Aaah so maybe that's what I should do here?</p> <p>Yes, but you can just take a saw and saw off this towards the middle of the centre.</p>

	<p>1:5 Sofia</p> <p>1:4 TE</p>	<p>cross. While he is speaking, he moves his left hand across the long side of the piece of wood.</p> <p>Watches the TE's hands while he demonstrates but raises her eyes towards the TE and says:</p> <p>Looks at the student and says:</p>	<p>What?</p> <p>Just saw it off near the centre.</p>
<p>Still 1:4</p> 	<p>1:6 Sofia</p> <p>1:5 TE</p> <p>1:7 Sofia</p> <p>1:6 TE</p> <p>1:7 TE</p> <p>1:8 TE</p> <p>1:8 Sofia</p>	<p>(Seems to consider what the TE meant).</p> <p>Makes sawing movements with his right arm.</p> <p>Nods.</p> <p>Looks for a woodturning tool on Sofia's bench.</p> <p>Leaves Sofia's bench.</p> <p>Stays standing there for a few minutes before walking towards the TE. Sofia takes the chisel from the TE and both return to the lathe.</p>	<p>Will that work?</p> <p>Yes, it's fine to do that.</p> <p>You could also use this woodturning tool to remove it. And so let's find a chisel [sw. stickstål] (cutting tool).</p>
<p>Still 1:5</p> 	<p>1:9 Sofia</p> <p>1:9 TE</p> <p>1:10 Sofia</p>	<p>Puts down the chisel to the left of the lathe. Loosens and changes the machine's guard and moves it closer to the object.</p> <p>TE picks up the chisel and shows it to Sofia. Points his finger at the chisel's tip.</p> <p>Looks at the chisel quickly, then continues to adjust the lathe's guard.</p>	<p>You only have to remember to make two grooves with this.</p> <p>Two grooves.</p>
<p>Still 1:6</p> 	<p>1:10 TE</p> <p>1:11 TE</p> <p>1:11 Sofia</p> <p>1:12 TE</p>	<p>TE stands in front of the lathe. Starts the lathe and starts turning with the chisel.</p> <p>Stops turning to go and sharpen the chisel.</p> <p>Stays by the lathe waiting.</p> <p>TE starts turning again. Sticks the chisel in and draws it out to make a new groove beside the other one.</p>	<p>I can show you.</p> <p>One groove, and then one more beside it.</p>
<p>Still 1:7</p> 	<p>1:12 Sofia</p> <p>1:13 TE</p> <p>1:13 Sofia</p>	<p>Watches TE's hands.</p> <p>Engraves two more grooves. Shows with thumb and forefinger of his left hand how much (c. 1 cm) Sofia should leave in the centre when she engraves.</p> <p>Watches TE's hand and then his face. Nods her comprehension.</p>	<p>You continue to vary it like this until it gets this thin.</p> <p>OK.</p>
<p>Still 1:8</p>	<p>1:14 TE</p> <p>1:14 Sofia</p>	<p>Gives the chisel to Sofia.</p> <p>Sofia continues turning where TE finished. Sofia makes the same moves as shown by TE. Engraves one groove</p>	

	<p>1:15 Sofia</p>	<p>with the chisel and then a new groove beside it. Alternates between these two.</p> <p>Stops the lathe and spins the object to see how her work has turned out. Feels the groove she has made with her finger at the same time.</p>	
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### Analysis description: To become more handy

Sofia has tried to solve the assignment by herself for a while but has not got it working properly (1:1 Sofia). The teacher listens to Sofia's description and then instructs her by means of practical demonstration (1:1–2 TE). In this situation, the teacher uses a master-apprentice approach and demonstrates how he solves the problem via suitable actions. Sofia observes what the teacher does and is given the opportunity of sharing his knowledge about how the problem can be solved. When Sofia asks the next question, here too she uses verbal and non-verbal communication to show what she wants to describe (1:5 Sofia). Sofia expresses tersely what she needs to say, and she uses body language to complement her question so that the teacher will understand what she means. The teacher responds to Sofia's question verbally, but also reinforces what he says with body movements to show what he means (1:3–6 TE). Sofia knows what a saw is but does not link the saw to woodturning. This elicits a process of abstraction in her, causing her to question the teacher's advice (1:7 Sofia). Sofia's questioning makes the teacher give her further instructions about how the object can be divided in the middle (1:7–12 TE) with the help of a woodturning chisel (cutting tool). Here Sofia can share the teacher's knowledge and experience concerning how a practised sloyd severs wood in the middle using a woodturning chisel, and how the woodturning material can react in relation to the chisel if it is not used in the correct manner. Sofia imitates the teacher's work method when she continues her woodturning (1:15–16 Sofia). By means of imitation and the teacher's instructions during supervision, Sofia is given the opportunity of developing her own handiness [sw. *händighet*] by understanding and experience concerning how the woodturning chisel and material function in relation to each other. The analysis shows a multimodal communication in which Sofia gets the opportunity of sharing the teacher's knowledge and skills via the master-apprentice approach. Sofia is able to practise her ability to reflect and think abstractly. Sofia uses her experiences and impressions concerning how to make distinctions and different ways of seeing and doing that will develop her handiness in the making.

In *Excerpt 2* the group of students is busy turning their sloyd objects; birds. There is a difference in how far the various students have got in their work processes. Several of them are totally focused on their woodturning while others ask for help from the teacher or a fellow student.

#### *Excerpt 2. Jenny is woodturning with Linda*

(3 minutes, 18 seconds)

<p>Still 2:1</p> 	<p>Opening situation: Jenny (on the left of the picture) has got quite a way into the woodturning process with her sloyd object; a turned bird in two sections. The lathe is standing on a group of workbenches with space for two lathes, one for Jenny (on the left of the picture) and one for Linda (on the right of the picture). Linda has got on further than Jenny in her work with her sloyd object. Jenny has attracted Linda's attention which makes Linda come to Jenny's lathe.</p>
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	<i>Who</i>	<i>Does what</i>	<i>Says</i>
<p>Still 2:2</p> 	<p>2:1 Jenny</p> <p>2:1 Linda</p> <p>2:2 Jenny</p>	<p>Turning on her sloyd object while Linda stands beside her.</p> <p>Takes over the woodturning tool from Jenny and continues to turn while the lathe is still running to show on Jenny's piece of work how she herself has formed the endpiece of her own sloyd object.</p> <p>Takes a step backwards but observes what Linda does.</p>	<p>(Jenny says something inaudible and Linda answers something inaudible)</p>
<p>Still 2:3</p> 	<p>2:3 Jenny</p> <p>2:2 Linda</p> <p>2:4 Jenny</p> <p>2:3 Linda</p>	<p>Takes back the woodturning tool and continues turning where Linda had formed the sloyd object. Jenny moves the turning tool over the endpiece and tries to cut into the endpiece of the material.</p> <p>Grips her own turning tool in her hand and stands in the same place all the time studying what Jenny is doing.</p>	<p>(Linda says something inaudible just when Jenny is about to start turning)</p> <p>How hard should you press then?</p> <p>Yeah well, how far in do you want to go? Or how much rim do you want left?</p>
<p>Still 2:4</p> 	<p>2:5 Jenny</p> <p>2:4 Linda</p>	<p>Looks up quickly at Linda's lathe.</p> <p>Stands beside Jenny with her eyes fixed on the turned object to compare. Turns round and looks at her own object and back again to look at Jenny's object. Turns round again to look at her own object and then looks again at Jenny's.</p>	<p>Can't it be either or?!</p> <p>Ehh, like what's it supposed to be? Half a centimetre, a metre, or a centimetre.</p>
<p>Still 2:5</p> 	<p>2:6 Jenny</p> <p>2:5 Linda</p> <p>2:7 Jenny</p> <p>2:6 Linda</p> <p>2:7 Linda</p> <p>2:8 Jenny</p> <p>2:8 Linda</p>	<p>Laughs but continues to turn and with her eyes on the material.</p> <p>Shakes her head and laughs at having said something wrong.</p> <p>Continues turning. Linda stands in the same place.</p> <p>Leans forward slightly to see where Jenny is turning.</p> <p>Lifts up the turning tool and looks at the endpiece and then continues turning again.</p> <p>Her eyes following Jenny's woodturning all the time.</p>	<p>(Says something inaudible)</p> <p>Should it be more?</p> <p>Yeah I mean you don't need to press harder.</p> <p>(Says something inaudible)</p> <p>(Says something inaudible)</p> <p>More?</p> <p>No that's probably OK as it is.</p>
<p>Still 2:6</p>	<p>2:9 Linda</p> <p>2:10 Linda</p> <p>2:9 Jenny</p>	<p>Linda stops the lathe.</p> <p>Both bend forward to look at the groove [sw. falsen] where the object for woodturning is fixed.</p>	<p>Just want to see how it turned out.</p>

	<p>2:10 Jenny</p> <p>2:11 Linda</p> <p>2:11 Jenny</p> <p>2:1 Marie</p>	<p>Jenny spins the turned object so that they both can see better.</p> <p>Points her finger at the endpiece.</p> <p>Spins the material slightly and feels where with her fingers Linda has pointed.</p> <p>Marie (to the right in the picture) comes to Linda's lathe and places the teacher's woodturned demonstration object and compares Linda's ongoing work with the teacher's.</p> <p>Marie stands there and studies Linda's and Jenny's discussion on the turning of the endpiece.</p>	<p>(Says something inaudible)</p> <p>Though it's a bit thin there.</p> <p>(Says something inaudible)</p>
<p>Still 2:7</p> 	<p>2:12 Linda</p> <p>2:12 Jenny</p> <p>2:13 Linda</p> <p>2:2 Marie</p>	<p>Points at the endpiece with her turning tool.</p> <p>Looks where Linda is pointing with her turning tool and starts turning.</p> <p>Linda goes to her lathe where Marie is waiting. They discuss and point and compare the shape of Linda's object with the teacher's demonstration object.</p>	<p>(Says something inaudible)</p>

### Analysis description: To become more dexterous

Linda shows Jenny how she uses the tool in relation to the material and what is to be accomplished (2:1 Linda). Linda is in this situation the more competent and skilled and demonstrates what to do while also communicating verbally. When Jenny takes over the woodturning tool she imitates what she has seen and heard from Linda (2:3–10 Jenny) to develop the specific way of using the tool with the material. Jenny gets the opportunity by the process of dialogue for body experience of how the woodturning tool works in relation to the material. While Jenny is turning, she asked Linda a number of questions about “how hard should you press?” (2:4 Jenny). Jenny is here seeking support from Linda so as to share Linda's experiences of dexterity [sw. hantverksskicklig] of how hard she should press with the turning tool. Linda answers the question with another (2:3 Linda) which makes Jenny reflects over what she means in relation to the woodturning process (2:4 Jenny). Linda gives Jenny guiding comments and answers during the woodturning process (2:6–13 Linda) as support so that Jenny will be able to develop her knowledge and skills. Jenny ‘borrows’ Linda's knowledge, skills and experiences and turns them into her own. In this situation Linda gets the opportunity of reflecting over her own actions which leads to deeper learning. The video analysis shows how a more competent fellow student (Linda) via multimodal communication gives support and instructions so that Jenny can attain a higher level of knowledge development than Jenny on her own would have been able to achieve during her process with developing her own handiness and dexterity.

In *Excerpt 3* below, Marie has waited by Linda's lathe to discuss the next step in the process. Marie has not got very far in her woodturning process. Linda has got on furthest with her object in the student group, which means that she is the person apart from the teacher who has experiences of how the various steps should be accomplished in the woodturning process.

Excerpt 3. Linda and Marie compare forms

(2 minutes, 44 seconds)

<p>Still 3:1</p> 	<p>Opening situation: During the time Linda (in the middle in the picture) has helped Jenny, Marie (on the right in the picture) has come to Linda's lathe. Marie has her own woodturning tool with her and the demonstration object that the student has been given by the teacher (a turned bird with a tapering tail) and which the teacher has used in the demonstration in front of the whole student group. Linda and Marie are discussing how to forming the bird's shape.</p>		
<p>Still 3:2</p> 	<p><b>Who</b></p> <p>3:1 Marie</p> <p>3:1 Linda</p> <p>3:2 Marie</p> <p>3:2 Linda</p>	<p><b>Does what</b></p> <p>Nods to Linda.</p> <p>Nods to Marie.</p> <p>Drawing her finger backwards and forwards over Linda's object. At the same time holding the teacher's demonstration object in her hand (a bird with tapering tail).</p> <p>Linda stands beside her and also feels her own object with her hand after Marie's.</p>	<p><b>Says</b></p> <p>You're busy doing this bit aren't you?</p> <p>Yeah, I am.</p> <p>(Says something inaudible) (Loud noise from Jenny's lathe)</p> <p>(Says something inaudible) (Loud noise from Jenny's lathe)</p>
<p>Still 3:3</p> 	<p>3:3 Marie</p> <p>3:3 Linda</p>	<p>Marie points her woodturning tool at the demonstration object's front section on the lathe and then uses her finger to feel the front section and back section of Linda's bird. Linda also feels the bird with her finger.</p>	<p>(Says something inaudible) (Loud noise from Jenny's lathe)</p> <p>(Says something inaudible) (Loud noise from Jenny's lathe)</p>
<p>Still 3:4</p> 	<p>3:4 Linda</p> <p>3:4 Marie</p> <p>3:5 Linda</p>	<p>Feels along the length of the bird on the lathe with her hand. Stretches out her hand towards Marie's hand holding the teacher's demonstration object. Linda takes the demonstration object and lays it on top of the bird-to-be on the lathe to compare their forms.</p> <p>Point to Linda's object's hind section.</p> <p>Lifts away the demonstration object and looks at it closely. Lays the demonstration object on top of her own object on the lathe again afterwards. Lifts up the demonstration object again, about 3 cm, and points with her little finger at her own bird's front section. She does this with the same hand as she is holding the demonstration object with, and then lays it on top again. After a couple of seconds, Linda gives the</p>	<p>(Says something inaudible) (Loud noise from Jenny's lathe)</p> <p>(Says something inaudible) (Loud noise from Jenny's lathe)</p> <p>(Says something inaudible) (Loud noise from Jenny's lathe)</p>

		demonstration object back to Marie.	
<p>Still 3:5</p> 	3:6 Linda	Feels the length of her bird on the lathe again with her hand while at the same time looking at Marie. Puts her head on one side and looks up at the ceiling at the same time as she puts a question to Marie and keeps holding her hand on the bird's rear end.	Wonder how you do this tail bit here?
<p>Still 3:6</p> 	3:5 Marie	Looks first at the tail of the demonstration object that she is holding in her left hand. Then she holds up the demonstration object in front of Linda's ongoing bird on the lathe.	This little bit will be left on here abouts.  You grind [sw. slipar] it down under here.  Mmmm.  When you start that then there's a risk it'll break off, like.
	3:7 Linda	Looks at Marie's hands and her own object on the lathe.	
	3:6 Marie	Takes the demonstration object away from Linda's bird on the lathe and points her woodturning tool at the demonstration object at the same time as she speaks.	
	3:8 Linda	Nods.	
<p>Still 3:7</p> 	3:8 Marie	Marie (on the left in the picture) walks round the lathe and points her turning tool at the rear section of Linda's bird.	It just do it, like. But it's just about here I suppose.  Yeah.
	3:9 Linda	Looks where Marie is pointing and turns around to pick up her own demonstration object (that the teacher has laid on Linda's workbench).	
<p>Still 3:8</p> 	3:10 Linda	Lays her own demonstration object on top of her bird on the lathe to see if it matches it.	Aha, yours is narrower.
	3:9 Marie	Watches Linda when she lays down her demonstration object for comparison. Marie goes to her own lathe again.	

### Analysis description: To become more skilful

The noise level in the sloyd classroom is high when several students are busy woodturning. Marie, who has not got as far as Linda, wants to discuss and reflect on the form of the bird (3:2–4 Marie). Linda runs her hand over her object after Marie has done so and then comments on what Marie has said (3:2 Linda). Marie and Linda use tactile actions in this situation to create an understanding and reflection around the experience of forming a crafted artefact [sw. konstfärdig]. Marie points to and feels the teacher's object as well as Linda's object, to see, feel and distinguish (3:3–4 Marie). Marie is helped by

the teacher's object to gain support for her thought process around how the bird can be shaped. Linda also uses the teacher's object as a mediating tool to discuss form. Linda puts the question "wonder how you do this tail bit here?" (3:6 Linda). Here Linda reinforces the verbal communication with a gesture to show that she is pondering. Marie uses the teacher's demonstration object to show what she is explaining to Linda (3:5 Marie). The teacher's demonstration object thus becomes a tool that mediate abstraction processes possible so Marie and Linda can reflect on and coordinate their experiences (which is also part of being sw. "konstfärdig"). The analysis shows how Marie and Linda coordinate their actions in the situation that is created. They produce and reproduce knowledge and skills that form an artifact through their reflections on similarities and differences in performance and experiences in forming.

## **Discussion and conclusion**

### **The individual's work in interaction**

The interaction between the students, teacher and surroundings that was investigated by microanalysing video-recorded situations in this study on woodturning shows that learning takes place in a social and cultural context, it can be said to be socially and culturally situated (cf. Lave & Wenger, 1991; Säljö, 2000, 2011). The teacher walks round in the sloyd classroom to various students and supervises them when it seems necessary. The students seek help from the teacher themselves as well, or ask for support in their learning process from fellow students. During major parts of the learning processes, reciprocal verbal and non-verbal communication occurs between teacher and students, and between student and student. The excerpts show that learning to do sloyd work is not something that takes place by only working on one's own object (e.g. 2:1–6 Jenny). The students alternate between standing by and watch, or practice, or demonstrated, their skills when they work on each other's object. The analysis shows that knowledge of sloyd includes handicraft knowledge as well as pedagogic aspects, important to pay attention to both in teacher training and at school. Earlier studies in Swedish primary school (Illum & Johansson, 2009; Johansson, 2002) have also shown that pupils often work on each others' sloyd objects, even if the pupils say that they have made their sloyd objects themselves.

In the interaction between Jenny and Linda (2:1–6 Jenny; 2:1–5 Linda), gestures, body language and facial expressions are used to reinforce verbal language. When Jenny continues with her woodturning, she 'borrows' Linda's knowledge, skills and experiences when she imitates what Linda has verbalised and described with actions. In this way, Jenny and Linda can both view and practice to be more handy and dexterous. The excerpt shows the interaction's importance for learning. Jenny gets an opportunity to attain a higher knowledge level like that Vygotsky (1978) describes as the nearest zone of development, in which support from someone more knowledgeable helps to raise one's own knowledge level. But the knowledge, skills and experiences that Jenny 'borrows' from Linda are not possible to acquire only by Jenny's and Linda's communication. It is also essential that Jenny herself actually does the work so she can develop her own handiness and dexterity. To the question "How hard should you press then?" (2:4 Jenny) it becomes obvious that it is not possible to communicate knowledge and skills only verbally, also personal body experience is essential for the individual receiving the instruction (cf. Illum, 2004; Illum & Johansson, 2009; Keller, & Keller, 1996) in order to create understanding of how hard the woodturning tool can be pressed against the material to remove a certain amount of material. The discussion (2:2–4 Linda; 2:4–5 Jenny) shows similarities with the one Schön (1983) describes as reflection in action. Linda reproduces knowledge and skills through reflection when she stands next and compares what she has done in relation to what Jenny is doing in the process. Based on these reflections, new conclusions are drawn about what might be suitable action in the situation in question.

Production and form are discussed by Linda and Marie when Linda says "Wonder how you do this tail bit here?" (3:6 Linda). Through this discussion (3:6–8 Linda; 3:5–7 Marie) both of them get

opportunities for a process of reflection and abstraction like the one Thorstensen (2015) describes as big and small pieces falling into place concerning the work being planned, i.e. imagine something that not yet exist. Knowledge, skills and experiences that Linda and Marie have acquired during previous sloyd work and woodturning are reproduced and recreated anew through their shared creation of an idea of how the bird's tail should be made and formed, knowledge and skills that can be linked to skilfulness of forming a crafted artefact [sw. konstfärdig]. Knowledge and skills are developed towards a more differentiated way of experiencing (cf. Carlgren, 2015) in which Linda and Marie develop their knowledge through distinguishing and seeing how different things hang together. Being able to distinguish and see whole entities is part of the complex knowledge that Molander (1996) describes as being possessed by craftsmen who develop it by means of reflection with practical and theoretical insights.

### **Choice of task**

The assignment given to the students includes several dimensions. The teacher has created a task that is relevant to the knowledge and skills that the teacher considers that sloyd teachers-to-be need to have in their baggage from their teacher training course in sloyd. The assignment is based on the teacher experiences, knowledge and skills concerning materials and woodturning tools. The teacher has a handiness and dexterity in the assignment that like Thorstensen (2015) can be compared to “seeing a film playing in his head” about the work, i.e. the knowledgeable teacher can ‘see’ various decisions in the whole work process, and wants in this way to offer the students these opportunities for learning by the task. Thus the teacher can, partly be seen as skilful since he is knowledgeable about the craftwork itself and can ‘see’ the work of woodturning with his inner eye, partly a skilled pedagogue with regard to subject didactics by being able to ‘see’ various decision-making processes in the students’ learning situation as they learn woodturning. Being skilful can be linked both to the craft work in itself and also to being a skilful pedagogue. On the other hand, the teacher’s task is an assignment that must be completed and which can thereby be understood as more or less engaging for the students. Research done by Westerlund (2015) has shown how sloyd work is changed by expressions of pleasure or lack of pleasure. Being interested in a task can open up for learning, but this involvement can perhaps first experience if, or when, one feels commitment. Irrespective of interest, learning does occur, Säljö expresses it as “The choice does not stand between whether people learn something or not, but what they learn from the situation in which they are part of” (our translation, Säljö, 2000, s. 28). Learning that it must be a shared tasks, or how one can learn together with others, also becomes a kind of learning in those situations that arise during the workshop in woodturning. Over and above the dilemma of learning what the teacher has considered should be learnt, have Oja, Sjöberg and Johansson (2014) focus on the positive value for learning of the resources embedded in communication, communicative values that are included in sloyd work e.g. helping each other and being polite and encouraging, i.e. characteristics that students in teacher training can draw advantage of in their future work as teachers.

The teacher shows during the introductory demonstration how he uses various woodturning tools to form the material according to his own wishes, in this case as a bird. Based on the demonstration, the plan is for the students to create their own birds in order to develop their knowledge, e.g. to become more handy, dexterous and skilful in forming a sloyd object with the help of tools and materials. Making a bird can be done in several different ways and with the help of different tools and techniques. By woodturning a bird, the students gain access to the knowledge embedded (cf. Johansson, 2002, 2008) in the different specific woodturning tools that might be needed to complete the assignment of woodturning. An experienced and knowledgeable sloyder, in this case the teacher, knows by experiences in action (cf. Molander, 1996) that there are tools that can be used in an equivalent way. (1:3–7 TE). The experienced person thinks and acts through the mediating tools. In the situation with the engraving iron or chisel (excerpt 1), Sofia gets the opportunity to share the teacher’s knowledge, skills and experiences in a master-apprentice situation (cf. Dreyfus & Dreyfus, 1991, 2000; Nielsen & Kvale,

2000) concerning how a particular element of woodturning can be solved of a handy person with the use of different tools.

During the making of the turned object, the opportunity is created for becoming familiar with, and gaining knowledge about, the characteristics of the material in the meeting between the woodturning tool and the material when the object is being worked on and formed. The teacher (1:9 TE) demonstrates and acts according to his previous knowledge and experiences with focus on a suitable action show that an engraving iron or chisel can be used in a safe way when a piece of material is to be divided in the middle. The teacher uses verbal as well as non-verbal communication when he supervises Sofia in order to create explicitness and the opportunity for shared understanding of what is being done. When Sofia herself is about to carry out what the teacher has demonstrated (1:14 Sofia) this takes place by imitation and the instructions the teacher has described that guide Sofia's woodturning from the start. During the time that Sofia is woodturning, she is building up her own handiness and bodybased knowledge like that described by Illum (2004) as the process's dialogue with experiences about how the woodturning tool can be used in interplay between materials, tools and person. The tool becomes an integrated part of the person where the body responds with intuitive action e.g. when a problem occurs.

The task with the turned bird creates opportunities for different interpretations of how a form can be seen and experienced when the turning tool meets the material. During their communication (3:2 Marie; 3:2 Linda), Marie and Linda develop a common understanding of what a form is and how it can be made. By using sight and tactile experience, Marie and Linda gain bodybased knowledge about form and material. Both the teacher's and Linda's objects are used as mediating tools in their multimodal communication (cf. Bezemer & Kress, 2016; Selander, & Kress, 2010). Just as verbal and non-verbal language communicate knowledge, can a situation or an artefact also mediate knowledge to those who can 'read' it, e.g. the turned bird, the turning tool or the lathe. Learning situations in the classroom for Sloyd can open up for multimodal learning in several ways.

### **Concluding comment**

This article provides examples of how students on a teacher training course in sloyd develop their knowledge of sloyd during a workshop in woodturning. The assignment of learning to turn should not be seen as isolated, rather a part of a whole, and together with the teachers' and the students' earlier experiences of how techniques, tools and materials can be processed and worked on in different ways. To become more handy, dexterous and skilful takes time and a great deal of practice is needed on one's own, as well as together with others, in order to attain a level at which a person may feel sufficiently knowledgeable and skilled. Being able to 'read' actions and objects is accomplished based on different preconceptions, and one's own knowledge and skills, provide 'tools' for specific ways of seeing, doing and being.

The design of this study have not been optimal when it comes to the collection of empirical data, since the high noise level of woodturning limited the audibility of verbal communication in the video-recorded situations. The results show how several multimodal languages are coordinated in the students' impressions and expressions. The study was carried out during two full days' workshops with a limited number of students, which means that the study's results are not intended to be generalisable. The results are based on the students' work on the teacher training course in sloyd, but the results can probably be discussed and increase reflection in relation to other materials, techniques and situations both in teacher training and in school sloyd situations.

School sloyd lessons offer a kind of learning that differs from many school subjects in that parts of the knowledge are practised and made visible through making a physical sloyd object. During the working processes in teacher training, conditions and opportunities are created for students to develop their skills

in the meeting with materials, tools and other students, valuable experience for their future jobs as sloyd teachers in schools. It is important to observe how learning takes place during the making of sloyd objects, in order to be able to make didactic decisions. This study shows that so-called practical knowledge is not only communicated verbally but also requires support from several multimodal forms of interactions. Body language and actions have an important role in how shared understanding is created for how for example the suitable handling of a woodturning tool should be implemented. The meanings embedded in the sloyd concept used in this article – handy, dexterous and skilful in forming a crafted artefact – show that knowledge of sloyd includes handicraft as well as pedagogical aspects.

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