Instructions in skills teaching: A case study of four elementary school handicrafts teachers

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Abstract

The purpose of this study is to clarify the instructions teachers use when directing the pupils’ work during crafts lessons. The aim of the study is to classify and describe different contents of instructions. The research problem is to determine which instructions are used most during crafts lessons. This research is a case study with a qualitative character. The material was collected by observing and videotaping crafts lessons and analyzed by the methods of theory-driven content analysis. As results, ten different categories for contents of instructions are introduced. The most common contents of instructions described the concepts and procedures and gave feedback.

Keywords: work instructions; crafts; skills teaching; tacit knowledge

1. Introduction

This study is based on the studies of Fogarty Wang and Creek (2001) on different contents of instructions and Ekström, Lindwall and Säljö (2009) on instructions used in crafts teaching. Theories on skills teaching and tacit knowledge of skillful artisans are also a significant part of the theoretical background. During the handwork lessons, teachers give a vast number of different work instructions with which they direct pupils’ working and learning processes. Lindfors (1991) specifies work instructions as a teacher-led teaching method that resembles demonstrations, but it is briefer in content and does not always require a new subject in teaching. The instructions can be given during the work process and with their help a teaching discussion between the pupils and teacher can be formed (Lindfors, 1991, 134-135).

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The work instructions are in a central position when it comes to what pupils learn during their work processes. It has been stated that the work instructions are also connected to the realization of the objectives of the curriculum (Gaskins, Anderson, Pressley, Cunicelli & Satlow, 1993). The ability to give suitable work instructions is an essential part of the professional skills of handwork teachers. Many earlier studies have been conducted on instructions in different subjects; however, it is more difficult to find studies related to handicrafts teaching. The studies have concentrated on reports on craft education and not on craft action itself. It is necessary to examine the practices related to understanding artifacts and directing the craft process. More information is also needed about the skillful artisans’ knowledge and practices (Ekström, Lindwall & Säljö, 2009, 498-499). The target of this study was to explore the professional skills of skillful artisans, crafts teachers, and the practices that are related to directing pupils. The aims of this study were to classify and describe different contents of instructions and study which instructions are used most during crafts lessons. The purpose of this study is to clarify what work instructions teachers use when directing the pupils’ work during crafts lessons. The aim of the study is to classify and describe different contents of instructions and the research problem is to determine which instructions are used most during crafts lessons. This research is a case study with a qualitative character. The material was collected by observing and videotaping crafts lessons and analyzed by the methods of theory-driven content analysis. As results of this study, ten different categories for contents of instructions are introduced.

This study emerged from a practical problem. A prominent challenge in handicrafts classes is to direct a large group of pupils effectively and promote their independent work, creativity and problem solving in the best possible way. These objectives are significant aims for crafts teaching in the Finnish National Core Curriculum for Basic Education (2004). The study was based on Ekström, Lindwall & Säljö’s (2009) definition of instructions according to which the goal of the instructions is to establish understanding of artifacts and to direct the manual work necessary to produce them. The latter part of the definition covers several types of instructions that are used in directing pupils’ work. In the study by Ekström et al. (2009), the objective was to clarify the use of work instructions and their role in directing pupil's actions. They focused especially on discourses between teachers and pupils. Differences in pupils and teachers' knowledge and skills proved to be a challenge to directing the work process (Ekström et al., 2009).

Johansson’s study (2002) in turn broadens the image of practices in school craft lessons and emphasizes the significance of craft as a social operation. In that study, the social dimension of school crafts was examined with the help of video analyses and the central focus was on the analysis of social situations both between teachers and pupils and among pupil themselves. Johansson emphasizes the significance of comprehensive verbal and non-verbal interaction in craft actions (Johansson, 2002). In this study, the goal was to approach craft action through both these dimensions. For this reason, video study was chosen as a method of research in this study as well.

Fogarty, Wang & Creek (1983) approached instructions through their contents. Instructions were studied in a novice-expert comparison setting. The researchers (1983) defined seven different contents of instructions. Furthermore, they also examined the instructional situations through tips on the learning environment. It was stated that the teaching experience affected the ability to command the complex interaction of teaching situations (Fogarty et al., 1983). Their (1983) classification of instruction types helped to characterize the concept of a work instruction more broadly. The seven instruction categories of the study served as the body that directed the analysis of this material. The categories were gives feedback; explains concept/procedure, checks knowledge, focuses attention/effort, applies/extends/plans, elicits/incorporates input and manages (Fogarty et al., 1983).

Gaskins, Anderson, Pressley, Cunicelli and Satlow (2003) explored teachers’ instructions through eighth instructional actions. The actions concentrated e.g. on describing the aims of processes and
contents or directed the use of different strategies. The teachers followed very clearly their visions of giving instructions. Their instructional actions formed three types of instructional cycles. The cyclical structure of instructions helped the teachers e.g. to direct the group more efficiently. (Gaskins etc., 2003.)

In Ivarsson’s (2003) study of computer-based LEGO-Dacta learning environment an index language between the teachers and students was discovered in discourses during crafts lessons. The index language maintained an illusory intersubjectivity amongst the teachers and pupils. The teachers used more conceptual language, but the students referred directly to the objects of the learning environment. The instructional situations were significantly complicated by the difficulties in creating a mutual language. (Ivarsson, 2003.)

2. Study design

2.1. Research problems

The purpose of this study is to clarify what work instructions craft teachers use when directing the pupils’ work during crafts lessons. The aim of the study is to classify and describe different contents of instructions and the research problem is to determine which instructions are used most during crafts lessons.

2.2. Subjects and material collection

Four elementary school teachers from three different schools in Southern Finland participated in the study. Two teachers taught handicrafts in the lower classes (1st to 6th grade) of elementary school, and two in the upper classes (7th to 9th grade). Three teachers taught textile work and one technical work. All teachers had groups of 11 pupils. The teachers’ work experience varied from two to sixteen years.

The material was collected by videotaping and observing handicrafts lessons in lower and upper classes of elementary school. With the help of videos, it was possible to gain detailed information on the practices of instructional action. The videos contained material about instructions in both verbal and non-verbal form. Observation was chosen as a research method in order to support the material of the videos. A significant benefit of using videos is that it is always possible to return to the material and re-evaluate the results by comparing them with the authentic material (Vienola, 2004). In this study, videos were used as a method since there was so little prior knowledge on the subject. Videotaping made it possible to approach the material inductively (Derry, Pea, Barron, Engle, Erickson, Goldman, Hall, Koschmann, Lemke, Sherin & Sherin, 2010).

By observing interaction during the lessons, it was possible to gain immediate and detailed information on the context of the videos (Saaranen-Kauppinen & Puusniekka, 2006). There is a need for information on interaction between teachers and pupils during crafts lessons as well as practices of crafts teaching (Ekström, Lindwall & Säljö, 2009). Hence, observations made in an authentic context on crafts classes were a justified method for data collection. The data gathered through observations was used to complement and explicate the video material.

2.3. Research data

The research data consisted of eight video-recorded lessons of technical and textile work. There were two lessons of 45 minutes from each teacher. For the content analysis all teachers’ speech and pupils’ questions and other comments that led to instructional situations were transcribed from the videos. There
were altogether 49 pages transcribed in which there were 274 items of instructional situations and 699 items of actual work instructions.

2.4. Data analysis

The study was a case study with a qualitative character. The data was analyzed by methods of theory-driven content analysis. The theory-driven content analysis was chosen since there were so few earlier studies on the subject. By emphasizing the empirical data, it was possible to see the authentic material more diversely.

The analysis units were chosen from the research data and the theory was utilized to provide guidelines for the analysis. In the theory-driven content analysis, the data collection can be carried out quite freely and the role of the theory will be emphasized at the end of the analysis (Tuomi & Sarajärvi, 2009, 96-97, 150).

The classification body was based on the Fogarty, Wang and Creek (1983) study on experienced and novice teachers’ instructional beliefs and actions. The context of this study differed from the context of the study by Fogarty et al. (1983) since their data was collected in natural science lessons rather than handicrafts. The theory-driven analysis enabled the typical characteristics of handicrafts to emerge from the data since the analysis was not so strictly bound to the classification body.

The transcribed video data was classified according to meanings. When the analysis is based on meanings and etymology, the data needs to be categorized based on similarities and differences (Piergiorgio, 2003, 253). The analysis began by defining the concept of a work instruction. After defining the concept, we divided the transcribed data into analysis units. One work instruction formed one analysis unit. The units were then categorized by their contents and descriptions of typical examples of each category were then defined. A simple quantitative analysis was used to survey the occurrences of the instructions.

3. Results

As the results, the use of instructions in handicraft lessons is presented. In Table 1 the occurrence rates of the instructions with different contents can be seen by specific teacher and generally for the entire study. The additions and alterations to Fogarty’s etc. (1983) classification body are asterisked. The contents of instructions are explained more specifically later on. When the quantitative occurrence of the contents of instructions is examined, the four most typical categories are clearly distinguished. In the entire study data, the most general instruction type was a description of a concept or performance. These instructions represent a fourth (178/699) of all instructions in the data. The instructions given in handicrafts lessons have two aims: to establish an understanding of artifacts and direct their production (Ekström, Lindvall & Säljö, 2009). Both goals are achieved through the descriptive instructions. The instructions that described a structure, material or tool increased the understanding of the artifacts to be made. With the help of the descriptive instructions, the teachers tried to increase the pupil’s understanding of the process of making handicrafts and at the same time to promote the production of artifacts. The large quantitative share of these descriptive instructions can probably be explained by their significance, in particular, for the pupils’ learning process.
Table 1. The quantitative occurrences of different contents of instructions, adapting Fogarty, Wang & Creek (1983)

| Instruction type                        | teacher A | teacher B | teacher C | teacher D | Total |
|-----------------------------------------|-----------|-----------|-----------|-----------|-------|
| Feedback                                | 24        | 31        | 24        | 32        | 121   |
| Describing a concept or performance    | 46        | 23        | 45        | 64        | 178   |
| Checking know-how or understanding     | 33        | 22        | 10        | 52        | 117   |
| Directing observations                 | 8         | 7         | 23        | 7         | 45    |
| Applying or extending instructions*    |           |           |           | 13        | 20    |
| Describing a concept or performance    |           |           |           | 13        | 20    |
| Encouraging pupils to make initiatives and use of initiatives in teaching | 16        | 7         | 3         | 10        | 36    |
| Direct instruction*                    | 31        | 29        | 25        | 16        | 101   |
| Setting problems*                      | 4         | 3         |           | 7         | 7     |
| Planning instructions or course of lesson* | 1         | 8         | 10        |           | 19    |
| Controlling the group                  | 20        | 9         | 10        | 7         | 46    |
| Total                                  | 173       | 157       | 161       | 208       | 699   |

The second most general instruction type was feedback instructions (121/699). The significance of feedback for learning the correct performance is central and it explains the share of feedback instructions in the data. With the help of feedback, the teacher directs a pupil to the correct performance trying to strengthen the right functions and to reduce mistakes. The feedback instructions are based on the idea of model learning. Reproductive, basic skills have a central role (Salakari, 2007, 21-25) on the model learning. It also explains the frequent use of feedback instructions. The majority of the feedback was given during the performance and it improved the performance immediately. After the performance, the given feedback helped to develop broad information entities and increased understanding of the task, but their share of all the feedback was considerably smaller (Romiszovski, 1999, 473-474).

The third most general instruction type was instructions that were related to checking expertise or understanding (117/699). The number of these instructions was the largest in lessons in which the pupils worked independently. Instructions of this category were found to a lesser extent in the data of Fogarty et al. (1983) than in this data. An explanation here could be that there was an emphasis on independent work in handicrafts lessons, as opposed to the work in the natural sciences in their study. When the pupils work alone, instructional situations will supposedly be created more often than during pair work or teamwork. On the other hand, handicrafts lessons are perhaps more interactive than those of many academic subjects (Johansson, 2002, 117). Therefore, checking the pupils’ skills may also receive a larger share of the total number of instructions.

The three instruction types that least appeared were planning (19/699), applying or extending (20/699) and setting problems (7/699). The first two categories had also the smallest number of occurrences in the Fogarty et al. (2001) study and those instructions were only used by experienced teachers. In this data, only the two most experienced teachers used these instructions. Describing the structure of instructions or the lesson may help pupils to perceive the process of the work itself and its critical sections because they often follow the stages of the work. These instructions can serve as sort of heuristic instructions (Suojanen, 1993, 144-146). The teachers’ experience and the higher skill level of the teaching group together could explain the use of indirect, more challenging instructions.

The scantiness of instructions directed to problem solution may have been caused by the objectives of the work. However, problem solution is included in an essential way in the craft action (Williams, 1990)
and it is supposed that at least a certain type of problem solution will be emphasized at the early stages of learning certain skills. The problem solution process can be somewhat built into the craft process; therefore, it is not always so clearly intervened with the work instructions. Adapting Ivarsson’s (2003) research results, it can also be assumed that during their work process, pupils meet problems they might not be able communicate to teachers. The teachers who work in the position of a skillful handworker approach problems from a very different point of view than their pupils do and might not always perceive the problems their pupils encounter.

Already at the end of the transcription stage, a clear difference in the structures of lessons was seen between the lower and upper classes of elementary school in terms of instructional situations. There were at least twice as many (a 112 and an 83 item) instructional situations in the data of the lower classes than in the data of the upper classes (39 and 40 items). The time for instruction was also clearly shorter in the data of the lower classes. However, one must take into consideration that there were more teaching situations directed to the entire group in the data of the upper classes than there were in the data of the lower classes. The structural differences between the lessons of the lower and upper classes were still significant.

In the numbers of the work instructions, the differences between the teachers became even more considerable. It was not possible to perceive clear differences between the teachers of the lower and upper classes in the numbers of the work instructions. Only in the data of teacher D were there clearly more instructions than in the other teachers’ data. When examining the numbers of the instructions and the instructional situations, one can state that the teachers of the lower classes organized more instructional situations than the teachers of the upper classes did, but gave fewer instructions during their time in class. The instructional situations of the teachers of the upper classes were longer and during their instruction, they gave more different work instructions. This quantitative division of instructions seems consistent. The motoric and observational skills of pupils in the lower classes tend to be more undeveloped so following long and complex instructions would be challenging for them (Skolstyrelsen, 1989, 10; Parikka, 1980, 11).

Fogarty et al. (1983) stated that teachers’ experience affected the versatility of the work instructions to some extent. As far as experience is concerned, there were no significant differences between teachers in this data. The work experience did not seem to be correlated with the use of instructions. However, it was possible to perceive some connections between the objectives of the work as well as pupils’ age and skill levels and the occurrence rates of the instructions. Fogarty et al. (1983) also noticed that the objectives of the work affected the use of instructions more than the teachers’ experience did.

Teachers A, B and C set as primary target practicing reproductive, basic skills (Romiszovski, 1999, 467-468) and used the most direct instructions. The idea that when teaching basic skills direct instructions are emphasized seems consistent with data. The pupils at an early stage of learning a skill probably need instructions that are more direct. Teacher D had set as a target to practice productive skills that required applying new strategies. In the data of teacher D, the instructions that concentrated on descriptions of concepts or performances, checking expertise or understanding and giving feedback were emphasized. In addition to the objectives, the work being constructed probably significantly affected the occurrence of instruction types as well. Some works gave pupils an opportunity to carry out their own ideas rather freely, whereas in making other work, correct performance and end results were defined more precisely.

Teachers C and D both taught groups of upper level classes in elementary school. The differences in the data between the upper and lower classes are seen especially in the categories applying and extending instructions and planning instructions. The more frequent use of instructions concentrated on applying and extending instructions in the upper level classes can probably be explained by pupils’ age and more advanced skills. With more skillful pupils, it is possible to proceed to more challenging tasks and apply
the new skills in multiple ways. Skillful pupils are able to perceive broader entities and to form more complicated internal models of performances (Parikka, 1989, 33, 35).

3.1. Contents of work instructions in handicrafts lessons

The feedback instructions contained information about the pupils’ performance or answer. There were two types of feedback instructions in the data, correcting and confirming. With the help of the correcting feedback instructions, the teachers tried to point out errors in the pupils’ performances or answers. Usually they also included information on how to reach a successful performance or answer. The additional information and the tips concentrated on the critical sections of the performance. With the help of the confirming feedback instructions, the teachers confirmed that the pupils’ answers or performances were correct. The feedback instructions served as external feedback that supported learning a skill, but at the same time, they also modeled internal feedback. The significance of the internal feedback is emphasized when the learning process proceeds (Salakari, 2007, 21).

The work instructions, which concentrated on describing a concept or performance, contained information on stages, materials, tools and structures of a performance. Teachers explicated their expertise and modeled the skillful artisans’ working and thinking processes. By combining these instructions with observations and pupils’ personal experiences, teachers supported learning of the skill in its different sectors (Anttila, 2007, 79-80; Syrjäläinen & Haverinen, 2008, 145.) The instructions typically contained information on critical sections of performances as well as features of a successful performance. The instructions were usually very context-bound: teachers and described how they would act in that particular situation, but did not necessarily generalize the instruction to cover other situations. These instructions supported learning in a very similar way as do the methods of mental practice and training (Vartiainen, Teikari & Pulkkis, 1989, 75).

With the help of the instructions that concentrated on checking expertise and understanding, teachers enquired about either pupils’ earlier expertise or expertise on a topic taught during the lesson. These instructions were questions, but especially when checking work plans, teachers asked the pupils to describe their plans or show concretely how they intended to proceed in their work. They tried to encourage pupils to describe the characteristics of a correct performance. Instructions of this kind supported the learning process through external talk (Vartiainen, 1989, 46).

Instructions with which the teachers directed observation always referred to concrete examples, such as always connected to these instructions with either objects or pictures. The instructions contained observations of the details of the object or suggestions to monitor a certain matter. These instructions supported forming internal models of the structures of the work, tools or materials (Suojanen, 1993, 99).

With the instructions that applied or extended instructions, the teachers applied taught knowledge to new situations and extended given instructions with additional information. When applying instructions, the teachers gave hints on how the same technique or structure could be utilized either in different phases of the same work or in some other work. The content of these instructions consisted of skillful handworker's essential expertise: information on how the techniques can be applied to new situations (Anttila, 2007, 92). Supposedly, the instructions included plenty of skillful handworker's tacit knowledge (Bereiter & Scardamalia, 1993, 46, 61).

Through the instructions that encouraged initiatives, the teachers persuaded pupils to relate their own thoughts or experiences on the technique taught. In these instructions, the plans of a novice and the expertise of a skillful handworker were combined in a discourse. Such instructions encouraged pupils to be creative (Lindh, 1989, 21, 23). In these instructions, there were also features that are typical of the
methods of ‘vision teaching’: pupils’ own visions and plans were used to guide the craft process (Metsärinne, 2003, 12, 20).

**Direct instructions** were straightforward manuals for the work process. They were connected especially to carrying out performances. Direct instructions were given in the form of an order and they usually did not contain alternative ways to complete the performance.

The teachers also used work instructions with which they did not try to check pupils’ expertise or understanding, but directed them to solve problems. These instructions were separated to a category called *setting problems*. They contained a problem task that the pupils had to solve either by discussing or through working. The problems were usually closed; in other words, a solution (Suojanen, 1993, 59-60) already existed.

The instructions that concentrated on *planning instructions or course of lesson* contained a description of the stages of instructions or lessons. Teachers told pupils what subjects would be discussed and what tasks pupils would carry out during the lesson. These instructions helped pupils to perceive the course of a lesson or a performance.

Instructions focused on *controlling the group* were connected to arranging and directing a group of pupils or individual pupils during instructional situations. Controlling pupils’ disturbing behavior was not included in these instructions, but their objective was to organize the pupil group in order to reach didactic goals.

**4. Conclusion**

As results of this study, ten different categories for contents of instructions are introduced. The two most common contents of instructions described the concepts and procedures and gave feedback. The instructions used were characterized by their connections to concrete examples: clear, descriptive and developmental. The most central information in the contents of instructions was the knowledge of experienced artisans about the subject matter and the feedback related to pupils’ work. The contents of instructions as well as their quantitative occurrence in the data suit the picture of crafts teaching outlined by earlier studies. The results can be applied to practices of crafts teaching in order to realize the aims of the curriculum.

Perhaps the most significant outcome of this study is the development of the categories of instructions of the study of Fogarty et al. (1983) in the context of handicrafts. The categories and theory helped to see the versatility of the instructions. The instructions used in crafts lessons have many similarities to instructions used in lessons of other subjects (cf. Fogarty et al. 1983). However, according to the results of this study, it seems that those instructions used in crafts lessons have some specific elements that are typical of crafts teaching. The instructions used in crafts teaching seem to be examples that are concrete, descriptive, developmental and illustrative. Those specific features implied alterations and additions to the classification body. E.g. the direct, procedural instructions the teachers used were clearly different from instructions of any other category and their quantitative share of the data was significant. They were also a somewhat typical form of crafts instructions. Therefore separating them as a new category added a distinctive feature of crafts teaching to the original classification body.

The most central information in the instructions was the (tacit) knowledge of a skillful artisan about the objectives (e.g., procedure, materials, tools and products) and the feedback about the pupils’ work. These results are consistent with the results of some other studies and theories on crafts teaching (cf. Suojanen, 1993; Johansson, 2002; Brandt, Farmer & Buckmaster, 1993, & Romiszovski, 1999). The contents of instructions and their quantitative occurrence in the data reflect rather well the practices of crafts teaching as well as learning and the production of artifacts during crafts classes.
The different instruction types discovered in this study offer concrete tools for directing pupils effectively and diversely. By using various types of instructions, teachers can guide pupils proceeding at different stages of work as well as respond to their learning strategies and needs. Realizing the versatility of instructions also makes it possible to use them more appropriately and meet the aims of the curriculum better. By varying instructions, teachers can make the learning environment of crafts classes more meaningful for pupils (cf. Autio, Hietanoro & Ruismäki, 2010, 358). The variety of instructions also broadens the image of craft teachers’ professional skills.

This study raises some interesting questions for further studies. Firstly, investigating crafts teachers’ arguments for using instructions through stimulated recall-studies could deepen understanding of their professional skills. The arguments could help to explain how teachers pass on their craft knowledge to pupils and awaken discussion about the ability to explicate and transfer tacit knowledge. Secondly, an interesting subject to explore would be the instructions pupils give to each other. In the video data of this study, it can be seen that pupils indeed often guide one another during crafts lessons. Pupils’ own instructions could give information on how they perceive the taught subjects and on their concepts of artifacts and their production (cf. Ekström et al., 2009). On the other hand, these instructions might help to understand the learning strategies pupils use when learning crafts skills.

Instructions are of such importance for pupils’ learning process (cf. Ekström, 2006, 126) and for meeting the aims of curriculum (Gaskins et al., 1993) that further studies on them would be beneficial. Describing and understanding teachers’ artisanship and practices of teaching might offer means to developing crafts teaching. Gaskins et al. (1993, 278) state that instructions have significant role in realizing curricular reforms. Instructions could be a way to take these reforms all the way to the practices of crafts teaching.

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