The Development of Sloyd Teacher Students' Self-Directed Learning Readiness

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This research is the first part of a longitudinal study of sloyd teacher students' self-directed learning of craft & technology studies at the end of bachelor level throughout three decades in Finland. Sloyd education is the main subject in the sloyd teacher study program in University of Turku and Åbo Akademi University in Finland. These sloyd teacher study programs progresses to the master's level of education and provides readiness to teach the school subject sloyd in comprehensive and high schools. This study is focused mainly of the craft and technology combination in purposes of sloyd education in university of Turku. The studies consists mainly of wood, plastic, metal, information and textile technologies, mechanical engineering, electricity and some basics of automation technologies, research methodologies, pedagogics and product planning. The aim of the present research was to study whether there are any Self-Directed Learning Readiness (SDLR) differences between the craft & technology studies of sloyd teacher students in the year 1992 and 2002. The main result was that the 92-group had higher SDLR -points compared to the 02-group. The main conclusion is that craft & technology studies require plenty of time for students' development of self –directed learning that is adequate for sloyd teacher education.

Key words: Sloyd education, Self-direction learning; self-directed learning readiness, Sloyd (craft & technology) teacher education

Introduction

This research is the first part of a longitudinal study. The purpose is to get information on sloyd teacher students' Self-Directed Learning Readiness (SDLR) over three decades at the University of Turku in Finland. Sloyd education has been a discipline for 23 years and it is the main subject in the sloyd teacher study program. The sloyd teacher study program progresses to the master's level of education and provides readiness to teach the school subject sloyd (craft) in comprehensive and high schools. Self-directed learning is a process by which individuals manage their own learning by developing and then addressing personal learning outcomes. (Hays 2009). SDL is not what he/she can do under a teacher's direction, but what the teacher has enabled him to decide and to do on his own. (Gibbons 2012). The key features of SDL include reflection, goal setting, and an orientation toward action. (Du 2012).

The aim of the present research was to study if there are any SDLR differences between sloyd teacher students in the years 1992 and 2002 at the end of bachelor level craft & technology studies. Craft & technology studies in 1992 and in 2002 was comprised mainly of research methodologies, pedagogics, wood-, metal-, plastic-, stone-, machinery-, textile-, electricity- and information technologies, product planning studies and the knowledge needed for a scholarly thesis and other craft projects. The results of the study are used to determine whether there are any SDLR effects of changes to sloyd studies and study context. The purpose of the second half of this longitudinal study is to get information in 2012

and compare these results with this part of the study. The underlying factors are that teaching hours were reduced in craft & technology studies in the last decades. At the same time students' SDLR is developed in the curriculum so, that teaching supports students' self- directed learning. The interest to do research on this topic has followed from the dissertations of Metsärinne (2003) and Virta (2005). Metsärinne (2003) studied comprehensive school's 9th year students' self-directed learning readiness within sloyd. There were applied many qualitative methods which SDLR measuring supported. Virta (2005) studied teacher students' SDL with Guglielmino's SDLRS and by open ended questionnaire that concentrated on the students' SDL readiness and activities. In both studies Guglielmino's (1978) Self-Directed Learning Readiness Scale was applied.

The main goals in sloyd teacher education have been to educate teacher students' individual growth in the teaching of craft & technology (Metsärinne, Kallio, Kullas & Pirttimaa 2011). Students' have to define and make the production processes behind the product functions and technology for teaching purposes. (Peltonen 2009a). This requires students' to have metacognitive skills and craft sense (Virta 2006; Peltonen, 2007). Learning is associated with students' self-direction and self-regulation through the constructing of sloyd study contents in craft & technology (Metsärinne 2009a). However, students' learning styles have notably changed with regard to the contents and methodologies for students' craft process creating. As well sloyd equipment for technology control along with technological procedures was renewed. Also, since the beginning of the 1990s study projects have changed toward initiative work processes using learning research -based production. (Peltonen, 2003, 2009b; Metsärinne & Kallio 2011). At the end of bachelor studies students aggregate and apply the craft & technology contents together. In this study the research target is the students' SDLR of sloyd education at the end the bachelor's level studies.

The present study asks the following research questions: 1) What kind of differences -92 and -02 students' had in SDLRS -points in the end of basic and subject studies? And 2) What kind of differences of SDLRS -dimensions -92 and -02 students' had in the end of basic and subject studies?

Theoretical background

The origins of self-directed learning can be traced back to John Dewey as he has written that all persons are born with an unlimited potential for growth and development (Dewey, 1938). The concept of self-directed learning emerged in North American literature in the mid-1970s. The role of the teacher in adult education is to help adults learn. (Wilcox, 1996). According to Wilcox (1996), Tough's (1971) learning projects research had demonstrated that self-teaching was a natural process among many adults, and Knowles (1975; 1980) built his andragogical model on the basic assumption that adult learners are self-directing (see also Huang, 2008). Since then, self-directed learning has become a prominent feature of adult education theory and practice – some educators suggest that adult education is synonymous with self-directed learning. According to Edmondson, Boyer and Artis (2012) SDL is significantly and positively related to academic performance, future aspiration, creativity, curiosity and life satisfaction.

The teacher's purpose is to guide the learner's stage of self-direction from dependent to self-directed with. (Metsärinne 2002, 2003, 2007; Grow, 1991). An effective teacher of adults focuses on learning topics and tasks that learners have identified as meaningful to them, and accepts the fact that the power for growth and development is in the learner's hands. (Wilcox, 1996). It is also important that educators gain a firsthand perspective of students' personal, emotional, and professional growth. (Hains & Smith 2012, 371). For example the Personal Responsible Orientation (PRO) model offers a basis for

examining self-directed learning as a skill, which encompasses the teaching-learning transaction (Holt & Brockett 2012, 2076).

The three main components of self-directed learning are topic knowledge, procedural skills and self-monitoring. (Lieberman & Linn 1991). Mäkinen (1998) argues that the main component of self-directedness is metacognition. Mäkinen states that metacognitive skills are the basis for self-directed learning. Mäkinen's view is closely connected to the concept of self-regulated learning and metacognition (see e.g. Olaussen & Bråten, 1999; Paris & Winograd, 2001; Vermunt, 1996, 1998; Vermunt & Verloop, 1999; Zimmerman, 1989). Those researchers who regard self-directed learning as a process vary widely in the specificity and focus of their conceptions and in the degree to which they include personality characteristics of the learner as influences. (Oddi, 1987).

Candy (1991) has constructed a conceptual framework for understanding self-directed learning as both a goal and a process, which embraces four distinct phenomena: personal autonomy, self-management, learner control, and autodidaxy. The literature on adult education emphasises the characteristics of the learners and the learning process and provides insight into methods that may be used to facilitate the learning. (Wilcox, 1996). They who effectively engage in self-directed learning are more creative and curious. (Edmondson, Boyer and Artis 2012, 45).

In contrast to the conceptualization of SDL as a process, some researchers, for example Chene, Fellenz, Oddi, Knowles and Guglielmino see it more as a personality characteristic (Svedberg, 2010). Several researchers state that the personality characteristics and skills of the self-directed learner are: initiative, emotional independence, responsibility, a strong desire to gain knowledge and to learn, ability to dialogue, reflectivity, planning, an ability to organize tasks, goal-orientation and intentionality (Heinonen, 2002; Koro, 1992; Leino-Kilpi, 1993; Ruohotie, 1993; Varila, 1990, Virta, 2005, 2006). Guglielmino (1978) regards setting personal goals for learning, identifying learning resources and evaluating the success of learning as important skills. Guglielmino's personality characteristics of self-directed learners are: initiative, independence and persistence in learning, responsibility for one's own learning, viewing problems as challenges, capability of self-discipline, curiosity, a strong desire to learn or change, self-confidence, an ability to use basic study skills, to organize and set an appropriate pace for learning and to develop a plan for completing work, enjoying learning, and goal-orientation.

Several researchers consider that self-direction consists of four basic dimensions (Vesisenaho, 1998). Usually the dimensions, components or factors of self-directed learning have been based on studies using Guglielmino's (1978) SDLR-scale (see e.g. Kolehmainen, 1991; Koro, 1993; Kreber, 1998; Pasanen & Ruuskanen, 1989; Pasanen, Ruuskanen & Varila, 1989; Varila, 1990; Vesisenaho, 1998, Virta 2005). Guglielmino's SDLRS is one of the most frequently used in SDLR assessment (Svedberg, 2010; see also Guglielmino & Guglielmino, 2008). Originally, the SDLR-scale has eight factors, but some researchers have changed its construction to four factors for better validation and reliability (e.g. Varila, 1990b). Pasanen et al. (1989) have translated the SDLR-scale into Finnish. Koro (1993) decided to use Varila's (1989) model because his research subjects were similar to those of Varila. Koro (1993) found four dimensions in his wide study concerning self-directed learning. His dimensions were: 1) intrinsic motivation and planning, 2) self-confidence and initiative, 3) creativity and flexibility and 4) self-evaluation. A salient feature in the first dimension is intrinsic motivation towards a desire to learn. In the second dimension a learner can take feedback and is also capable of self-evaluation. An independent learner is capable of making choices. Finding and using flexible solutions is closely connected to self-confidence. The fourth dimension contains the learner's openness and curiosity towards new challenges. The learner is critical and ready to question traditional solutions and to find new ones. If the learner is not confident, he/she is not able to use these solutions. (See also Virta, 2005, 2006).

Brookfield (1986) has been one of the most articulate critics of self-directed learning, warning of the dangers of orthodoxy of self-directed learning. Yet he continues to be one of its most ardent supporters, arguing that self-directed learning honours both humanistic and critical traditions in adult education and allows adults to achieve autonomy in and through learning (Brookfield, 1993). In sloyd education there has also been a critic of self-direction. There are stated that especially in successful hand skills of learning is seldom meaningful without guided learning processes. Teacher-centered learning lead to independent mastery of certain subject matter; and seldom can a learner him/herself ensure the conditions of self-directed learning. This implies that too much freedom in the early phase does not support students' self-directed learning.

Some researchers have studied self-directed learning and readiness within sloyd education. Kolehmainen (1991), Metsärinne (2003) and Virta (2003a, 2005) have used Guglielmino's (1978) scale as a basis. Kolehmainen (1991) studied I-IV year sloyd teacher students' self-directed learning readiness. He found out that previous working experience correlated with the 5th dimension (love of learning) in the eight- dimension model. Furthermore, a critical attitude towards learning and previous experience of sloyd subject at comprehensive and high school level correlated with the first dimension, the perception of oneself as a learner. Metsärinne (2003) studied comprehensive school's 9th year students' self-directed learning readiness within sloyd. Teaching and learning theories of sloyd education are associated in SDLR. One main goal is to guide and make better environment of pupil's life more viable. The core for that is to educate pupils' initiativeness, visioning and producing production activities. Pupils' SDLR was supported step by step with different kinds of sloyd processes during grades 7-9. (Metsärinne, 2002). It gave frames to do experimental research where pupils vision and define their own goals before and during production activities. Teacher was a researcher in the experiment. In this sloyd vision teaching and learning research the main finding was that in comprehensive school pupils have quite good self-directed learning readiness. This support consideration that SDLR –scale is valid for all levels of education. (Guglielmino 1977, 80; Mäkinen 1998). The learning results were also in line of national curriculum aims although pupils defined and implement goals from their own life situations. Virta (2003a; 2005) found that the average SDLRS points were fairly good in teacher education. However, students' own evaluations of their self-direction were not as good as the SDLRS indicated. These results imply that students need more supportive environment for self-directed learning. This is crucial because if teacher is not capable of evaluating and reflecting his/her own SDL, how they would be able to support pupils in this matter? Malik & Shabbir (2008) wrote that although a main premise of higher education is that students are responsible of their own learning, problems arise when the focus throughout pre-university education is on passive rote learning. In such situations students are mostly dependent on the teachers and information. Furthermore, this situation might lead to educational frustration. Altogether, SDL is not as clear phenomenon to understand and implement in university studies.

Methods

In the present study, Varila's (1989) version of Guglielmino's SDLR -scale is used because Kolehmainen collected the data 1992 using it. Other well-known instrument is the Oddi Continuing learning Inventory (OCLI) (Oddi 1986). Newer is the Bartlett-Kotrlik Inventory of Self Learning (BKISL) (Bartlett-Kotrlik 1999). However, no further studies reported BKISL's validity and reliability. (Chou 2012, 34). According to Kolehmainen (1991a) the SDLR- scale is usable and valid in sloyd education. In his research SDLR –scale was divided acceptably in eight dimensions. (Kolehmainen 1991a, 89-113). Dimensions or components of self-directed learning have been often based on researches using Guglielmino's (1978) SDLR-scale and it is widely known and developed in education.

(see e.g. Kolehmainen, 1991; Koro, 1993; Kreber, 1998; Pasanen & Ruuskanen, 1989; Pasanen, Ruuskanen & Varila, 1989; Varila, 1990b; Vesisenaho, 1998, Metsärinne 2003, Virta 2003 and Deyo, Huynh, Rochester, Sturpe & Kiser 2011).

Guglielmino's scale has also been criticized SDLR- scale is too much based on book-learning and formal learning. (Varila 1990, 44). Field (1989) has criticized the validity and the factor structure of the SDLR-scale. The SDLR- scale does not separate enough if respondents' has about same kind of education. (Field 1989, 138). The concepts in the scale are broadly-based and multidisciplinary. One person cannot understand the concepts, relationships, or the combined total. (Field 1989, 129; Field 1990, 102) According to Field results of the scale should tell you something about the self-direction capabilities of persons who have received poor scores. (see also Varila 1990). The scale should be regarded not only expert valid context. (Varila 1990, 44-45). In addition, the scale is a problem with the negative impact on parts of the question in relation to the overall results. Guglielmino (1978, 77) has referred to the development of them and Field (1990, 101; 1989, 129, 133-134) is mentioned that the negative issues are one of the main factor in the meter gauge for poor validity. According to Bonham (1991) low SDLRS scores have been a problem because most scholars seem to assume that low scores indicate a preference for having someone else plan the learner's activities. The consequence thus seems to be that the other-directed person is not motivated to make the effort that self-planning requires. Bonham has presented data raising the possibility that low SDLR scores indicate a dislike for any kind of learning. The real self- directed learning is probably thanks to the work of teacher. (Bonham 1991). Yet the level of self-direction needed may change in different context and might be different in different content areas. (Song & Hill 2007, Candy 1991). Knowledge acquisition is a problem, because frame of reference of the scale is presented as structured and ready. Validity of the scale is the best when the respondents particularly appreciate mental and cognitive performance of their own. (Varila 1990).

Despite the criticism toward SDLRS it is an appropriate tool for measuring willingness and capacity for self-directed learning and, to some degree at least, for measuring individuals' self-concepts as autonomous learners. (Kreber 1998). Virta (2006) came to similar conclusions. He found that even though the SDLRS points were fairly high, the actual level of SDLRS was not in the students' own evaluations. Guglielmino (1989, 235-240) are introduced results which support reliability and validity of the scale. His announcement is also that the scale has been used extensively and it is commonly found that the scale' reliability is high. (Kolehmainen 1991, 59; Wichadee 2011, 45.) According to Koro (1993) adult students (n = 782) and Orawiwatnakul and Wichadee (2011) adult students (n = 5445) SDLR can use it to find quite reliably and valid. Results from comprehensive school (N137) support the same opinion (Mäkinen 1998) as well as research (N= 260) according to which the scale is generally considered sufficient is reliable and-valid (Varila 1990).

Kolehmainen used 7 options in his scale, which was applied in Varila's (1989) version of the SDLR-Scale in 1992. We decided to modify the scale in-to a 5-point likert scale by combining the extreme options. In this study, the SDLR-scale's reliability was good, the Crohnbach's alpha being .86. Reliabilities within subscales were between Crohnbach alphas of .51-.75. Reliability and parametric scalability analyses were performed to form reliable subscales using the theoretical background. The four dimensional model of SDLRS was adopted from Koro's (1993) study. The statistical data was analysed by means of T-test and cross tabulations. Koro's (1993) four-dimensional model of self-directed learning was used in the analysis. From the results it is conceived whether students' SDLR connected to their self-regulation in the different decades study programs. The participants of this study were 64 sloyd teacher students (n=32 in -92 and n=32 in -02). A small amount can't be used for

quantitative generalization, but the data comprises all third year students in -92 and -02. In this way, case study data was collected in two phases, in spring 1992 (92-group) and 2002 (02-group).

Results

Credit points

The credit points for craft & technology studies were almost same in –92 and –02, as can be seen in Table I. Sloyd teacher students in –92 were in the phase of moving towards more independent project work. In 2002, learning focused on more clearly established practice of production process with craft research methodologies, and it became important for the students to learn more technological knowledge in craft and technical environments.

Table I. Entire amounts of lectures, small group studies and total credit points in the end of bachelor level studies of craft & technology (Sloyd teacher study program books 1992 and 2002 at University of Turku)

	Amount of craft & technology studies in year 1992	**Amount of craft & technology studies in year 2002**
Lecture	382 hours	160 hours
Small group studies	915 hours	766 hours
Total	1297 hours / 68 credit points	926 hours / 68 credit points

From table I it can be seen that both lectures and demonstrations have decreased in the sloyd education basic and subject studies of craft & technology. The lectures have decreased by 222 hours and demonstrations by 149 hours. This means that -02 students need to be much more self- directed to get, collect, construct and control technological knowledge and skills than -92 students. At the same time, teacher-directed projects were removed nearly completely.

Students' SDLRS –points

The mean for SDLRS-scores was 159 with the 92-group and the range was from 119 to 188. The mean scores were above the national and international level (see. Guglielmino, 1978; Koro, 1993; Pasanen, Ruuskanen & Varila, 1989; Varila, 1990.) The average among the 02-group was 146 and the total range was from 98 to 175. The t-test revealed a significant difference between the groups concerning the SDLRS-points. Year 1992 students had significantly higher SDLRS-points compared to the students in 2002.

TABLE II. Groups and SDLRS-points

	Groups **92-group** (N=32)		**02-group** (N=32)				
	Mean	**Sd**	**Mean**	**Sd**	**F**	**t**	**Sig.**
SDLRS-points	159.03	15.34	145.84	15.78	.002	3.39	.001**

**Significance at level p<.01

Students' SDLRS –dimensions

Table III shows that there were significant statistical difference between the groups concerning intrinsic motivation and self-evaluation. The weakness in the result is low reliabilities in the dimensions of the scale. On the other hand the Crohnbach's alpha being .86. in the whole SDLR-scale was good and all the target population was studied. The result is indicative. 1992 years students' self-directed learning readiness is emphasized more on intrinsic motivation and self-evaluation.

TABLE III. Groups and SDLRS-dimensions

SDLRS-dimensions	Groups						
	92-group (N=32)		**02-group** (N=32)				
	Mean	**Sd**	**Mean**	**Sd**	**F**	**t**	**Sig.**
Intrinsic motivation and planning	4,16	,47	3,53	,58	1,02	4,74	.000***
Self-confidence and Initiative	3,71	,61	3,58	,48	1,58	,94	.351
Creativity and flexibility	3,80	,49	3,67	,39	1,55	1,16	,250
Self-evaluation	3,82	,54	3,19	,53	,002	4,71	.000***

***Significance at level p<.001

Discussion

The main finding of the present study was that the 92-group had significantly higher SDLRS-scores compared to the 02-group. The weakness in the result is low reliabilities in the dimensions of the scale. There is also noticed that SDLR –scale has problems in the method chapter. One main problem in sloyd education might be that SDLR- scale is too much based on book-learning and formal learning. One person cannot consider how the results can give new information to develop craft & technology studies. From the reduced credit points of view the craft & technology studies demand much more self-directed readiness and learning for 02- students than -92 students. In students third study year, they also need self- directed learning for their candidate study, in which they make their own study project of learning research based production. These results raise question of what things have changed during the decade and were there any learning differences before university studies of the two groups.

In the eighties school sloyd had almost the same aims which were created when comprehensive school system started in early seventies in Finland. Technical work and textile work subjects had equal treatment as a school sloyd education. The old school technical craft subjects from sixties that were woodwork, metalwork, machinery and electronics and also technical drawing were integrated in one technical work subject. However the old subjects were taught mostly as separate contents even in eighties. For the 92-group this indicates well orders comprehension of technical and textile work of sloyd. The separate contents and the structure of sloyd teacher education in the early nineteen's does not indicate the better SDLR. One could guess that more integrated and research based study program would have indicated better SDLR for 02-group. Most of students' in the 02- group have studied school sloyd in the nineties. At that time research based sloyd education and craft science in teacher education in Finnish universities gave new ground for schools sloyd from the beginning of the 1980.

Also new foreign trends of technology education and design based craft studies have an effect on sloyd. There were efforts to teach sloyd without the traditional subject partition and to integrate new information and automation technologies. For the 02-group this indicates better SDLR than the 92-group. The SDLR results are not in line with the theoretical indication. According to the theory of sloyd education as well as technology education there should not be strict subjects of technology for the future's life-management skills as was in the 02- group. It can indicate that already in school level teachers have to guide pupils own technological comprehensiveness with crafting and take in to account their own life situations and not to teach newest technologies as much as possible. Pupils need to learn and apply mundane technologies in many active ways for understanding new technologies widely. (Metsärinne 2009b). In addition pupils need self- directed craft learning for choosing ever-changing exotic technologies and applying them sensibly for their life-management skills.

In the introduction the changes within craft & technology studies in basic and subject studies in sloyd teacher education program were discussed. Another change that has taken place is that high school has changed from graded to non-graded grouping in between at -92 and -02 (see e.g. Kuusela, 2003). All of 92- group of students had studied in a more traditional high school system, whereas presently high schools are non-graded. Additionally the -02 group had given more advanced ICT skills than the -92 group. In sloyd education it may be even so that it is better concentrate essentials of the discipline basics without many information and communication technologies. Non graded high school system provided also more freedom for the -02 group of students own schedule making than the -92 group of students. Too much freedom and too little guidance might not support self-direction in the early phases of studies at high school level or in university settings. Although Metsärinne (2003) found that even comprehensive school' pupils can be quite self-directed in sloyd learning (self –reliant study). These study's findings and the changes in high school indicate that the changes toward more SDLR learning between at 1992 and 2002 might not supported students' self-directed learning in SE. University students need more small-group teaching although it is diminished. (table 1). Also the changes in the craft & technology studies of sloyd teacher education program might enhance the current development of SDLR. Furthermore, Lindblom-Ylänne, Lonka & Leskinen (1999) argued that higher education settings do not support students' self-regulative and deep level learning.

The -92- group had significantly higher points in two dimensions, intrinsic motivation and planning and self-evaluation than the 02- group. The reason might lie in the differences in the study programs. In the early 90's there was less contents and more teaching. Also, there were more teaching resources per credit point. Taking into account these issues, the older study program might have been more supportive in intrinsic motivation and planning and self-evaluation. These results should take into account when planning the next sloyd teacher education curriculum and teaching methods for students. Students' self-directed learning must be supported in a new way to prepare future sloyd teachers to the quickly changing work life and to manage renewable technologies. One of the problems in Finland after university studies is that students have too little entrepreneurship and attitude without risk. Also the teacher students want a secure teaching position and they might not see entrepreneurship tempting sufficiently. SDL with entrepreneurship education in sloyd teacher education via school sloyd seem to be important link for solving this pupils' future problem. Unfortunately SDL is important part of the game also because of hardening competition and diminishing resources in universities.

In the second phase of this longitudinal research is to compare SDLR between the groups -02 and -12. In addition, it would be interesting to find out if there are connections between SDLR and self-regulation of learning (SRL). This information was gathered from the -02 and -12 groups by the SDLR-scale and the SRL scale of the Task Booklet of Learning (Lonka & Lindblom-Ylänne 1996). In addition the learning contents have been increased while teaching has been reduced from 2002 to 2012.

Furthermore, the index of teaching resources per credit points has been also reduced. At the same time students' self-reliant studies have increased. The self-reliant studies were supported by course design and also with for example web-based materials (see e.g. Kullas 2005; Virta 2006). These indicate that the next measurement in 2012 is important to analyse, since the demands and amount of craft & technology content has increased substantially in the sloyd teacher education. In the future it would be interesting to find out how SDLR and SRL are developed. If the tendency is still towards lower abilities in SDLR and SRL of craft & technology studies the reason might be lack of teaching resources, tighter study schedule and that self-reliant study development is not sufficient in sloyd teacher education.

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