Creative Education, 2014, 5, 1821-1833
Published Online November 2014 in SciRes. http://www.scirp.org/journal/ce
http://dx.doi.org/10.4236/ce.2014.520203

Scientific Research

Teachers' and Teacher Students' Conceptions of Learning and Creativity

Iida Vedenpää, Kirsti Lonka

Department of Teacher Education, University of Helsinki, Helsinki, Finland
Email: kirsti.lonka@helsinki.fi

Received 26 August 2014; revised 20 September 2014; accepted 9 October 2014

Abstract

The aim of this study was to explore what kinds of conceptions of creativity and learning Finnish teachers and teacher students expressed, and how these conceptions were related to the respondents' epistemologies (conceptions of knowledge and learning). The participants (n = 89) answered an e-form, consisting of 3 open-ended questions (conceptions of learning, creativity and the connection between the two). In addition, there were 23 two-part Likert-type statements on epistemologies (Lonka et al., 2008) as well as 10 background questions. Mixed method approach was used to analyze the conceptions that the respondents' expressed. Two qualitative categories of conceptions of learning came from previous research, *Constructivity* and *active epistemology* (Lonka, Joram, & Bryson, 1996). A new category also emerged: *Collaborativity of learning*. The answers about creativity were classified based on whether creativity was viewed as an inborn ability or something changeable, whether focus was on product or process, and whether creativity was seen as collaborative. The participants' open-ended conceptions of learning reflected a view of learning as teacher-regulated assimilation, whereas their (structured) epistemologies higlighted reflection and deep-level learning. Creativity was viewed as something that can be improved, focusing on the collaborative process. A link between learning and creativity was identified. It shall be of interest to see, how such epistemic stands would be related to group work.

Keywords

Learning, Creativity, Conceptions, Epistemologies, Teachers, University Students, Beliefs, Epistemic

1. Introduction

Rapidly changing knowledge society sets new demands for our school system (i.e. Sahlberg, 2009; Hargreaves,

2003; Hakkarainen, Lonka, & Lipponen, 2004). Moran (2010) questions, how educators will accomplish the feat of educating the next generation for a future that cannot be foreseen and is not readily predictable from what currently exists. It is clear that in constantly evolving knowledge society, propagating knowledge from the past is not enough anymore.

In recent research literature, the importance of creativity and collaboration have been emphasized as key components of 21st century learning (OECD, 2008). Finland's report *Basic Education* 2020 (Ministry of Education and Culture, 2009) states that teaching should encourage creativity and innovation. According to *Basic education* 2020-report, promoting creativity in schools is attached to the methods of teaching that are used in schools: "Creativity requires chances and space for spontaneous and open-minded thinking, doing and enthusiasm as well as finding one's own strengths." Sahlberg (2011) claims that the demand for better quality teaching and learning is universal. According to Sahlberg (2010), conceptual learning, engaging in creative action and understanding innovation are essential elements of contemporary schooling in a knowledge society. Hakkarainen, Lonka, & Lipponen (2004) bring up an increasing need to improve learners' critical thinking and skills in creative problem-solving through interaction between individuals and cultural processes.

Conceptions of learning, intelligence and knowledge have significantly changed in the past 20 years (Dweck, 2008). Intelligence is not seen as a stable ability anymore. As stated by Hakkarainen, Lonka, & Lipponen (2004), researchers have recently increasingly emphazised that a person's intelligent activity is based on interaction between physical and social environment. Current zeitgeist in educational psychology and research in learning emphasize constructive learning processesand sociocultural approaches to learning, in which learning is understood as social in nature and teaching is seen as instructing processes, not simply transmitting knowledge (i.e. Bereiter, 2002).

Plucker, Beghetto, & Dow (2004) bring out the fact that our knowledge of creativity—and thinking and learning in general—has advanced over the past several decades, but our strategies for enchancing creativity have changed very little. Reforming school is a complex and slow process (Sahlberg, 2011). According to Sahlberg (2011), educational change in Finland has been successful within last 20 years: the use of resources in the school system is efficient and young people learn well. Can we still do more to regenerate competencies and working skills in the future knowledge society? Are creativity and collaboration truly emphasized in schools?

It is important to reflect on what kinds of ideas of learning, studying and knowledge underlie our theories and inventories (Lonka, Olkinuora, & Mäkinen, 2004). People have implicit theories on intelligence and creativity (Sternberg, 1985; Blackwell, Trzesniewski, & Dweck, 2007). Lonka, Joram, & Bryson (1996) refer to Sternberg (1985) and Bereiter & Scardamalia (1984) as they present that the beliefs and conceptions of learning and knowledge play an important role in, and provide a framework for, how people understand and explain phenomena such as school learning and intelligent behavior. In their article they conclude that: "it may be difficult to implement new innovations of teaching and learning in society if ordinary people do not share the views of experts who suggest the reforms" (Lonka et al., 1996: p. 241). Furthermore it is important to explore teachers' conceptions of learning and creativity if we pursue to develop creativity fostering learning environments in schools.

The exploratory goal of the present study is to understand teachers' epistemologies and conceptions of learning and creativity. It is important to look at the conceptions of teachers and future teachers, since they may have consequences in the classroom.

SAL (Students approaches to learning) tradition of research aims to describe and measure students' epistemologies and conceptions of learning. MED NORD is an instrument developed within SAL framework (Nieminen, 2011) for measuring conceptions of learning, study orientations and wellbeing. MED NORD has been validated as an appropriate research instrument measuring students' wellbeing and study orientations. (Lonka et al., 2008). For this study, parts of MED NORD was used to measure primary and secondary level teachers' and teacher students' conceptions of learning.

1.1. Theoretical Concepts in the Study

1.1.1. Learning

Learning is a complex phenomenon. The research in learning has shifted from looking at individuals who acquire knowledge and intelligence as stable towards highlighting the active, constructivist and collaborative aspects of learning. In sociocultural approaches to learning, it is seen as a part of social processes of knowledge construction mediated by cultural tools and norms (Muukkonen-van der Meer, 2011). Vygotsky's zone of proximal development (Vygotsky, 1978) views learning as a social activity, problem solving with more capable

peers. Teacher's role is to be a facilitator of this process.

Sfard (1998) wrote about two metaphors of learning: acquisition metaphor and participation metaphor. Acquisition metaphor sees the mind as a container of knowledge. In the acquisition metaphor, learning is seen as a process that fills the container. According to Paavola, Lipponen, & Hakkarainen (2004), the acquisition metaphor has been a prominent one in the history of learning sciences. Participation metaphor views learning as participation in various cultural processes and shared learning activities. In the participation metaphor, knowledge is an aspect of participation in cultural practice, and learning is a matter of participation in practices and actions. In their article Paavola, Lipponen, & Hakkarainen (2004) present a third learning metaphor: the knowledge-creation metaphor. Knowledge creation metaphor is based on Nonaka & Takeuchi's (1995) knowledge creation-model, Engeström's (1999) model of expansive learning and Bereiter's (2002) knowledge building. Knowledge-creation models conceptualize learning and knowledge advancement as collaborative processes. Learning is understood as a collaborative effort. In collaborative learning, individuals work towards a common objective aiming for shared knowledge construction in collaboration (i.e. Muukkonen-van der Meer, 2011).

In constructivist approaches to learning, learning is seen as active construction of knowledge, not passive registration of knowledge (Lonka, 1997). Teaching is not seen as transmitting information but rather fostering learning and promoting group processes (e.g. inquiry based learning, phenomenon-based learning) (Lonka et al. 2004). Wells & Arauz (2006) have explored that through collaboration it is possible for teachers to support active construction of students' knowledge and to reduce the transferring of knowledge from teacher to student. According to Litmanen, Lonka, Inkinen, Lipponen & Hakkarainen (2012), activating, student-centered methods and collaborative learning processes contribute to active construction of knowledgeand promote the learners' autonomy and responsibility. Progressive inquiry learning (Lonka, Hakkarainen, & Sintonen, 2000) is based on student-activating instruction. It highlights the active role of the learner and encourages students' own thinking. Through intensive collaboration and peer interaction, resources of the whole learning community may be used to facilitate advancement of inquiry.

Perry (1970) wrote about dualistic and relativistic conceptions of knowledge. He presented that dualistic conceptions of knowledge view knowledge as a set of clear, unchanging facts, as certain knowledge, which can be verified by authorities, whereas the relativistic conceptions of knowledge view knowledge as something that is created and evaluated in specific context and can be supported and criticized by presenting relevant evidence and arguments.

Marton & Säljö (1976a, 1976b) found two different ways of how the students approach their learning tasks: memorizing the text and rote learning are known as surface approach, as paying attention to the meaning, understanding comprehensible wholes and critical evaluation of the study material are known as deep approach. "Deep approach" and "surface approach" to learning are broadly used terminology in the research of learning (Nieminen, 2011). Previous study shows that surface approach tends to correlate with dualistic ideas of knowledge (Lonka, Sharafi, Karlgren, Masiello, Nieminen, Biergegård, & Josephson, 2008).

Metacognition is an important aspect in terms of student learning. Metacognition refers to the monitoring and control of cognition (Whitebread & Pino Pasternak, 2010). This means the activities that help the students to plan their learning and regulate or change it (Lonka et al., 2004). Metacognition is attached to self-regulated learning and self-regulated learning serves students' learning motives in high quality of learning (Heikkilä, Niemivirta, Nieminen, & Lonka, 2011).

Lonka & Lindblom-Ylänne (1996) presented different aspects of studying that may lead to either superficial learning or deep-level learning. According to Lonka & Lindblom-Ylänne (1996) the approaches that were related to superficial learning are surface approach, reproduction of knowledge, teacher-regulated learning, passive epistemology, dualistic view, and intake of knowledge. Deep approach, transformation of knowledge, self-regulated learning, active epistemology, relativistic view and construction of knowledge were presented as approaches that may lead to deeper levels of learning (Lonka & Lindblom-Ylänne, 1996).

1.1.2. Creativity

Guilford's (1950) speech for American Psychologist's Association is often referred to as a starting point for contemporary creativity research (i.e. Sternberg & Lubart, 1999; Baer & Kaufman, 2006; Sawyer, 2012). In his speech, Guilford expressed his concern for the lack of creativity research in the first half of the 1900's. Guilford demanded more attention and appreciation for creativity research. He pondered already in 1949: Why do education and creative action have so few correlations? Why does education system produce so few creative individuals? He asked two important questions: "How do we find creativity from our children, and how can we promote

the development of creative personalities?" (Guilford, 1950). After Guilford's comment, the interest in creativity research evolved and, since then, almost all significant psychologists have researched creativity, and what it means to be creative. (i.e. Sawyer, 2012; Beghetto & Kaufman, 2007).

After Guilford's speech, psychological research in creativity focused on exploring the creative individual. Researchers were interested in personal traits and intelligence of creative individuals. The next stage in creativity research was the researchers' growing interest in cognitive processes of creative thinking (Sawyer & DeZutter, 2009). In the 1980's the researchers started to show interest in the social and cultural factors of an individual's creativity. Theresa Amabile (1983) wrote that in creativity research it is not only important to investigate the personality and cognition of a creative individual, but also take the social context into consideration. Amabile (1983) stated that the research had concentrated too much on the individuals and their personality traits, leaving the creative situations and social context aside.

Amabile was not the only creativity researcher who questioned the individuality of research in creativity. Mihaly Csikszentmihalyi (1996) explored three elements of creativity: the creative domain, the creative field and the creative individual. Csikszentmihalyi's model of creativity is known as a systems model of creativity. Creative domain means culture, symbolic rules and procedures as well as symbolic knowledge shared by a particular society or humanity as a whole. Creative field is the social community that acts in the domain, and the individuals (experts) who decide whether a new idea or product should be included in the domain. Csikscentmihalyi's third element of creativity is the creative person, an individual who acts in the creative field, using the symbols of the creative domain. According to Csikscentmihalyi's systems model of creativity, creativity is jointly constituted by the interaction among domain, field, and person. Creativity can be any act, idea or product that changes the existing domain or transforms existing domain into a new one. A personal trait of creativity is not what predicts creativity. Systems model recognizes the fact that creativity cannot be separated from its recognition. It is not enough to research the creative individual. Not any great man of history have created anything alone. Creativity is never only in the mind of a person, it must be recognized by the experts in the field and it has to be included in to the domain it belongs. Creativity is always an interaction between an individual's thoughts and a sociocultural context (Csikszentmihalyi, 1996).

Creativity researchers often describe the distinction between Big-C creativity and little-c creativity (Beghetto & Kaufman, 2007). Big-C creativity highlights eminent creative contributions, the breakthrough creativity that changes the field. Little-c creativity emphasizes everyday creativity that may make a solid contribution. Beghetto & Kaufman (2007) brought in to creativity research the conception of "mini-c" that highlights the creative process, not creative product like Big-C and little-c.

1.1.3. Relations among Learning and Creativity

Sawyer & DeZutter (2009) assert a shift in creativity research, exploring the social and cultural dimensions of creativity in 1980's and 1990's, which was inspired by the similar shift in cognitive science—a shift in analysing the distributed cognition,distribution across people, tools, and environments. This was a shift from focusing on internal mental states and processes in both cognitive science and creativity research. Plucker, Beghetto, & Dow (2004) relate creativity to the sociocultural approaches of learning. In the sociocultural point of view social, interactional and collaborative processes are important for learning. Researchers (i.e. John-Steiner, 2000; Moran, 2010) connected collaborational creativity to Vygotsky's (1978) thoughts about socio-cultural characteristics of learning. Moran (2010) states, Vygotsky saw educational development as two-way: the individual also produces and reproduces culture.

According to Plucker et al. (2004) creativity research can contribute to the social constructivist approaches to learning and teaching. Constructivism in a sense, emphasizes the aspects of restructuring knowledge in the process of learning, and overlaps with creativity.

The knowledge-creation metaphor (Paavola, Lipponen, & Hakkarainen, 2004) views learning as a shared problem-solving process. New ideas emerge between, rather than within, people. The knowledge-creation metaphor of learning is about advancing and creating new practices and knowledge, emphasizing the importance of going beyond the information given. Learning is seen as an equivalent to innovative processes of inquiry, where something new is created and the existing knowledge is either substantially enriched or significantly transformed during the process.

Bereiter's (2002) knowledge building approach has been used extensively in educational institutions to guide students and teachers engaging in collaborative efforts to develop their thoughts and ideas (Bereiter, 2002).

Scardamalia & Bereiter (2006) present that authentic, creative knowledge work can take place in the classrooms. Knowledge building views learning as not only as process of advancing personal knowledge, but also as developing collective knowledge (Scardamalia & Bereiter, 2006). Progressive inquiry learning (Lonka, Hakkarainen, & Sintonen, 2000) highlights wondering and asking questions in the learning process. It views learning as meaningful play in which knoewledge is reconstructed. Both knowledge building and progressive inquiry learning are collaborative, creative learning processes where knowledge is reconstructed.

In creativity research (Beghetto & Kaufman, 2007), the concept of mini-c creativity illustrates the relationship between learning and creativity. It highlights the creative process inherent in the development of learning, a dynamic, interpretive process of constructing new, personally meaningful insights and understandings.

Vera John-Steiner (2000) wrote that as the understanding on the functioning of the mind has grown, has it become clear that the productive ideas arise from common thinking (thinking together) and shared problems achieving new perspectives. As stated by Wells & Arauz (2006) succesful collaboration in the learning process is very similar to collective creativity. Essential for both of them is critical dialogue, different perspectives and discussions, which all are generating something new.

2. Research Context

In Finland all the children complete the same 9-year comprehensive education. At the age of 7 children attend the 1st grade. Primary level is from 1st to 6th grade and after that a three-year upper secondary level, grades 7 to 9.

All the teachers in Finland must have a master's degree in order to be a qualified teacher. Class teacher (primary level teachers, grades 1 - 6) education consists of three years of Bachelor's and two years of Master's studies in either educational sciences or educational psychology. Educational psychology as an alternative major is a teacher education program in University of Helsinki. The students study intensively in a small group for 3 years, applying progressive inquiry-based learning as one of their main approaches.

Subject teachers (upper secondary level, grades 7 - 9) usually have a master's degree in a specific subject (mathemathics, biology etc.) with compulsory additional studies in educational sciences. Special education teachers teach in both primary and secondary schools in grades 1 - 9, and they are required to have a master's degree in educational sciences with the major subject being special education.

2.1. Aims of the Study

The aim of this study was to investigate, what kinds of conceptions do teachers and teacher students express of learning and creativity and to find out do teachers and student teachers think that there is a connection between learning and creativity.

2.2. Research Questions

The aim of the study was approached through the following research questions:

1) What kinds of conceptions of learning do teachers and student teachers express?
2) What kinds of conceptions of creativity do teachers and student teachers express?
3) Do teachers and student teachers see a connection between learning and creativity?

The intention of the present study was to pilot the measures with a group of active teachers in order to later construct structured items for looking at whether the results may be generalized. It was of interest to see, how open-ended and structured questions functioned.

3. Methods

In this study a mixed methods approach (i.e. Creswell & Plano Clark, 2011) was used as both qualitative and quantitative data was collected and analyzed. Mixed methods approach was chosen because with mixed methods research it is possible to get a better understanding of the research problems than with either quantitative or qualitative research alone (Creswell & Plano Clark, 2011).

3.1. Participants

The participants were 89 Finnish teachers and teacher students (female 77 and male 12) who answered an e-form questionnaire in May, June and July 2012.

Of the participants, 28% (n = 25) were teacher students, 32% (n = 28) were class-teachers in primary level of education (grades 1 to 6) and 27% (n = 24) were subject teachers for upper secondary level (grades 7 - 9). Also there were special education teachers (11%, n = 10) and principals (2%, n = 2) in the respondents.

Majority of the participants (71%, n = 63) had obtained a Master's degree. The rest of the participants were high school graduates completing their Bachelor's degree (15%, n = 13) or Bachelors completing their Master's degree (12%, n = 11) and one of the participants (1%, n=1) had a PhD degree. One respondent had responded "other" to a question of educational background. Of the participants, 43% (n = 38) majored in educational sciences, 23% (n = 21) majored in educational psychology and 34% (n = 30) had another major (subject or special education).

The participants had working experience as a teacher from less than a year (27%, n = 24) to 32 years (2%, n = 2). Mean of the working experience as a teacher was 9 years. Age of the participants was from 20 to 54, mean being 38 years.

3.2. Materials

The data were collected by a web-based e-form questionnaire. Link to e-form was shared via Facebook and Twitter to the friends of Kirsti Lonka and a Facebook group of educational psychology students and sent by e-mail to mailing lists containing teacher students and teachers in profession during May, June and July 2012. The questionnaire took approximately 20 minutes to complete.

The following background variables were collected: gender, education, major subject, minor subjects, current job, year of birth, graduation year, working experience as a teacher, working experience at current job and current workplace.

In the first part of the questionnaire there were three open-ended questions to explore the conceptions of learning and creativity and the connection between them:

1) Give your own subjective definition of learning.
2) Give your own subjective definition of creativity.
3) Do you see a connection between learning and creativity? If you do, what kind of a connection is it?

The open-ended questions were modified from Lonka, Joram, & Bryson's (1996) research on conceptions of learning. Open-ended questions were quite general in nature, with the intention to find out how participants spontaneously define learning and creativity and not leading the subjects toward "acceptable" answers. They were also situated in the first part of the questionnaire, before the Likert-type statements, so that the statements would not lead respondents toward "acceptable" answers.

In the second part, there were 10 one-part Likert-type statements (self-report items) measuring respondents' mindset (Dweck, 2008). The 5 statements measuring optimism and lack of interest based on the MED NORD questionnaire (Lonka et al., 2008). Mindset, optimism and lack of interest were, however, left out of the eventual analysis and results.

The third part of the questionnaire consisted of 23 two-part Likert-type statements based on the MED NORD questionnaire (Lonka et al., 2008) measuring epistemologies: reflective learning, collaborative knowledge building, valuing metacognition, certain knowledge and deep and surface approach to learning. In the two-part statements, statement A explored the conceptions ("*Knowing one's own thinking is the major contributor to successful learning*"). Statement B concerned the utilization of the statement A conceptions in a real life class room environment ("*I use multiple methods to enhance this particular skill*.") This methodology was adapted on the basis of Nieminen (2011). Participants rated all the statements on a six-point Likert-type scales. Scale 1 to 6 (1 = totally disagree, 2 = disagree, 3 = partially disagree, 4 = partially agree, 5 = agree, 6 = totally agree). The higher the score, the more the epistemology in question was valued (i.e. reflection, surface approach).

3.3. Methods and Procedures

The analyses were carried out by using a mixed method approach (Creswell et al., 2011), analysing qualitatively described conceptions of learning and creativity and quantitatively assessed epistemologies that the participants expressed.

3.3.1. Content Analysis of Open-Ended Questions

The open-ended questions were analysed by using a qualitative analysis coding the answers into different scales

and categories (Creswell & Plano Clark, 2011) adopted from the previous research (Lonka, Joram, & Bryson, 1996). In addition, new data-driven categories were constructed especially for the questions concerning collaborativity of learning and for the questions concerning creativity.

The answers of the first open-ended question (*Give your own subjective definition of learning.*) were scored on two scales adopted from Lonka, Joram, & Bryson's (1996) research in conceptions of learning. Lonka et al., (1996) defined constructivity and active epistemology as the two core conceptions of learning. At the one end of the continuum of constructivity, learning is seen as accumulation of new information in memory and at the other end as a constructive process that involves qualitative restructuring and modification of mental models. At the one end of the continuum of active epistemology the learners are seen as active, intentional actors who are responsible for their own learning, at the other end of the continuum the learners are seen as objects who passively receive what is taught by a teacher. The data-driven category of collaborativity was based on the current zeitgeist of educational psychology that highlights group processes of learning and collaborative knowledge building (e.g. Bereiter, 2002; Hakkarainen, Lonka, & Lipponen, 2004). The answers were categorized by analysing if they expressed conceptions of learning as individual process or as a collaborational act.

Answers for the second open-ended question (*Give your own subjective definition of creativity.*) were analysed based on the creativity research (e.g. Sawyer, 2012). The answers were categorized into data-driven categories by evaluating if the answers expressed respondents' conceptions of creativity as innate ability or something that is possible for anybody, creative product (Big-C-creativity) or creative process, and individual or collaborational creativity.

The third open-ended question (*Do you see a connection between learning and creativity*? *If you do, what kind of a connection is it*?) answers were coded into three categories based on whether they reported the connection of learning and creativity not existing, possibly existing or definitely existing.

3.3.2. Analysis of the Structured Questions

The quantitative analysis was performed using Statistical Package for the Social Sciences (SPSS version 21). The multiple items measures were calculated for MED NORD statements. Cronbach's coefficient alpha was used for measuring internal consistency of the multiple items measures. According to Richardson (2004), any values below .6 are regarded as poor. The only Cronbach's Alpha below .6 was Reflective learning A (see **Table 8**).

The normality of the variables were observed graphically by histograms and by the skewness and kurtosis of the variables. Reflective learning A, collaborativity A + B and deep approach A + B were nonnormally distributed so nonparametric tests were used for analysis. Also the constructivity of learning and active epistemology were nonnormally distributed but they were "borderline cases" so both parametric and nonparametric tests were used for analysis. The Spearman correlation is a nonparametric test for correlations. It gives the same result as the parametric Pearson correlation with normally distributed variables, so all the correlations are Spearman's correlations.

4. Results

The results show that learning was viewed as assimilation (see **Table 1**). The mean of constructivity of learning was 1.868 and standard deviation .745. The most typical answers were categories 1 and 2.

Table 2 shows that learner's role in a learning process was most often seen as implicitly passive. The mean of active epistemology was 2.318 and standard deviation .838.

Table 3 shows that the most typical expressions reflected the view of learning as both individual and collaborative act. The mean of collaborativity of learning was 1.898 and standard deviation .588.

Table 4 shows that creativity was seen as an ability that can be improved. Mean was 2.0, standard deviation .456 and mode 2. Scale 1 - 3 ranged 1 - 3.

The respondents highlighted the creative process, not a creative product (see **Table 5**). Mean was 2.6, standard deviation .542 and mode 2.

Creativity was typically seen as individual (see **Table 6**). Mean was 1.256, standard deviation .499 and mode 1. Scale 1 - 3 ranged 1 - 3.

Table 7 shows that majority of the participants saw a connection between learning and creativity. Mean was 2.356, standard deviation .568.

Table 1. Constructivity.

Categories with example answers	f (%)
1) Storing existing knowledge: Learning is seen as absorption, intake of knowledge, or simply storing "*Learning is acquiring new information.*"	29 (35%)
2) Assimilation: Learning is viewed as assimilating new knowledge into a pre-existing framework or interpreting knowledge within an existing framework. "*Learning is intaking new information that transforms and expands existing structures of knowledge.*"	36 (43%)
3) Change or reorganization takes place: Learning is seen as changing thinking or reorganizing knowledge; Learning is an interplay between assimilation and accommodation. "*Learning is understanding, observing and acquiring new information connecting things and acting in new ways.*"	18 (22%)
4) Construction of new knowledge: Learning is seen as changing/reorganizing plus constructing new knowledge, knowledge structures, or new ideas.	0 (0%)

Table 2. Active epistemology.

Categories with example answers	f (%)
1) Learner viewed as object of education: Learning is absorption of information; To learn is to be taught. "Learning is opening a particular thought to a pupil."	11 (13%)
2) Learner seen as implicitly passive: Learning is acquisition of information; A changes occurs. "Absorbing knowledge or ability that affects actions or thinking of the individual."	48 (54%)
3) Learner seen as implicitly active: An active verb is used to describe learning, e.g. "learning is using mental abilities"; Learning viewed as problem solving or as discovery. "Learning is an ability to process new things…"	19 (22%)
4) Learner emphasized as being active: Learning explicitly described as an active process. "Learning is active improving of a person's own skills and knowledge."	10 (11%)

Table 3. Collaborativity.

Categories with example answers	f (%)
1) Learning is an individual process "Learning mostly happens within a learner's head."	20 (23%)
2) Learning can be individual or collaborational: Answers don't highlight either individualistic or collaborational learning. "At its best, learning is cooperative."	57 (65%)
3) Learning is seen as a collaborational process: "Learning is a process that happens in interaction between other people and environment."	11 (12%)

Table 4. Creativity seen as innate ability or something that is possible to anybody.

Categories with example answers	f (%)
1) Innate ability "Creativity is an inborn ability."	8 (10%)
2) Needs a lot of time, exercise or talent "Creativity is an ability that is linked to freedom and intelligence.", "Creativity needs time."	62 (80%)
3) Everybody is creative "There is creativity in everybody."	8 (10%)

Table 5. Creativity seen as a product or process.

Categories with example answers	f (%)
1) Big C creativity, a meaningful, new product no one has ever before invented. "Creativity is an ability to envisage and create something new."	2 (3%)
2) Respondent's focus not clearly in product or process "Innovative thinking and inventing new things."	28 (35%)
3) Process, an everyday problem solving process "Creativity means using one's knowledge or skills in a way that is new either to the individual or to the community. Problem solving is closely attached to creativity."	50 (62%)

Table 8 shows the means, standard deviations, scales, ranges and Cronbach's Alphas of the multiple item measures calculated MED NORD statements. The means of reflective learning, collaborative knowledge build-

Table 6. Creativity seen as individual or collaborational.

Categories with example answers	f (%)
1) Individual "Creativity is expressing and seeking oneself."	60 (76%)
2) Individual, based on culture history/sociocultural process "Creative individual never invents things just out of nothing but builds on already existing knowledge and experiences. Creativity can also be taking a new perspective and seeing something that has never been seen in a culture before."	17 (21%)
3) Collaborative "Creativity is well achieved in groups."	2 (3%)

Table 7. Connection of learning and creativity.

Categories with example answers	f (%)
1) No connection "I think creativity is something that already exists. Learning comes from outside."	2 (2%)
2) Might sometimes be a connection in certain conditions "Creativity can be taken advantage of in learning. For example, teacher may be creative when planning the methods or learners can be creative when constructing their own learning."	52 (60%)
3) Definitely a connection. Learning is a creative process and creativity is a learning process. "Creativity as well as learning is a problem solving process. Creative process is always also a learning process."	33 (38%)

Table 8. The descriptive statistics and Cronbach's alphas of the multiple item measures.

Scale	Mean	Std. deviation	Scale	Range	α	n
Reflective learning A	5.31	0.55	1 - 6	3.67 - 6	.56	87
Reflective learning B	4.56	0.75	1 - 6	3 - 6	.66	86
Collaborative knowledge building A	5.60	0.45	1 - 6	4.5 - 6	.81	86
Collaborative knowledge building B	4.98	0.76	1 - 6	2.5 - 6	.86	88
Valuing metacognition A	5.22	0.68	1 - 6	3.5 - 6	.79	88
Valuing metacognition B	4.45	0.95	1 - 6	2 - 6	.83	87
Certain knowledge A	2.97	1.02	1 - 6	1 - 5.67	.80	88
Certain knowledge B	2.96	0.97	1 - 6	1 - 5	.74	87
Deep approach A	5.28	0.59	1 - 6	2.5 - 6	.83	85
Deep approach B	4.93	0.72	1 - 6	2.67 - 6	.86	86
Surface approach A	2.98	0.86	1 - 6	1.2 - 5.4	.69	84
Surface approach B	2.97	0.84	1 - 6	1.2 - 5.2	.77	83

ing, valuing metacognition and deep approach were very high (approximately 5 - 6, scale being 1 - 6), which reports ceiling effect. Surface approach (A + B) and certain knowledge (A + B) ranged approximately 1 - 5, mean being approximately 3. The statement B had better validity (Cronbach's alpha) in all the variables, except the certain knowledge. The B-parts of the statements also had less ceiling effect so they were used in the final analysis.

Table 9 shows Spearman's correlations between the conceptions of learning (constructivity and active epistemology) and MED NORD epistemologies.

The constructivity and active epistemology of learning correlated positively with valuing metacognition. They also significantly correlated with each other (Spearman correlation .510).

Table 10 shows Spearman's correlations between MED NORD statements. Reflective learning, collaborative knowledge building, valuing metacognition and deep approach were related. Surface approach and certain knowledge were related.

5. Discussion

The aim of this study was to explore teachers' and teacher students' conceptions of learning and creativity and the interrelations of these conceptions. Further, it was of interest whether there were any indications of collaboration in the definitions of learning and creativity.

The participants' conceptions of learning were not very constructivistic as they viewed learning as assimi-

Table 9. Spearman's correlations between constructivity, active epistemology and MED NORD and mindset.

	Constructivity	Active epistemology
Reflective learning B	.080	.137
Collaborative knowledge building B	.186	.161
Valuing metacognition B	.344**	.272*
Certain knowledge B	−.218	−.202
Deep approach B	.154	.153
Surface approach B	−.040	−.050

Note: *$p < .05$ (2-tailed), **$p < .01$ (2-tailed).

Table 10. Spearman's correlations between MED NORD statements.

	1	2	3	4	5	6
1) Reflective learning B	−.134					
2) Collaborative knowledge building B	−.261*	.646**				
3) Valuing metacognition B	−.211	.523**	.484**			
4) Certain knowledge B	.287**	−.085	−.022	−.180		
5) Deep approach B	−.234*	.709**	.492**	.427**	−.128	
6) Surface approach B	.270*	−.011	−.035	.015	.483**	.050

Note. *$p < .05$ (2-tailed), **$p < .01$ (2-tailed).

lating new knowledge into a pre-existing framework or interpreting knowlegde within an existing framework (Lonka, Joram, & Bryson, 1996). In the answers of open-ended questions no one viewed learning as construction of new knowledge. The learner was most often seen as implicitly passive. Neither individuality nor collaborativity of learning were emphasized in the answers of the open-ended questions.

Conceptions of creativity viewed creativity as an ability that is not innate, but needs time or exercise to develop. The respondents' focus was in a creative process, not creative product. Creativity was viewed individual as there were indications of collaborativity only in two responsdents' definitions of creativity. The respondents typically saw a connection between learning and creativity.

Reflective learning, collaborative knowledge building, valuing metacognition and deep approach were all reported very high. Positive correlation between constructivity, active epistemology, valuing metacognition stresses high quality of learning (Heikkilä et al., 2011) and deep-level learning (Lonka & Lindblom-Ylänne, 1996). Positive correlation between reflective learning, valuing metacognition, deep approach and collaborative knowledge building refer to high quality of learning and deep-level learning. Certain knowledge and surface approach, which are approaches that may, according to Lonka & Lindblom-Ylänne (1996), lead to superficial learning, were quite low on average level, as the mean of both of them was approximately 3 (scale 1 - 6).

5.1. Methodological Reflections

The present study was conducted as a mixed method study by triangulating qualitative and quantitative data. The results from open-ended questions were quite different as compared to MED NORD-statements. The open-ended questions came fist so that the statements would not lead subjects towards" acceptable" answers.

The population in this study was selected because they were professional, enlightened teachers and teacher students, who were especially active as they answered an e-form shared via professor Kirsti Lonka's Twitter account and specific e-mail lists for teacher students and teachers. Due to the background of the population, it was expected that the MED NORD conceptions had ceiling effect in high quality learning approaches (Lonka et al., 1996). In this study, the B statements of MED NORD items were pointed to practice, to a real-life work environment. This methodology was adopted from Juha Nieminen (2011) as his study showed better reliability and validity with less ceiling effect when the conceptions were asked in a real life professional context. The difference between A and B statements validity and reliability supports that assumption.

There may be distinctions between reported beliefs and behavior (Lonka, Joram, & Bryson, 1996). Despite of that, Lonka, Joram, & Bryson, 1996 emphasize the importance of the study of belief systems, as they may play an important role in mediating behavior. There was a mismatch between the answers of open-ended questions

and structured items. The categories of open-ended questions were much less socially desirable than the reactions given to structured items.

5.2. General Conclusions and Future Research

According to Lonka, Joram, & Bryson (1996), teachers' knowledge may be atheoretical in nature and they may be blind to features in their practice that bear significantly on students' learning. Therefore Lonka, Joram & Bryson expected that teachers' conceptions of learning would not necessarily be very constructive. That might explain the results showing that the majority of the participants defined learning as assimilation of knowledge. The learner was most often seen as implicitly passive which highlighted teacher-regulated learning that may lead to superficial learning (Lonka & Joram Bryson, 1996; Lonka & Lindblom-Ylänne, 1996). It may be that teachers do not see individuality or collaborativity central in definition of learning, as they mostly did not refer to either individual or collaborative nature of learning in their answers. New categories also emerged and they provided new insights about how teachers and future teachers saw connections between learning and creativity.

The results show that teachers and teacher students saw creativity as an ability that can be improved, both product- and process-oriented, and individual. Creativity seen as an ability that can be improved with time or exersice, reflected a growth mindset (Dweck, 2008) which might be promising for developing creativity in schools. The fact that collaboration was not accentuated in neither learning nor creativity may be a roadblock for fostering creativity in schools. Also the conceptions of learning as assimilation and learners viewed as implicitly passive, may be an obstacle for creative collaboration in classrooms and schools. If teachers would see learning as a creative act and the role of learner as active, they might be more likely to foster creativity in the classroom. Hargreaves (1999) wrote about knowledge-creating school as an answer to the challenges of knowledge society. He asserted a demand that teachers and headmasters of the schools need to become creators of professional knowledge in order to help students to develop skills and competencies needed for knowledge-creation. It would be fruitful to do an intervention of educating teachers and headmasters to collaborative knowledge-creation processes (e.g. progressive inquiry learning) to increase collaboration and creativity in the classrooms.

Plucker, Beghetto, & Dow (2004) ask in their article, why creativity hasn't been a more important research subject in educational psychology even though it has so much to give for educational psychology. Moran (2010) lists benefits of creativity that have been proposed for educational outcomes: Creativity increases student engagement and achievement and stresses student activity. It provides synergy and cross-fertilization among ideas, subject areas, and skills, which improve adaptability. Creativity also provides support for metacognition (Moran, 2010). According to Amabile (1983), creativity merges intrinsic motivation, domain-relevant knowledge and abilities, creativity-relevant skills (Amabile, 1983). According to Kaufman & Beghetto, (2009): "A broader conception of creativity will go a long way towards helping educators recognize and support creativity in schools and classrooms. Creativity is associated with high levels of interest, enjoyment and curiosity."

Sawyer & DeZutter (2009) researched collaborative creativity in improvisation theatre groups. They executed a real-time interaction analysis of distributed creativity in action. Real-time analysis of creativity in schools would be very productive in researching collaborative learning processes. Future research should concentrate on the real-world interaction in the classrooms shedding light on whether the learning processes can be creative processes. It may also be interesting to see, how conceptions of learning and creativity may affect the ways teachers act in their classrooms.

Acknowledgements

This research was funded by Academy of Finland Mind Program project "Mind the Gap" (1265528) and the Finnish Funding Agency for Technology and Innovation (TEKES) project RYM Indoor environment (462054).

References

Amabile, T. M. (1983). The Social Psychology of Creativity: A Componential Conceptualization. *Journal of Personality and Social Psychology*, *45*, 357-376. http://dx.doi.org/10.1037/0022-3514.45.2.357

Baer, J., & Kaufman, J. C. (2006). Creativity Research in English-Speaking Countries. In J. C. Kaufman, & R. J. Sternberg (Eds.), *The International Handbook of Creativity* (pp. 10-38). Cambridge: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511818240.002

Beghetto, R. A., & Kaufman, J. C. (2007). Toward a Broader Conception of Creativity: A Case for "mini.c" Creativity. *Psy-*

chology of Aesthetics, Creativity, and the Arts, 1, 73-79. http://dx.doi.org/10.1037/1931-3896.1.2.73

Bereiter, C. (2002). *Education and Mind in the Knowledge Age*. New Jersey: Lawrence Erlbaum Associates.

Blackwell, L., Trzesniewski, K., & Dweck, C. (2007). Implicit Theories of Intelligence Predict Achievement across an Adolescent Transition: A Longitudinal Study and an Intervention. *Child Development, 78,* 246-263. http://dx.doi.org/10.1111/j.1467-8624.2007.00995.x

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and Conducting Mixed Methods Research.* Thousands Oaks: Sage Publications.

Csikszentmihalyi, M. (1996). *Creativity, Flow and the Psychology of Discovery and Invention.* New York: Harper Collins Publishers.

Dweck, C. S. (2008). *Mindset: The New Psychology of Success.* New York: Ballantine Books.

Engeström, Y. (1999). Innovative Learning in Work Teams: Analyzing Cycles of Knowledge Creation in Practice. In Y. Engeström, R. Miettinen, & R.-L. Punamäki (Eds.), *Perspectives on Activity Theory* (pp. 377-404). Cambridge: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511812774.025

Guilford, J. P. (1950).Creativity. *American Psychologist, 5*, 444-454. http://dx.doi.org/10.1037/h0063487

Hakkarainen, K., Lonka, K., & Lipponen, L. (2004). *Tutkiva Oppiminen. Järki, tunteet ja motivaatio oppimisen sytyttäjinä* (*Progressive Inquiry-Based Learning. How Reason, Emotions and Motivation Light up Learning*). Porvoo: WSOY.

Hargreaves, A. (2003). *Teaching in the Knowledge Society: Education in the Age of Insecurity.* Milton Keynes: Open University Press.

Hargreaves, D. H. (1999). The Knowledge-Creating School. *British Journal of Educational Studies, 47,* 122-144. http://dx.doi.org/10.1111/1467-8527.00107

Heikkilä, A., Niemivirta, M., Nieminen, J., & Lonka, K. (2011). Interrelations among University Students' Approaches to Learning, Regulation of Learning and Cognitive and Attributional Strategies: A Person Oriented Approach. *Higher Education, 61,* 513-529. http://dx.doi.org/10.1007/s10734-010-9346-2

John-Steiner, V. (2000). *Creative Collaboration.* Oxford: Oxford University Press.

Lonka, K., & Lindblom-Ylänne, S. (1996). Epistemologies, Conceptions of Learning, and Study Practices in Medicine and Psychology. *Higher Education, 31,* 5-24. http://dx.doi.org/10.1007/BF00129105

Lonka, K., Hakkarainen, K., & Sintonen, M. (2000). Progressive Inquiry Learning for Children. Experiences, Possibilities, Limitations. *European Early Childhood Education Research Journal, 8,* 7-23. http://dx.doi.org/10.1080/13502930085208461

Lonka, K., Joram, E., & Bryson, M. (1996). Conceptions of Learning and Knowledge: Does Training Make a Difference? *Contemporary Educational Psychology, 21,* 240-260. http://dx.doi.org/10.1006/ceps.1996.0021

Lonka, K., Olkinuora, E., & Mäkinen, J. (2004). Aspects and Prospects of Measuring Studying in Higher Education. *Educational Psychology Review, 16,* 301-323. http://dx.doi.org/10.1007/s10648-004-0002-1

Lonka, K., Sharafi, P., Karlgren, K., Masiello, I., Nieminen, J., Biergegård, G., & Josephson, A. (2008). MED NORD—A Tool for Measuring Medical Students' Well-Being and Study Orientations. *Medical Teacher, 30,* 72-79. http://dx.doi.org/10.1080/01421590701769555

Marton, F., & Säljö, R. (1976a). On Qualitative Differences in Learning: I—Outcome and Process. *British Journal of Educational Psychology, 46,* 4-11. http://dx.doi.org/10.1111/j.2044-8279.1976.tb02980.x

Marton, F., & Säljö, R. (1976b). On Qualitative Differences in Learning: II—Outcome as a Function of the Learner's Conception of the Task. *British Journal of Educational Psychology, 46,* 115-127. http://dx.doi.org/10.1111/j.2044-8279.1976.tb02304.x

Ministry of Education and Culture (2009). *Basic Education 2020—The National General Objectives and Distribution of Lesson Hours: 2009.* http://www.minedu.fi/export/sites/default/OPM/Julkaisut/2010/liitteet/okmtr01.pdf?lang=fi

Moran, S. (2010). Creativity in School. In K. Littleton, C. Wood, & J. Kleine Staarman (Eds.), *The International Handbook of Psychology in Education* (pp. 319-359). England: Emerald.

Muukkonen-van der Meer, H. (2011). *Perspectives on Knowledge Creating Inquiry in Higher Education.* Doctoral Thesis, University of Helsinki. https://helda.helsinki.fi/bitstream/handle/10138/24260/perspect.pdf?sequence=1

Nieminen, J. (2011). *Dimensions of University Student Learning in Medicine and Pharmacy*. Doctoral Thesis, University of Helsinki. https://helda.helsinki.fi/bitstream/handle/10138/26494/dimensio.pdf?sequence=1

Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation.* New York: Oxford University Press.

OECD (2008). 21st Century Learning: Research, Innovation and Policy Directions from Recent OECD Analyses. http://www.oecd.org/site/educeri21st/40554299.pdf

Paavola, S., Lipponen, L., & Hakkarainen, K. (2004). Models of Innovative Knowledge Communities, and Three Metaphors of Learning. *Review of Educational Research, 74,* 557-576. http://dx.doi.org/10.3102/00346543074004557

Perry, W. G. (1970). *Forms of Intellectual and Ethical Development in the College Years: A Scheme.* New York: Holt, Rinehart & Winston.

Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why Isn't Creativity More Important to Educational Psychologists? Potentials, Pitfalls, and Future Directions in Creativity Research. *Educational Psychologist, 39,* 83-96. http://dx.doi.org/10.1207/s15326985ep3902_1

Richardson, J. (2004). Methodological Issues in Questionnaire-Based Research on Student Learning in Higher Education. *Educational Psychology Review, 16,* 347-358. http://dx.doi.org/10.1007/s10648-004-0004-z

Sahlberg, P. (2009). Creativity and Innovation through Lifelong Learning. *Journal of Lifelong Learning in Europe, 14,* 53-60.

Sahlberg, P. (2010). Rethinking Accountability in a Knowledge Society. *Journal of Educational Change, 11,* 45-61. http://dx.doi.org/10.1007/s10833-008-9098-2

Sahlberg, P. (2011). *Finnish Lessons. What Can the World Learn from Educational Change in Finland?* New York: Teachers College, Columbia University.

Sawyer, K. (2012). *Explaining Creativity: The Science of Human Innovation.* New York: Oxford University Press.

Sawyer, K., & DeZutter, S. (2009). Distributed Creativity: How Collective Creations Emerge from Collaboration. *Psychogy of Aesthetics, Creativity and the Arts, 3,* 81-92. http://dx.doi.org/10.1037/a0013282

Scardamalia, M., & Bereiter, C. (2006). Knowledge Building: Theory, Pedagogy, and Technology. In K. Sawyer (Ed.), *Cambridge Handbook of the Learning Sciences* (pp. 97-118). New York: Cambridge University Press.

Sfard, A. (1998). On Two Metaphors of Learning and the Dangers of Choosing Just One. *Educational Researcher, 27,* 4-13. http://dx.doi.org/10.3102/0013189X027002004

Sternberg, R. (1985). Implicit Theories of Intelligence, Creativity, and Wisdom. *Journal of Personality and Social Psychology, 49,* 607-627. http://dx.doi.org/10.1037/0022-3514.49.3.607

Sternberg, R. J., & Lubart, T. I. (1999). Concept of Creativity: Prospects and Paradigms. In R. J. Sternberg (Ed.), *Handbook of Creativity* (pp. 3-15). USA: Cambridge University Press.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes.* Cambridge, MA: Harvard University Press.

Wells, G., & Arauz, R. M. (2006). Dialogue in the Classroom. *Journal of the Learning Sciences, 15,* 379-428. http://dx.doi.org/10.1207/s15327809jls1503_3

Whitebread, D., & Pino Pasternak, D. (2010). Metacognition, Self-Regulation and Meta-Knowing. In K. Littleton, C. Wood, & J. Kleine Staarman (Eds.), *The International Handbook of Psychology in Education* (pp. 673-711). England: Emerald.