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STUDENTS' MOTIVATION IN GROUP DEVELOPMENT STAGES DURING
COLLABORATIVE LEARNING

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Thesis abstract

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Tiivistelmä/Abstract <p>When students work in small groups, it is expected that they experience five stages of group development to perform well; forming, storming, norming, performing and adjourning. Yet, the duration of each stage namely, when particular stage starts and when it finishes was not investigated in the previous researches. Furthermore, all the stages have features that characterize them, most of the features describe emotional state of students, whereas motivational level of students is still not clear. So, taking into account of the previous research gaps, the aim of this thesis is to examine duration of group development stages, and how to characterize students' motivation at the different stages of collaborative learning. The research involved 15 first-year teacher education students. Four small-groups (3-4 members in each) were engaged in collaborative learning tasks on math within six sessions. Except the tasks, they were assigned to discuss macro-level scripts: Orientation questions in the beginning, Checkup questions in the middle, and Reflection questions at the end of the each session. The data was collected by videotaping of students' small-group work. For the data analysis of this thesis, the scripted phases were transcribed and coded based on the thematic categories.</p> <p>The results show that almost all of the group developmental stages may last one or two collaborative sessions. There are quite a lot of overlaps between the stages, when they are mixed in one session. Another point is that, not all five stages may be present in the group development. As this study shows, adjourning stage was not included in the analysis since none of the groups did experience it.</p> <p>According to the analysis, the groups' motivational state vary from one stage to another. At the beginning of the course students are more motivated and at the end of the course students' motivation is low. The thesis demonstrates which stage is specifically more beneficial for students' high motivation. It can be concluded that the knowledge of groups' development stages are useful for the teachers in designing the collaborative learning sessions. Taking into account the emotions and motivation that students are expected to have at the different stages, the teachers may enhance learning process.</p>			
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1 Introduction

Learning in groups has been receiving a great research attention over the past several years (Dillenbourg, 1999; Webb, 1989; Slavin, 1996; Harding-Smith, 1993; Johnson & Johnson, 1994; Bruffee, 1999; Sharan, 1980). Different theories such as active learning (Prince, 2004; Johnson, Johnson & Smith 1998; Bonwell & Eison, 1991) or student centered learning (Jones, 2007; Jonassen & Easter, 2012) have supported the theory that students learn more and better when they work together. From active learning theory perspective, students learn actively through speaking out their opinions, applying their knowledge into practice, and creating something new rather than listening and note taking (Bonwell & Eison, 1991). Thus, students develop communicative skills and collaboration skills, and take a responsibility for their own learning. From the student-centered learning theory (Jones, 2007; Jonassen & Easter, 2012) when students are engaged in the active participation, they acquire deeper understanding and long-term retention of the knowledge, and are able to internalize the skills. The teacher is no longer on the lecture stage, but instead the students are in the center of learning process (Jones, 2007; Young & Paterson, 2007; Wright, 2011). Hence, traditional classroom settings has been changing into small group learning environment, i.e. collaborative learning, where students have the opportunity to learn together toward the common goal (Dillenbourg, 1999; Rochelle & Teasley, 1995).

However, prior research has shown that collaborative learning is challenging for students (Näykki, Järvelä, Kirschner, & Järvenoja, 2014). Students do not work collaboratively spontaneously once they are assigned in small groups (Cohen, 1994; Kuhn, Shaw, & Felton, 1997). They need time and put effort to adapt in their new learning environment, thus groups go through several developmental stages. Prior research has explored the different developmental stages within group learning (Tuckman, 1965; Runkel, Lawrence, Oldfield, Rider, Clark, 1971; Zurcher, 1969; Smith, 1966; Lacoursiere, 1974). Each of the developmental stages predict certain types of behavior and feelings, which affect the learning process within the small-group. The group developmental stages were established by Tuckman (1965), and later were tested by other researchers (Runkel, et al., 1971; Zurcher, 1969; Smith, 1966; Lacoursiere, 1974.) who brought few additional characteristics for each stage such as fear (Lacoursiere, 1974), hesitation (Yalom, 1970), dependency (Spitz & Sadock, 1973), confuse (Spitz & Sadock, 1973), dissatisfaction, frustration, along with depression and anger (Lacoursiere, 1974) or aggression, and negativism (Dunphy, 1968). Yet, there is

a lack of studies about longitude of the stages and when a particular stage is more likely to occur. On the other hand, most of the studies on the group-developmental stages were focused on the behavioral and emotional aspects of the group (Lacoursiere, 1974; Yalom, 1970; Spitz & Sadock, 1973), whereas motivational aspect was out of the attention. This gap in the researches makes the stages incomplete, since emotion and motivation is bidirectional elements of collaborative learning (Meyer & Turner, 2006; Järvelä, Hurme, Järvenoja, 2011). Having these gaps in focus, the aim of this thesis is to discover when and how long the stages take place in the small-groups, and what characterizes students' motivation in different developmental stages.

2 Theoretical framework

2.1 Collaborative learning

According to Dillenbourg (1999) there is not a standard definition as such for collaborative learning. The most used definition of collaborative learning is “it is a situation in which two or more people learn or attempt to learn something together” (Dillenbourg, 1999, p. 1). He found that different researchers use different words to explain the same phenomena. Rochelle and Teasley (1995, p. 70) defined collaborative learning as: “a mutual engagement of participants in a coordinated effort to solve the problem together”. These two definitions complement each other in a way that makes the phenomena of collaborative learning more clear. The main features of collaborative learning can be generalized according to Kirschner (2001) as an active and shared learning in small group in which students take responsibilities for own learning, and where teachers are operating in a facilitative role.

Furthermore, prior research has emphasized that skillful students know the right time and the right way to ask questions, to give explanations, and to motivate their peers, as well as how to manage conversation and conflicting situations in collaboration (Jarboe, 1996).

2.2 Five stages of group development in collaborative learning

Many studies on group development rely on Tuckman's (1965) model of developmental stages in group settings. Tuckman's model is a linear model of group development that covers group structure (i.e., relationship patterns) and task behavior (i.e., what the group is working on). Tuckman proposed the following five stages of group development:

1. Forming: when members are first grouped to get to know each other and the task. The major function of the stage is orientation to the task and to the group working.
2. Storming: developing interpersonal relationships, setting up rules and roles in the group. In this stage conflicts and competition may occur during the group process.
3. Norming: in-group feelings and cohesiveness can develop, new standards evolve, and new roles can be adopted. The stage when group members start to work together, share information, and engage in active discussions.

4. Performing: at this stage group members are more flexible and functional. They are often task-oriented to reach conclusions and to deliver results.

5. Adjourning: the final stage when the task is completed, and group members reach the end of their working together.

It is expected that groups will face all these stages that help them to perform well. The stages are actual seen as a mechanism for groups' development in collaborative learning (Phielix, Prins, Kirschner, 2010).

However, the classical use of Tuckman's model, the model has been studied and extended by other researchers (Runkel, Lawrence, Rider & Clark, 1971; Zurcher, 1969; Smith, 1966; Shambaugh & Kanter, 1969; Lacoursiere, 1974; Spitz & Sadock, 1973; Braaten, 1975). According to these researchers not all the five stages are necessarily visible or present in group working. The most visible stage is forming which takes place in the very beginning of group work, and it is obvious that the group members are introduced with each other, with the task, and the procedure. The prior research has shown that students may feel fear (Lacoursiere, 1974), hesitation (Yalom, 1970) dependency (Spitz & Sadock, 1973), and confuse (Spitz & Sadock, 1973) at the forming stage. Storming stage is somewhat visible but with some additional characteristics, like *"dissatisfaction, characterized by increasing sense of frustration, along with depression and anger"* (Lacoursiere, 1974) or *aggression and negativism* (Dunphy, 1968). Smith (1966) and Lacoursiere (1974) have found that it is typical in the storming stage to experience *conflict not only interpersonal but toward to the task activity behavior or outside force*. Norming stage have been characterized as the period of *"beginning of trust"* (Lacouserie, 1974) *"closeness and cohesiveness"* (Spitz & Sadock). Performing stage have been analyzed close to norming stage therefore not described in the most of the aforementioned studies.

Adjourning stage was included to Tuckman's model as a results of the additional studies, since the most of the researchers mentioned termination stage in their analysis (Shambaugh & Kanter, 1969; Lacoursiere, 1974; Spitz & Sadock, 1973; Mann, 1977). The stage takes place at the end of the group work, and students are at this stage expected to make conclusion and feel disappointment of finishing their group.

2.3 How scripting can promote collaborative learning

Students in a collaborative learning may need external scaffolding to facilitate interaction in the group, because research has shown that they often have difficulties engaging spontaneously in beneficial collaborative learning activities (Cohen, 1994; Kuhn, Shaw, & Felton, 1997). Scripts are one of the scaffolding tools that are used to guide students to understand the topic through discussing (Vogel, 2016), explaining (King, 1998), questioning (Webb, Franke, De, Chan, Freund, Shein, & Melkonian, 2009), and acquire specific skills such as working in a team, and argumentation (Weinberger, Stegmann, & Fischer, 2006). Thus, scripts facilitate collaborative learning through “engaging them in specific activities that otherwise might not occur” (Weinberger, 2011, p. 190). Two types *internal* and *external* collaboration scripts have been defined (Fischer, 2013; Weinberger, 2011). *Internal scripts* are assumed as the knowledge about and understanding of collaboration activities, which guide the learner's actions in the group (Dillenbourg, Järvelä, & Fischer, 2009). *External scripts* are assumed as an external pedagogic instruction that aims at involving students in a sequence of activities within the collaborative groups. These two scripts have parallel structure (Dillenbourg, et al., 2009) and supposed to subordinate each other for effective collaboration and learning outcomes (Weinberger, 2011). Especially, in the level of coercion that scripts have been criticized for, and can be effectively used to evaluate how much the external scripts should be intervened in the collaborative learning depending on the internal scripts of students (Weinberger, 2011). External scripts are designed at a micro- or macro- level (Dillenbourg & Hong, 2008; Fischer, Mandl, Haake & Kollar, 2007). Micro-scripts include detailed instructions to engage students in specified activities, like assigning roles for example (Hämäläinen, & Häkkinen, 2009). Macro-scripts are more general, and focus on producing desired interaction (Dillenbourg, & Tchounikine, 2007) among members. The data that is used in this thesis is based on the students' responds that are involved in the discussion of macro-script questions (Näykki, Pöysä-Tarhonen, Järvelä, & Häkkinen, 2015; Näykki, Isohätälä, Järvelä, Pöysä-Tarhonen, & Häkkinen, submitted)

2.4 Motivation in collaborative learning

Students' motivation is essential in successful collaborative learning. The term motivation means “move” from Latin in general, therefore motivational research explores moving or energization of students in their learning. Motivation is researched by motivational science

having focused on students' motivation in academic settings (i.e. Pintrich, 2003). During the learning process the students have a level of motivation toward to the engagement, effort and persistence at a task, thus motivation plays an important role that makes students keep in learning (Pintrich, 2003). In addition, motivation may help students to handle with challenging situations (Hmelo-Silver, Chinn, Chan, & O'Donnell, 2013)

Nowadays when collaborative learning is getting more research attention (Dillenbourg, 1999; Rochelle & Teasley, 1995; Slavin, 1996; Harding-Smith, 1993; Johnson & Johnson, 1994), several educational researchers have focused on investigating motivation within social learning context (Crook, 2000; Järvelä, Volet, Järvenoja, 2010; Järvelä, Hurme, Järvenoja, 2011). Collaborative learning can be used as an effective learning environment that help students to trigger motivation through interacting with the peers, getting the support and feedback from them and from teachers (Järvelä, Volet, Järvenoja, 2010; Zimmerman, 1989). At the same time, collaborative learning can be more challenging for students' motivation due to the individual's different personal characteristics and goals (Järvelä, Volet, Järvenoja, 2010) which requires enhanced effort and time for constant negotiation and argumentation (Hmelo-Silver, et al., 2013; Järvelä, Volet, Järvenoja, 2010) than learning in more traditional classrooms which often focuses on direct instruction and individual learning. Thus, collaborative learning may support groups' motivation for successful learning, and at the same time it can bring additional challenges requiring more effort and time that may affect negatively to group members' motivation (Mäkitalo, Häkkinen, Järvelä, & Leinonen, 2002; Feltovich, Spiro, Coulson, & Feltovich, 1996; Arvaja, Salovaara, Hakkinen, & Järvelä, 2007).

Research has shown that students can direct own motivation to get interested, be oriented to master skills and knowledge, and to feel self-efficacious (Winne & Marx, 1989). Aforementioned forms of motivation are characterized as the major findings from motivation research that are important for academic achievement and successful learning (Hmelo-Silver, et al., 2013). These three concepts, i.e. mastery goal orientation, interest and self-efficacy are the main concepts in this thesis, and therefore, I will provide theoretical background of each further.

2.4.1 Self-efficacy beliefs in collaborative learning

Self-efficacy refers to one's beliefs about accomplishing a task and can influence choice of activities, effort, persistence, and achievement (Schunk, 1995). Students who believe that they can do well are more likely to be motivated to work harder and persist longer toward to accomplishing the task than those with low competence beliefs (Bandura, 2002; Eccles, Wigfield & Schiefele, 1998; Pintrich & Schunk, 2002). The importance of this, is that having a confidence about own capabilities students are more cognitively engaged in learning and thinking (Pintrich, 1999, Pintrich & Schrauben, 1992; Schunk, 1991). Moreover, self-efficacy influences student's behavior to persist and to do better performance when they face challenges and negative feelings (Abu-Tineh, Khasawneh & Khalailah, 2011).

Students' self-efficacy belief is formed through personal experience and qualities (Hmelo-Silver, et al., 2013). Thus, group members' self-efficacy levels may vary when they enter to the collaborative learning activities (Hmelo-Silver, et al., 2013). First, collaborative learning settings may promote one's self-efficacy through observing peers and modelling the most successful behavior (Schunk, 1995). This results forming positive judgments about own capabilities. Social support and peers' positive feedback about one's contribution to group work may also promotes students' self-efficacy beliefs (Hmelo-Silver, et al., 2013). Consequently, collaborative learning provides additional opportunities to individuals to learn better and achieve success through increasing feelings of self-efficacy. Second, collaborative learning may influence students' self-efficacy beliefs negatively (Bandura, 1997). Students may not always model the most productive behavior, and for some students when they observe the most productive behavior, their self-efficacy belief may be decreased thinking that they are less capable (Hmelo-Silver, et al., 2013). Another challenge to self-efficacy belief is the possible negative feedback from the peers which may decrease one's own self-efficacy beliefs (Hmelo-Silver, et al., 2013). Thus, collaborative learning has both sides, positive and negative, in terms of self-efficacy.

Third, collaborative learning may provide an opportunity to form collective self-efficacy of the group, making them to share collective beliefs about capabilities of the team which help them to perform the task and get academic achievement (Bandura, 1997). Collective efficacy may strengthen the group work, encourage students to persist in challenging situations, and help groups to establish high self-efficacy which is not necessarily shared by all the team members (Gibson, 1999). Fourth, collaborative learning and self-efficacy is recip-

rocal, collaborative learning influences self-efficacy beliefs on the individual and group level, whereas self-efficacy may foster students to interact with each other, to engage in a task and performance better (Hmelo-Silver, et al., 2013). Thus, making the collaborative learning as a more productive and effective learning environment.

2.4.2 Interest in collaborative learning

Interest is a central feature of intrinsic motivation, and divided into two types: personal and situational interest (Pintrich, 2003). Personal interest is an internal state of an individual that directs him/her to engage in a particular activity or topic for own sake and to enjoy or to like to be engaged. Thus, makes it “relatively stable, resides within the individual, and includes a deep personal connection to and enjoyment to the domain” (Hmelo-Silver, et al., 2013, p. 258). In contrast, situational interest is “assumed to be a psychological state of being interested in a task or activity that is generated by the interestingness of the task or context” (Pintrich, 2003, p. 11), and “is relatively brief, and based more on the situation than an enduring quality residing within the individual” (Hmelo-Silver, et al., 2013, p. 258). Situational interest is more characteristic in the collaborative learning settings (Hmelo-Silver, et al., 2013). First, every group member is expected to contribute to the group result. Thus, even students initially do not have an interest in the task or topic, their interest may emerge from the need to make their contribution (Hidi & Renninger, 2006). Second, their interest may be enhanced through feedback from peers and teachers, and get them involved more in the group tasks (Hänze & Berger, 2007). Third, students may get interested when they have the opportunity to increase own competence through explaining or teaching and leading other group members (Hänze & Berger, 2007). And, finally, authentic tasks of collaborative learning may enhance students’ interest since they may connect the tasks to the real world situations (Durik & Harackiewicz, 2007, Linnenbrink-Garcia, Patall & Messersmith, 2013; Mitchell, 1993). It is important to point out that situational interest may be further developed into individual interest (Hidi & Renninger, 2006; Linnenbrink-Garcia, et al., 2013).

2.4.3 Goal-orientation in collaborative learning

Along with self-efficacy beliefs and interest, individuals can be motivated by the goals that they set up for own learning, adjustment and achievement (Pintrich, 2003). Goals are di-

vided into two types according to their orientations which are “defined as the reasons and purposes for approaching and engaging in achievement tasks” (Pintrich, 2003, p.676). The two types of goal orientation are mastery goal orientation and performance goal orientation. “Mastery goals orient the students toward learning and understanding, developing new skills, and a focus on self-improvement using self-referenced standards. Mastery goals have generally been associated with a host of positive cognitive, motivational, affective, and behavioral outcomes (Ames, 1992; Dweck & Leggett, 1988) because “students who want to learn, who want to achieve, and who are willing to follow the classroom rules and take responsibility for their learning seem to be more motivated and perform better” (Pintrich, 2003, p. 677). Whereas, performance goals represents a concern with demonstrating ability, obtaining recognition of high ability, protecting self-worth, and a focus on comparative standards relative to other students and attempting to best or surpass others. Performance goals have been linked to less adaptive outcomes (Ames, 1992; Dweck & Leggett, 1988). Performance goal orientation can be performance-approach goals, which is focused to demonstrate the higher competence, and performance-avoidance goal orientation, which focused on avoiding appearing incompetent (Hmelo-Silver, et al., 2013). The latter is more challenging in a group work because such students may be hesitating to interact with others or avoid to ask for help from peers or teachers due to his/her less competence (Middleton & Midgley, 1997).

Collaborative learning components such as the variety of tasks, flexibility in choices and time, evaluation of each other's and own accomplishment, and team work practices orient students toward to mastery goal (Hmelo-Silver, et al., 2013; Ames, 1992; Maehr & Midgley, 1991). In addition to it, connectivity to the real world practices of collaborative learning tasks, like problem-solving, encourages students to mastery goal orientation (Durik & Harackiewicz, 2007; Linnenbrink-Garcia, et al., 2013; Mitchell, 1993). Thus collaborative learning is beneficial for mastery-goal orientation in students. Mastery goal orientation supports students' interest and self-efficacy, which is positively related to positive emotions and well-being in the group (Linnenbrink & Pintrich, 2000). However, teachers should design carefully the collaborative learning tasks and topics. The tasks should be interesting and at the same time sufficiently challenging otherwise students seem to be bored or lose their interest in the group work (Pintrich, 2003).

Since, collaborative learning is challenging due to individual's different characteristics and cultural background (Cohen & Lotan, 2014), some students may pursue performance goal

orientation positioning to look better and smarter, and less competent students may focus on performance-avoiding goal orientation. Teachers' feedback may also evoke performance goal orientation in groups, especially if the teacher criticize or praise the groups publicly (Kempler & Linnenbrink, 2004). Thus, teachers should give private feedback about the group progress, and value individual's contribution so that the students better focus on the task and contribution.

3 Methodology

3.1 Aims and Research questions

Group development stages theory has been tested by a large amount of researches, therefore it is assumed as a classical model of group development. Nevertheless, there are still gaps that make the theory incomplete. None of the research have investigated how long a particular stage lasts, and how the students are motivated during each stage. Taking into account the gaps in previous researches as I have described in Introduction Chapter, the aim of this Master's thesis is first, to describe the duration of each stage of group development, and to explore the motivational level of students at each of these stages. Based on the aim, the following questions were formulated:

- 1) *When each group development stage (forming, storming, norming, performing, and adjourning) take place and how long they last?*
- 2) *How students' motivation state differ from one stage to another?*

3.2 PREP21 Project

This master thesis used the data that was pre-collected as a part of the PREP21 –research project (Preparing Teacher Education Students for the 21st Century Learning Practices). The general aim of the PREP21 project is to study and prepare teacher education students for the 21st century learning (Häkkinen et al., 2017). The research investigates 21st century skills such as learning skills, collaboration skills, problem-solving skills, and use of technology in education, which are found necessary skills for teachers nowadays.

3.3 Participants and context

Participants of the study were 15 first-year teacher education students (female = 12, male = 3) with an average age of 23. The participants were working on mathematical tasks in small groups with 3 to 4 members in each. They participated in six collaborative learning tasks with the duration of approximately 1 hour per task. In addition to mathematical tasks solutions, the groups went through the macro-scripts phases. The participants were instructed to discuss scripted questions at the beginning (**Orientation questions**), in the

middle (**Checkup questions**), and at the end (**Reflection questions**) of each group session (Näykki et al., 2015; Näykki et al., submitted).

3.4 Scripted Phases questions

1. Orientation questions, students read the task individually and discuss their task understandings, feelings, group's goals and plans for the session based on the following questions:

- *What is the purpose of the task?*
- *What kind of feelings does the task arouse?*
- *What kind of strength does your group have?*
- *What is the goal of your group?*
- *How do you plan to work?*

2. Checkup questions, students evaluate and discuss group's progress, feelings, challenges, and how they are going to proceed based on the following questions:

- *How has your work progressed?*
- *What kind of feelings does your work arouse?*
- *What kind of challenges are you currently facing?*
- *How will you proceed from here on?*

3. Reflection questions, students evaluate the whole session, and discuss how they overcame the challenges and what helped them in their group work based on the following questions:

- *How would you evaluate your work as a group?*
- *How did you reach your results?*
- *What helped or hindered reaching your goals?*
- *How did you overcome possible challenges?*

3.5 Data collection

The data was collected through video observation. For this, the class was equipped with headset microphones and 360 spherical camera, which was beneficial to collect high quality data. Duration of one session was around one hour length, and in total the researchers in the PREP21 research project collected over 100 hours of video data.

3.6 Data analysis

Qualitative research use often unstructured and a large amount of data collected from, for example, open-ended surveys, interviews, textual documents or audio-visual materials (Silverman, 2006). The researcher needs to organize the data by categories, to classify according to themes, to theorize, explain, and to explore the data to find the answers to the research questions (Patton, 2005; Attride-Stirling, 2001; Hsieh & Shannon, 2005). These functions vary depending on the research questions and the type of data collected (Gibson & Brown, 2009) as well as the type of analysis researcher may choose. In my data analysis I used content analysis approach (Chi, 1997; Hsieh & Shannon, 2005; Corbin & Strauss, 2008). This type of qualitative analysis allows to organize the qualitative data into systematic structure through coding and category-building hence making the analysis process clearer to highlight the focused research phenomena (Chi, 1997; Hsieh, Shannon, 2005; Corbin & Strauss, 2008).

For the analysis, I transcribed all the group members' responds at the scripted phases that described in the second subsection of this part. I used coding to categorize all the students' answers line by line. I took the most common features for every group based upon their answers, and excluded the less common features. It helped me to find out the stages of group development based on characteristics of each of them according to the theoretical framework of this thesis. After finding stages, I looked into the students' description of their motivation at every stage. My main focus was is students' motivation different at these group development stages because at each stage students' emotions may vary. Hence, taking into account the bidirectional relationship between emotion and motivation, the students' motivation may also vary from one stage to another (Meyer & Turner, 2006; Järvelä, Hurme, Järvenoja, 2011).

4 Results

In this section, I will present the key findings of my research based on the coding criteria.

First, in Chapter 4.1, I will focus on my research question 1: *When each group development stage take place and how long they last?* I give in-depth description of each stage, based on the theories that was represented in Chapter 2.2, and comparison between the different group developmental stages stage during six collaborative learning sessions.

Second, in Chapter 4.2, I look into the students' motivation at each stage based on my research question 2: *How students' motivation state differ from one stage to another?*, from three motivational concepts perspectives such as *mastery goal orientation, self-efficacy, and interest*.

4.1 Group development stages

Forming stage

Forming stage is a well-defined stage because it is the first stage of the group work when the students get to know each other, with the task and procedures needed (Tuckman, 1965). This is the first session where the students were assigned to the small groups and get to know about other group members. In my data the students already knew each other since they are students in the same study program, but here they got introduced who will be in the same small group for the next six sessions. They got instructed by the teachers about the tasks and procedures including scripted phases questions. In the first session they got more instructions and more frequent reminder about the script questions. Students were more inclined to forget the script phases and all the groups did not do one of the scripted questions. However, the rest of the script answers were quite sufficient as the students discussed the questions thoroughly. All the group members were involved in the discussions of the questions providing explicit answers for each question and sharing their opinion about it.

The most common groups' feeling in forming stage was confusion. The students were confused about the instructions, as it came visible for example by the following examples from the data (Student in Group 1): *"I am slightly petrified because the instructions are complicated I don't get it ..."* Confusion was present also during their task working (Student in

Group 2): *“I feel confusion on the 2nd page”* and (Student in Group 3) *“we get off track a lot”*. Feeling confused affected the group work as it was commented by one of the students (Group 4): *“We are confused, scary to say something and it slows us down”*. It also affect the group interaction. The groups tended to “ask questions” from each other and teacher as shown in their answers. In terms of collaborative learning it can be assumed to be a positive sign showing the groups’ high interaction and getting support from each other, but it also means that the students may feel over-dependent on each other and the teacher.

Storming stage

The main characteristic of storming stage is intra-personal conflict (Tuckman, 1965) or conflict toward to the task (Dunphy, 1968; Lacoursiere, 1974). During this stage the students are expected to feel more negative feelings like anxiety or aggressiveness (Lacoursiere, 1974; Dunphy, 1968). The analysis of this study showed that the most groups had conflicts to the task rather than the interpersonal conflicts. Only Group 1 had slight negative feelings towards the group working but not to any particular individuals. In the following example their group (Group 1) had four members instead of three members that they had previously. They discussed that it was their challenge as it was mentioned in these following examples. Student 1: *“I think there were too many people this time. It was easier when there were only two or three of us. Because it was too much, you were (pointing at S3 and S4) too far away from me”*,

Student 4 also mentioned the size of the group: *“I think, there were more of us and this time was so easy for one of us to just kind of sitting on one side, and say yeah, I agree with you or whatever”*.

Student 3: *“I think this was more for pair work than a group work activity”*.

It is not clear which session or when storming stage takes place, but it is defined to occur in the middle and after the forming stage. I defined either 2nd or 3rd session as a storming stage. According to its characteristics some other negative feelings are expected, such as feeling frustrated or finding the tasks increasingly boring. The following examples show this type of challenges, as the student in Group 1 mentioned: *“I think these might be boring”* and *“it was just the same thing over and over. It was just boring”* or expressing their negative attitude towards the topic (Student in Group 2) *“I have never had fun with fractions”*. At this stage students felt confused about the topic: (Student in Group 2) *“Fractions*

always confuses me”, and the task: (Student in Group 4) *“First there were some misunderstandings”*, (Student in Group 1) *“...as a University student this is challenging”*, (Student in Group 3) *“I’m still a little bit confused with these like it can we mix them or with your example for example (pointing at the task paper) should we been using only one color all the time”*. This may cause feeling dependency since some students commented: *“asking questions”* (Group 1, Group 2, Group 3) as one of their strategies of overcoming the challenges. However, most of the groups became more autonomous and did not ask the teacher at this stage. Only Group 2 mentioned *“asking teacher”* during their discussions. Their approach to *“asking questions”* is changed, they felt more open and getting to know each other better and closer since it was their (Student in Group 4) *“2nd time working together”* pointed out as their group's strength. They felt getting each other better as (Student in Group 1) *“we get along, and we all have good team working skills to learn to use those [learning tools]”*, (Student in Group 3) *“we have different strengths and weaknesses”*, and *“we are different ... from different educational system and open to share own feelings”* as their group's strength. Feeling closeness to each other helped them to share their opinion more open and they were (Student in Group 1) *“are asking questions no matter how silly they might seem at first”* which may lower the level of hesitation and made them feel (Student in Group 3) *“comfortable to share ... and free”* and *“think as well and consider what they were doing”*. They were no longer feeling (Student in Group 2) *“silly for asking something or blurting something out”*. The groups needed support from each other, but they may not need help from the teachers as pointed in Group 2 discussions, when one of the members said *“I wish we wouldn’t be interrupted”* showing teacher’s side.

Norming stage

According to Tuckman (1965) this is the stage when the group settle the norms and start to work closer and cohesive, building trust and take part in discussions actively. In my analysis this is the 3rd or 4th sessions of the groups after the storming stage. I found norming stage started from the second or third sessions that were described above as a storming stage. Consequently, feeling of trust toward to each other (Lacouserie, 1974) starts at the storming stage and continues at the norming stage. Group 2 and 4 answered they *“worked well as a group”* and *“collaboratively”*. Feeling close facilitated deep discussions on individual level, as one student highlighted in Group 2: *“We got back if someone didn’t understand”*. They were open and worked toward to constructing each other's knowledge and understanding. The groups may feel satisfaction working together which helped them to

(Student in Group 1) “*achieve success*” and (Student in Group 2) “*reached their goals*”. Group 1 commented that they could “*figure out challenges*”. Cohesiveness and mutual trust (Tuckman, 1965; Spitz & Sadock, 1973) helped them to build strong relationships between each other as a group, successfully perform the task, and handle with challenges.

Despite the positive comments to the group work and their performance, the students still felt some negative feelings as at the storming stage. They shared some negative feelings, mostly about the topic: (Student in Group 4) “*anxiety because I hate special stuff*” which was supported by another student in that group as: “*Yeah that’s a challenge to motivate us to like it*”. Students in Group 1 showed feeling tired of doing the task commenting that: “*they were excited [at the beginning of the session] but went down*” and they started to “*feel that they have played with manipulatives enough*”, which made them to desire (Group 1, 2, 4) “*to complete the task*” and (Student in Group 1) “*just go home*”. At this stage students may became more independent, they didn't get help from the teachers, and moreover they felt that they were interrupted by the teacher commenting external instructions as (Student in Group 3) “*destructions*” that challenged their group work. The students had mixed feelings, they were working in a high level as a group and were excited that they were able to succeed, but at the same time they continued to have negative feelings.

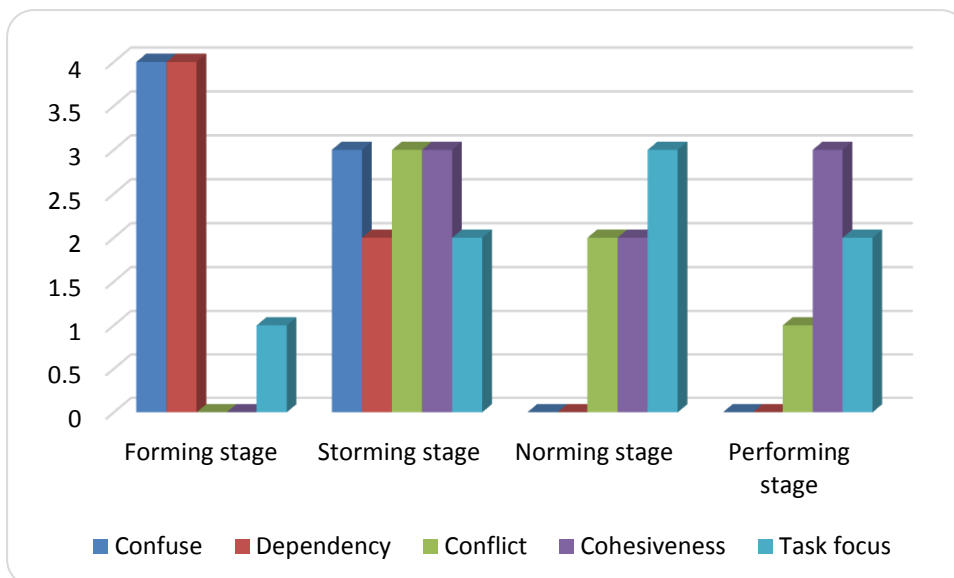
Performing stage

At this stage students are expected to be task oriented and deliver the results. They are expected to be more flexible and functional (Tuckman, 1965). According to the data the performing stage may start in the norming stage when the students were more focused to complete the task. The task focus started at the norming stage when the students commenting to complete the task as their goal, and is visible at this stage as well. Two groups commented that they have to (Student in Group 1) “*work efficiently*” or (Student in Group 2) “*quickly*” and having done the task before the (Student in Group 1) “*time is off*”. Cohesiveness is present at this stage as well. Three groups showed positive attitudes to group work, they (Student in Group 1) “*felt more comfortable*”, they (Student in Group 4) “*are good in collaborative work*”, and (Student in Group 2) “*glad that it's a group work*”. Because of their positive attitudes, at this stage there are less negative feelings among groups. Only Group 2 commented feeling as “*annoyed about the task*”. The same group had off-topic discussions that made them “*feel happy*”, and while answering the questions they

were talking about other topics that they had have before coming to the class. Hence, in addition to the task focus, off-topic discussions may take place during this stage.

Task focus behavior hindered to get explicit discussions for scripted phases especially the Checkup and Reflection questions. Three groups (Group 1, 2, 4) discussed better the Orientation questions. All the groups discussed very little the Checkup questions, using very short descriptions. Group 2 skipped the Reflection questions, they were focused on the finishing and submitting the task. Three groups (Group 1, 3 and 4) did the Reflection questions, but very shortly answered the questions and did not discuss the questions. In Group 1 and Group 3 only one member answered to the all of the questions and the others were not involved to discuss and share and they seem to agree with this way of answering to the questions. As a result the amount of discussions decreased.

Figure 1. Duration of each stage



The data that was used in this study shows that the stages is somewhat linear as proposed by Tuckman (1965) that taking place one after another, but not necessarily follow the sequence one stage after another (Figure 1). The stages are more mixed having characteristics of the previous or next stages. Forming stage and storming stage have linked with the level of confuse in students, whereas conflicts starts at the storming stage and may last till the performing stage. However, the peak of conflicts may take place particularly at the storming stage. At the storming stage and performing stages characteristics of the norming stage such as cohesiveness and closeness are surprisingly higher than the norming stage. Task performance feature of the performing stage starts from the norming stage and demonstrated higher than the performing stage.

However, some characteristics may take place only at the particular stage (s). For example, feeling of dependency may start and end at the forming stage, because at the storming stage students did not need any external help even when they were confused. Feeling of confuse starts at the forming stage and ends at the storming stage because none of the groups mentioned about confuse at the two last stages. The task focus starts only at the norming stage and continues at the performing stage

4.2 Student's motivation state at stages of group development

Motivation at the Forming stage

Goal-orientation:

At the *forming stage* of group development, the students were oriented toward to developing new skills, trying to understand their work, improving their level of competence, and achieving a sense of mastery (Pintrich, 2003). At this stage all the groups demonstrated their goals to be not just to learn something new but also to master in teaching math and to use the same exercises in teaching the school kids (Table 1). The students demonstrated a high expectation that the practice will help them to understand what school children feel when they start to learn mathematics. Some students also shared their own school experiences, and highlighted the value of learning because they also have had math difficulties in the school.

Table 1. Students' goal orientation

Groups	Example	Motivational concept
Group 1:	<p><i>To learn how to use those.</i></p> <p><i>Learn to use the base ten systems. Learn to introduce them in the class.</i></p> <p><i>Looking forward to learning to teach.</i></p> <p><i>Help us to understand the how the students feel if they don't understand. We will also experience it.</i></p>	Mastery goal orientation

Group 2: *Understanding the relationship between the numbers.* Mastery goal orientation

Having practice, like you can see how important it is before going to the class, so it is going to be useful as well. Well, I can see in what point I can use these at school. I think, it makes easier to become real.

Learn to, to work with manipulatives, to explain the base ten system, I would say.

Group 3: *To teach to use base ten blocks. Montessori number cards in these ten blocks.* Mastery goal orientation

So, for example this, this is supposed to have them to understand the base ten.

Ten base effectively in teaching.

Progressed a lot. We are asking questions that we would have while teaching.

I'm going to learn them, I really don't how it is going to work for them in their [school children's] minds.

Group 4: *Yeah, to understand base ten system and how it works.* Mastery goal orientation

Yeah, I mean the challenge was that if we were to teach this to the class, you need to know more than one method explaining the tool.

Self-efficacy:

Students' interaction demonstrated high self-efficacy beliefs toward to the group, and to the task performance. During their script-phases, the students used self-efficacy talks, as shown in the Table 2. The groups were self-efficacious before they started their group work. Further, the students encouraged their group to do the task by highlighting positive qualities of their own groups.

Table 2. Students' self-efficacy talks

Groups	Example	Motivational concept
Group 1:	<i>We are all positive thinkers. All are optimistic. To be the best.</i>	Self-efficacy talk toward to the group
Group 2:	<i>We are pretty awesome. I think, we all are quite active, like we talk what we think, and that's good. Share thoughts.</i>	Self-efficacy talk toward to the group
Group 3:	<i>Try our best.</i>	Self-efficacy talk toward to the group
Group 4:	-	

Students used self-efficacy talks then they were evaluating their progress on the task as well (Table 2.1). Most of the groups came to the conclusion that they did well.

Table 2.1 Students' self-efficacy toward to the task performance

Groups	Example	Motivational concept
Group 1:	<i>We progressed well We figured out everything. We were patient.</i>	Self-efficacy talk toward to the progress
Group 2:	<i>Diligently [did the task].</i>	Self-efficacy talk toward to the progress
Group 3:	<i>Efficiently. We progressed a lot. We are asking questions that we would have while teaching.</i>	Self-efficacy talk toward to the progress
Group 4:	<i>[Progressed] really well. We started slowly but we got all familiar with them and quickly. Yeah, I think we managed to do all the tasks in time.</i>	Self-efficacy talk toward to the progress

All the groups were satisfied with their task performance and the work they had done so far. Group 1 and 2 pointed out the strategies as being patient and diligent that helped them to success.

Interest:

Students are more likely to generate interest by doing the tasks they find interesting (Pintrich, 2003). As the Table 3 shows, the students were excited and they demonstrated to enjoy the task even though they (like in Group 2, 3 and 4) expected to experience some challenges at the beginning. Hence, the activity, task and tools may have supported the situational interest in students, which motivated them to be involved in the task actively. In comparison to situational interest, personal interest was mentioned only once (Group 4). Again, students were able to generate situational interest not having personal interest initially.

Table 3. Students' interest

Groups	Example	Motivational concept
Group 1:	<i>I am excited because we will learn how to use those things.</i>	Situational interest
Group 2:	<i>I think, they (materials) are cool. I want to play with them more. Better, because at first I was confused this with 5 base systems. I was like, ahhh, it is horrible, so I didn't want to do it. But this is nice. I'm excited to continue. I am excited because we finally get to work with manipulatives.</i>	Situational interest
Group 3:	<i>Motivation. Fun.</i>	Situational interest
Group 4:	<i>Curiosity. We all love math. Happy. We have done without fighting.</i>	Situational/Personal interest

Motivation at the Storming stage:*Goal orientation:*

At this group developmental stage students continued to be motivated to understand, learn and to improve their skills about fractions. All the groups mentioned learning as their main goal. Some students also expressed to be motivated to learn to teach, but in comparison to

the first session it was less mentioned and “to learn” was more discussed instead. The reason of this could be that the most of the students found the topic challenging and not easy to explain to the school children (Table 4).

Table 4. Students' goal orientation

Groups	Example	Motivational concept
Group 1:	<i>And to learn how to use these in teaching. Yeah, so that you can teach in future your visual learners.</i>	Mastery goal orientation
Group 2:	<i>To learn these things.</i>	Mastery goal orientation
Group 3:	<i>To learn about the fractions. And exactly about the fractions, what they are, where they are, why they are.... How to add them, why we need them. I never like fractions. Eager to see how to use to simplify [fractions]. To learn about the fractions. How to use these, how to teach them. And also to get better insights how to teach this from the very beginning.</i>	Mastery goal orientation
Group 4:	<i>To get to know the fractions ... cakes ... and manipulatives. Hopefully, to learn something about these cakes.</i>	Mastery goal orientation

Self-efficacy:

Self-efficacy toward to the task completion remained at the same level at this stage, but none of the groups showed self-efficacy toward to the group. Most of them evaluated how well and how quick they did their task (Table 5). Two groups pointed out the group member's contribution that helped them to progress well. Despite the same level as at previous stages, one group's self-efficacy toward to the task progress was low.

Table 5. Students' self-efficacy

Groups	Example	Motivational concept
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Group 1:	<i>We were agreeable. But I think we still did pretty well. We still solved all the problems. Task by task very efficiently. Yeah... And I think you two (pointing at two other peers) kept the thing going on, so that was good.</i>	Self-efficacy talk toward to the group and the progress
Group 2:	<i>We are good communicators. Slow ... but good. I think we did good. We are all the same level it was really good because we actually got to figure out something. None of us was passive. We are all helping each other to understand.</i>	Self-efficacy talk to the group and the progress
Group 3:	<i>Somewhat. We didn't finish, but we found the challenges.</i>	Low self-efficacy talk to the group and the progress
Group 4:	<i>Pretty quick. We understood how it works, so we have done quickly.</i>	Self-efficacy talk to the group and the progress

Interest:

Most students found the task and learning tool as interesting and exciting (Table 6). They also compared the tasks, and shared their feelings about other tasks, some tasks they evaluated to be more interesting but some tasks they defined to be boring. This was visible especially in Group 1.

Table 6. Students' interest

Groups	Example	Motivational concept
Group 1:	<i>I like it. I am excited, I am actually excited more with these than the last ones. I was more excited with them because they were colorful.</i>	<i>Situational interest</i>
Group 2:	<i>I am just interesting in using these.</i>	<i>Situational interest</i>
Group 3:	-	

Group 4: *So interesting.
Exciting.*

Situational interest

As well as in the first sessions, groups were getting interested from the task and learning tools that supported their engagement in learning. However, Group 3 did not show any interest or excitement toward the task this time.

Students' motivation at the Norming stage

Goal orientation:

Learning to teach was the focus of two of the groups at this stage, but students were not just stating that the task will help them in teaching they were more critically analyzing how they can use it to teach children. Consequently, the students were more open in sharing their feelings and to engage in higher-order thinking than before (Table 7).

Table 7. Students' goal orientation

Groups	Example	Motivational concept
Group 1:	<i>To offer a good learning environment for the children. Activities for this like learning, because I think I feel like I can come with a lot of fun games for it, but - I don't know how to make it educative especially for one specific grade.</i>	Mastery goal orientation
Group 2:	-	
Group 3:	<i>To think how to use these in teaching.</i>	Mastery goal orientation
Group 4:	<i>[To learn] Special skills to teach this.</i>	Mastery goal orientation

On the other hand at this stage students were more motivated to “*complete the task*” rather than to learn. Group 1 answered that they were able to finish the task for the first time, and the Group 2 member stated: “*we need to finish drawing and then we are done*”. As it is shown in the Table 7. Group 2 did not discuss learning as a goal, they oriented on the task commenting as: “*To take this box [box with materials] and build*”. From this stage, the groups discussed the scripted questions less explicitly, therefore the data is being decreased. Moreover, only Group 2 managed to answer all the scripted questions, the other groups simply skipped some of the questions.

Self-efficacy:

Three groups' acknowledged the task performance after they finished the task. High self-efficacy was visible in the Group 2 discussions (Table 8). They felt self-efficacious before they started the task and after. At this stage the data is decreasing because the groups tend to skip one or two scripted questions and were describing their group efficacy less and shortly, self-efficacy was less demonstrated. Self-efficacy was not present in Group 3 discussions at all. Moreover, this group skipped two of the scripted questions.

Table 8. Students' self-efficacy

Groups	Example	Motivational concept
Group 1:	<i>To do the best activity ever. [Progressed] ok I'd say.</i>	Self-efficacy talk to the group and the progress
Group 2:	<i>Well, quickly, we finished. Progress, there was a challenge be we figured it out. We were really quick about it. I think we worked well as a group. We did a good job.</i>	Self-efficacy talk to the group and the progress
Group 3:	-	
Group 4:	<i>We were successful.</i>	Self-efficacy talk to the progress

Interest:

The groups were more likely to get interested during the session. Students felt excitement because they liked the tools and the task, especially the second task, and they found it more interesting than the previous task of this session. However, the feeling of excitement and enjoy is not shared by all the students, for example, in Group 1 and Group 4, when one of the members express own interest, the other members shows that they were excited less. At this stage, students' interest may be at different level (Table 9).

Table 9. Students' interest

Groups	Example	Motivational concept
Group 1:	- <i>I am excited, I like working on creating tasks with manipulatives. It's good practice</i> - <i>Ok, good that one of us is more excited.</i>	Situational interest
Group 2:	- <i>Yeah, I like building with blocks, so I am excited</i> - <i>I haven't even played with blocks before, even as a child, so that's why I'm lucky now I'll use my time</i> - <i>I'm more interested in this in any other tasks. I was interested about them as well, but I want to see how this works</i>	Situational interest
Group 3:	-	
Group 4:	- <i>More excitement now because we have a sort of idea</i> - <i>I like it, but it is not so easy</i> - <i>One of us good at it, and likes it</i>	Situational interest

Students' motivation at the Performing stage

Goal orientation:

The groups were keeping their motivation “to understand” and “to learn” the subject (Table 10). Their previous motivation “to learn to teach” was getting less commented, and only one group mentioned about it. So, to learn to teach is now out of from the focus of the groups. Table 10. Students' goal orientation

Groups	Example	Motivational concept
Group 1:	<i>To learn more about geometrical stuff because all the questions are geometrically related.</i>	Mastery goal orientation
Group 2:	<i>Useful things to learn.</i>	Mastery goal orientation
Group 3:	<i>To cover some difficulties we have and understandings.</i> <i>To see different ways of teaching.</i>	Mastery goal orientation
Group 4:	-	

At this stage completing the task remained at the same degree as it was in the previous stage. The students were more task-focused and set completion of the task as their goal for the lesson and they were motivated to complete it “*quickly*” as mentioned by some of the students.

Self-efficacy:

Some students pointed out self-efficacy strategies before they started the task. The students answered that they felt “*more comfortable with each other*” as a group. They were satisfied with the way they accomplished the task. Self-efficacy toward to the task completion remained at the same level as in the previous sessions, but groups showed no self-efficacy toward to the group.

Table 11. Student’s self-efficacy

Groups	Example	Motivational concept
Group 1:	<i>Progressed well.</i> <i>Quite well.</i>	Self-efficacy talk the progress
Group 2:	<i>In a jolly good way (planning phase).</i> <i>Fine.</i> <i>Quickly.</i>	Self-efficacy talk to the group and the progress
Group 3:	<i>We did a good job.</i> <i>Quite well.</i>	Self-efficacy talk to the progress
Group 4:	<i>Good.</i> <i>Go on like this, try our best.</i>	Self-efficacy talk to the group and the progress

Interest:

At this stage it is more likely that the students' interest is reduced (Table 12). Two groups commented that they were excited, whereas in Group 3 the student shortly commented “*excitement*” but did not give any justification for own comment. Not any groups showed or considered the task as ‘interesting’. The students' motivation switched to “*completing the task*” counted as an extrinsic motivation.

Table 12. Students’ interest

Groups	Example	Motivational concept
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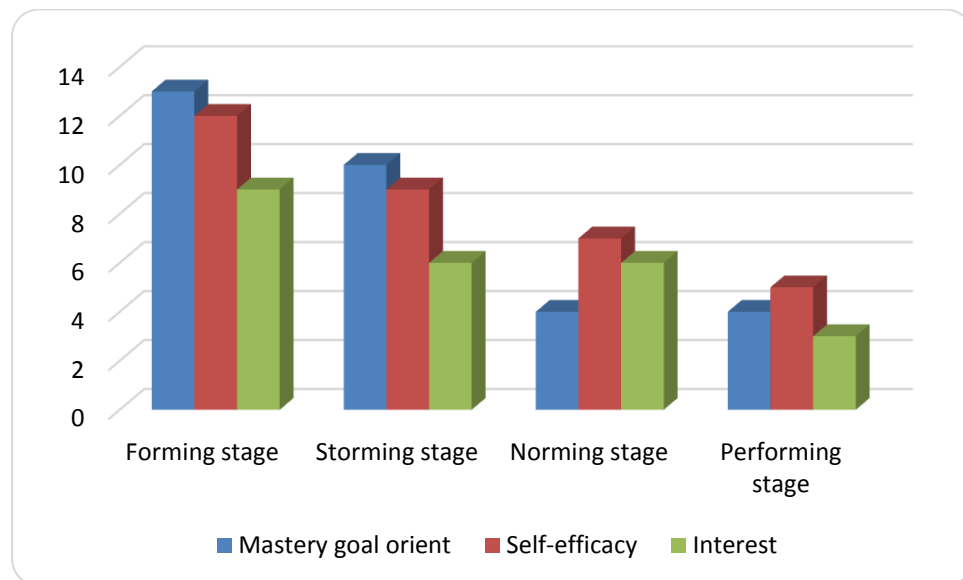
Group 1: *I am excited, I like working on creating tasks with Situational interest manipulatives. It's a good practice.*

Group 2: - *Situational interest*

Group 3: *Excitement. Situational interest*

Group 4: *Excited because I don't know what others did. I saw some of them took the same manipulatives like ours. I have never worked with some of them.*

Figure 2. Students' motivation at group development stages



As it is shown in Figure 2, in terms of goal orientation, the students were keeping mastery goal orientation till the end of the course. They are motivated to understand, to learn, and to learn to teach. The latter achieved its peak at the forming stage, when students commented less “to learn” and “to understand” as their goal. It continues at the storming stage, students set their goal to learn and understand more than “to learn to teach” but still it can be found in students' answers. At the norming stage students were commenting less about teaching, but still it is present, and they oriented not only “to learn to teach” but were more critically viewing “how it could be taught” in a school. At the performing stage, students are mostly focused on “completing the task ... quickly” and they were commenting less about their learning goals. So, it could be concluded that at the performing stage when students are more focused on performance their goals switched to the task completion. However, the students started to think more about “completing the

task” from the norming stage, but at the same time they had learning goals as well.

Students are more likely to feel self-efficacious during all the session. Especially, for their progress evaluation, they were always satisfied and praising their performance. They used positive judgments toward the group work as well throughout all the sessions. These positive judgments, may increase students' motivation, but at the same time students tend to exaggerate and may cause a learning challenge. Teachers can play a significant role by providing realistic and accurate feedback to avoid overestimated self-efficacy beliefs (Pintrich, 2003).

Students mostly expressed situational interest during the whole course. Only one student expressed personal interest in the first session. From storming and the norming stage students expressed situational interests, they were excited and found the activities interesting. On the other hand, at these stages some students showed no interest to the task commenting it as a “boring or confusing task”. At the performing stage students seem to switch their interest to the external factor, and were motivated rather “to complete the task”. Again, the reason could due to characteristics of the stage, when students are mostly focused on the task performance.

To sum up students’ motivation state, I will highlight that students’ motivation is higher during the first sessions, they come with personal interest, they are more self-efficacious, they have strong goals to learn and improve their skills. They follow the instructions (density of their answers for scripted questions), they are in general more motivated to discuss the scripted phases. Feeling of confuse is high at these stages, however it may not affect the level of motivation in students.

The middle of the course (norming stage and performing stage) may bring down students’ motivation toward to the learning goals. The students seem more motivated to work on the task and quickly in many cases. It can be concluded that the students may not pay attention to the quality of the task performance but the quickness instead. It may effect negatively the learning process in general.

5 Discussion

This study investigated duration of the classical group development stages (Tuckman, 1965) applying them into one course sessions where students were engaged in collaborative learning. On the one hand, each stage nearly starts one another as it was claimed by Tuckman (1965), the order of each stage is also somewhat confirmed. For example, as the data shows the forming stage starts in the first session, and finishes during the second session, whereas storming and norming stages have quite many overlaps thus in the middle of the course the groups may go through the mixed storming and norming stages. As well as the norming and performing stages that are also quite closely related to each other having more common features. Therefore, the stages may start according to the sequence, but may start earlier and last longer than they are expected to be.

Several researches (Shambaugh & Kanter, 1969; Lacoursiere, 1974; Spitz & Sadock, 1973; Mann, 1977) have shown that the groups have the termination stage in their last group work, based on which Tuckman's model was updated with the fifth stage, namely adjourning stage. According to its characteristics, this is the stage when students know that this is their last session as one group, that's why it is expected that students feel sad (Lacousere, 1974; Spitz & Sadock, 1973) and also self-evaluate own group work (Tuckman, 1965). I did not include adjourning stage in the analysis because this stage was not present in the data. The students did not give either comments or show their feelings about their last session, which may bring to the conclusion that the adjourning stage needs to be intentionally included in the session by the teachers, so that the students will have the opportunity to evaluate their group work. Self-evaluation is important, because it provides the students to acquire critical thinking (Totten, Sills, Digby & Russ, 1991) and collaboration skills through evaluation of their group work, which is useful for other collaborative learning courses that the students may have in the future.

As it was described in Introduction section of the thesis, the stages mostly described in terms of students' emotions, while motivation has not investigated yet in terms of group development stages. Furthermore, motivation which is viewed as a critical determinant that help students to learn successfully and get high level of academic achievement (Graham & Winer, 1992; Pintrich & Schunk, 2002). In addition, emotion and motivation is bidirectional and intertwined in the student's learning process and group work, which means that the

emotions that students feel during the stages of development may impact on their motivation (Meyer & Turner, 2006; Järvelä, Hurme, Järvenoja, 2011). As the analysis show, motivation level of students are different from each stage to another stage. Students seem to have more positive feelings and their motivation during the first stages is higher than in the last two sessions. They demonstrate to be a mastery goal oriented and to feel more self-efficacious during the forming and storming stages. Students' negative emotions are also high at these stages, they felt confused and annoyed about the task or topic, but their emotions did not affect their motivation. The breaking point to their motivation is the norming stage, students' motivation is then decreasing and they slowdown in their group work. The most common feature of these stages are students got tired of the tasks and activities that make them to feel bored and lose their interest. Hence, bidirectional relationship (Meyer & Turner, 2006; Järvelä, Hurme, Järvenoja, 2011) between emotion and motivation is confirmed also at some level. Students' motivation depends on the type of emotion, such as confuse may not challenge motivation, whereas students' tiredness and feeling bored affect students' motivation directly.

The research is based on the students' responds during their discussions, and I tried to exclude any personal biases, having said this, I would like to highlight the reliability and validity of the research. It raises important points about the group development and how students' motivation is changed during the course. I strongly believe that, it would give guidelines for teachers to select the right topic, tasks or activities, and learning tools in every session of the course.

However, there are the limitations of the study that I would point out:

1. Only small portion from the big data was used in the analysis of this master thesis, i.e. scripted phases, are taken for the analysis, which means the data may not be necessarily providing the whole picture of their group work during each session.
2. In terms of motivation, the data was not compared to the final achievement or success, so my claims are relied only on motivational theories that predicts academic achievement. I would recommend cross-comparison of each group's success on each task and group work.
3. The groups did not always discuss the scripted phases, or skipped some phases, especially in the last two stages, which limits the findings, and the data is not

thus complete. If the students were discussing the questions in the same way that they did during the first two stages, probably there would be different results.

4. The pre-collected data was not designed for the purposes of to analyze the group development stages. Thus, I have adjusted the data to my research questions, therefore the research that is initially set up to analyze the stages of group development would have different results.
5. The adjourning stage was not present in the findings, that's why it was not included in the analysis. Since, many researchers found this stage in their studies, it is important to include in the course with the different scripted questions. The questions could be directing the students for the self-evaluation.

Taking into consideration the limitations, it would be recommended to facilitate and/or control the group discussions of macro-scripts so that they share their own thoughts more explicitly. It would be even more interesting to take a larger amount of data, not only scripted phases. In this way, the research would demonstrate what the students say and what they actually do at the each stage (see e.g. Näykki et al., submitted). In terms of motivation at each stage, I would recommend to compare students' responses and their group results. I think, it would give in-depth analysis and comparison with the actual motivational state of students at each stage.

6 Conclusion

This thesis describes how groups develop throughout one collaborative learning course. All the group development stages were visible, except the adjourning stage, which might be designed by teachers intentionally so that the students can evaluate their group work. Evaluation of group work would be useful to acquire collaborative learning skills. The other stages are well described in the theories (i.e. Tuckman, 1965), and are important in the course design.

The analysis show that at the storming and norming stages students react more negatively to the task, topic or learning tools. Hence, it is important to concern all of those elements, i.e. task, topic, or learning materials in the middle of the course. Since, at these stages students also feel more independent, it is challenging to intervene with additional instructions as well. In addition, at the storming stage intra-group conflicts are expected, and according to the analysis of the thesis conflicts toward to the task may continue at the norming stage, which may affect negatively to the productivity of the group work.

Taking the group development stages into consideration, the teachers may avoid negative emotions that influences students' motivation and thus undermine the whole learning process and academic achievement. As the study demonstrated each stage evoked different emotions in the group, which had an effect on students' motivation. The forming and storming stages the level of confusion is high, which causes feeling of scared and dependence on each other or teacher. Consequently, the beginning of the course is the time when teachers' instructions and active facilitation is necessary. Despite the level of confusion, the students stay highly motivated during the first sessions. They demonstrate a high will to learn something new and they want to master their skills as future education professionals. They are satisfied with their work as a group and every member's contribution is positively valued. They are able to trigger interest to the task and activities. They seem to overcome possible challenges and stay excited with and enjoy the activities. The breaking point for the students' motivation is the norming stage (middle of the course), when students feel tired and have more negative emotions, and their motivation is slowed down. Negative emotions continue to arise at the performing stage. Therefore, at the end of sessions students' will to learn is switched to complete the task. For the benefits of the learning process, it is important to design instructional support in the middle and end of the course

more carefully. The middle and end of the course tasks and activities should be interesting and enough challenging, so that the students will be involved more actively.

I would conclude that, the stages of group development play an important role in the motivation support. Taking them into account while designing the course will be useful for the teachers and students. Moreover, the stages can be a good guide for task assignments or topic selection. Teachers also will have more idea about the right time for facilitating the group work.

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