EGLE SÄRE

Developing the reasoning skills of pre-schoolers through Philosophy for Children

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Developing the reasoning skills of pre-schoolers through Philosophy for Children

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Dedication

This work is dedicated to my children.
It would not have been possible without your understanding and patience.

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LIST OF ORIGINAL PUBLICATIONS

I. **Säre, E.,** Luik, P., & Fisher, R. (2016). Supporting educational researchers and practitioners in their work in education: assessing the verbal reasoning skills of 5- to 6-year-old children. *European Early Childhood Education Research Journal, 25*(5), 638–651, doi:10.1080/1350293X.2016.1213564

II. **Säre, E.,** Luik, P., & Tulviste, T. (2016). Improving pre-schoolers´ reasoning skills using the Philosophy for Children programme. *Trames: Journal of the Humanities and Social Sciences, 20*(3), 273–295. Estonia: Estonian Academy Publishers, doi: 10.3176/tr.2016.3.03

III. **Säre, E.,** Tulviste, T., & Luik, P. (2017). The function of questions in developing a preschooler's verbal reasoning skills during philosophical group discussions. *Early Child Development and Care, 0*(0), doi: 10.1080/03004430.2017.1331221

The author contributed to the publications as follows:
Article I: designing the study, formulating the research questions, designing and validating the composed instrument, carrying out data collection and participating in the analysis process as one coder, writing the paper as the main author.
Article II and III: designing the study, formulating the research questions, carrying out data collection and participating in the analysis process as one coder, writing the paper as the main author.

Related publications:
Säre, E., & Luik, P. (2011). A Case Study Analysing the Appearance of Reasoning in Primary Students' Class Discussions Using the Philosophy for Children Programme. In: Preschool and Primary Education, 121−134. Frankfurt am Main: Peter Lang Europäischer Verlag der Wissenschaften.
Säre, E. (2010). Wie das Philosophieren in den Kindergarten kommt. In. A. A. Bucher, G. Büttner, P. Freudenberger-Lötz, & M. Schreiner (Eds.), *In der Mitte ist ein Kreuz. Kindertheologische Zugänge im Elementarbereich* (Jahrbuch für Kindertheologie, Band 9, pp. 255–259). Stuttgart: Calwer Verlag.

1. INTRODUCTION

Theorists and practitioners for over 40 years, and even more today stress the need for the educational process to pay more attention to *teaching how* than *teaching that*, and such a need has grown in relevance ever since (Bodrova, 2008; Boyd, 2015; Cam, 2014; Haynes & Murris, 2011; Lipman, 1973). It is generally customary that we teach children their mother tongue, mathematics, physical education, art, music, foreign languages etc., but do not teach them general thinking skills in a similar way (Baroody, Purpura, Eiland, & Reid, 2015). Also, when we teach them hygiene and what is right or wrong about different actions and behavior, then we should also seek to teach what is right and wrong about the thinking behind these things. The reason why children need to be taught thinking skills is multifaceted: for example, the growing necessity for thinking skills needed in the 21st century and in the future; to understand the important relation between the development of thinking and language skills, and their dependence on each other; to excel academically; and also to develop as a person.

In our rapidly developing world, where information is easy to find, children do not need to memorize facts; rather, children need better cognitive skills in order to independently process the information and learning materials, to associate new information with previous knowledge and to interpret it. It is known that Estonian children aged 7 to 9 may have difficulties solving problems, including reasoning, and by first grade they already need in higher thinking skills in order to achieve the learning outcomes set in the curriculum (Häidkind & Kikas, 2004; Säre & Luik, 2011).

Children want to feel they are important as a person: they want to participate actively, to use their potential to think independently, to be able to express and give reasons for their opinions, to understand the meaning of their own lives, and to know why they are obliged to acquire an education (Boyd, 2015; Taggart, Ridley, Rudd, & Benefield, 2005). Therefore, now and in the future, children need more than just factual knowledge, but to learn the skill of multi-dimensional thinking and the main aspect of education could be shifted more to learning such skills, i.e. critical, caring, and creative thinking skills (Lipman, 2003). A sub-type of critical thinking is reasoning – some important skills for children to acquire, for example, are language skills, how to formulate one's own opinions and respect others' opinions, how to explain one's own opinion and evaluate the opinion of others, and how to understand the meaning of learning (Juuso, 2007, Lipman, Shrap, & Oscanyan, 1977). Verbal reasoning is when a reason for an opinion is expressed in words, e.g., a view about the world, as well as when a reason is provided in words for an action, judgment or evaluation (Nottingham, 2012; Lipman, 2003; Peterson & Bentley, 2015). For example, verbal reason forms the answer to such questions: *Why you are of that opinion?* or *Why did you act this way?* or *Why do you need to know this?* Verbal reasoning skills should be supported more by educators. Some authors are of the

opinion that children's potential to reason verbally improves as they are given opportunities to demonstrate it, and therefore it should be supported systematically (Kikas, 2010; Matsak, 2010; Säre & Luik, 2011). Thus, according to the conditions of everyday life and children's needs and potential, and the skills children may need in the future, as described above, there is a practical reason to support their skills of using precise language and making explicit the reasons for their opinions – these things develop the ability to express one's thoughts clearly in words.

During the last 20–30 years, interest in investigating thinking skills and how to support children's reasoning skills has grown (Aubrey, Ghenta, & Kanira, 2012; Daniel, Gagnon, & Pettier, 2012; Gillies & Haynes, 2011; Molnàr, 2011; Tolmie, Ghazali, & Morris, 2016). There have been studies investigating the development of different types of reasoning, competencies related to reasoning skills, and methods supporting the development of different types of reasoning skills (see also Article I in Säre, Luik, & Fisher, 2016). According to the results of previous studies, it could be supposed that people who have higher verbal reasoning skills are better at acquiring new information, but also understanding literal texts or verbal contexts, communicating with peers, teamwork, and problem solving etc., because verbal reasoning is positively related to reading comprehension (Ribeiro, Cadime, Freitas, & Viana, 2016; Tighe & Schatschneider, 2014), vocabulary, working memory, non-verbal reasoning (Ribeiro et al., 2016; Tighe & Schatschneider, 2014), fluency and listening comprehension (Tighe & Schatschneider, 2014), language skills and emotional understanding (de Stasio, Fiorilli, & Chiacchio, 2014; Tighe & Schatschneider, 2014), mathematical thinking (Vukovic & Lesaux, 2013), and verbal description and explanation as part of group work (Tolmie et al., 2016). Studies have found that the development of reasoning takes place throughout childhood and continues to develop during adolescence (Chen, Sanchez, & Campbell, 1997; McColgan & McCormack, 2008; Piaget & Inhelder, 1975). It is known that the different types of reasoning skills instilled in pre-schoolers support their later development, learning, and academic success; pre-schoolers' reasoning skills are also associated with literacy, behavior, and mathematical ability (Whittaker, 2014), and therefore it is essential to pay more attention to supporting pre-schoolers' verbal reasoning skills. Older school children have to solve problems that already require reasoning skills (Häidkind & Kikas, 2004; Säre & Luik, 2011), and therefore it is important to support these skills earlier. Supporting pre-schoolers' verbal reasoning skills is also necessary according to the Estonian National Curriculum, according to which it is important to develop verbal thinking skills, so that children aged 6–7 would be able to explain the reason for their own opinion, and participate in argumentative discourse (Koolieelse lasteasutuse riiklik õppekava, 2008).

Education specialists and researchers, however, have reached no consensus on how thinking skills and reasoning should be taught or researched for pre-schoolers (Aubrey et al., 2012; Taggart et al., 2005). When teaching thinking and measuring reasoning skills, it is certainly important to focus above all on

the fact that the development of thinking and reasoning skills are directly related with the development of speech and language skills. The development of verbal reasoning is dynamic, starting in the interactional context of dialog (Meindertsma, Dijk, Steenbeek, & Geert, 2014; Vygotsky, 1934/2014). The level of children's verbal reasoning can vary according to the task at hand. A child that can demonstrate high verbal reasoning skills with one task does not necessarily automatically demonstrate the same level of verbal reasoning with another task, and therefore children need many different reasoning experiences in different contexts. For a child it is helpful to have contextual support in an everyday interactional context that is logically created based on the child's opinions and views. All the participants in interactions create a context that helps children reach a higher level of verbal reasoning (Meindertsma et al., 2014). Previous studies have shown that teaching methods and techniques can influence the development of children's verbal reasoning (Gillies & Haynes, 2011). Many earlier studies have shown that structured group discussions using a specific questioning technique between adult and peer could be good places to promote children's verbal reasoning skills in a co-operative approach (Aubrey et al., 2012; Boyd, 2015; Cabell, Justice, McGintyc, DeCostera, & Forsto, 2015; Daniel et al., 2012; Gilles & Khan, 2009; Goh, Yamauchi, & Ratliffe, 2012; Jacoby & Lesaux, 2014; Lipman, 1973, 2003; Pontecorvo & Arcidiacono, 2010; Sperber & Mercier, 2010; White, 2012).

It is known, that questioning techniques used in group discussions and generally in different learning activities are very often used by teachers. Numerous earlier studies indicate that teachers ask 300–400 questions per day and between 30 and 120 questions per hour, and teachers' open-ended questions are associated with the development of children's verbal thinking (Goossen, 2002; Pagliaro, 2011; Walsh & Sattes, 2011). According to the review of Goossen (2002), the proportion of questions teachers ask has remained similar over many years: 60% of teachers' questions are closed-ended, 20% have the potential to activate thinking skills, and 20% are not related to the topic. The large number of closed-ended questions creates an obvious conflict: according to the curriculum the child should be able to argue, discuss, and reason verbally by the age of 6–7 (Koolieelse lasteasutuse riiklik õppekava, 2008), but it seems that the majority of teachers' questions do not enable the full development of pre-schoolers' potential to reason verbally (Goh et al., 2012; Jacoby & Lesaux, 2014).

So far, in the knowledge of this study's author, an investigation into the possibility of developing pre-schoolers' verbal reasoning skills in group discussion has not been studied. In Estonia kindergarten teachers mainly work with the whole group and rarely in small groups or individually. By developing pre-schoolers' verbal reasoning skills, it should be taken into account that the development of verbal reasoning skills is a slow process (Lipman, 2003; Ribeiro et al., 2016; de Stasio et al., 2014), but verbal reasoning can be learned and improved (Dowden, 2017; Topping & Trickey, 2014). Since the development of verbal reasoning is correlated with speech and language skills, it is

most efficient to support children's cognitive development in social interaction, more precisely, simultaneously with the development of language skills as suggested by Vygotsky (1934/2014). One method to develop verbal reasoning is philosophical group discussion implemented according to the programme Philosophy for Children (P4C), which combines several approaches in inter-actional and logically created contexts, in order to develop thinking, speech, and language skills, e.g. listening, speaking, thinking, and questioning (Fisher, 2007; Trickey & Topping, 2004). P4C was developed and implemented first in the 1970s in the USA, first with older schoolchildren (Lipman, 1973), and later with pre-schoolers (Lipman, 1987; Lipman et al., 1977). Philosophical group discussion according to P4C enables children to demonstrate and practice language skills related to the development of verbal reasoning skills (Lipman, 1973). The implementation of philosophical group discussions has shown a positive effect on 5–10-year-old children's thinking skills (e.g. Daniel et al., 2012; Topping & Trickey, 2007, 2014). P4C is widely used with pre-schoolers (Murris, 2016; Zeitler, 2010; Zoller, 2008), but in a rare study of P4C with pre-schoolers aged 4 to 6, it was found that pre-schoolers' have a high capability and willingness to participate and engage in philosophical discussion (Daniel et al., 2012). A review by Trickey and Topping (2004) and meta-analysis by García-Moriyón, Rebollo, & Colom (2005) showed also that most of earlier studies implemented P4C focused to older school children. In the Estonian education system, P4C was first introduced to pre-schoolers in 2007 (Säre, 2010), without being researched, and to school children in 2010, which has been researched qualitatively (Säre & Luik, 2011). The author of this study is not aware of any other scientific research carried out with pre-schoolers in-vestigating their verbal reasoning skills by implementing P4C, or research to determine the adult moderator questions in support of verbal reasoning skills during philosophical group discussion (P4C). This study is an attempt to start to filling this gap by providing missing data.

The greatest value of P4C lies in its potential to develop verbal reasoning skills in the integration with developing language, and based on the different everyday topics, and through multiple activities and curriculum topics in preschools (Murris, 2016; Zeitler, 2010). Thus, it is reasonable to investigate the possibilities of developing verbal reasoning skills by implementing philo-sophical group discussions with pre-schoolers according to the programme P4C. Moreover, using the elements of P4C separately could be also helpful in sup-porting pre-schoolers' verbal reasoning skills, and other thinking, language and social skills needed in everyday life and later in school.

1.1. Focus of the research

This study investigates the implementation of the programme Philosophy for Children (P4C) and its efficiency in supporting the development of pre-schoolers' verbal reasoning skills. In the present study especially children's

language and thinking skills were supported by utilizing quality questioning (Walsh & Sattes, 2011) and the Socratic questioning technique (Brüning, 2001; Pagliaro, 2011) during philosophical group discussions according to the P4C, in order to facilitate their acquisition of better verbal reasoning skills.

The aim of this doctoral study is to find out the emergence of 5- to 6-year-old Estonian pre-schoolers' verbal reasoning skills by examining their responses to questions asked by an adult moderator, during the implementation of philosophical group discussions based on P4C.

The aim was to be achieved by answering the following research questions:

1. What is the reliability and validity of the composed YCVR-test aimed at assessing pre-schoolers' verbal reasoning skills?
2. Are pre-schoolers from intervention group who participated in philosophical group discussions able to provide significantly more verbal reasons if they are asked to reason their opinion than pre-schoolers in the control group?
3. Are pre-schoolers from intervention group who participated in philosophical group discussions significantly more talkative if they are asked to reason their opinion than pre-schoolers in the control group?
4. Which adult moderators' questions have more potential to support pre-schoolers' verbal reasoning skills during philosophical group discussions?

2. REVIEW OF THE LITERATURE

2.1. Thinking skills and verbal reasoning

The ability to argue and reason about our thoughts and opinion depends on the quality of our thinking (Fisher, 2007). Vygotsky (1934/2014, 1978) views language as a primary tool to express thoughts as well as reasons, and to form thinking skills: the development of thinking is directly connected to a child's speech and socio-cultural experiences. Speech and thinking are basic abilities to acquire information and process it: more precisely, their joint operation makes it possible to process and analyse information, without which the child would not be able to practice a new skill, or use new knowledge (Vygotsky, 1934/2014). The joint operation between speech and thinking helps the child to socialise, understand, organise information, and implement knowledge and skills, the level of which is correlated with their success in attaining the academic skills needed later in school (Curenton & Justice, 2004; Demir, Rowe, Heller, Goldin-Meadow, & Levine, 2015; Snow, 1991). Therefore, pre-schoolers need more of the kinds of learning environments in which they can practice their language and thinking skills simultaneously.

Verbal reasoning as a sub-type of critical thinking is important during a child's development, which is mediated by language as a cultural sign system (Vygotsky, 1934/2014). Reasoning skills enable children to give explanations of opinions or complicated ideas, behavior (what to do or what not to do), and experiences (to make effective decisions about one's own life); to draw inferences (what to do and what to believe), and to explain one's thoughts (Dowden, 2017; Taggart et al., 2005). Reasoning is generally viewed as the ability to serve the reasoner's own cognitive goals, which involves paying attention to the relationship between claims and their logical basis; reasoning is primarily social and has two functions: (1) to produce arguments to convince others, and (2) to evaluate the arguments others use in order to convince us (Sperber & Mercier, 2010). Reasoning is a costly mental activity, which involves ordering and co-ordinating the information identified through enquiry and finding valid ways of extending and organizing what has been discovered, while verifying it as accurate (Sperber & Mercier, 2010; Topping & Trickey, 2007). Thus, reasoning is a fundamental skill needed to acquire skills related to speech (e.g. speaking, communicating, listening, reading, writing) (Lipman et al., 1977; Lipman, 2003; Vygotsky, 1934/2014). As reasoning is primarily social and mediated by speech (Sperber & Mercier, 2010; Vygotsky, 1934/2014), verbally expressed reasoning will be the focus of investigation in this study. Below, a brief overview is presented of the main aspects of the development of pre-schoolers' verbal reasoning skills and how the development of verbal reasoning can be facilitated.

2.1.1. The development of pre-schoolers' verbal reasoning skills

Lipman et al. (1977) argue that reasoning starts with an assumption, for example, when a child hears the rumble of wheels and concludes that a car is approaching. This example illustrates how future verbal reasoning develops through a child's own experience of processes in everyday interactional contexts during their earliest years, first as non-verbal reasoning (Sperber & Mercier, 2010; Vygotsky, 1934/2014). The reasoning can develop in a natural way without intervention, but children learn verbal reasoning also from adults through hearing, asking questions, giving responses, imitating adults, and being instructed (Vygotsky, 1978). Thus, children are open also to the teaching of thinking skills.

Lipman et al. (1977) claims that a child's first "why" when they are approximately three years old indicates the start of abstract thinking, and a willingness to participate in discussion. First, children start to ask about what surrounds them. They are seeking answers and expanding their knowledge. Initially children reason using explanations through describing situations and presenting examples, then compare analogues, similarities or contrasts, and consider relations; later, they reason with logical explanations or causal connections, expressing it with the phrase "because of that" or other phrases with this meaning (Dowden, 2017; Kikas, 2010; Lipman et al., 1977, Toomela, 2003; Vygotsky, 1934/2014). Children's own questions give a good chance of developing verbal reasoning skills, and adults' questions also have a high potential to activate, guide and support children's reflections and verbal reasoning (Boyd, 2015; Vygotsky, 1934/2014).

Dowden (2017) stresses that reasoning can be supported, learned and also improved. One effective way to improve children's reasoning skills is by using specific adult questions which can guide the child to reason verbally. Through questioning, the adult guides the child to produce arguments in order to convince others (Sperber & Mercier, 2010). For example, a why question can directly guide the child to reason (e.g. *Teacher: Why do you think it got wrinkled up? Child: Because they were in the water.*) (Lee & Kinzie, 2012). Questioning techniques which have potential to support thinking skills and reasoning are described in more detail in the next chapters.

To facilitate the development of verbal reasoning, children need to practice language and reasoning skills simultaneously with the help of others (adult and peers), in a suitable atmosphere to reach their full potential. Vygotsky emphasises the effective conditions and environment, where verbal reasoning is supported through interaction with others who can assist and challenge children to achieve their highest potential (the zone of proximal development) (Vygotsky, 1978, 1934/2014). Accordingly, the development of verbal reasoning skills needs a process guided by an adult who questions, creates an atmosphere, and supports interaction, to influence the emergent reasoning of pre-schoolers (Jacoby & Lesaux, 2014), and this could be practiced effectively by the implementation of the programme Philosophy for Children (Lipman, 2003). The

programme Philosophy for Children, which can be used as the basis to implement philosophical group discussions among pre-schoolers and provide a chance to practice their language skills to improve their verbal reasoning skills, is thoroughly reviewed in the subsequent sections.

2.1.2. Measuring pre-schoolers' verbal thinking and verbal reasoning skills

To measure how a child thinks, the child should be placed in imaginary scenarios that they are exposed to everyday (Kikas, 2008). A purely verbal presentation of a scenario does not lead the child to think and reason, thus, they need acted and narrated scenarios, for example with puppets or with pictures (Doverborg & Pramling, 1993; Kikas, 2008).

Many authors emphasize the importance of context, which can influence the results of the measurement of thinking skills (Doverborg & Pramling, 1993; Kikas, 2008; Meindertsma et al., 2014). Five- to six-year-old children's specific everyday experiences can vary in many ways or be completely absent in some fields. Such children's thinking level can be very different in terms of the same topics and same context, which may require the researcher to initiate each child's actual experience and thinking level differently (Doverborg & Pramling, 1993; Kikas, 2008). The context of testing, in which reasoning skills are discovered and measured, is created by the adult, task, and child (see Figure 1), with all three interacting with each other, which helps assess the actual competence level of the child (Meindertsma et al., 2014).
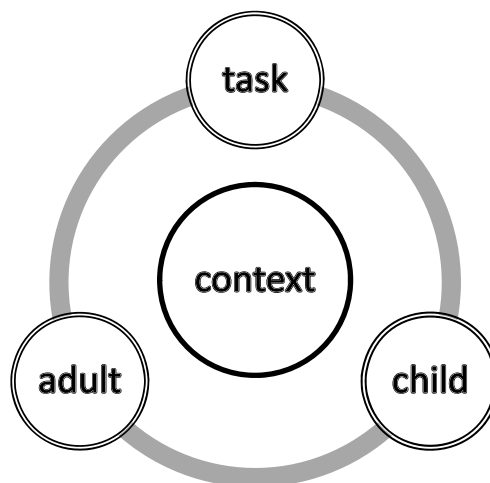

Figure 1. Reciprocal relationships among adult, child, and task, in the formation of context (the figure is composed based on Meindertsma et al., 2014).

Meintertsma et al. (2014) emphasise the need to use an approach based on scaffolding that relies on a child's initial level of thinking. Scaffolding means supporting a child step by step so that they reach a target that would not have been possible without assistance. Scaffolding can help the child to reach a higher level of reasoning within an interactional context (Meindertsma et al., 2014; Smith, Cowie, & Blades, 2008). Based on the specific scenario, the researcher should find the child's real thinking level according to the zone of proximal development and support the child in an individual way, so that the child can demonstrate their potential verbal reasoning skills (Vygotsky, 1978). It is important to find the child's real thinking level, because there could be great variations, even within a specific age and cultural group (Doverborg & Pramling, 1993).

Observation, an individual interview, and tests are the most typical ways of assessing pre-schoolers' thinking skills (Doverborg & Pramling, 1993). According to many researchers, investigations have shown that pre-schoolers have different types of reasoning skills, which can be revealed by using specific scenarios based on discourse and adult-guided discussions. Many of the reviewed tests present a scenario and use a verbal approach supported by visual materials, such as objects or picture cards (Kikas, Hannust, & Kanter, 2002; Pontecorvo & Arcidiacono, 2010), and then ask questions about the scenario (Kelemen, Widdowson, Posner, Brown, & Casler, 2003; Müller, Miller, Michalczyk, & Karapinka, 2007; Roman, Pisoni, & Kronenbergerb, 2014), and in many cases, the child was asked his or her opinion about the scenario (Neys & Vanderputte, 2011; Shtulman & Carey, 2007; Toyama & College, 2011), and in some cases were additionally asked to explain why they thought that way (Legare, Gellman, & Wellman 2010; Pontecorvo & Arcidiacono, 2010. For a more thorough overview about earlier studies and instruments to measure different types of reasoning skills, see in Article I in Säre et al. (2016a). From the reviewed tests, it appears that an individual interview using a verbal approach, supported by visual materials and scenarios, asking opinion and explanations of one's opinion is a suitable way to measure pre-schoolers' verbal reasoning because:

- the dialogic form of the interview encourages thinking and talking, which is important because verbal reasoning becomes evident through talking;
- an interview enables one to place a child in a situation where it is necessary to think in a specific way;
- an interview enables asking questions that guide children to provide reasons per their own opinions (thus helping the researcher go to the child's actual level of thinking);
- an interview enables the researcher to initiate from the child's actual level of thinking, and to guide the child step by step to reach their potential level of thinking;
- during an interview it is possible to support the scenario with suitable pictures;

- an interview enables one to support the child by reformulating the same question or using a different context;
- an interview enables respecting the child's personality and their feelings to create a positive relationship;
- an interview enables creating an environment in which the child is able to concentrate (Doverborg & Pramling, 1993; Meindertsma et al., 2014; Vygotsky, 1978, 1934/2014). For more about interviewing children and questioning techniques, see Doverborg & Pramling (1993).

But no test was found which would meet the previously named conditions and which would assess the verbal reasoning of pre-schoolers aged 5 to 6 which would ask their own opinion and also to explain it, and therefore a new test had to be composed for this purpose.

2.1.3. Questioning in the learning process generally and as a technique to develop thinking and verbal reasoning skills

Asking and answering questions is generally considered the most important intellectual tool in the learning process and a powerful teaching approach, because questions enable one to guide the thinking processes, thereby creating new knowledge and enhancing existing knowledge (Goossen, 2002; Pagliaro, 2011; Walsh & Sattes, 2005). Questions help engage children in the process of understanding, making the context meaningful and inspiring inquiry among children (Chin, 2007; Walsh & Sattes, 2005).

The current national curriculum of Estonia urges the socio-constructive learning strategy as a principled approach to learning activities (Koolieelse lasteasutuse riiklik õppekava, 2008), according to which closed-ended questions (recall, facts, memory, and check) are not effective in supporting thinking skills, whereas open-ended questions supposedly have more potential. Previous studies also recognise open-ended questions (those to which there is no single answer) as more effective, especially when using child- and context-initiated questions, in developing children's cognitive skills (Boyd, 2015; Cabell et al., 2015; Lee, Kinzie, & Whittaker, 2012).

Questioning is a common method to guide learning activities and based on the data of Goossen (2002) and Pagliaro (2011), numerous earlier studies indicate that teachers ask up to 400 questions per day and up to 120 questions per hour. Thus, questions may influence children's verbal thinking development to a significant degree. Goossen (2002) emphasises that the proportion of questions teachers ask has remained similar over many years: a large number of questions are closed-ended, and only 20% have the potential to activate thinking skills, which is why it is important to analyse the effectiveness of questions. However, according to some authors (Fisher, 2001; Pagliaro, 2011; Zoller Morf, 2010) there could be some closed-ended questions worth asking during philosophical group discussions with children to activate higher cognitive processes. Therefore, it seems important to investigate the function of questions, to

determine which have the potential to support children's verbal reasoning skills (Ho, 2005; Pagliaro, 2011).

Questions have traditionally been classified by their type and function. Most often questions are classified as open and closed, under which are categorised questions of different functions. The function of a teacher's questions determines which types of knowledge and responses are valued and expected, and the level of thinking (Boyd, 2015). For example, in general a teacher's open-ended questions reflect their inquiry, while closed-ended questions are aimed at finding out what the children have learned or to check existing knowledge (Boyd, 2015; Lee, Kinzie, & Whittaker, 2012).

Questioning the teacher is different than in traditionally structured activities and social activities, as well as in philosophical group discussion. According to the traditional approach "The teacher asks a closed question that is basically information-seeking, that requires a predetermined short answer, and that is usually pitched at the recall or lower-order cognitive level" in the words of Chin (2007, p. 818) who, in her study, investigated teachers' questions in classroom discourse. In traditionally structured activities teachers use a series of questions in accordance with a planned agenda; they are the authority who asserts knowledge that they expect the children to accept without argument (Chin, 2007; Lee, Kinzie, & Whittaker, 2012; Walsh & Sattes, 2005).

However, when the focus of the learning activity is interactive, learner-centred, and collaborative, as it is in philosophical group discussions, then the nature of questioning scaffolds children's thinking. In these kinds of activities, the teacher asks questions with the function of eliciting what children think (explanations, predictions, reasons), to "encourage them to elaborate on their previous answers and ideas" as highlighted by Chin, (2007, p. 818) in her study based on other researcher s' works. In order to scaffold children's thinking the teacher asks questions in a neutral rather than evaluative manner, by giving the responsibility of thinking back to the children. In interactive and learner-centred learning activities, teachers formulate questions in ways that shift the authority from themselves to all the children (Chin, 2007; Pagliaro, 2011). The questioning technique used in philosophical group discussions implemented according to P4C is introduced in the next chapter.

2.2. Philosophical group discussion based on the programme Philosophy for Children as a context of the study

The nature of philosophical group discussion is described with different emphases in Articles I and II and used as the basis of this dissertation. This chapter provides an overview of what has been the traditional approach to philosophise with children according to the initial programme Philosophy for Children (P4C).

P4C is an educational programme, also called a learning-to-think programme, created by Matthew Lipman (1922–2010), who was of the opinion "that children not only can, but should, practice philosophy." (Gregory & Granger, 2012, p. 10). Lipman "started working on Philosophy for Children in the 1960s, after his experiences teaching philosophy to college students and adult education students at Columbia, and the political upheaval he saw there and on other university campuses around the country convinced him that learning to think critically, to inquire about philosophical questions and to form reasonable judgments should begin much earlier in life." (Gregory, 2011, p. 201). Lipman was also of the opinion that children do not think as well as they could, and created the programme P4C in collaboration with colleagues for teachers without an academic background in philosophy, at the Institute for the Advancement of Philosophy for Children (IAPC) at Montclair State University (USA) (Murris, 2016). The programme consists of seven philosophical novels: (1) Elfie, (2) Kio and Gus, (3) Pixie, (4) Harry, (5) Lisa, (6) Suki, and (7) Mark, with accompanying teacher manuals specifically designed for primary and secondary education; these novels are aimed at encouraging teachers to introduce philosophical group discussions (Fisher, 2005). Philosophical group discussions can be conducted in many ways and to school children from kindergarten to high school (Cam, 2014; Ebers & Melchers, 2006; Limpan, 1984; Murris, 2008). Lipman also designed materials to foster basic thinking skills among kindergarten children, and the curriculum was expanded to cover ages 3–18 (Juuso, 2007).

Across the world philosophical discussions are conducted with children under different titles, for example: *philosophical community of inquiry* (Cam, 1995), *collaborative philosophical inquiry* (Topping & Trickey, 2007), *Socratic conversation* and *philosophical activity* (Göd, 1995), *philosophy for young children* (Gaut & Gaut, 2015), *philosophy for children* (Fisher, 2001; Lipman, et al., 1977, 2003; Välitalo, Juuso, & Sutinen, 2016), *philosophy with children* (Haynes & Murris, 2011; Lyle, 2017), *enquiry-based teaching method* (Trickey & Topping, 2004), *dialogues with children* (Matthews, 2006), *community of inquiry* (Elbers & Streefland, 2000; Lipman, 2003), *community of philosophical inquiry* (Cassidy & Christie, 2013); *philosophising with children* (Brüning, 2001; Pihlgren, 2008; Zeitler, 2010; Wiesheu, 2008), and *dialogic teaching* (Fisher, 2007). All these programmes were more or less inspired by Lipman's programme P4C.

In this dissertation the concept *philosophical group discussion* is used, which was based on the programme Philosophy for children (P4C) and the approach *philosophising with children* used in German culture (also based on Lipman's P4C) and *philosophising* is used in the same meaning as *philosophical group discussion* in this dissertation. P4C is used in over 60 countries and has inspired practitioners to create a variety of alternative approaches for children aged three and above to implement P4C in kindergarten (e.g. Murris, 2008; Zeitler, 2010; Zoller, 2008).

P4C does not mean learning about philosophy, it means to learn to philosophise better: learning to think philosophically and philosophising in group discussion is intended to help children become more thoughtful, more reflective, and more reasonable individuals who know when to act and when not to act (Lipman et al., 1977). The main aim of P4C is to facilitate children's verbal reasoning skills through the implementation of philosophical group discussion. Lipman viewed P4C as a solution to meet the need of giving meaningfulness in children's lives. Lipman stressed that children need to be taught to think for themselves (Lipman et al., 1977), to formulate their own opinions and to respect others' opinions; this is the way philosophy is useful to all children (Juuso, 2007). In addition to cognitive skills P4C also aims to foster children's social skills and language skills through questioning and dialog among child, teacher, and peers, as they discuss concepts of importance to them (Lipman, 1975; Peterson, & Bentley, 2015; Topping & Trickey, 2014). For example, previous studies have shown that the implementation of P4C leads to growth in children's self-esteem and has a positive impact on different cognitive and reasoning skills (García-Moriyón, Rebollo, & Colom, 2005; Philosophy: A school of freedom, 2007; Trickey & Topping 2004). Philosophising with children in groups develops higher-order thinking skills, also called philosophical thinking (Cam, 1995; Murris, 2016) because this form of thinking is original, critical, creative, collaborative, and caring (Fisher, 2001; Peterson, & Bentley, 2015) (see Figure 2). The programme was created as an educational practice, where the focus is on the process of how to think and express one's thoughts clearly in words (Välitalo et al., 2016).

critical thinking	creative thinking
examining problems from a different angle and verbalising a reason per each possible solution	exploring and experimenting with new approaches

philosophical thinking

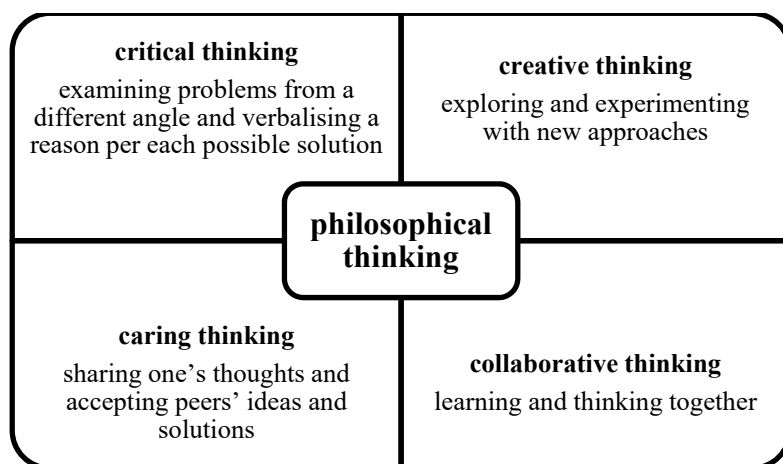| caring thinking	collaborative thinking
sharing one's thoughts and accepting peers' ideas and solutions	learning and thinking together

Figure 2. The nature of philosophical thinking (the figure is composed based on Fisher, 2001 and Peterson & Bentley, 2015).

Children's wonderment and hunger to understand why things are the way they are is where P4C begins (Lipman et al., 1977). To satisfy this curiosity, children ask "why". Lipman et al. (1977) were convinced that children's why-questions at the age of three to four show the capacity and willingness to philosophise and discuss. When children ask why questions, they are interested in both causes and purposes. Young children's questions and thoughts drive the philosophical discussions, which will engage as an impulse to start a discussion (Zoller, 2008). Children's questions such as *Why do I have to learn? (five-year-old girl), How were all people born, if there was no mother on the earth? (three-year-old girl)* (Säre, 2010) demonstrate the wonder and curiosity, which are two aspects that illustrate why children aged 3–7 should participate in philosophical discussion as early as possible (Zoller Morf, 2010).

Philosophical group discussions based on P4C are implemented based on the construction Community of Inquiry, which involves critical, creative, collaborative, and caring dimensions of complex thinking, thus offering the opportunity to facilitate reasoning and argumentative skills (Masi & Santi, 2016). Community of Inquiry is seen as a context in which children can learn through child-to-adult and peer-to-peer interaction, and the initiating of real-life topics, practical questions, and problems. Philosophical discussions in a Community of Inquiry can provide dialogue-based interpersonal exchanges of thoughts, rather than a simple agreement or consensus (Lipman, 2003; Masi & Santi, 2016). The process of philosophical group discussions is child-centred, structured, and with a certain aim, which is thoroughly described below.

By philosophising, children learn to resolve questions through reasoning (Trickey & Topping, 2004). Philosophical discussion can consist of various actions: being amazed, asking, rethinking, being suspicious, inquiring, and thinking forward (Brüning, 2001; Lipman et al., 1977). Previous studies of P4C have shown that pre-schoolers (aged 5–7) have a greater capacity to engage in philosophical group discussion if they have a stimulus (Daniel et al, 2012; Fisher, 2007). Traditionally, philosophical group discussion is introduced with a story that makes it possible to select different topics for discussion (Fisher, 2005).

The structure of a philosophical group discussion consists traditionally of three parts: 1) tuning and introduction, in which pre-philosophical exercises that foster executive functions are implemented, rules are agreed on, and the text is presented; 2) discussion, in which ideas and thoughts are explored, and reasons provided for opinions; 3) summarising the topic of discussion and evaluating the process of group discussion, by highlighting what became more clear and what should be explored further, and also cleared how everyone participated as a team during the group discussion (Brüning, 2001; Zoller Morf, 2010; see also Säre & Luik, 2011, and Article II in Säre, Luik, & Tulviste, 2016). A more detailed overview of the planning and moderating of a philosophical group discussion is provided in the Appendix. Some illustrative examples of the everyday topics three- to seven-year-old Estonian children liked to philosophise about are:

- Why are all people not rich?
- What is a lie?
- What is a tree?
- How did the earth start?
- What is time? (Säre, 2010)

During philosophical group discussions the teacher as moderator provides an atmosphere of friendship and co-operation. The role of the teacher is to guide philosophical dialogue, to connect thoughts and questions that the group raises, and guide children to think about opinions and experiences themselves (Juuso, 2007). The moderator wants to know what the child is thinking about, and why they think that way, and accepts all children's opinions and viewpoints with a neutral attitude, i.e. without interpreting and moralising. The function of the moderator is to guide the process of discussion, to help the children verbalise their thoughts, encourage the children to express their own opinions, support children to change their opinion, and assist children to converse directly with one another (DeHaan, MacColl & McCutcheon, 2008; Zoller Morf, 2006). The whole process of philosophical group discussion is guided via an interactional context, mainly by the art of questioning, which is described in the next chapter and provides more detailed insight into the nature of the process of philosophical group discussions.

In sum, P4C is a programme that does not mean learning philosophy theoretically, but aims to improve children's independent thinking so they grow up to be rational, responsible, active, and creative citizens who have opinions that they do not hesitate to express. P4C is based on dialogue, and aims to encourage verbal reasoning skills and foster children to listen to each other and ponder each other's thoughts using the four Cs: critical, creative, caring, and collaborative thinking (DeHaan, MacColl, & McCutcheon, 2008; Demissie, 2017). By the teacher assisting children to draw on the four Cs, children's reflective thinking, including verbal reasoning skills exploring everyday topics, is facilitated (Demissie, 2017; Lipman et al., 1977).

2.2.1. Questioning techniques used in philosophical group discussions based on the programme Philosophy for children

According to P4C, questioning is a prime technique to guide philosophical group discussion, whereby children are engaged mainly with questions that "allow [one] to respond through high-level thinking." (Pagliaro, 2011, p. 5). Studies have also indicated the positive effect of high-cognitive-level questions upon children's higher-cognitive-level responses with P4C (Daniel et al., 2012) and in other learning processes (Lee & Kinzie, 2012; Pagliaro, 2011; Zucker, Justice, Piasta, & Kaderavek, 2010). Thus, it is reasonable to use questioning techniques to develop children's verbal reasoning skills.

Philosophical group discussion is implemented using a Socratic questioning technique, which is adapted to philosophical group discussion in a way of

nowadays that is interactive, learner-centred, and collaborative (Brüning, 2001). Socratic questioning aims to search for better options and reasons, as well as providing instant relearning and reorganization of information which may lead to other topics (Pagliaro, 2011). Socratic questioning that initiates children's ideas and beliefs must be logically lead: "This is teaching by stimulating student's thinking in certain focused areas, in order to draw ideas out of them; it is not 'teaching' by pushing ideas into students that they may or may not be able to absorb or assimilate." (Pagliaro, 2011, p. 108). According to Socratic questioning, the process of philosophical group discussion – mainly guided through questions – is classified into eight categories: (1) determining purpose, (2) clarifying problems/issues, (3) gathering information, (4) interpreting information, (5) understanding concepts, (6) checking assumptions, (7) under-standing implications, and (8) probing points of view (Pagliaro, 2011). The categories of questions in Socratic questioning also describe the main aim of the process of questioning in philosophical group discussions.

The questioning techniques used in philosophical group discussions enables the teacher to guide the discussion effectively without criticising, interpreting, moralising and valuating, based on an everyday interactional context (Brüning, 2001; Pagliaro, 2011). When leading the process of philosophical group discussion, questions are often used as a tool to engage attention, motivate, initiate thoughts, determine purpose, clarify problems, gather information, interpret information, understand concepts, inquire about opinions, check assumptions, give reasons, ask for examples, make inferences, examine con-sequences, make deductions, and generalise; questions are asked not because of misunderstanding or confusion, but rather because of curiosity and interest, to support children to verbalise their thoughts (Ebers & Melchers, 2006; Pagliaro, 2011).

In sum, considering that teachers ask many questions during different learning activities, it is essential that teachers learn to ask questions to consciously and purposefully foster children's thinking skills. Considering the specific instructional function of questions helps one to understand if the question is supportive, corrective, broadens or narrows thinking, or directly guides verbal reasoning (Boyd, 2015; Ho, 2005). Thus, the role of a teacher's questions in discussions is a fruitful area to explore. In this study questions which support the development of pre-schoolers verbal reasoning skills in philosophical group discussions are explored.

3. RESEARCH METHODOLOGY

Considering the overall aim and research questions, the study was designed as follows: first, a test (YCVR-test) to measure pre-schoolers' verbal reasoning skills was composed and validated; next, a quasi-experiment was carried out to find out the effect of the implementation of the P4C programme upon children's verbal reasoning skills and talkativeness; finally, the questions adults asked and the verbal reasons pre-schoolers' provided to the adult's questions in philosophical group discussions were determined in order to find out adult moderator´s questions which have more potential to support pre-schoolers' verbal reasoning skills during philosophical group discussions. Table 1 shows an overview of the research questions formulated for this dissertation and how these research questions and their examination are divided between the three studies.

Table 1. Overview of the research questions examined in the three studies

Research question	Title of published article
1. What is the reliability and validity of the composed YCVR-test aimed at assessing pre-schooler's verbal reasoning skills?	STUDY I /ARTICLE I Supporting educational researchers and practitioners in their work in education: assessing the verbal reasoning skills of 5- to 6-year-old children. *European Early Childhood Education Research Journal. 25*(5), 638–651. Doi:10.1080/1350293X.2016.1213564
2. Are pre-schoolers from intervention group who participated in philosophical group discussions able to provide significantly more verbal reasons if they are asked to reason their opinion than pre-schoolers in the control group? 3. Are pre-schoolers from intervention group who participated in philosophical group discussions significantly more talkative if they are asked to reason their opinion than pre-schoolers in the control group?	STUDY II /ARTICLE II Improving pre-schoolers´ reasoning skills using the Philosophy for Children programme. *Trames: Journal of the Humanities and Social Sciences, 20*(3), 273–295. Estonia: Estonian Academy Publishers. Doi:10.3176/tr.2016.3.03
4. Which adult moderator´s questions have more potential to support pre-schoolers' verbal reasoning skills during philosophical group discussions?	STUDY III /ARTICLE III The function of questions in developing a preschooler's verbal reasoning skills during philosophical group discussions. *Early Child Development and Care,0*(0) Doi:10.1080/03004430.2017.1331221

3.1. Participants and procedure

Different samples were created for studies I–III. Samples were selected on the principle of comfort due to the long duration of the study. The creation of samples took into account some specific limitation: the kindergarten should have a separate room available for testing children and conducting philosophical group discussions weekly over 29 weeks; there should be almost 10 children per kindergarten who volunteered to participate in the study. The children's parents were informed of the activities of the studies. All parents gave written consent for their children to participate in a study. Children of typical development participated in these studies and the language spoken at home was Estonian. Table 2 provides an overview of the samples, measurements, and methods of data analysis per study.

Pre-schoolers' verbal reasoning skills were evaluated using the YCVR-test (Study I, II). The validity and reliability of the YCVR test was controlled in Study I. In a quasi-experiment (Study II) the YCVR-test was used as a pretest/post-test for the intervention and control group, initially at the beginning of the academic year and a second time at the end of the academic year, there were approximately eight months between the two tests. Before implementing the YCVR-test (Study I, II), the researcher played with the children in order for them to become familiar with each other, and then to inform them that the researcher would like to talk to them and ask some questions. First, the researcher explained that if the child did not know the answer or wanted to think longer, he or she should say so. Testing took place in the form of individual interviews in a quiet room at the children's own kindergarten. During testing only the researcher and child were in the room. The duration of testing was approximately 10–15 minutes (Study I) and 10–20 minutes (Study II). After testing was discussed with the child in order to ensure safety and avoid misunderstanding to repeat similar scenarios in their real life. The researcher was trained previously to use the test in a trustworthy manner. To provide more objectivity in the quasi-experiment design, the audio-recordings of the tests were controlled by an independent expert, to minimise the effect of the researcher, who gave her acceptance of their objectivity.

The game *curious shop assistant* was conducted with a small group of children and a shop assistant (researcher) in the same room as the testing took place (Study I).

Table 2. An overview of the samples, measurements, and methods of data analysis used in Studies I, II and III

Study	Sample	Measurements	Data analysis methods
Study I	**First sample** N = 24 (5- to 6-year-old children from kindergarten) Estonian-speaking children from a single kindergarten in a town (12 boys, 12 girls)	*Younger Children Verbal Reasoning Test (YCVR-test)*; and a game *curious shop assistant*	Correlation analysis (Pearson's coefficient, Cronbach's alpha coefficient)
	Second sample N = 129 (incl. participants in Study II & III) (5- to 6-year-old children from kindergarten) Estonian-speaking children from four kindergartens in urban areas and two in rural areas (62 boys, 67girls)	*YCVR-test*	Cronbach's alpha
Study II	N = 125 children (5- to 6-year-old; 59 boys, 66 girls) in control (67) and intervention (58) groups from four kindergartens in the town of Tartu and two in the county of Tartu N = 58 children in the philosophical group discussion intervention group (31 boys, 27 girls). N = 67 children in the control group (28 boys, 39 girls).	Pre-test/post-test: *YCVR-test*	Repeated-measure ANOVA
	Teachers evaluation of pre-schoolers social, emotional, general physical, mental and cognitive development, and verbal ability did not differ between the intervention and control groups ($p > .05$).	Questionnaire	Mann-Whitney U-Test
	Mothers' educational level did not differ between the intervention and control group pre-schoolers ($p > .05$)	Questionnaire	T-test
Study III	N = 58 (same as in Study II in philosophical group discussion intervention group)	Twenty group discussions with video recordings	Repeated-measure ANOVA, content analysis

The children (n = 58) in the philosophical group discussion intervention group were divided into five groups (9 to 13 children per group) which participated in philosophical group discussions once a week in a quiet room at the children's own kindergarten. Every group participated in 26 to 29 philosophical group discussions. Five groups participated altogether in 141 philosophical group discussions, and the same researcher conducted all 141 philosophical discussions with all 58 children. Each lesson had a new topic. For discussions an easy-going atmosphere was created by sitting in a circle, using a musical ritual, voluntarily talking, agreeing on the rules of discussion, pre-philosophical exercises, adult guidance free of judgment and the children's own evaluation of the process. The children and the researcher always sat in a circle. A relaxed atmosphere was created for the discussions to create the circumstances where it was less important that a child remember certain data than that she or he think effectively. Before the beginning of the regular weekly philosophical group discussions, an agreement was made on how the participants would participate in the group discussions. Before introducing the topic pre-philosophical exercises were implemented in order to achieve a suitable mood and foster executive functions. The aim of the pre-philosophical exercises was to focus the children's attention consciously on the process and the topic of discussion, to calm down and to activate their cognitive control, for example, through the monitoring of breathing, stimulating of different senses or visualization of the appropriate situation.

The role of the researcher was to moderate discussion as a questioner who was interested in stimulating and facilitating the discussion among the children. The researcher as a moderator accepted all answers, not judging them as right or wrong. A typical philosophical group discussion in this study started with a musical ritual, philosophy song or focusing exercise (also discussing the rules, a relaxation or breathing exercise, a fantasy trip or a thinking game), which was then followed by sharing a stimulus (presenting a story, observing a picture book or playing a game) and then thinking time (children think about what is interesting or unusual about the stimulus), then followed questioning and discussion (children are asked to respond, with the researcher probing for reasons, examples and alternative viewpoints), and finally the evaluation of the process (children are asked to summarise what has been said and reflect upon the activity) where the children answered sample questions: (1) Did you feel good during the discussion? (2) Did you listen to others? (3) Did others listen to you? (4) Did you like this discussion?

The samples and procedures are described more accurately in the individual articles (i.e., I, II, & III).

3.2. Measurements

In order to measure pre-schoolers' verbal reasoning skills a test to investigate 5- to 6-years-old children's verbal reason if they are asked to reason their own opinion was sought, but a suitable one was not found to. For example, some of

the well-established tests found assess different verbal abilities, intelligence or general intellectual ability, including thinking skills which are related with verbal reasoning but not the same (Männamaa, 2010; Wechsler, 1989; Wechsler, 2002), also they are impractical for assessing large groups of pre-schoolers in a kindergarten as the assessment time is too long (40–50 minutes). Therefore, the Younger Children Verbal Reasoning Test (YCVR-test) (see Table 1 in Article I) was composed specifically for this study, guided by some previous tests (described in chapter 2.1.2.) and discussion plans. The discussion plan with topic *bravery* was taken as the basis from Kovach (2006) and supplemented with the help of questions from Fisher's (1999) discussion plan, which was also important to understand how to better support and listen pre-schoolers in order to provide an environment in which they feel confident and safe, have enough time to express themselves during testing and are scaffolded individually (Bodrova, 2008; Meindertsma et al., 2014; Pascal & Bertram, 2009; Vygotsky, 1978). The validity and reliability of the YCVR-test was also evaluated. The test consisted of three phases: introduction, practice, and testing. The introduction phase consists of questions which encourage the child to talk about themselves, but also includes some questions that may be asked according to the child's response or lack thereof. The practice phase enables the child to imagine three situations from a personal context. The test phase includes five scenarios, each with two questions and with some extra guidance questions in order to help the pre-schoolers's reasoning. The questions about the scenarios enable the child to demonstrate different reasoning skills at different levels of thinking, such as comparing, decision making, and reasoning. Each scenario was supported with one illustration; all illustrations had been specially drawn by an artist for this test (see illustrations in Figure 1 in Article I). The test consists of a total of 28 open- and closed-ended questions. For more about the YCVR-test, see Article I in Säre et al. (2016a).

The same YCVR-test was used as a pre- post-test of the intervention and control groups (time interval between pre- and post-tests was eight month) with the 125 five- to six-year-old children to compare the responses among the two groups (Study II).

The game *curious shop assistant* was used with 24 five- to six-year-old children to check the reliability of the YCVR-test (Study I). The game was composed by the researchers. In the game, children role-play as customers who can answer spontaneous why-questions from a shop assistant. Before going to the shop assistant, each child chooses an item. Picture cards were used to represent items in the shop (for more information, see Article I). The shop assistant asks follow-up questions according to each child's answer. The children's replies are accepted as a form of payment (like money) in the shop, except for responses such as "I don't know"; after such a response the shop assistant continues asking the child until they are ready to continue to answer.

Group discussions with the 58 five- to six-year-old children were video recorded to help evaluate children's verbal reasoning skills and to determine the types and functions of the researcher's questions (Study III). Data was collected

over 25 weeks. In total, 20 video recordings (four per group) were made of the philosophical discussions during Study III.

The evaluation of pre-schoolers' development was studied using a question-naire developed by the researchers (Study II). The kindergarten teachers completed a written questionnaire on each child that evaluated their current social, emotional, physical, mental, and cognitive development, and verbal ability (for more information, see Article II). All kindergarten teachers were instructed to fill the questionnaire by the same researcher personally by giving them same instructions. One-on-one communication gave the teachers the possibility to ask specific questions, and gave researchers the chance to understand ambiguous answers.

The parents of the pre-schoolers were asked to give information about their education, but since many fathers did not answer, it could only analyse information regarding the mothers' educational level (see also Article II).

3.3. Data analysis

Data analysis was composed of correlation (Pearson's coefficient), psycho-metric testing (Cronbach's alpha), repeated-measure ANOVA, and content analysis. In addition, descriptive statistics were used. An overview of the data-analysis methods applied during Studies I, II, and III is given in Table 2. The following is an overview of the data analysis in the topic sections.

Pre-schoolers' verbal reasoning and talkativeness
Five- to six-year-old pre-schoolers' responses (verbal reasons and talkativeness [number of words]) were collected with a voice recorder using the YCVR-test (Study I and II). First, it was important to find out what the 5- to 6-year-old children's verbal reasons were and how many verbal reasons children provided. Therefore, a specific classification for scoring was created. Scoring was made by two coders. Verbal reasons were sorted into three main scoring categories and four subcategories; the scoring system was based on the examples of other authors (Kikas, 2010; Toomela, 2003; Vygotsky & Luria, 1930/1994).

The scoring of the pre-schoolers' responses was based on the principle: each verbal reason received one point; when the child answered with a verbal response that was not a verbal reason, or if the child did not answer at all, no point was given. The verbal reasons were sorted into three main scoring categories: (a) *everyday concepts*, (b) *synthetic concepts (the reasoning or explanation contains some scientific information but is not fully consistent with scientific theory),* (c) *scientific concepts (the reasoning or explanation is consistent with scientific theory);* and *everyday concepts* were sorted into four subcategories: (1) *direct description of a phenomenon, with or without their own interpretation*, (2) *fragments heard from adults (explanation contains utterances that do not fit logically into context, the content of which the child does not understand),* (3) *explanation based on analogy, relationship, or*

comparison, (4) *explanation includes decision or inference* (for more information see Article I). Children's responses, collected during the game *curious shop assistant*, were scored in the same way as the responses collected during the YCVR-tests as described above (Study I).

To analyse pre-schoolers' verbal reasons during the pre- and post-test among the intervention and control group, scoring was adapted to take into consideration the appearance of verbal reasoning at different levels and substantive observations. The changes made to the scoring system were: when children provided very few and simple reasons, the scores for the subcategories of verbal reasons were combined, and the level of *fragments heard from adults* and partly the level of *direct description of the picture* were left out. The reason to exclude these levels was that it was not possible to determine if the children's verbal reasons were their own vis-à-vis *fragments heard from adults*. Responses where the child poorly described the situation in the picture and repeated the researcher's explanation without their own interpretation were not scored as verbal reasons (for more information, see Article II).

The scoring of pre-schoolers' responses collected with video recordings during group discussions (Study III) was done by two coders using the same principle as children's responses to the YCVR-test (Study II): children's responses were sorted into two scoring categories: *verbal reason* and *verbal phrase*. Three categories of verbal reasons were created: (1) *association based on reality* (Child describes activities related to the situation in the picture), (2) *connection between the words* (Child's response contains connection, analogy, comparison, contrast and inference, but no response contains "because of that"), and (3) *a sense-making explanation* (Child´s response contains a logical explanation or causal connection, saying "because of that") (adapted from the scoring system in Study II; see more in Article III). Each verbal reason was awarded one point, and when the child answered with a verbal phrase that was not a verbal reason or if the child did not answer at all, no point was given.

The rates of verbal reasons and number of words (talkativeness) in the pre- and post-tests of the intervention and control groups were compared using repeated-measure ANOVA, to estimate whether there was a difference in the mean scores (see Study II).

Pre-schoolers' verbal reasons during philosophical group discussions were estimated using repeated-measure (ANOVA) to compare the means of pre-schoolers' verbal reasons to the adults' questions (Study III).

Kindergarten teachers evaluated the 125 children's current social, emotional, physical, mental, and cognitive development, and verbal ability on a 5-point scale, according to the following levels: significantly above age appropriateness, somewhat above age appropriateness, age-appropriate, somewhat below age appropriateness, and significantly below age appropriateness. The results were analysed using the Mann-Whitney U-Test (Study II).

Adults' questions

To identify the proportions of the type and function of questions the adults asked during philosophical group discussions, and any statistically significant differences between the mean scores, the adults' questions were analysed using repeated-measure ANOVA with Bonferroni adjustment. Content analysis was used to analyse the adults' questions in philosophical group discussions qualitatively, to elucidate meaning and provide examples to illustrate the results (Study III).

The coding of adult's questions collected with video recordings from the philosophical group discussions was done as follows: inspired by some authors (Birbili, 2013; Boyd, 2015; Lee & Kinzie, 2012; Siraj-Blatchford & Manni, 2008; Zoller, 1987; Walsh & Sattes, 2011) was partly adapted and created a final coding system using the principle of being open to additional codes emerging during the analysis (Study III). Under the main category *open-ended questions* four functions *subcategories formed:*

> *(1) initiative* (The question guides children to share and describe a general or specific opinion, feeling, idea, or experience. The question can be asked to open the discussion topic, to engage the children to think and construct schemata of thinking [Zoller, 1987; Walsh & Sattes, 2011]);
>
> *(2) interpretation* (The question guides the children to explain the concept or opinion using a description. It also guides them to explain or interpret the opinion at the meta-level [to think about their own thinking] through description [Walsh & Sattes, 2011]. The question can also guide them to explain their opinion through an example [Zoller, 1987]);
>
> *(3) process* (The question guides the children to reason about their personal opinion or is text-based; guides them to clarify an understanding through their own argumentation [Birbili, 2013]. This question may be asked after the child's response or after reading a text introducing the discussion. This question may guide the child to make personal meaning and knowledge through reasoning processes [Walsh & Sattes, 2011]. Typically, the question begins with "why" and guides the child to use the phrase "because of that" or a similar formulation. The question may or may not include the opinion or thought or experience about which a reason is sought [Zoller, 1987]);
>
> *(4) speculative* (The question guides the children to infer, argue about the consequences, speculate, assume [Birbili, 2013], or compare. The question can be asked to motivate the children to participate more actively, and to make arguing fun, or to provide fantasy through predictions [Boyd, 2015]. The question can also be asked about the influence based on their own experience [Zoller, 1987; Walsh & Sattes, 2011]).

Under the main-category *closed-ended questions* two function subcategories formed:

(1) *Yes/No* (The question invites an answer of Yes or No. The question may also lead to a non-verbal response, such as a nod, smile, laugh, etc. [Siraj-Blatchford & Manni, 2008]. Reflexion formulated as a question. Sometimes it is a question that guides the children to answer Yes/No and also to specify the statement [Boyd, 2015], hesitate, explain, or compare [Zoller, 1987]);

(2) choice (The question guides the children to choose between two or more answers offered [Lee & Kinzie, 2012]. This question could not be answered with Yes or No).

The third main-category was *off-discussion questions* (The question guides the children to organise the procedure of the discussion, classroom management, or other questions not related to topics [Lee & Kinzie, 2012]. The question guides them to attend to her or his behavior, activity, rules in the process of discussion, also ground rules [Boyd, 2015]. The question may also be used to direct the children's attention back to the discussion if it has shifted to other activities [Lee & Kinzie, 2012; Siraj-Blatchford & Manni, 2008]).

Reliability and validity of the YCVR-test
The reliability of the YCVR-test, the internal reliability of the YCVR-test was estimated using Cronbach's alpha coefficient with the first sample (N=24). Additionally, to estimate internal reliability of the YCVR-test, was evaluated the Cronbach's alpha with the second sample (N=129). To estimate equivalent forms' reliability of the YCVR-test, Pearson's correlation coefficient was used to check the scores of the verbal reason YCVR-test and in the everyday context using a game *curious shop assistant*. In addition, means and standard deviations were compared (Study I).

The content validity of the YCVR-test was estimated using "expert" judgement. Evaluation from three experts was used who were competent in pedagogy, teaching pre-schoolers, and assessing thinking skills. Face validity was estimated by interviewing children after the testing to ask their opinion about the procedure of testing with the YCVR-test (Study I). Also the description of researcher's evaluation for the testing procedure using the YCVR-test was used.

4. FINDINGS AND DISCUSSION

This chapter summarises the main results of the research questions of the current doctoral thesis (see also Table 1). A more thorough account of the study results are provided in the individual articles (I–III).

4.1. Reliability and validity of YCVR-test

Researchers designed the YCVR-test to measure pre-schoolers' verbal reasoning skills in terms of the ability to give reasons for their own opinions. The reliability and validity of the YCVR-test were analysed in order to answer the first research question of this dissertation (see Table 1 in chapter 3.1.).

The results revealed that the YCVR-test is an internally consistent and reliable tool to assess the verbal reasoning skills of 5- to 6-year-old children. The calculated reliability and validity are presented and discussed below.

The equivalent form of reliability of the YCVR-test. The equivalent form of reliability indicates that the YCVR-test and the game *curious shop assistant* measure both equally the aspect of pre-schoolers' verbal reasoning, and produce similar scores (this result is explained according to the definition of Gay, Mills, & Airasian, 2006). Significant correlations between the different levels of reasoning in the YCVR-test and in the everyday context using a game at a significance level of at least .05 indicated acceptable reliability of the YCVR-test. Descriptive statistics from the total scores of the first sample (N = 24) for the different levels of reasoning from the YCVR-test are presented in Table 4 of Article I.

Internal reliability of the YCVR-test. Internal reliability indicates that the test questions measure all verbal reasoning similarly and the measure is consistent within itself (this result is explained according to Gay et.al., 2006). YCVR-testing internal reliability was .91 for the first sample (N = 24) when using the total scores for different levels of reasoning per task. Therefore, a high reliability for the YCVR-test was shown, as it exceeded .80 according to Cronbach's alpha (Cohen, Manion, & Morrison, 2007). The Cronbach's alpha coefficients (see Table 5, Article I) for different levels of reasoning in the entire YCVR-test were acceptable, exceeding the .60 criterion (Cohen, Manion, & Morrison, 2007). The second YCVR-test sample (N = 129) showed internal reliability to be .90 when using total scores for different levels of reasoning per task.

The children gave responses at a similar level of reasoning for the YCVR-test and everyday context (*curious shop assistant* game), which offers positive evidence of acceptable reliability. Such a high level of reliability might be explained in various ways. First, the duration of the test was suitable (10 to 15 minutes) for the children, and allowed high attention and concentration. Comparing, for example, the test time of YCVR-test with earlier studies testing verbal abilities and general intellectual ability (Männamaa, 2010; Wechsler,

1989; Wechsler, 2002)—those tests' excessive duration (40–50 minutes) can be tiring for a child aged 5 to 6. In Estonian curriculum a duration of no more than 30 minutes for learning activities has been increasingly suggested (Koolieelse lasteasutuse riiklik õppekava, 2008). Thus, it could be concluded that the YCVR-test composed for this study could not be tiring for pre-schoolers aged 5 to 6 since its duration is only 10 to 15 minutes. Second, the YCVR-test and game *curious shop assistant* as everyday context were very similar in nature, and thus were easily comparable. Third, the test questions and the scenarios were both interesting and engaging for the children. In the YCVR-test, the questions used were initiated by children and about everyday topics which were interesting to children. The questions in the YCVR-test were composed according to Kovach (2006) and Fisher (1999), who also highly stress that questions should be initiated by children and should be everyday topics familiar to them. Fourth, the test questions and scenarios were comprehensible to the children (age-appropriate); therefore, the children had the opportunity to think about their own opinion and express it. Fifth, children had enough time to think about question and how to answer; children really need sufficient time to think in order to make relations to first understanding the question and then to formulate their response to the question. Sixth, the researcher was a suitable conversation partner, which established the right conditions for each child to be ready to talk with an unfamiliar adult. The researcher was trained to talk with pre-schoolers and used questioning and listening techniques, such as developing empathy, neutral attitude, and safety, which all helped to create a suitable atmosphere to encourage children to express their opinion and reasoning.

Content validity of the YCVR-test. Content validity indicates that the test covers sufficiently the appropriate content area of pre-schoolers' verbal reasoning (this result is explained according to Gay et.al., 2006). Experts in the field were of the opinion that the questions were comprehensible for children aged 5 to 6 years old, that the test questions seemed age-appropriate to extract informative and open answers, that the illustrations were generally under-standable and supported comprehension of the test questions, and that the test questions could stimulate verbal reasoning in children 5 to 6 years old. The test produced evidence of children giving a range of reasons for their opinions, which provided useful data for analysis.

Content validity was generally good for the YCVR-test. All three experts thought the illustrations supported the verbally presented scenarios. Illustration and picture-cards as learning materials are familiar to pre-schoolers in Estonian kindergarten; they are used to looking at the picture and listening to the teacher's speech at the same time. Scenarios presented only verbally can be boring for children or not sufficient for them to understand the content of each scenario, as was found also by Kikas et al. (2002) in their study. However, based on Kikas et al. (2002), illustrations may also reduce the children's focus on the content, and therefore, it is essential to also accurately explain the illustrations verbally. The illustrations and scenarios in the YCVR-test were presented jointly and complemented each other, similar approach were also

used by other researchers to measure the thinking skills of pre-schoolers (Kelemen, et al., 2003; Müller, et al., 2007). It is important that the test questions use a simple everyday context, because most children of this age are unable to understand and express themselves using scientific concepts. The YCVR-test was composed on the topic of bravery and used simple everyday scenarios familiar to children from their everyday learning activities in kindergarten. Hence, the questions of the YCVR-test did help children produce reasons for their choices and provide useful data for analysis.

Face validity of the YCVR-test. Face validity was used to describe the content validity of the test which was followed up by content validation indicating that the test is suitable to measure pre-schoolers' verbal reasoning according to pre-schoolers' subjective judgement and researchers' evaluation (this result is explained according to the definition of Gay et.al., 2006). By interviewing the children after the testing, all 24 children stated in the interview that they liked the whole process of the test, or they liked the illustrations, or they liked the chance to talk during the test. A total of 23 of the 24 children stated in the interview that all the questions and scenarios with illustrations were comprehensible and not very difficult to answer, or they were easy to answer. The children's evaluation of the YCVR-testing procedure is given in Table 6 of Article I. All the participants followed the guidelines and suggestions given by the researcher and evaluated that the articulation and wording was understandable, and the tone of voice acceptable.

The researcher's evaluation of the YCVR-testing procedure was also used to examine the face validity. A total of 23 of the 24 children were interested in looking at all the illustrations. One child did not want to look at the illustrations for long, but she was not ready to explain why. The children's attention and motivation were sustained until the end of the test: 23 children looked at all the illustrations with interest, and two children asked if the question could be repeated. At the end of the test, five children wanted to see more pictures, three children wanted to answer more questions, and one child wanted the researcher to offer more activities.

The face validity of the YCVR-test was very good. According to the 24 children, the testing procedure generally motivated the children to use verbal reasoning and was interesting, showing that the YCVR-test is age-appropriate and practicable for these children. Interviewing children with the YCVR-test probably gave them new information or new knowledge that increased their motivation. Although the children did not give any reasons categorised as scientific concepts in this study, the YCVR-test allowed them to give answers at their own developmental level: using everyday concepts and synthetic concepts.

This fast acceptance of the children of the YCVR-test was supported by the previous communications before interviewing, by explaining about the process of the interviewing and the first questions of the YCVR-test, which created a supportive atmosphere for communication. The first questions of the YCVR-test enabled the child to talk about themselves, which is generally easy, pleasurable, and motivating; as Lipman stressed, children prefer their own "thoughts to those

that are re-presentational" (2003, p.165), and the topic of the first questions were related to the next questions about scenarios. Thus, the test seemed like a complete activity to the child.

4.2. Pre-schoolers' reasoning and talkativeness by individual YCVR-testing

Verbal reasoning is a precondition to attain the four main language skills: speaking, listening, reading, and writing (Fisher, 2001), as well as computation. Thus, reasoning is fundamental to their development (Lipman, 2003). A quasi-experiment was carried out with the aim of finding out the effect of the implementation of the P4C programme upon children's verbal reasoning skills and talkativeness. To answer the second research question of this dissertation (see Table 1 in chapter 3.1.), different sub-types of verbal reasons were examined: (1) comparison, (2) analogy, (3) contrast, (4) justification, (5) causal connection, (6) understanding about mental states, and (7) the wording "because of that". To answer the third research question of this dissertation, a number of words in the pre-schoolers' responses was compared.

According to the research question the question of whether or not there was a difference in the mean scores of the intervention and control groups' pre- and post-test results was examined. The descriptive statistic of dependent variables and interactions for the intervention and control group in the pre- and post-tests are shown in Table 3. Four dependent variables were used in the comparison: (1) connection between words, (2) a sense-making explanation, (3) the answer "because of that", and (4) talkativeness (Table 3).

Table 3. Pre-post standardised scores for intervention (N = 58) and control (N = 67) groups.

	Intervention group							Control group						
	Pre-test		Post-test		Change M difference	p		Pre-test		Post-test		Change M difference	p
	M	SD	M	SD				M	SD	M	SD		
1. Connection between words (analogy, comparison, contrast, justification)	2.0	1.9	5.8	5.2	+3.8	< .05*		3.1	2.3	2.2	2.5	-0.9	< .05*
2. Sense-making explanation: causal connection, understanding about mental states	0.1	0.4	8.3	4.2	+8.2	< .05*		1.4	1.4	5.0	3.6	+3.6	< .05*
3. Answer „because of that"	0.6	1.2	7.6	3.8	+7.0	< .05*		2.8	2.4	4.9	3.6	+2.1	< .05*
4. Talkativeness (number of words)	80.9	32.7	212.1	156.9	+131.2	< .05*		90.2	32.8	133.7	90.8	+43.5	< .05*

Note. Significance (2-tailed) level *p* < .05.

The results of this quasi-experiment showed a positive effect of P4C on pre-schoolers' verbal reasoning skills. Changes in the intervention group included an increased ability to reason verbally. The positive changes in the control group was smaller than the intervention group. There was a statistically significant difference between the mean scores of the two groups when comparing the pre-test and post-test results of all three sub-types, $p < .05$. The analysis showed an increase in the verbal reasons for the sub-type "connection between words" for the intervention group that was significantly greater than the control group, where a decrease was observed, $F = 36.61$, $p < .05$ (see Table 3). In relation to the sub-type "sense-making explanations", the increase of the intervention group was significantly higher than the control group's ($F = 81.96$, $p < .05$) (see Table 3).

The result that children in the intervention group gave more reasons than the children in the control group when asked to reason their opinion after the eight-month implementation of philosophical discussions based on P4C could be generally explained by earlier studies (Trickey & Topping, 2004; García-Moriyón et al., 2005) which provide evidence about the positive impact of P4C to the school children's thinking skills, including reasoning skills. There was also one previous study with pre-schoolers: the investigation of Daniel et al. (2012), which found that implementing philosophical discussions according to P4C can probably help children aged 5 to produce more responses at a higher cognitive level. However, since they did not specifically investigate pre-schoolers' verbal reasoning and the results are made based on a small sample size (26 children), their results remained in need of further examination. Thus, the results of this study can provide more data on the effect of the implementation of the P4C programme upon pre-schoolers's verbal reasoning skills. The higher performance revealed in this study might depend on the questioning technique that was used specifically to promote verbal reasoning skills. Therefore, it could be assumed that philosophical group discussion based on P4C can act as a trigger for children to produce more reasons and different types of verbal reasoning. Compared with the control group, the intervention group had more time for a joint discussion, which helped children produce verbal reasons. This can be conclude based on previous studies carried out with school children. For example, Topping and Trickey (2007, 2014) investigated 10-year-old students with an experiment in intervention and found that the implementation of P4C improved intervention group verbal reasoning significantly compared to the control group.

The results revealed that children in the intervention group gave more responses using the phrase "because of that" when asked to reason their opinion (e.g. *Why do you think that he is brave? – Because he thinks all the time that nothing will happen to him*) than the children in the control group. The increase in the use of the phrase "because of that" to express reasoning in the intervention group was significantly greater than in the control group, $F = 71.73$, $p < .05$. The differences in descriptive statistics, when comparing the intervention and control group, are shown in Table 3. It could be assumed that the

combination of group discussion as an active verbal–social process (Sperber & Mercier, 2010), questioning techniques (Zucker et al., 2010, Lee et al., 2012), scaffolding (Vygotsky, 1978, 1934/2014), and arguing once a week over eight months via philosophical group discussions according to the P4C programme (Daniel et al., 2012) allowed children to practice reasoning at their own potential cognitive level supported by adults and peers. These approaches implemented simultaneously can have a positive effect on pre-schoolers verbal reasoning.

The children in the intervention group were significantly more talkative than the children in the control group when asked to reason their opinion after the eight-month implementation of philosophical discussions. The increase in talkativeness in the intervention group was significantly higher than in the control group, ($F = 22.08$, $p < .05$) (see Table 3). According to the results of the pre-test, children's talkativeness in the intervention and control groups did not differ significantly ($p > .05$), but in the post-test there was a significant difference ($p < .05$) (see Table 3).

Some reasons why did the children in the intervention group became more talkative than the children in the control group when asked to reason their opinion could be discussed. First, the adult's open-ended and context-based questions during philosophical discussion (children heard each other's answers sitting in a common discussion circle) promoted more discussion. Second, the discussions were based on the children's responses (children initiated the discussion). It seems to be important to implement these approaches simultaneously with increased talkativeness. This higher performance might depend on the questioning technique used according to P4C to specifically promote children to answer openly based on the child's own opinion or experiences, which is the main aim of the Socratic questioning used in philosophical group discussions, but also because of the attitude of the adult moderator, who accepts all children's responses with a neutral attitude, free from interpreting and moralising comments, (which was prescribed to implement according to the programme P4C). However, the aspect of the adult moderator's neutral attitude is only speculation in this case and needs to be verified.

However, the intervention period was rather long and children generally increased their ability to reason verbally. Despite this, there was always a number of children who did not participate well in the philosophical group discussions, and it was therefore appropriate that children's ability to reason verbally be assessed by individual testing. Supposedly, those children who were not active participants in discussions still followed the logic of their peers and benefited from listening to their contributions, and in this way developed their skill of verbal reasoning, despite their low activity, as similarly pointed out by Topping & Trickey (2014). According to the teachers' evaluations, the pre-schoolers' development did not differ between the intervention and control groups ($p > .05$). As mothers' time in education did not differ significantly between the intervention (15.4 years) and control group (15.7 years; $p > .05$), it could be assumed that philosophical group discussions are important in

increasing the performance of children in terms of verbal reasoning skills and talkativeness.

This study offers evidence that it is possible to effectively increase pre-schoolers' verbal reasoning skills through a relatively short intervention pro-gramme (30 minutes per week, over 8 months). This is in contrast to another thinking skills programme that also focused on the teacher's questioning style, but was conducted over a longer period (18 months), which did not show evidence of any significant development in children's verbal or non-verbal reasoning (Aubrey et al., 2012).

4.3 Moderator's supportive questions in developing pre-schoolers' verbal reasoning during philosophical group discussions

The development of verbal reasoning skills is sensitive to questioning tech-niques: *open-ended* and *closed-ended* questions and their amount, based on earlier studies, can differently influence the emergence of children's verbal reasoning skills (Gillies & Haynes, 2011; Goossen, 2002; Ho, 2005; Lee & Kinzie, 2012; Walsh & Sattes, 2005). The different types and functions of the adult's questions asked during the philosophical group discussions were aimed at developing pre-schoolers' verbal reasoning skills and their answers were analysed in order to answer the fourth research question of this dissertation (see Table 1 in chapter 3.1.). In the case of Study III, the researcher was the adult moderator of the philosophical group discussions.

The analysis of the researcher's questions indicated a statistically significant difference between the proportions of the three types of questions (*open-ended, closed-ended,* and *off discussion* questions), F (2, 18) = 16.5, $p < .05$. A com-parison of the questions asked indicated that the researcher asked significantly more *open-ended* questions (see Table 2 in Article III) than *closed-ended* questions (mean difference 11.85, $p < .05$)*,* and *off discussion* questions (mean difference 17.05, $p < .05$), but there was no statistically significant difference between *closed-ended* and *off discussion* questions. From the *open-ended* questions, the researcher asked significantly more *initiating* (256) and *process* (206) questions than *interpretation*, *speculative*, *Yes/No*, and *choice* questions. Of the *closed-ended* questions*,* the researcher asked significantly more *Yes/No* (417) questions than *initiating*, *interpretation*, *process*, *speculative*, *choice*, and *off-discussion* questions. A statistically significant difference was indicated between the numbers of all questions (*initiating*, *interpretation*, *process*, *specu-lative*, *Yes/No*, *choice*, and *off-discussion*), F (6, 14) = 18.64, $p < .05$. Descrip-tive statistics of variables for *open-, closed-ended* and *off-discussion* questions, as well as descriptions of the questions, and examples of questions of different functions, are shown in Table 2 of Article III.

The results of this study indicated a difference among the proportions of *open-ended, closed-ended* and *off-discussion* questions: the proportion of

closed-ended questions was rather high. According to Goossen (2002), *open-* and *closed-ended* questions are both important, and *open-ended* questions may not automatically result in children using higher order thinking skills. Therefore, it could be argued that *open-* and *closed-ended* questions in philosophical group discussion could show an effect also when they are rather of equal proportion. Therefore, the dominance of the researcher's *open-ended* questions in this study was probably related to the fact that in the current study the researchers' questions and children's answers were gathered during philosophical group discussion based on the principles of P4C. The proportion of *off-discussion* questions in this study could be explained according to data from Goossen (2002), who found that earlier studies confirmed a similar proportion (generally 20%) of *off-discussion* questions. It should be noted that the questions in the philosophical group discussion were strongly connected with the children's previous responses and the whole context of the philosophical group discussion (implemented according to the programme P4C), which guided the children to answer based on their own opinions or experiences. It could be supposed that this feature also applied to the *closed-ended* questions, the original questioning technique, according to the programme P4C. One difference compared to earlier studies (Boyd, 2015; Siraj-Blatchford & Manni, 2008) was that factual and recall questions, which are normally always presented by the teacher, and are criticised as thinking lockers, did not emerge during philosophical group discussions in the current study. Therefore, contrary to previous studies (for example Lee & Kinzie, 2012, and Zucker et al., 2010), asking pre-schoolers *closed-ended* questions could be advisable during philosophical discussions. Because the same pre-schoolers participated in the quasi-experiment in the intervention group (Study II) and their performance in verbal reasoning was much better than the control groups, it can be concluded that this proportions of different questions from the researcher is suitable. Teachers should just avoid large numbers of factual and recall questions, and understand that questions that potentially guide pre-schoolers' to reason should mainly be related to the child's own personal opinions, feelings, ideas, thoughts, examples, or experiences (e.g. Interpretation questions: *How did you come to the thought that nobody knows what the time is? Yes/No questions: Do you want to say that bad words can hurt?*).

The results of this study indicated that some *open-* and *closed-ended* questions could potentially offer more support in developing pre-schoolers' verbal reasoning. First, the number of verbal reasons in response to the researcher's questions by the children at different levels (R1 – association based on reality, R2 – connection between words, R3 – a sense-making explanation) was compared. The pre-schoolers gave the most verbal reasons (682) (R1, R2, R3 together) out of a total of 1,119 verbal reasons in response to the researcher's *open-ended* questions, with an average of 1.11 (SD=.51) reasons per question ($p < .05$, $F(2, 18) = 11.16$). When comparing questions with different functions, the most verbal reasons (R1, R2, R3 together) were provided in response to *interpretative* questions, with an average of 1.58

(SD=.10) reasons per question. Next were *process* questions, with an average of 1.48 (SD=.83) reasons per question. Finally, *Yes/No* questions had an average of 1.16 (SD=1.11) reasons per question ($p < .05$, $F (6, 14) = 10.61$). The number of pre-schoolers' verbal reasons at different levels in response to the researcher's questions and descriptive statistics are presented in Table 3 of Article III.

Follow-up comparisons revealed that pre-schoolers gave the most verbal reasons (100 out of a total of 169) at the level of *sense-making explanations* (R3) in response to the researcher's *open-ended* questions with a *process* function, which is an average of $M = .53$, $SD = .32$ per question, which was significantly more verbal reasons (R3) than provided to *initiating, speculative, Yes/No*, and *off-discussion* questions ($p < .05$, $F (6, 14) = 15.34$), but not significantly different from the verbal reasons (R3) provided in response to *interpretative* and *choice* questions (Table 3 in Article III).

In response to the researcher's 417 *Yes/No* questions, the pre-schoolers gave 28 verbal reasons at the level of *sense-making explanations* (R3), with an average of $M = .13$, $SD = .24$ per question, which was statistically different only to verbal reasons (R3) provided in response to *process* questions ($p < .05$, $F (6, 14) = 15.34$) (Table 3). However, taking into account that the pre-schoolers generally tended to answer "yes" or "no" to *Yes/No* questions, those *Yes/No* questions to which the children responded with verbal reasons at the level of *sense-making explanations* (R3) were qualitatively analysed and some patterns found. All these *Yes/No* questions were initiated from a child's previous verbal reaction to the question about the child's own opinion or experience. In addition, these questions guided the child to compare, hesitate, find connec- tions, or explain.

The results indicate that pre-schoolers gave the highest number of verbal reasons to the *open-ended* questions in philosophical group discussions, with questioning technique being key. These results are valuable, because although previous studies have examined philosophical group discussions according to P4C, the case of pre-schoolers was not known. As with García-Moriyón et al.'s (2005) meta-analysis and Trickey and Topping's (2004) systematic review, which concluded, according to the results of 28 studies in which P4C was conducted mainly with older school-children, the current study also demonstra- tes a positive impact of P4C on pre-schoolers' development of higher-order thinking skills. More precisely, the results of this study demonstrate that children aged 5 to 6, similar to older school children, also reason verbally and give logical and sense-making explanations during philosophical group discus- sions implemented according to P4C if they are scaffolded with appropriate questions.

While *Yes/No* questions are mainly understood as questions that guide children to answer briefly and at a lower cognitive level (Walsh & Sattes, 2011), this study, to the contrary, demonstrates that *Yes/No* questions (except for factual and recall questions, which did not emerge in this study) also activate higher thinking processes and allow pre-school-aged children to use explanations. *Closed-ended Yes/No* questions that guided pre-schoolers in this

study to answer Yes/No and additionally also to hesitate, explain, or compare (e.g. *Do hitting and bad words affect people equally badly?*), similar questions were earlier recommended by the practitioner Zoller (1987) to use in philosophical group discussion but not examined previously. Moreover, the three cognitive activities presented in the function of *Yes/No* questions in this study (hesitation, explanation, comparison) are closely related to the basic thinking skills emphasised by Fisher (2001).

Proportionally, the highest number of verbal reasons were provided in response to *interpretation* questions *(What should you do then to have more time?)*, although, *process* questions seem to have more potential for supporting verbal reasoning because they guide children directly to the reason (*Why do you have to be polite?*). It could be supposed that one reason for this is that *interpretation questions* guide children to reason through descriptions, which are easier to understand for a 5- to 6-year-old child. The other reason could be that the children needed more practice to increase their capacity to answer other *open-ended* questions (on the higher cognitive level); this assumption is made by some authors who stress that reasoning is a slow process and develops simultaneously with speech and language skills (Gillies & Khan, 2009; Lipman, 2003; Ribeiro et al., 2016; de Stasio et al., 2014; Walsh & Sattes, 2005). Proportionally, the highest number of verbal reasons at the level of *sense-making explanations* were provided in response to the researcher's *process* questions, and this emphasises the value of *process* questions and their high potential for guiding pre-schoolers to reason verbally. According to the results, it could be especially suggested to ask *interpretation, process* and *Yes/No* questions, because the children gave the most verbal reasons per question to these questions (see Table 3 in Article III).

Summarising the findings, it should be highlighted that in addition to *open-ended* questions*, closed-ended* questions could also have the potential to encourage verbal reasoning skills, at least during philosophical group discussions. In the literature it has often been stressed that mainly *open-ended* questions facilitate such reasoning skills (Birbili, 2013; Pagliaro, 2011). While earlier studies have calculated that around 5–20% of a teacher's questions may have the potential to activate higher cognitive levels (Birbili, 2013; Pagliaro, 2011; Walsh & Sattes, 2005), in this study 48.57% of questions showed such potential (*interpretation, process*, and *Yes/No* questions). This result could stem from the nature of the P4C programme (Article III in Säre et al., 2017), in which the art of questioning is initiated by the children's responses and the context created by dialog and occurring naturally in interaction. According to previous studies, it was not known which adult questions have the potential to specifically support pre-schoolers' verbal reasoning skills during philosophical group discussions, but this study determined the adult moderators' type and function of questions, as well as their proportions, which best support pre-schoolers to reason verbally.

5. SUMMARY AND CONCLUSIONS

Different types of reasoning skills support children's later development, learning, and academic success, as well as behavior (Whittaker, 2014). As Estonian children's verbal reasoning skills at the ages of 7 and 9 are poor (Häidkind & Kikas, 2004; Säre & Luik, 2011), it is essential to support children's verbal reasoning skills earlier in the pre-school age. The programme Philosophy for Children (P4C) has shown a positive effect on older school children's reasoning skills (Trickey & Topping, 2004; García-Moriyón et al., 2005). P4C is widely used with pre-schoolers. There are materials developed for pre-schoolers to conduct philosophical discussions (for example DeHaan et al., 2008; Lipman, 1987; Zeitler, 2010; Zoller, 2008), but the effectiveness of the implementation of P4C with pre-schoolers upon their thinking skills is rarely investigated (Daniel et al., 2012). Therefore, it was decided to use P4C to support Estonian pre-schoolers' verbal reasoning skills. The aim of this doctoral study was to find out the emergence of 5- to 6-year-old Estonian pre-schoolers' verbal reasoning skills by examining their responses to questions asked by an adult moderator, during the implementation of philosophical group discussions based on P4C. Three studies of the dissertation help to find out:

- the validity and reliability of the composed YCVR-test in order to assess pre-schooler´s verbal reasoning skills (Study I),
- if there is a differences between the proportions of the verbal reasons given by pre-schoolers in the intervention and control groups by testing with YCVR-test (pre-post-test) while intervention group participated in philosophical group discussions and the control group did not (Study II),
- if there is a differences between the talkativeness by pre-schoolers in the intervention and control groups by testing with YCVR-test (pre-post-test) if they are asked to reason their opinion while intervention group participated in philosophical group discussions and the control group did not (Study II),
- if there are adult moderators questions which can have more potential to support pre-schoolers verbal reasoning skills during philosophical group discussions (Study III).

The results of the research allow to draw the following conclusions:

1. The YCVR-test is a suitable instrument to assess 5- to 6-year-old Estonian pre-schoolers' verbal reasoning skills, because acceptable reliability and validity was demonstrated. The YCVR-test enables one to measure verbal reasoning skills, and the issue of the test was age-appropriate, also the duration of testing (10–15 minutes). The tasks of the YCVR-test are in compliance with the requirements set for

knowledge and skills in the Estonian national curriculum in the areas of learning (Child and their environment, Speech and language, Self-management skills, Social skills). The procedure of conducting the test is flexible, and the materials are interesting and understandable for children.

2. The results of the quasi-experiment showed a positive effect on the verbal reasoning skills of pre-schoolers by implementing P4C. Pre-schoolers in the philosophical discussion intervention group performed higher in their thinking skills than control group. When examining pre-schoolers' verbal reasoning skills at different levels it emerged that reasons on the levels "connection between words", "sense-making explanations", and the use of the phrase "because of that" were higher in the results of children attending philosophical group discussions. Thus, there is evidence that pre-schoolers' verbal reasoning skills could be developed in philosophical group discussions by using specific questioning based on the programme P4C.

3. The results of the quasi-experiment showed a positive effect on talkativeness. Children in the philosophical discussion intervention group were significantly more talkative than in the control group, if they were asked to reason their opinion after the eight-month implementation of philosophical discussions. It seems to be important to implement some approaches (the adult's *open-ended* and context based questions; the discussions based on the children's responses) that simultaneously used increase talkativeness.

4. The results indicate that during the 20 philosophical group discussions in developing pre-schoolers' verbal reasoning skills, the adult moderator asked different types of questions which were classified into three subtypes: 1) *open-ended questions* with four functions: *initiating, interpretation, process, speculative*; 2) *closed-ended questions* with two functions: *Yes/No, choice*; and 3) *off-discussion questions*. Open-ended questions were proportionally in dominance. Factual *closed-ended* questions did not emerge in this study, which supposedly do not support also the development of verbal reasoning skills. Earlier studies have calculated that usually 5–20% of a teacher's questions may have the potential to activate higher cognitive thinking (Birbili, 2013; Pagliaro, 2011; Walsh & Sattes, 2005), in this study 48.57% of questions showed such a potential (*interpretation, process*, *Yes/No* questions).

5. Results indicate that some adult moderator questions may have more potential to support pre-schoolers verbal reasoning skills during philosophical group discussions, these questions were: *interpretation*, *process* and *Yes/No questions*. Proportionally the most verbal reasons at the level of *sense-making explanation* were in response to *process* questions, which are responses on the highest cognitive level in this study. It needs to be highlighted that in additional to *interpretation* and *process* questions that were open-ended, pre-schoolers also gave verbal

reasons to *Yes/No* questions that were closed-ended. Thus, the results revealed that when implementing philosophical discussions, *closed-ended* questions also have an important role in developing pre-schoolers' verbal reasoning skills. From *Yes/No* questions asked in this study during philosophical group discussions could be supposed to ask questions that guided the child to compare, hesitate, find connections, or explain.

5.1. Limitations and potential further studies

Despite the interesting findings there were some potential limitations to the studies. These limitations should be considered when generalising the findings. The first limitation has to do with pre-schoolers' capability to reason verbally under different conditions. Sperber and Mercier (2010) pointed out that children reason better in group discussions. This study compared only how each child reasons independently and with the help of an adult. However, the intervention was conducted in terms of group discussions and it was not compared how each child reasoned individually and in group. Therefore, in the future it would be ideal to examine and compare the children's explanations to determine whether each child reasons better in individual or philosophical group discussion, to find out who can scaffold the child better, the adult, peers, or the adult and peers together.

Another limitation of the study has to do with the intervention. In this study the philosophical group discussions were conducted by one researcher, which could reduce the effect because the researcher has the contact with intervention group only 30 minutes once a week. The children's own teacher could use elements of the intervention throughout the whole day, and thus influence the children in a more natural way than the researcher. Future investigations should examine what are the effects when the children's own teacher conducts weekly philosophical group discussions, this would also make it possible to implement group discussions twice a week, or even fully integrate P4C into all activities.

A limitation was also that children in intervention group were not specifically introduced to ask their own questions, and the researcher was dominant when asking questions. Guiding children to ask their own questions could be helpful in developing their reasoning skills.

Children in control group were in a somewhat unequal situation compared with the intervention group when conducting the post-test, because children in the intervention group were more familiar with the researcher from the philosophical group discussions. When currying out a similar experiment, it would be necessary to use another researcher to conduct the post-test.

Another limitation of this study could be that it was carried out with no follow-up study. A follow-up study with one more post-test would give an additional value by examining whether the positive results remained, without any more philosophical group discussions in- between. Future experiments with

pre- and post-tests plus a follow-up examination to answer this question would be instructive.

A limitation is also that intervention group children became more supportive learning activities than control group children during the same period, which could influence the results of investigation. Future investigation should use additional intervention during the same period also with control group.

In the future it would be reasonable to compare different forms of group discussions and questioning techniques to find out whether more practices develop verbal reasoning skills, and to implement questioning techniques out-side of philosophical group discussions and test for any effects.

The results of this study demonstrated pre-schoolers' verbal reasoning skills using everyday concepts in a specific topic *bravery*. It is not known how predictive pre-schoolers' verbal reasoning skills are of understanding scientific concepts when they are older. It is not known if the pre-schoolers are able to demonstrate the same level of verbal reasoning regarding another task. Therefore, future research could find out whether and to what extent the skills of verbal reasoning in everyday concepts reflect future scientific reasoning at school and in different tasks.

A limitation is that the specific teaching style of the teachers who taught the pre-schoolers participating in this study in their everyday learning situations at six different kindergartens was not known – their learning styles could also influence the results of the study. It is only known that none of them had im-plemented philosophical group discussions or was trained to use such an approach of questioning to foster children's verbal reasoning skills.

Finally, there could be other factors that influenced the performance of pre-schoolers' verbal reasoning that were not taken into account in this study. A limitation is that only the function of the researcher's questions were in-vestigated in the process of philosophical group discussion. In the process of questioning and supporting verbal reasoning skills, other factors could also play an important role, for example the researcher's general attitude and willingness, tone of voice when asking questions, personal values, the topic of the discus-sion, related activities, and waiting time after each question and before each reaction. Therefore, further studies are needed to find out if other activities on the part of the teacher can potentially support the development of verbal reasoning in children.

5.2. Recommendations for practitioners

The results of this study point out some major aspects of how to support the development of pre-schoolers' verbal reasoning skills. First, the results allow to recommend the implementation of philosophical group discussions in kinder-gartens on a regular basis, for example once a week. Second, the questions asked by the adult in philosophical discussions according to P4C—can also be used in other learning activities or in argumentative conversations of everyday

contexts or learning activities. The identified questions are perhaps the most fundamental finding for teachers to use in their everyday work with pre-schoolers. Third, it is important to implement activities that allow the development of thinking and language skills simultaneously.

The results allow to recommend to ask mainly questions which guide the child to explain or to reason their own opinion or about the world; these kinds of questions are mainly *open-ended*. Although, asking *interpretation*, *process* and *Yes/No* questions guided pre-schoolers to produce the most verbal reasons, it is also recommended to ask other *open-ended* questions and *off-discussion* questions which are initiated from the child and topic and asked with a neutral attitude. Especially could be suggested *process* questions, because to these questions children yielded the greatest number of verbal reasons at the level of "sense-making explanations", which is the highest level of verbal reasoning of pre-schoolers in this study. Thus, a general suggestion for teachers is to avoid large numbers of factual and recall questions, also keep a balance in the types of questions asked, and observe that questions that potentially guide pre-schoolers to reason should mainly be related to the pre-schooler's own personal opinions, feelings, ideas, thoughts, examples, experiences, or activities.

In sum, the results of this study can provide a guideline for kindergarten teachers to increase their repertoire of guiding group discussions and questioning techniques, and to shift their traditional approach toward more constructivist based practices.

APPENDIX

The process of planning and moderating a philosophical group discussion (created based on Brüning, 2001; DeHaan, MacColl, & McCutcheon, 2008; and Zoller Morf, 2006) implemented in this study

Step	Activity	Example of intervention	Specification/explanation

Planning the discussion.	- Selecting stimulus materials.
	- Creating the discussion plan.
		- Text,
		- picture book,
		- video,
		- photo,
		- song,
		- real-life problem.
			- Moderator should prepare:
			  a) possible sub-topics that could emerge,
			  b) questions initiated from topic and sub-topics,
			  c) related play or activities,
			  d) suitable tuning,
			  e) possible way to summarise the discussion,
			  f) possible way to evaluate the discussion.

Tuning.	Forming a circle (incl. ritual activity).	- With chairs in a circle (without tables) or on the carpet.	- Everyone can see and hear everyone else. - The moderator is on an equal level.
Introduction.	- Pre-philosophical exercises fostering executive functions. - Rules are agreed. - Reading/presenting the stimulus material to the children.	- Exercises to train the attention, to calm etc.	- Moderator explains that when somebody violates the rules then a meta-discussion will be conducted.

Step	Activity	Example of intervention	Specification/explanation
Discussion.	- Eliciting questions (and thoughts) that may provide the basis for discussion. - The children are asked if there is anything in the story that they found interesting, or that they wonder about, or would like to know more about. - Children are encouraged to put these into question form.	- *What thoughts and questions arose?*	- Moderator: a) writes all the questions up on a large sheet of paper, b) accepts all contributions equally, c) records the child's name against the questions in order to motivate (even non-readers will recognise their own name on their question).
	- Seek clarifications when taking questions by restating what you take to be their question.	- *Can you explain to me what you mean?*	- Moderator should be patient, listen carefully, and try not to interpret.
	- Making connections between questions and thoughts that arose.	- *Which similarities can you see between…?*	- Children are asked if any of the questions go together and why.
	- Beginning the discussion with a question, which could be voted by children or chosen by the moderator.	- *Can anyone think of how that might have happened?*	- All children should be encouraged to have their turn. - The initiator(s) of the question are asked to say why they asked it and what it was that puzzled or interested them.
	- Making distinctions and connections is fundamental to thinking and reasoning. - Children are asked to compare and contrast in order to formulate concepts.	- *How is that different from what X said?* - *Is that like what X said?* - *Which distinctions can you see between…?*	- Children are assisted to drawing connections and distinctions.

Step	Activity	Example of intervention	Specification/ explanation
	- Points of view. - Children are encouraged to express alternative ideas and opinions; also to generate and explore alternatives.	- *How else could we think about that?*	- It is important that children come to recognise that some of the questions do not necessarily have right or wrong answers.
	- Reasoning: a) to support the views, b) justify, or c) explain the claims.	- *Why do you think so?* - *What makes you think that … ?*	- Reasons will help children to uncover assumptions and draw inferences.
	- Drawing attention to inconsistencies. - Consistency is valued. - It is pointing out when somebody contradicts themselves.	- *Does that agree with what was said earlier?*	- Children should know that there is nothing wrong with changing your opinion.
	- Disagreements. - Pointing out when children are agreeing or disagreeing with each other.	- *Can you explain why you agree or disagree?* - *We need an explanation to understand you better. Can you explain why you disagree?*	- Children are encouraged to respect others' opinions, even if they do not agree.
	- Facilitating the discussion between the children. - Children are encouraged to converse directly with one another, rather than filtering the discussion through the moderator.	- *What do you think about this?* - *What do others think?* - *I don't know. What do you think?*	- The objective is a self-directing and self-correcting group. - Agreeing with rules: we are talking to each other, not only to the teacher.
	- Providing a model: moderator actions and attitude is an example to the children.	- Moderator shows respect for the children's questions, ideas and opinions.	- Moderator helps children to self-correct and adjust their thinking accordingly.

Step	Activity	Example of intervention	Specification/explanation
	- Keeping on task.	- The issue is examined so as to understand what parts things play and what is going on.	- The discussion does not wander aimlessly from one topic to another, it focuses upon an issue, question or problem.
	- Moving on.	- Other potential issues and follow-up activities or exercises could be implemented.	- Silence is thinking time. - A change of topic or activity should be clearly indicated.
	- Exercises and activities. Owing to the *open-ended* nature of the philosophical group discussion, a number of exercises and activities from which to choose will be prepared.	- Study the stimulus materials, consider in what directions the discussion may go and plan for this accordingly.	- Moderator should always be prepared to revise their plans.
Summarising the topic.	- It will be clear what became clear or clearer; which issues or questions need more discussion.	- *How could we summarise the discussion?* - *Where have we got to?* - *Why did that happen?*	- Moderator summarises the main viewpoints and reasons. - All children will get the opportunity to answer the last question. - Moderator asks the first question again.
Evaluation of the process of group discussion.	- Assessment: thumbs up or down. - Using fingers for a scale of one to five.	- *Did we listen well today?* - *Did we all participate today?* - *Was the discussion interesting today?*	- Moderator included.

REFERENCES

Aubrey, C., Ghenta, K., & Kanira, E. (2012). Enhancing thinking skills in early child-hood. *International Journal of Early Years Education, 20*, 332–348. doi: 10.1080/09669760.2012.743102

Baroody, A. J., Purpura, D. J., Eiland, M. D, & Reid, E. E. (2015). The impact of highly and minimally guided discovery instruction on promoting the learning of reasoning strategies for basic add-1 and doubles combinations. *Early Childhood Research Quarterly, 30*, 93–105

Birbili, M. (2013). Developing young children's thinking skills in Greek early childhood classrooms: curriculum and practice. *Early Child Development and Care, 183*(8), 1101–1114, doi: http://dx.doi.org/10.1080/03004430.2013.772990

Bodrova, E. (2008). Make-believe play versus academic skills: A Vygotskian approach to today's dilemma of early childhood education. *European Early Childhood Education Research Journal, 16*(3), 357–369, doi: 10.1080/13502930802291777

Boyd, M. P. (2015). Relations between teacher questioning and student talk in one elementary ELL classroom. *Journal of Literacy Research, 47*(3) 370–404, 10.1177/1086296X16632451

Brüning, B. (2001). *Philosophieren in der Grundschule*. Berlin: Cornlesen.

Cabell, S. Q., Justice, L. M., McGintyc, A. S., DeCostera, J., & Forsto, L. F. (2015). Teacher–child conversations in preschool classrooms: Contributions to children's vocabulary development. *Early Childhood Research Quarterly, 30*, 80–92.

Cam, P. (2014). Philosophy for Children, values education and the inquiring society. *Educational Philosophy and Theory: Incorporating ACCESS, 46*(11), 1203–1211, doi: 10.1080/00131857.2013.771443

Cam, P. (1995). *Thinking together. Philosophical inquiry for the classroom*. Sydney: Hale & Iremonger Pry Limited.

Cassidy, C., & Christie, D. (2013). Philosophy with children: talking, thinking and learning together. *Early Child Development and Care, 183*(8), 1072–1083, doi: 10.1080/03004430.2013.773509

Cebas, E., & Moriyón, F. G. (2000). What we know about research in philosophy for children. Retrieved from: http://sophia.eu.org/Research/What%20we%20know%20about%20research%5B1%5D.pdf

Chin, C. (2007). Teacher questioning in science classrooms: Approaches that stimulate productive thinking. *Journal of research in science teaching, 44*(6), 815–843, doi: 10.1002/tea.20171

Chen, Z., Sanchez, R., & Campbell, T. (1997). From beyond to within their grasp: Analogical problem solving in 10- and 13-month-olds. *Developmental Psychology, 33*, 790–801.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education.*2nd ed., 51–289. New York, NY: Routledge.

Curenton, S. M., & Justice, L. M. (2004). African American and Caucasian pre-schoolers' use of decontextualized language: Literate language features in oral narratives. *Language, speech, and hearing service, 35,* 240 – 253.

Daniel, M. F., Gagnon, M., & Pettier, J. C. (2012). Chapter 7 philosophy for children and the developmental process of dialogical critical thinking in groups of preschool children. By John A. Sutterby, ed. *Early education in a global context*. Retrieved from: <http://goo.gl/OdQAtj>.

DeHaan, C., MacColl, S., & McCutcheon, L. (2008). Philosophy with Kids, Book 1. Australia: Five Senses Education Pty Ltd.

Demir, Ö. E., Rowe, M. L., Heller, G., Goldin-Meadow, S., & Levine, S. C. (2015). Vocabulary, syntax, and narrative development in typically developing children and children with early unilateral brain injury: Early parental talk about the "There-and-Then" matters. *Developmental Psychology, 51*(2), 161–175.

Demissie, F. (2017). P4C in early childhood education. In B. Andreson (Eds.), *Philosophy for children. Theories and praxis in teacher education*. New York: Routlege.

De Stasio, S, Fiorilli, C., & Chiacchio, C. D. (2014). Effects of verbal ability and fluid intelligence on children's emotion understanding. *International Journal of Psychology*, *49*(5), 409–414, doi: 10.1002/ijop.12032

Doverborg, E., & Pramling, I. (1993). *To understand children's thinking: Methods for interviewing children.* Reports from Department of Methodology, University of Goteborg, No. 5.

Dowden, B. H. (2017). *Logical Reasoning.* California, USA: Wadsworth Publishing Company, Belmont,

Ebers, T., & Melchers, M. (2006). Praktisches Philosophieren mit Kindern. Konzepte, Methoden, Beispiele. [Practical philosophizing with children. Concepts, methods, examples.] Berlin: LIT Verlag.

Elbers, E., & Streefland, L. (2000). Shall we be researchers again? Identity and social interaction in a community of inquiry. In Cowie, H. & van der Aalsvoort, G. (Eds.), Social interaction in learning and instruction: the meaning of discourse for the construction of knowledge. Oxford: Pergamon.

Fisher, R. (2005). *Õpetame lapsi mõtlema*. [Teaching children to think.] Tartu, Estonia: AS Atlex.

Fisher, R. (1999**).** *First Stories for Thinking*. Oxford, UK: Nash Pollock.

Fisher, R. (2001). Philosophy in primary schools: Fostering thinking skills and literacy. *Reading, 35*(2), 67–73.

Fisher, R. (2007). Dialogic teaching: developing thinking and meta-cognition through philosophical discussion. *Early Child Development and Care,* 177, 615–631.

García-Moriyón, F., Rebollo, I., & Colom, R. (2005). Evaluating Philosophy for Children: A meta-analysis. *Thinking: The Journal of Philosophy for Children, 17*(4), 14–22. doi: 10.5840/thinking20051743

Gaut, B., & Gaut, M. (2015). *Filosoofilised arutelud väikeste lastega*. [Philosophy for young children. A practical guide.] Estonia: Studium.

Gay, L. R., Mills, G. E., & Airasian, P. (2006). *Educational Research. Competencies for Analysis and Applications.* New Jersey, NJ: Pearson.

Gillies, R. M., & Haynes, M. (2011). Increasing explanatory behaviour, problem-solving, and reasoning within classes using cooperative group work. *Instructional Science, 39*(3), 349–366, doi: 10.1007/s11251-010-9130-9

Gillies, R. M., & Khan, A. (2009). Promoting reasoned argumentation, problem-solving and learning during small-group work. *Cambridge Journal of Education, 39*(1), 7–27.

Goh, S. S., Yamauchi, L. A., & Ratliffe, K. T. (2012). Educators' perspectives on instructional conversations in preschool settings. *Early Childhood Education Journal,* 40, 305–314. doi: 10.1007/s10643-012-0518-9

Goossen, L. H. (2002). *Classroom Questioning Strategies as Indicators of Inquiry Based Science Instruction.* (Doctoral dissertation, Western Michigan University: Michigan). Retrieved from: http://scholarworks.wmich.edu/dissertations/1278

Göd, S. (1995). Philosophieren mit Kindern in der Grundschule. Unpublished master theses. Wien: Pädagogische Akademie des Bundes in Wien.

Gregory, M. (2011). Philosophy for Children and its Critics: A Mendham dialogue. *Journal of Philosophy of Education, 45*(2). doi: 10.1111/j.1467-9752.2011.00795.x

Gregory, M., & Granger, D. (2012). Introduction: John Dewey on philosophy and childhood. *Education and Culture*, *28*(2), 1-25. doi: 10.1353/eac.2012.0014

Haynes, J., & Murris, K. (2011). The provocation of an epistemological shift in teacher education through philosophy with children. *Journal of Philosophy of Education, 45*, 285–303.

Ho, D. G. E. (2005). Why do teachers ask the questions they ask? *Regional Language Centre Journal, 36*, 297–310, doi: 10.1177/0033688205060052

Häidkind. P., & Kikas, E. (2004). *Koolivalmiduse ning 1. klassi õpilase arengu jälgimise pilootuuringu II osa analüüs.* [*School readiness and the analysis of part 2 of a pilot study on observing a first grade student*]. Retrieved from http://www.curriculum.ut.ee/sites/default/files/sh/aruanne_koolivalmidus_ii_osa.pdf

Jacoby, J. W., & Lesaux, N. K. (2014). Support for extended discourse in teacher talk with linguistically diverse pre-schoolers. *Early Education and Development, 25*, 1162–1179. doi: 10.1080/10409289.2014.907695

Juuso, H. (2007). Child, philosophy and education. Discussing the intellectual sources of Phylosophy for Children. Faculty of education, Department of Educational Sciences and Teacher Education, University of Oulu, Finland. Retrieved from http://jultika.oulu.fi/files/isbn9789514285509.pdf

Kelemen, D., Widdowson, D., Posner, T., Brown, A. L., & Casler. K. (2003). Teleo-functional constraints on preschool children's reasoning about living things. *Developmental Science, 6*(3), 329–345.

Kikas, E., Hannust, T., & Kanter, H. (2002). The influence of experimental teaching on 5- and 7-year-old children's concepts of the Earth and gravity. *Journal of Baltic Science Education, 2*, 19–30.

Kikas, E. (2008). Tunnetusprotsesside areng. [Development of the cognitive processes.] In E. Kikas, ed. *Õppimine ja õpetamine koolieelses eas*, 19–37. [Learning and teaching in pre-school age.] Tartu, Estonia: Tartu University Press.

Kikas, E. 2010. Laste mõtlemine. Pilved, vihm ja vikerkaar laste seletustes. [Children's thinking. Clouds, rain, and a rainbow in children's explanations.] *Mäetagused,* 139–156.

Koolieelse lasteasutuse riiklik õppekava (2008). [Estonian National Curriculum.]

Kovach, V. (2006). *Bravery – Discussion Plans for Year 2*. http://www.p4c.org.nz/media/Bravery%20Discussion%20Plans.pdf

Lee, Y., & Kinzie, M. B. (2012). Teacher question and student response with regard to cognition and language use. *Instructional Science, 40,* 857–874, doi: 10.1007/s11251-011-9193-2

Lee, Y., Kinzie, M. B., & Whittaker, J. V. (2012). Impact of online support for teachers' open-ended questioning in pre-k science activities. *Teaching and Teacher Education* 28, 568–577. doi:10.1016/j.tate.2012.01.002

Legare, C. H., Gellman, S. A., & Wellman, H. M. (2010). Inconsistency with prior knowledge triggers children's causal explanatory reasoning. *Child Development, 81*(3), 929–944.

Lipman, M. (1973). *Philosophy for children.* Upper Montclair, New Jersey: Institute for the Advancement of Philosophy for Children, Montclair State College.

Lipman, 1975. *Grade school philosophy: How come and where to?* Upper Montclair, New Jersey: Institute for the Advancement of Philosophy for Children, Montclair State College.

Lipman, M. (1984) "The cultivation of reasoning through philosophy". *Educational leadership* 51–56.

Lipman, M. (1987). *Elfie (Philosophy for Children Series).* Upper Montclair, New Jersey: Institute for the Advancement of Philosophy for Children.

Lipman, M. (2003). *Thinking in Education (2).* New York, US: Cambridge University.

Lipman, M., Sharp, A. M., & Oscanyan, F. S. (1977). *Philosophy in the Classroom.* Philadelphia, PA: Temple University Press.

Lyle, S. (2017). *The construct of the child: the "C" in PwC.* In B. Andreson (Eds.), *Philosophy for children. Theories and praxis in teacher education.* New York: Routlege.

Masi, D. Di., & Santi, M. (2016). Learning democratic thinking: a curriculum to philosophy for children as citizens, *Journal of Curriculum Studies, 48*(1), 136-150. doi: 10.1080/00220272.2015.1088064

Matsak, E. (2010). *Discovering logical constructs from Estonian children language* (Doctoral dissertation). Available online at <http://digi.lib.ttu.ee/i/?465>. Accessed on 24.08.2016.

Murris, K. S. (2008). Philosophy with children, the stingray and the educative value of disequilibrium. *Journal of Philosophy of Education 42,* 667–685.

Murris, K. (2016). The Philosophy for Children curriculum: Resisting 'Teacher Proof' texts and the formation of the ideal philosopher child. *Studies in Philosophy and Education, 35,* 63–78, doi: 10.1007/s11217-015-9466-3

Matthews, G. B. (2006). *Filosoofilised vestlused lastega.* [Philosophical conversations with children.] Tallinn: Tallinna Raamatutrükikoda.

McColcan, K. L., & McCormack, T. (2008). Searching and planning: Young children's reasoning about past and future event sequences. *Child Development, 79*(5), 1477-1497.

Meindertsma, H. B., Dijk, M. W. G., Steenbeek, H. W., & Geert, L. C. (2014). Assessment of preschooler's scientific reasoning in adult–child interactions: What is the optimal context? *Research in Science Education, 44,* 215–237. doi: 10.1007/s11165-013-9380-z

Molnàr, G. (2011). Playful fostering of 6- to 8-year-old students' inductive reasoning. *Thinking Skills and Creativity, 6,* 91– 99. doi:10.1016/j.tsc.2011.05.002

Müller, U., Miller, M. R., Michalczyk, K., & Karapinka, A. (2007). False belief understanding: The influence of person, grammatical mood, counterfactual reasoning and working memory. *British Journal of Developmental Psychology, 25,* 615–632, doi:10.1348/026151007X182962

Männamaa, M. (2010). *Word Guessing Test as a measure of verbal ability. Use of the test in different context and groups* (Doctoral dissertation). Tartu, Estonia: Tartu University Press.

Nottingham, J. (2012). *P4C in critical thinking.* In Lewis, L., & Chandley, N. (Eds.), *Philosophy for children. Through the secondary curriculum.* London: Continuum International Publishing Group

Pagliaro, M. M. (2011). *Exemplary classroom questioning.* United Kingtom: Rowman & Littlefied education.

Pascal, C., & Bertram, T. (2009). Listening to young citizens: The struggle to make real a participatory paradigm in research with young children. *European Early*

Childhood Education Research Journal, 17(2), 249–262. doi: 10.1080/13502930902951486

Philosophy: A school of freedom. Teaching philosophy and learning to philosophize: Status and prospects. (2007). Paris: UNESCO Publishing.

Piaget, J., & Inhelder, B. (1975). *The origin of the idea of chance in children*. New York: W. W. Norton & Company, Inc.

Peterson, A., & Bentley, B. (2015). Exploring the connections between Philosophy for Children and character education: Some implications for moral education? *Journal of Philosophy in Schools, 2*(2), doi: http://dx.doi.org/10.21913/JPS.v2i2.1271

Pontecorvo, C., & Arcidiacono, F. (2010). Development of reasoning through arguing in young children. *Культурноисторическая психология* [*Cultural-historical Psychology*]*, 4, 19–29.*

Ribeiro, I., Cadime, I., Freitas, T., & Viana, F. L. (2016). Beyond word recognition, fluency, and vocabulary: The influence of reasoning on reading comprehension. *Australian Journal of Psychology, 68*(2), 107–115. doi: 10.1111/ajpy.12095

Roman, A. S., Pisoni, D. B., & Kronenbergerb, W. G. (2014). Assessment of working memory capacity in preschool children using the missing scan task. *Infant and Child Development, 23*, 575–587, doi: 10.1002/icd.1849

Shtulman, A., & Carey, S. (2007). Improbable or impossible? How children reason about the possibility of extraordinary events. *Child Development, 78*(3), 1015–1032.

Siraj-Blatchford, I., & Manni, L. (2008). Would you like to tidy up now? An analysis of adult questioning in the English Foundation Stage. *Early Years, 28*(1), 5–22, doi: 10.1080/09575140701842213

Smith, P. K. Cowie, H., & Blades, M. (2008). *Laste arengu mõistmine*. [Understanding children´s development.] Oxford: Blackwell Publishing Ltd.

Snow, C. E. (1991). The theoretical basis for relationships between language and literacy development. *Journal of Research in Childhood Education*, *6*(1), 5–10.

Sperber, D., & Mercier, H. (2010). Reasoning as a social competence*.* In J. Elster & H. Landemore, eds. *Collective Wisdom.* Pennsylvania: MIT Press.

Säre, E. (2010). Wie das Philosophieren in den Kindergarten kommt. In. A. A. Bucher, G. Büttner, P. Freudenberger-Lötz, & M. Schreiner (Eds.), *In der Mitte ist ein Kreuz. Kindertheologische Zugänge im Elementarbereich* (Jahrbuch für Kindertheologie, Band 9, pp. 255–259). Stuttgart: Calwer Verlag.

Säre, E., & Luik, P. (2011). A case study analysing the appearance of reasoning in primary students' class discussions using the philosophy for children programme. In: Preschool and Primary Education, 121−134. Frankfurt am Main: Peter Lang Europäischer Verlag der Wissenschaften.

Säre, E., Luik, P., & Fisher, R. (2016a). Supporting educational researchers and practitioners in their work in education: assessing the verbal reasoning skills of 5- to 6-year-old children. *European Early Childhood Education Research Journal, 25*(5), 638–651, doi:10.1080/1350293X.2016.1213564

Säre, E., Luik, P., & Tulviste, T. (2016b). Improving pre-schoolers´ reasoning skills using the Philosophy for Children programme. *Trames: Journal of the Humanities and Social Sciences, 20*(3), 273–295. Estonia: Estonian Academy Publishers, doi: 10.3176/tr.2016.3.03

Säre, E., Tulviste, T., & Luik, P. (2017). The function of questions in developing a preschooler's verbal reasoning skills during philosophical group discussions. *Early Child Development and Care, 0*(0), doi: 10.1080/03004430.2017.1331221

Taggart, G., Ridley, K., Rudd, P., & Benefield, P. (2005). *Thinking skills in the early years: a literature review.* The Mere, Upton Park.

Tighe, E. L., & Schatschneider, C. (2014). A dominance analysis approach to determining predictor importance in third, seventh, and tenth Grande reading comprehension skills. *Reading and Writing, 27*(1), 101–127. doi: 10.1007/s11145-013-9435-6

Tolmie, Z., Ghazali, Z., & Morris, S. (2016). Children's science learning: A core skills approach. *British Journal of Educational Psychology, 86*(3), 481–497, doi: 10.1111/bjep.12119

Toomela, A. (2003). *Development of symbol meaning and the emergence of the semiotically mediated mind*. In A. Toomela (Eds.), *Cultural Guidance in the Development of the Human Mind.* Westport, CT: Ablex Publishing.

Topping, K. J., & Trickey, S. (2007). Collaborative philosophical enquiry for school children: Cognitive Effects at 10–12 Years. *British Journal of Educational Psychology, 77*, 271–288.

Topping, K. J., & Trickey, S. (2014). The role of dialog in philosophy for children. *International Journal of Educational Research, 63*, 69–78. http://dx.doi.org/10.1016/j.ijer.2013.01.002

Toyama, N., & College. T. (2011). Japanese children's and adults' reasoning about the consequences of psychogenic bodily reactions. *Merrill-Palmer Quarterly, 57*(2) 129–157.

Trickey, S., & Topping, K. J. (2004). Philosophy for children: A systematic review. *Research Papers in Education, 19*, 365–380.

Välitalo, R., Juuso, H., & Sutinen, A. (2016). Philosophy for Children as an educational practice. *Stud Philos Educ, 35,* 79–92. doi: 10.1007/s11217-015-9471-6

Vukovic, R. K., & Lesaux, N. K. (2013). The relationship between linguistic skills and arithmetic knowledge. *Learning and Individual Differences, 23*, 87–91, doi: http://dx.doi.org/10.1016/j.lindif.2012.10.007

Vygotsky, L. S. (1978). Interaction between learning and development. From: Mind and society. Cambridge. Harvard University Press. Reprinted in: *Readings on the development of Children*. Gauvain, M. & Cole, M., eds. New York: W. H. Freeman and Company.

Vygotsky, L. S. (1934/2014). *Mõtlemine ja kõne. Psühholoogilised uurimused.* [Thinking and speech. Psychological studies.] (Original work published 1934) Tartu: Ilmamaa.

Vygotsky, L., & Luria, A. (1930/ 1994). Tool and symbol in child development. In R. Van der Veer & J. Valsiner (Ed.), *The Vygotsky reader*. Oxford & Cambridge: Blackwell.

Walsh, B., & Blewitt, P. (2006). The effect of questioning style during storybook reading on novel vocabulary acquisition of pre-schoolers. *Early Childhood Education Journal, 33*, 273–278. doi: 10.1007/s10643-005-0052-0

Walsh, J. A., & Sattes, B. D. (2005). *Quality questioning: research-based practice to engage every learner.* California: Corwin Press. A Sage Publication Company.

Walsh, J. A., & Sattes, B. D. (2011). *Thinking through quality questioning. Deeping student engagement.* United Kingdom: Corwin Press. A Sage Company.

Wechsler, D. (1989). *Manual for the Wechsler Preschool and Primary Scale of Intelligence-Revised*. New York: Psychological Corporation.

Wechsler, D. (2002). *WPPSI-III: Technical and interpretative manual*. USA: The Psychological Corporation.

White, J. (2012). Philosophy in primary schools? *Journal of Philosophy of Education* 46, 449–460.

Whittaker, J. V. (2014). Good Thinking! Fostering children's reasoning and problem solving. *Young Children*. Retrieved from: http://www.naeyc.org/yc/files/yc/file/201407/YC0714_Fostering_Children's_Reasoning_Whittaker.pdf

Wiesheu, R. (2008). *Praxisleitfaden. Kinder philosophieren für Kindertageseinrichtungen und Schulen*. München: Highendmedia.

Zeitler, K. (2010). Siehst du die Welt auch so wie ich? Philosophieren in der Kita. [Do you see the world the way I do? Philosophising in the day care.] Freiburg: Herder Verlag.

Zoller, E. (1987). *Philosophieren lernen und lehren in der Volkschule*. [Title in English: Teaching and learning to philosophise in elementary school] Schweiz: Käuzli.

Zoller, E. (2008). *Väikesed filosoofid*. [Small philosophers.] Tallinn: Ilo Kirjastus.

Zoller Morf, E. (2006). *Philosophische Reise*. [Philosophical journey.] Zürich: Orell Füssli Verlag.

Zoller Morf, E. (2010). *Selber denken macht schlau*. [Thinking makes you smart.] Kempten: Zytglogge Verlag.

Zucker, T. A., Justice, L. M., Piasta, S. B., & Kaderavek, J. N. (2010). Preschool teachers' literal and inferential questions and children's responses during whole-class shared reading. *Early Childhood Research Quarterly, 25*(1), 65–83.

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ORIGINAL PUBLICATIONS

SUMMARY IN ESTONIAN

Eelkooliealiste laste põhjendamisoskuste arendamine lastega filosofeerimise kaudu

Tänapäeva kiiresti muutuvas maailmas, kus kogu informatsioon on kergesti leitav, vajavad lapsed paremaid kognitiivseid oskusi. See omakorda eeldab, et lapsed vajavad head väljendusoskust, et põhjendada oma arvamust olemaks võimeline väljendama oma mõtteid selgelt ja arusaadavalt. Selleks, et tulla iseseisvalt toime õppematerjalidega, et osaleda täisväärtuslikult sotsiaalses elus, suhelda moraalselt ja saada hakkama isiklikus elus, vajavad lapsed täna ja tulevikus faktiteadmistest rohkem multidimensionaalseid mõtlemisoskusi, mis tähendab oskust mõelda kriitiliselt, hoolivalt ja loovalt. Kriitilise mõtlemise alaliik – verbaalne põhjendamine toetab eelkooliealistel lastel nende hilisemat arengut, õppimist ja akadeemilist edukust. Kuna verbaalne põhjendamine on seotud loetu mõistmisega, verbaalse kirjeldamis- ja selgitamisoskusega, sõnaosavuse, sõna tähenduse mõistmise oskusega, sõnavaraga ja ka matemaatilise mõistmisoskusega, siis on tarvis kõne arendamist ning mõtlemisoskuste ja keeleliste osaoskuste õpetamist teostada seotult.

Teoreetikud ja praktikud haridusmaastikul on viimastel aastakümnetel üha enam soovitanud suuremat rõhku pöörata selle, kuidas õpetamine toimub ja mitte üleliia tähtsustada seda, mida õpetatakse (Boyd, 2015; Cam, 2014; Haynes & Murris, 2011; Lipman, 1973). Sarnaselt emakeele, matemaatika, muusika, kunsti ja võõrkeeltega võiks lastele õpetada ka mõtlemist (Baroody, Purpura, Eiland, & Reid, 2015; Lipman, 1973). Vastavalt Koolieelse lasteasutuse riiklikule õppekavale (2008) on oluline arendada verbaalse mõtlemise oskusi nii, et 6–7aastane laps oleks võimeline selgitama ja põhjendama oma seisukohti ning kasutama arutlevat dialoogi. Kõigest hoolimata on uurijad arvamusel, et laste potentsiaal verbaalselt põhjendada on suurem kui nad on võimelised demonstreerima (Kikas, 2010; Matsak, 2010; Säre & Luik, 2011). Üheks paljulubavaks ja maailmas peamiselt kooliealiste lastega laialdaselt rakendust leidnud ning teaduslikult uuritud meetodiks verbaalse põhjendamisoskuse arendamisel on lastega filosofeerimine (Philosophy for Children – P4C). Paraku puuduvad piisavad teaduspõhised tõendid selle kohta, kuivõrd toetab lastega filosofeerimise meetod (P4C) eelkooliealiste laste verbaalse põhjendamisoskuse arengut. Seetõttu on oluline uurida laste põhjendamisoskuse toetamise võimalusi rakendades lastega filosoofilisi arutelusid vastavalt P4C programmile.

Käesolev doktoritöö keskendub eelkooliealiste laste verbaalse põhjendamisoskuse arendamisele lastega filosofeerimise kaudu filosoofilistes aruteludes (P4C). Selle uuringu raames toetati laste keele- ja mõtlemisoskuste arengut küsimuste esitamise tehnikate ja dialoogilise interaktsiooniga filosoofilistes grupi aruteludes vastavalt P4C programmile. Doktoritöö eesmärgiks oli selgitada välja 5–6aastaste eesti laste verbaalsete põhjenduste esinemine oma vastustes ja täiskasvanud moderaatori küsimused, millel on enam potentsiaali toetada

eelkooliealiste laste verbaalset põhjendamisoskust filosoofilistes grupi aruteludes P4C programmi järgi.

Eesmärgi täitmiseks püstitati järgmised uurimisküsimused:

1. Milline on YCVR-testi reliaablus ja valiidsus, mis mõõdab eelkooliealiste laste verbaalset põhjendamisoskust?

2. Kas filosoofilistes grupi aruteludes osalenud katsegrupi lapsed annavad oluliselt rohkem verbaalseid põhjendusi kui kontrollgrupi lapsed kui neil palutakse oma arvamust põhjendada?

3. Kas filosoofilistes grupi aruteludes osalenud katsegrupi lapsed on oluliselt jutukamad kui kontrollgrupi lapsed kui neil palutakse oma arvamust põhjendada?

4. Missugustel täiskasvanud moderaatori poolt esitatud küsimustel on rohkem potentsiaali toetada laste verbaalset põhjendamisoskust filosoofilistes grupi aruteludes?

Käesoleva doktoritöö empiiriline osa koosnes kolmest eraldiseisvast alauurimusest. Esimese alauurimuse raames koostati test (YCVR-test), mis mõõdaks 5–6aastaste laste verbaalset põhjendusoskust ning kontrolliti selle reliaablust ja valiidsust (artikkel I). Teise alauurimuse raames viidi läbi kvaasi-eksperiment, milles osales 125 eelkooliealist last. Kvaasi-eksperimendi käigus osalesid 58 katsegrupi last 29 nädala jooksul iganädalastes filosoofilistes grupi aruteludes, et aidata kaasa nende paremale verbaalse põhjendamisoskuse omandamisele (artikkel II). Kolmanda alauurimuse raames uuriti 58 filosoofilistes grupi aruteludes osalenud lapse verbaalseid põhjendusi ja täiskasvanud moderaatori esitatud küsimusi filosoofilistes grupi aruteludes, et selgitada välja täiskasvanud moderaatori küsimused, millel on enam potentsiaali suunata lapsi verbaalselt põhjendama (artikkel III).

Uurimuse tulemused kinnitasid YCVR-testi sobilikkust 5–6aastaste laste verbaalse põhjendamisoskuse mõõtmisel. Kvaasi-eksperimendi käigus filosoofilistes grupi aruteludes osalenud katsegrupi laste põhjendamisoskus arenes enam kui kontrollgrupi lastel. Katsegrupi laste verbaalsete põhjenduste puhul saab välja tuua, et nende vastustes oli rohkem seoseid sõnade vahel, nende selgitused olid rohkem mõtestatud ja nad kasutasid rohkem fraasi „sellepärast, et" võrreldes kontrollgrupi laste antud vastustega. Lisaks näitas uurimus, et filosoofilistes grupi aruteludes osalenud laste jutukus tõusis oluliselt võrreldes kontrollgrupiga, kui neil paluti oma arvamust põhjendada pärast 8-kuulist eksperimenti, kui katsegrupi lapsed osalesid filosoofilistes grupi aruteludes vastavalt P4C programmile. Neist tulemustest lähtuvalt näib oluline verbaalsete põhjendamisoskuste arendamisel rakendada üheaegselt kahte olulisemat lähenemist: (1) täiskasvanud moderaatori avatud ja kontekstist lähtuvad küsimused; (2) arutelu, mis põhineb laste endi vastustel.

Lisaks näitasid uurimuse tulemused, et täiskasvanu küsis filosoofiliste grupi arutelude käigus üldiselt kolme tüüpi küsimusi: avatud küsimusi, suletud küsimusi ja teemaväliseid küsimusi. Ühtlasi toovad tulemused välja asjaolu, et lapsed andsid kõige rohkem erineval tasemel verbaalseid põhjendusi vastates täiskasvanu küsimustele, mille funktsiooniks oli: tõlgendada, analüüsida või

vatsata lühidalt Jah/Ei – nendel küsimustel on ka kõige rohkem potentsiaali toetada laste verbaalset põhjendamisoskust. Kõige rohkem mõtestatud ja kõrgemal kognitiivsel tasemel põhjendusi andsid lapsed küsimustele, mis suunasid analüüsima. Veel tõid tulemused esile, et lisaks selgitama ja analüüsima suunavatele küsimustele andsid lapsed verbaalseid põhjendusi ka suletud küsimustele, mis oma funktsioonilt suunasid vastama lühidalt Jah/Ei. Seega tuleb lähtuvalt tulemustest esile tõsta, et filosoofiliste grupi arutelude raames omavad tähtsat rolli ka suletud küsimused, et arendada eelkooliealiste laste verbaalseid põhjendamisoskusi. Neid lühidalt Jah/Ei vastama suunavaid küsimusi filosoofilistes grupi aruteludes võib kirjeldada kui küsimusi, mis suunavad lapsi võrdlema, kahtlema, seoseid leidma või selgitama. Faktiteadmisi esitama suunavaid küsimusi selle uurimuse käigus ei ilmnenud, mis teatavasti ei toeta verbaalsete põhjendamisoskuste arengut. Kokkuvõtteks, kui varasemad uurimused kinnitavad, et tavaliselt on vaid 5–20% õpetajate küsimustest potentsiaal aktiveerida lapsi kõrgemal kognitiivsel tasemel (Birbili, 2013; Pagliaro, 2011; Walsh & Sattes, 2005), siis käesolev uurimus näitas sellist potentsiaali 48.57% küsimustest.

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Säre, E., Luik, P., & Fisher, R. (2016). Supporting educational researchers and practitioners in their work in education: assessing the verbal reasoning skills of 5- to 6-year-old children. *European Early Childhood Education Research Journal, 25*(5), 638–651, doi:10.1080/1350293X.2016.1213564

Säre, E., Luik, P., & Tulviste, T. (2016). Improving pre-schoolers´ reasoning skills using the Philosophy for Children programme. *Trames: Journal of the Humanities and Social Sciences, 20*(3), 273–295. Estonia: Estonian Academy Publishers, doi: 10.3176/tr.2016.3.03

Säre, E., & Luik, P. (2011). A Case Study Analysing the Appearance of Reasoning in Primary Students' Class Discussions Using the Philosophy for Children Programme. In: Preschool and Primary Education, 121−134. Frankfurt am Main: Peter Lang Europäischer Verlag der Wissenschaften.

Säre, E. (2010). Wie das Philosophieren in den Kindergarten kommt. In. A. A. Bucher, G. Büttner, P. Freudenberger-Lötz, & M. Schreiner (Eds.), *In der Mitte ist ein Kreuz. Kindertheologische Zugänge im Elementarbereich* (Jahrbuch für Kindertheologie, Band 9, pp. 255–259). Stuttgart: Calwer Verlag.

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Teadustegevus:

Laste verbaalse põhjendamisoskuse arengu toetamine filosoofiliste grupiarutelude kaudu toetudes lastega filosofeerimise meetodile (Philosophy for Children).

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Säre, E., Luik, P., & Fisher, R. (2016). Supporting educational researchers and practitioners in their work in education: assessing the verbal reasoning skills of 5- to 6-year-old children. *European Early Childhood Education Research Journal, 25*(5), 638–651, doi:10.1080/1350293X.2016.1213564

Säre, E., Luik, P., & Tulviste, T. (2016). Improving pre-schoolers´ reasoning skills using the Philosophy for Children programme. *Trames: Journal of the Humanities and Social Sciences, 20*(3), 273–295. Estonia: Estonian Academy Publishers, doi: 10.3176/tr.2016.3.03

Säre, E., & Luik, P. (2011). A Case Study Analysing the Appearance of Reasoning in Primary Students' Class Discussions Using the Philosophy for Children Programme. In: Preschool and Primary Education, 121−134. Frankfurt am Main: Peter Lang Europäischer Verlag der Wissenschaften.

Säre, E. (2010). Wie das Philosophieren in den Kindergarten kommt. In. A. A. Bucher, G. Büttner, P. Freudenberger-Lötz, & M. Schreiner (Eds.), *In der Mitte ist ein Kreuz. Kindertheologische Zugänge im Elementarbereich* (Jahrbuch für Kindertheologie, Band 9, pp. 255–259). Stuttgart: Calwer Verlag.

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