

TALLINNA ÜLIKOOL
SOTSIAALTEADUSTE DISSERTATSIOONID

TALLINN UNIVERSITY
DISSERTATIONS OF SOCIAL SCIENCES

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Pilvi Kula

**PECULIARITIES OF LEFT-HANDED CHILDREN'S
SUCCESS AT SCHOOL**

Abstract

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Abstract

Faculty of Educational Sciences, Tallinn University, Tallinn, Estonia.

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LIST OF PUBLICATIONS

- I. Pilvi Kula 2008. Teaching left-handed primary school pupils in Estonia. – *Journal of Teacher Education for Sustainability*, 9, 58–67.
- II. Pilvi Kula 2008. Peculiarities of left-handed children in school environment. Konverentsi *Social Educational Sciences in Baltic-Nordic Cultural Context* kogumik (artikkel on vastu võetud kogumikus avaldamiseks).
- III. Pilvi Kula 2007. Oskus õpetada vasakukäelist last. – *Haridus*, 11/12, 65–69.
- IV. Pilvi Kula 2006. Vasakukäeliste laste õpiraskused koolis. *Sotsiaal- ja kasvatusteaduste doktorantide III teaduskonverents 21.–22. aprillil 2005 TLÜs Artiklite kogumik*. Koost. A. Lepik, M. Veisson jt Tallinn. TLÜ Kirjastus, 263–276.
- V. Pilvi Kula 2004. Vasakukäeliste laste toimetulek koolis. – *Haridus*, 6/7, 44–45.
- VI. Pilvi Kula 2007. Kirja eelharjutusi vasakukäelisele lapsele. Tallinn: Avita.
- VII. Pilvi Kula 2007. Kirja eelharjutused. Valmistume kooliks. Töövihik. Tallinn: Koolibri.
- VIII. Pilvi Kula 2006. Valmistume kooliks. Aabits. Tallinn: Koolibri.
- IX. Pilvi Kula 2005. Valmistume kooliks. Töövihik 2. osa. Tallinn: Koolibri.
- X. Pilvi Kula 2005. Valmistume kooliks. Töövihik 1. osa. Tallinn: Koolibri.
- XI. Pilvi Kula 2001. Kirja eelharjutusi vasakukäelisele lapsele. Tallinn: Avita.

INTRODUCTION

Left-handed people form 10% of the whole population (Dubrovina 1999: 32; Hachmann 1993: 8; Kansanen 1993: 57; Leppik 1996: 60). There are different methods of measurement and theories explaining handedness that are used in classifying handedness. Left-handedness is not simply a phenomenon, but there are probably etiologically different left-handers: part of them are pathological left-handers, others are genetically left-handed.

Based on the observations of Estonian teachers the number of left-handed children has increased compared to the times 20-30 years ago (Kula 2004: 44). Certainly it is not a trend, but rather the freedom of individuals that gives them the possibility to act according to their personal preferences, individuality, and natural characteristics. Unpleasant experiences that left-handed children had at school are now in the past. In the sixties and even earlier, left-handers experienced unpleasantness during the school years when writing with the left hand was strictly forbidden (Laaksonen 1985: 9; Meyer 1998: 79; Sovak 1968: 285).

The actuality of the problem is due to the need to take into consideration the fact that compared to right-handed population left-handers need a different approach.

The author of the present dissertation holds the view that teachers do not sufficiently consider the peculiarities of left-handed pupils. They do not instruct left-handed children proceeding from their peculiarity, because they do not have enough knowledge on the nature of and problems arising from left-handedness (Kula 2007: 66).

The author of the present paper believes that left-handedness is not an obstacle that prevents people from successfully managing with everyday life and at school. Nevertheless, left-handed children might experience difficulties with studying in case they lack appropriate schooling and education. Many researchers of left-handedness hold the same view (Besrukih 2000; Paul 2002; Sattler 1995; Sousa 2006; Sovak 1968).

Left-handed children have most problems with learning to write. One of the main reasons is the fact that in case of left-handedness we are dealing with sensomotor differences, which provide such children with different possibilities in acting, sensing, and also thinking. Secondly, teaching children to write teachers use only the methodology that is designed for right-handed children, which brings about the situation where left-handed pupils need to manage by themselves (Kula 2007: 68). Thirdly, the handwriting of present day children, who use a computer for various tasks, has become sloppy and often very difficult to read; it is increasingly difficult to motivate them to write with legible handwriting (Hiiepuu 2005: 7).

The hand that is more skilful and motorically more developed becomes the hand that children start to use for writing. Acquiring writing skills is initiated at school under the instruction of teachers.

Teachers often associate children's poor coping at school with left-handedness and believe that left-handed children are weaker in writing and need help from speech therapists. Left-handedness has become something like a myth; often wrong information is given about it and biased attitude is prevailing. The more research is published on handedness, the more open will the attitude towards left-handedness become.

The **aim** of the present research is to determine the coping of left-handed children in the **1st and 2nd** stage of basic school. Whereas writing skill is an important skill for coping at school and in everyday life, the **research task** of the present work is the mastery of orthography and script techniques in left-handed children. Proceeding from the aspects of script techniques and orthography more frequent errors/difficulties are pointed out by age groups and class types, which are then compared with the orthography and script techniques of right-handed children.

An overview on teachers' skills and knowledge on teaching left-handed children at school is given. Leaning on theoretical sources the coping peculiarities of left-handed children are explained. The **main problem** is formulated as a question: how do left-handed children cope with learning to write, if teachers use the methodology of teaching right-handed children?

Resulting from the aim of the paper and the research tasks, teachers are provided with suggestions on improving their competence in teaching left-handed children to write.

In order to reach the aim the following **research tasks** have been established:

- determine the percentage of left-handed pupils in grades 1-9 in different types of schools and classes;
- determine the coping of left-handed children in grades 1-6 (which subject field presents most difficulties);
- carry out diagnostic dictations in order to determine the orthographic skills and script techniques in right- and left-handed children in grades 1-6;
- analyse and compare the orthographic skills and script techniques of right- and left-handed children by gender, grade and class type in grades 1-6;
- study teachers' knowledge and skills on teaching left-handed children;
- determine the cases in studying where left-handers need more instruction;
- leaning on empirical research and scientific literature make suggestions to teachers to improve their competence in teaching left-handed children at school.

The research is essential both from the theoretical and practical aspect, therefore it has two outputs: The theoretical output is to determine and to explain the factors resulting from the central nervous system and the environment that have an effect on learning to write in left-handed children.

The practical output is a handbook for teachers and parents that contains explanations on the peculiarities concerning left-handed children and on how to teach them to write. The handbook can be used as a study material in in-service training courses for teachers.

1. THEORETICAL BACKGROUND OF THE RESEARCH

The psychologist J. Kramer (1970) classifies individuals as left-handers when they achieve better results by using their left hand compared to using the right hand, and when they prefer left hand in activities that require good coordination, strength, and accuracy (Meyer 1998: 26).

The percentage of left-handers in the population is approximately 5-25%. The differences in results are due to the activities that are regarded in determining the handedness of people and the degree of expression from which an individual is considered left-handed (Meyer 1998: 25).

Generally handedness begins to develop during a child's second year; in some cases handedness is expressed earlier, in other – later (Sovak 1968: 288). If a child's handedness has not clearly expressed by fourth or fifth year, it should be determined by using test methods (Jänes 2000: 61).

Handedness develops as long as long as it takes for the functions of cerebral hemispheres to develop. There are more left-handed boys than there are girls (Gaddes 1985: 225; Harris & Carlson 1988: 33; Kula 2000: 35; Leppik 1994: 46; Paul 2002: 23), because girls have stronger genetic heredity for right-handedness than boys (Gaddes 1985: 225). Only a small number of individuals are ambidexters (they use both hands with equal facility). Left-handers are divided into three sub groups: strong, weak, and mixed left-handers. Left-handedness is due to genetics, mild brain damage, pathology occurred during uterine period, or environmental conditions.

The choice of the left hand does not indicate the usefulness of the hand, although it is often a good indicator of the weakness of the right hand. Hence, many left-handers are also strong right-handers (Paul 2002: 33). Left-handed children actively use their left hand; additionally, their left leg is the supporting leg, their left eye and ear dominate. This provides left-handed children with different possibilities in their activities, perception, and thinking (Köve 1997: 56–57). The individual peculiarities of left-handers are regarded more substantial than those of right-handers (Besrukih 2000: 5; Leppik 1998: 114).

Usually left-handed children cope well with school work and differ from peers owing to their good language studies. They are musical, talented in arts and have good results in sports (Kula 2006: 273). At the beginning, left-handers are slower in writing and reading compared to their right-handed peers. However, they have above average capabilities in natural science subjects and in music (Kopietz & Sommer 1999: 179). In one hand it is more difficult for left-handers to write, because their hand moves over the written words, but in the other hand many good properties are better developed in left-handers compared to right-handers. Left-handers acquire foreign languages better and faster, their visual memory is better developed, they are more creative and they often have a more competitive character. It is not possible to change the character of left-handers, because they think in different ways compared to right-handers. Retrained left-handers often suffer from inferiority complex and they tend to have behavioural disorders. Discouraging or suppressing left-handers' individuality causes retardation, which in turn leads to slow and difficult learning (Kopietz & Sommer 1999: 179; Meyer 1998: 77; Sovak 1968: 296).

If teachers provide left-handers with enough possibilities for using their creativity and initiative, they are able to acquire knowledge even faster than some right-handers due to their activity and the dominating sensomotor hemisphere (Köve 1997: 54–55). Presently it has not been verified that left-handers differ from right-handers with respect to their educational special needs or IQ. Left-handedness is not an obstacle for cognitive development and not all left-handers experience difficulties (Paul 2002: 4).

However, learning difficulties are more frequent in left-handers than right-handers; more than half of such left-handers are boys (Kansanen 1993: 58; Sousa 2006: 177).

Most frequently left-handed children are diagnosed with specific disorder of learning proficiency (F80). Such children experience difficulties basically in acquiring the notions expressing spatial perception as well as in responding to such notions (left and right side, up and down). This, in turn, renders learning to read and write more difficult, development of mathematical skills is disturbed and constant orientating in the environment is hindered (Köve 1997: 56–57; Leppik 1996: 60; Paul 2002: 40).

Undoubtedly, left-handers experience the greatest problems with learning to write. For many left-handed children it is difficult to write neatly and legibly. They have problems with orientation, they tend to write from right to left and writing is sometimes reversed (mirror writing): reversed letters, numbers, and symbols. Left-handed writers do not see what they are writing, because their hand is covering what is written and it leads to a result that lacks neatness and is often messy (Paul 2002: 60).

Altogether it can be said that due to their physiological peculiarities the functions of cerebral hemispheres may develop later in left-handed children. Therefore, handedness in such children develops later, there may be confusion bound to using the left hand and motion perception is bad. Acquiring notions expressing motion perception and responding to them in turn render it more difficult to learn to read and write and the development of mathematical skills is disturbed. This is one reason why left-handed children more frequently have learning difficulties compared to right-handed children.

2. RESEARCH METHODS AND SAMPLE

In empirical part two studies were conducted, where quantitative research method was used.

1st stage: study and sample.

As the method of the first study a semi-structured questionnaire was used that was filled in by 43 teachers, who altogether taught 996 pupils. Teachers teach children from 7 to 17 years of age in grades 1-9 in English language special interest classes, in regular classes, in music and dance classes, and in remedial classes. Seventeen of the teachers have qualifications of special education teacher and speech therapist and they teach in classes or schools for children with learning difficulties. The average age of the respondents was 43 and all of them were women. In order to code the given answers an overall frequency chart was formed to find out how many times do different values of a feature occur. In data processing I systematized the answers. In case of each answer, I listed the frequencies of all the domains and I wrote out the results describing each answer the most.

2nd stage: study and sample

The second study was aimed at investigating the orthographic skills and script techniques of left-handed children. As the methodology of the study the analysis of errors in diagnostic dictations were used.

In writing diagnostic dictations a lot of stress is on orthography, where important aspects include the analysis of sounds and phonemes, it is important to know the rules and punctuation. In script techniques attention was paid to the correctness of letters, proportion, connections and the general appearance of the work.

Analysing dictations was based on the methodological material by R. Ruus that included quantitative and qualitative analysis of dictations and the analysis of errors against orthographic rules (Ruus 1975: 57). Also the materials by M. Martinson were used to analyse spelling mistakes (Martinson 1995: 4). In order to assess handwriting a 5-point scale was used. Every aspect of handwriting (there were four aspects) gave 1-5 points.

All the data on pupils' orthographic skills and script techniques were processed with the programs Microsoft Excel and SPSS. Differences between research groups (different class types) were analysed by ANOVA test; differences between left-handers and right-handers and between boys and girls were analysed by T-test. I compared the data on pupils' orthographic skills and script techniques on the basis of averages separately for every age group and class type. I compared the results of left- and right-handed pupils by grades and by all class types. I also compared the results of left-handed boys and girls in orthographic skills and script techniques both by class types and by age groups.

349 pupils from grades 1-6 from different class types participated in the study. The number of girls was 181 (51.9%) and the number of boys 168 (48.1%); 318 (91.1%) of them were right-handers and 31 (8.9%) were left-handers. Whereas a great number of left-handers learn in remedial classes, also the pupils learning in such classes were included in the study. This helps to draw better conclusions on the most typical mistakes/difficulties that left-handed pupils with learning difficulties experience.

3. RESULTS AND DISCUSSION

Determining the percentage of left-handed pupils among basic school population showed that left-handed pupils constitute 9% of the pupils, who participated in the study. Thus, we can claim that one in ten pupils is left-handed. Research from Kansanen (1993: 57), Paul (2002: 23), and Leppik (1997: 26) support the findings. Hence, in a school of 300 pupils there is approximately one class of left-handers and in a school of 1000 pupils the number of left-handers is around one hundred.

Left-handed boys form 6% of the whole pupil population and girls form 3%, thus there are twice as many left-handed boys than there are girls. Also many earlier studies assert that the number of left-handed boys is bigger than that of left-handed girls (Clark 1957: 190; Clark 1959: 10; Kula 2000: 35; Kungla 2001: 29; Käärrik 2005: 34; Leppik 1994: 46; Leppik 1997: 26; Leppik 1998: 112; Paul 2002: 23). The research results allow us to claim that the percentage of left-handed pupils is rather big, so teachers should notice and pay attention to teaching them.

Studying the distribution of left-handed pupils in different class types in regular schools it became evident that in regular and special interest classes in general education schools the distribution of left-handers is even; average proportion of left-handers was 8.3% of left-handed pupils in class. In music special interest classes the proportion was 7.4%, in dance classes 7.2%, in regular classes 7.2% and in English language special interest class 9.6%. The highest number (21.2%) of left-handers was in remedial classes, 17.3% were boys and 3.9% were girls. The research results allow us to claim that left-handed pupils have more learning difficulties compared to right-handers of the same age. Paul and Gaddes, researchers of left-handers support this statement and point out that for some specific reasons the development of cerebral hemispheres in left-handed children may occur later, which would explain lower results in learning in primary school (Gaddes 1985: 246; Gaddes & Edgell 1994: 248; Paul 2002: 40). Therefore, in such children also handedness develops later, there may be confusions bound to using the left hand and motion perception is bad. Acquiring notions expressing motion perception and responding to them in turn render it more difficult to learn to read and write and the development of mathematical skills is disturbed.

It is clear that in regular classes that hold a big number of pupils, left-handed children may not get necessary attention. Consequently, left-handedness as individuality may in many cases not be supported, which may lead to an increased risk that such children are disregarded and their development as a whole may suffer.

Teachers' assessment on the coping of left-handed children in regular and special interest classes

Left-handed children in regular and special interest classes in general education schools are good at acquiring foreign languages, art and music, and they have good results in sports.

Teacher assessments showed that left-handed children in regular and special interest classes have difficulties mostly with script techniques (32%), craft, and mathematics. These difficulties are mainly related to acquiring notions expressing motion perception, and manual activities. It is essential to acquire correct techniques in writing right from the start, because this guarantees legible handwriting in later stages of school, when the speed of writing increases. Also developing fine motorics in craft lessons is important.

Teachers' assessment on the coping of left-handed children in remedial classes

Similarly to left-handed pupils in regular and special interest classes also left-handers in remedial classes have difficulties mostly with acquiring script techniques. In addition to bad handwriting they have problems with coordination, bad motoric skills, clumsiness and difficulties with fine motorics. The studies showed that pupils switch hands when writing, which indicates to belated development of the functions of cerebral hemispheres. Most frequent errors include bad hand-

writing, writing numbers backwards (15-51), mixing up letters (b-d, g-p). Also reading and spelling were problematic (38%). Mirror writing is characteristic to 24% of the left-handed pupils in grades 1 and 2, but mostly they grow out of it. Ahvenainen and Karppi (1993: 54) remind us that almost all children during their development mix up letters and numbers or even have complete mirror writing. Based on teacher assessments we can claim that irrespective of school or class type, left-handed children had most difficulties with acquiring script techniques. Difficulties in writing in left-handed children are due to their physiological peculiarities, because traditional writing (from left to right) does not consider the characteristics of hand movement in left-handed children. For left-handed children the process of writing is opposite to what is taught. Traditional writing proceeds from right-handedness, both with respect to direction and the convenience of moving one's hand when writing. For that reason, more time should be granted for left-handers to acquire writing skills and proficiency in primary school.

Teachers' knowledge and skills in teaching left-handed children

The research showed that 2% of teachers have enough knowledge to teach left-handed pupils, because they are left-handers themselves. However, almost half (47%) of the teachers believe that they need more knowledge on the issue.

Teachers mostly need knowledge and practical skills on instructing manual activities (knitting, crocheting and embroidery).

This leads us to the conclusion that teachers need practical training that would focus on instructing the activity of left-handed children in teaching different skills and on pedagogical-psychological literature of left-handedness.

Analysing the orthographic skills of pupils in grades 1-6 it became evident that boys made more mistakes than girls. An average number of mistakes was 5.08 per pupil. In grades 1-6 right-handed pupils made more mistakes (average 5.08 mistakes) than left-handed pupils (average 4.81 mistakes). On the basis of orthographic components the average number of mistakes of all the indicators for both left- and right-handers in all grades was compared by using T-test, which was also used for comparing assessments on handwriting. The latter showed no statistically significant differences, because in case of all indicators $p > 0.05$. This means that left- and right-handers on average made the same number of orthographic mistakes and on average they had similar assessments on handwriting. The statement that left-handers are worse writers than right-handers was not asserted in the study.

Comparing class types less mistakes were found in pupils studying in music and dance classes. Pupils in remedial classes made the highest number of mistakes in writing (average 10.7 mistakes).

Comparative analysis on the orthography of left- and right-handed pupils showed that the prevailing mistakes are the same for left- and right-handed pupils: omissions, mistakes related to plosive consonants and rules. The average numbers of mistakes showed no statistically significant differences ($p > 0.05$) for left- and right-handed pupils. This means that there are no differences between the types of mistakes made by left- and right-handed pupils. Analysing the results it became evident that left- and right-handed boys and girls have the same types of orthographic mistakes in the 1st and 2nd stage of study. **Comparative analysis on left- and right-handed boys and girls** showed that left-handed boys had worse results in grades 1, 2, and 4; in grades 3, 5, and 6 left-handed boys had better results in orthography than right-handed boys.

In all age groups boys made more mistakes than girls. Thus in every age group more attention should be paid to acquiring orthographic rules through practical exercises (dictations, tests on orthography), whereas more time should be left for reinforcing the studied rules by using exercises.

Comparative analysis on the handwriting of left- and right-handed pupils by grades showed that no age group had statistically significant differences between the average assessments on handwriting for left- and right-handed pupils ($p > 0.05$). This means that on average left- and right-handed pupils had similar assessments in every age group. This allows us to claim that compared to right-handers left-handers are not weaker in script techniques; the overall appearance and legibility of left-handers' handwriting is similar to that of right-handed pupils.

Comparing the handwriting of left- or right-handed boys and girls it became evident that generally the handwriting of left-handed boys was weaker than that of left-handed girls. One reason for that could be boys' weaker preparedness in fine motorics. Therefore, compared to girls of the same age, left-handed boys need more time for acquiring script techniques and developing fine motorics. More difficulties in script techniques were observed in left-handed girls in grades 1 and 3 and in left-handed boys in grades 1 and 2. These results are supported by the findings of the first study, where the data analysis showed that pupils in grades 1 and 2 experienced more difficulties compared to pupils in other grades. This leads us to the conclusion that at the beginning of learning to write more attention should be paid to teaching script techniques to left-handed children. It is essential to learn how to connect letters and pay attention to the correctness of letters, their proportion, because these aspects improve the overall appearance of the work.

Comparative analysis on the handwriting of left- and right-handed pupils by class types showed that pupils in music and dance classes had fewer orthographic mistakes compared to pupils in regular classes and remedial classes. This means that due to having better ear for music and rhythm the pupils in such classes have better preconditions for learning and developing orthographic skills. Hence, in order to improve the study results of left-handers in remedial classes it is necessary to increase the number of music lessons. There are proofs that the skill of reading music may contribute to developing mathematical and reading skills (Fisher 2004: 10). We can definitely claim that by class types the presence of differences was certain.

Comparing the handwriting of left- and right-handed boys showed that in all class types left-handed boys had higher assessments on handwriting than right-handed boys of the same age. Thus we can conclude that the overall appearance of writing of left-handed boys is good and they are as good at writing as right-handed boys.

Analysing the orthography and script techniques of left-handed boys and girls showed that studying all class types and age groups with T-test it becomes evident that there is a statistically significant difference between the averages of types of mistakes made by left-handed boys and girls both in the number of mistakes ($p = .015$) and omission ($p = .040$). This means that boys make more mistakes than girls. There are no significant differences between the average assessments of the components of handwriting in left-handed boys and girls ($p > 0.05$). This means that there are no gender-related differences with respect to handwriting and the level of handwriting is the same for left-handed boys and girls. Thus we can claim that the handwriting of left-handed boys is as legible as that of right-handed boys.

In order to improve the study results and orthographic skills of pupils and especially left-handed pupils in remedial classes, it would be necessary to increase the number of music and rhythm lessons at school. Thus the pupils in remedial classes need the same number of music lessons as pupils in music classes. Another important aspect is the increasing awareness of teachers on how to teach left-handed pupils.

Proceeding from the aim of the work and the research tasks I will make suggestions to improve the competence of teachers in teaching left-handed pupils at school.

- The importance of teachers' practical training that focuses on instructing left-handed pupils to write should be increased along with guiding manual skills in pre- and primary school.
- Students learning to become class teachers need to treat the issue within the subject didactics course. This would provide them with theoretical and practical guidelines on how to instruct left-handed children at school.
- There is a need for compiling a pedagogical-psychological handbook for teachers and parents that contains explanations on the peculiarities concerning left-handed children and on how to teach them to write. The handbook can be used as a study material in in-service training courses for teachers.
- In primary school there should be a close cooperation with parents and they should be informed about the advantages that left-handers may have when correctly educated.
- It is important that teachers notice early enough the situations that are problematic for left-handed children. Solving problems in an early phase provides children with a sense of security in everyday life, helps to avoid later difficulties with studying and provides children with support in educational path in later stages of school.
- Left-handed children need individual guidance and the correct methodology should also be introduced to parents.
- Left-handed children develop in a slightly different manner than right-handed children. It is important to notice the special characteristics of such children, their weak and strong sides and also think about the reasons that cause these differences.
- At school teachers need to understand that left-handed children need to write with their left hand, because otherwise disturbances may develop between two cerebral hemispheres – the non-dominating cerebral hemisphere becomes overloaded and the dominating cerebral hemisphere is under loaded.
- Left-handers need pedagogical encouragement and practical help to carry out their abilities and gifts.

The research is essential both from the theoretical and practical aspect, therefore it has two outputs: The theoretical output is to determine and to explain the factors resulting from the central nervous system and the environment that have an effect on learning to write in left-handed children. The practical output is a handbook for teachers and parents that contain explanations on the peculiarities concerning left-handed children and on how to teach them to write. The handbook can be used as a study material in in-service training courses for teachers.

SUMMARY

Peculiarities of Left-handed Children's Success at School

The aim of the Doctoral thesis was to acknowledge the problems of left-handed children and ways to help them in the world of right-handers.

The main objective of the current research was to find out how do left-handed children manage in primary and secondary school level.

The main problem was set as a question: how do left-handed children manage to acquire writing skills when the teacher proceeds from the methodology of teaching right-handers?

Neuropsychological approach has been chosen as the theoretical basis for acquiring writing skills, because handedness has been explained in terms of motor functioning regulated by the central

nervous system. Leaning on theoretical sources the peculiarities of managing to acquire writing skills were explained.

Thus, the object of the research of the current Doctoral thesis was left-handed children; the subject of the research was the success of left-handed children in acquiring script technique and orthographic skills.

To reach the objective the following tasks were performed:

- 1) The percentage of left-handed pupils among pupils in grades 1–9 in different school and class types was determined;
- 2) The successful of left-handed children in grades 1–6 was observed (which subject causes the most difficulties);
- 3) Diagnostic dictations were written to study orthographic and script technique skills among right- and left-handed pupils in grades 1–6;
- 4) Script technique and orthographic skills of left- and right-handed pupils were analysed considering gender, different classes and class types in grades 1–6;
- 5) Teachers' knowledge and skills on teaching left-handed children were studied;
- 6) The situations where left-handers need help were determined;
- 7) Based on empirical studies and scientific literature recommendations were given on how to improve the competence of the teachers.

In the empirical part two surveys were carried out where two quantitative research methods were used. The aim of the first research method was to find out how do children manage at school, what are the most difficult subjects and what kind of knowledge and skills do teachers have for teaching left-handed children. A semi-structured questionnaire for teachers was compiled; 43 teachers answered the questionnaire. Another survey was carried out to study script technique and orthographic skills of left-handed children. As a research method diagnostic dictations were used. The types of mistakes occurring in different age groups and class types was studied and a comparison was made with right-handers' writing skills.

According to the first survey, 9% of the 996 pupils participating in the survey were left-handed. There were twice as many left-handed boys (6%) than left-handed girls (3%).

The division of left-handed pupils in class types was different. Most left-handed pupils studied in remedial classes. Learning difficulties of left-handed children are explained by the undeveloped laterality which means that handedness develops later and there is a confusion of using the left hand and a bad perception of direction. Left-handers have difficulties in acquiring the notions of space perception and reacting to them which complicates learning to read and write and develop mathematical skills.

According to the analysis of the teachers' evaluations left-handed children experienced most difficulties in learning to write which did not depend on the school or class type. These difficulties are due to physiological differences of the left-handed children as traditional way of learning to write does not consider the natural performance of movements and the direction of writing of the left-handed children.

The study of teachers' knowledge and skills showed that approximately half (47%) of the teachers need additional knowledge and practical skills in teaching handicraft (knitting, crocheting, embroidering) and writing. The hypothesis that teachers lack necessary knowledge and skills on teaching left-handed children was confirmed.

The comparative analysis of orthographic skills in different classes showed that on average left- and right-handed pupils in grades 1-6 made the same amount of orthographic/spelling mistakes and the types of mistakes were the same. Thus, left-handers can acquire orthographic skills as well as right-handers of the same age. This results in confirmation of the hypothesis that ortho-

graphic skills of the left-handers are not different compared to right-handers. As boys experience more difficulties in orthography than girls the hypothesis was confirmed that orthographic skills of left-handed boys are worse compared to left-handed girls.

The comparison of orthographic skills according to the class types showed that differences exist. Left-handed children of special music and dance classes made fewer mistakes in writing than pupils of traditional and remedial classes. This means that having a talent in music and a good sense of rhythm helps acquiring writing skills.

The comparison of script technique in different classes showed that left- and right-handers in grades 1-6 had on average the same evaluation in every age group. Left-handed boys in grades 1 and 2 and left-handed girls in grades 1 and 3 experienced more difficulties in script technique. Also the first survey showed that left-handed pupils in grades 1 and 2 experienced difficulties the most. Consequently, at the initial stage of learning to write more attention should be paid to teaching the skills of script technique. It is important to exercise connecting letters and to concentrate on correct spelling and proportion of letters that helps to improve the whole impression of the work. If needed the child should have individual guidance.

The hypothesis that script technique skills of left-handed pupils were weaker compared to right handed pupils was not confirmed comparing all left- and right-handed pupils in grades 1-6.

The survey proved that the writing skills of left-handed children do not differ much from the writing skills of right-handers. However, differences occur in different classes, class types and in gender. The pupils of all the classes had their stronger and weaker sides.

The current research showed that left-handedness is not an obstacle of success at school if the child's strong and weak sides have been noticed early and directed purposely. A left-handed child needs more time to acquire the skills of learning to write in primary classes.

The novelty of the thesis is the research of the theoretical aspects of left-handedness and its application at empirical level.

Based on the conclusion concrete recommendations have been given to improve teachers' competence on teaching left-handed children.

Both theoretical and empirical parts of the thesis could be used by lecturers, educators, students, teachers, special education teachers, speech therapists, doctors, parents and everyone else who is interested in left-handedness and writing skills.

The research had both theoretical and practical value:

The theoretical outcome: to present and explain the factors connected with central nervous system and the environment that influences a left-handed child's ability to learn to write.

The practical outcome: to compile a handbook about the peculiarities of left-handed children and teaching writing which is planned to be used as a study material in teacher training courses.

ÕPILASTE VASAKUKÄELISUSEST TULENEVAD TOIMETULEKU ISEÄRASUSED KOOLIS

Kokkuvõte

Käesolevas uurimustöös keskenduti vasakukäeliste laste toimetuleku uurimisele koolis. Kuidas tulevad vasakukäelised õpilased toime kirjutama õppimisega? See on põhiküsimus, millele otsitakse väitekirjas vastust. Kirjutama õppimise teoreetiliseks aluseks oli valitud neuropsühholoogiline lähenemine, sest käelisust on põhjendatud kesknärvisüsteemi poolt reguleeriva motoorika toimimisest lähtuvalt. Teoreetilistele allikatele toetudes antakse selgitus vasakukäeliste laste toimetuleku iseärasustele kirjutama õppimisel.

Käelisus on komplekselt seotud funktsioonide jaotusega vasaku ja parema ajupoolkera vahel, millest tulenevalt on vasakukäelistel ja paremakäelistel erinevad võimalused ümbrust tajuda ja saadud informatsiooni tõlgendada. Elades paremakäeliste maailmas, kus kõik on kohandatud lähtuvalt parema käe kasutamisest, tähendab vasakukäelisele lapsele, et ta peab toimima oma loomupärastele liigutustele vastupidiselt.

Empiirilises osas viidi läbi kaks uuringut, kus kasutati kvantitatiivset uurimismeetodit. Esimese uuringu eesmärgiks oli selgitada välja vasakukäeliste laste toimetulek koolis, enam raskusi valmistavad valdkonnad ning õpetajate teadmised ja oskused vasakukäeliste laste õpetamisel. Uurimistöö metoodikana kasutati poolstruktureeritud küsimustikku õpetajatele, millele vastas 43 õpetajat. Teine uuring oli suunatud vasakukäeliste laste kirjutehnika valdamise ja õigekirjaoskuse uurimisele. Uurimistöö metoodikana kasutati diagnoosetteütusi, kus vaatluse all oli kirjutehnika ja õigekirjaoskus. Uuriti, missugused vead esinevad erinevates vanuseastmetes ja klassitüüpides ning võrreldi saadud tulemusi paremakäeliste õigekirjaoskuse ja kirjutehnika valdamisega.

Esimese uuringu põhjal selgus, et uurimuses osalenud 996 õpilasest oli 9% vasakukäelisi. Vasakukäelisi poisse (6%) oli kaks korda rohkem kui vasakukäelisi tüdrukuid (3%).

Vasakukäeliste õpilaste jaotuvus klassitüüpidesse oli erinev. Kõige rohkem õppis vasakukäelisi õpilasi tasandusklassides. Sellest saab järeldada, et on igati vajalik, et tavakoolides tegutsevad paralleelselt tavaklassidega ka tasandusklassid. Kergemate, ajutiste õpiraskuste korral ei pea õpilane vahetama kooli, vaid saab vajadusel vajalikku õpiabi oma kooli tasandusklassis õppides. Saadud uuringust järeldub, et vasakukäelistel lastel esineb algõpetuses mõnevõrra rohkem õpiraskusi kui samaealistel paremakäelistel. Vasakukäeliste laste õpiraskusi põhjendatakse väljakujunemata lateraalsusega. See tähendab, et laste käelisus kujuneb välja hiljem ja esineb vasaku käe kasutamise segadus ning halb suunataju. Vasakukäelistel ilmnevad raskused ruumitaju väljendavate mõistete omandamisel ja neile reageerimisel, mis omakorda raskendab lugema ja kirjutama õppimist ning matemaatiliste oskuste kujunemist.

Õpetajate hinnangute analüüsist selgus, et olenemata koolist või klassitüübist esines vasakukäelistel lastel kõige rohkem raskusi kirjutama õppimisel. Kirjutamisraskused tulenevad vasakukäeliste laste füsioloogilisest eripärast, sest traditsiooniline kirjutamine ei arvesta vasakukäeliste laste liigutuste sooritamise loomupärast ja kirjutamise suunda. Vasakukäelised on motoorselt kohmakad ja erinevad raskused on eelkõige seotud käeliste tegevustega, mis nõuavad täpsust ja osavust ning vajavad individuaalset juhendamist.

Õpetajate teadmiste ja oskuste uuringust selgus, et ligi pooled (47%) pedagoogidest vajavad enda hinnangul lisateadmisi. Kõige enam vajatakse teadmisi ja praktilisi oskusi käeliste tegevuste (kudumine, heegeldamine ja tikkimine) ja kirjutama õpetamise kohta. Teise etapi põhieesmärgiks oli välja selgitada, kas vasakukäelised on kehvemad kirjutajad kui paremakäelised õpilased.

Õigekirja võrdlev analüüs klassiti näitas, et 1.–6. klassi vasaku- ja paremakäelised õpilased tegid keskmiselt ühepalju õigekirjavigu ja ülekaalus olid samad vealiigid (ärajätmised, klusili- ja reegli-vead). Vealiigid olid vanuseastmeti erinevad. Vasakukäelised tulevad õigekirja omandamisega sama edukalt toime kui paremakäelised eakaaslased. Saadud tulemus kinnitab, et vasakukäeliste õigekirjaoskus ei erine paremakäeliste kirjutamisoskusest. Et poistel esineb õigekirjas rohkem vigu kui tüdrukutel, siis leidis kinnitust hüpoteesi, et vasakukäeliste poiste õigekirjaoskused on halvemad kui vasakukäelistel tüdrukutel.

Õigekirja võrdlus klassitüübiti näitas, et erinevused on olemas. Muusika- ja tantsuklasside vasakukäelised õpilased tegid kirjutamisel vähem vigu kui tava- ja tasandusklasside õpilased. See tähendab, nende klasside õpilastel on parema muusikalise kuulmise ja rütmitunnetuse tõttu eeldused õigekirjaoskuse õppimisel ja kujunemisel.

Kirjatehnika võrdlus klassiti näitas, et 1.–6. klassis said vasaku- ja paremakäelised keskmiselt samad hinnangud igas vanuseastmes. Enam raskusi kirjatehnikas esines 1. ja 2. klassi vasakukäelistel poistel ning 1. ja 3. klassi vasakukäelistel tüdrukutel. Ka esimene uuring näitas, et rohkem raskusi oli 1. ja 2. klassi vasakukäelistel õpilastel. Sellest järeldub, et kirja õppimise algusperioodil tuleb neile suuremat tähelepanu pöörata kirjatehnika õpetamisel. Oluline on harjutada tähtede seoseid ja pöörata tähelepanu tähtede õigsusele, proportsioonile, mis aitab parandada kogu töö üldilmet. Vajadusel tuleb last individuaalselt juhendada.

Läbiviidud uurimus tõestas, et vasakukäeliste laste õigekirjaoskus ja kirjatehnika valdamine ei erine oluliselt paremakäeliste õigekirjaoskusest ja kirjatehnika valdamisest, kuigi erinevusi ilmneb klassiti, klassitüübiti ja sooti. Teistest paremaid tulemusi näitasid muusika- ja tantsuklasside vasaku- ja paremakäelised õpilased nii õigekirjas kui ka kirjatehnikas. See tähendab, nende klasside õpilastel on parema muusikalise kuulmise ja rütmitunnetuse tõttu eeldused õigekirjaoskuse õppimisel ja kujunemisel. Muusikalis-rütmiline tegevus aitab kaasa liigutuste täpsuse kujunemisele, mis mõjutab positiivselt kogu õpitegevust.

Et parandada tasandusklasside õpilaste ja seal õppivate vasakukäeliste õpitulemusi ja õigekirjaoskust oleks vaja suurendada rütmioõpetuse ja muusikatundide arvu. Oluline on ka pedagoogide teadlikkuse kasv vasakukäeliste laste õpetamisel.

Käesolev uurimus näitas, et vasakukäelisus ei ole takistuseks edukaks toimetulekuks koolis, kui lapse tugevaid ja nõrku külgi on varakult märgatud ja nende arendamist teadlikult suunatud. Vasakukäelisele lapsele tuleb anda rohkem aega kirjutamisoskuse ja –vilumuse omandamiseks algklassides.

Dissertatsiooni teaduslik uudsus seisneb vasakukäelisust puudutavate teoreetiliste käsitluste laialdasemas läbiuurimises ja empiirilisel tasandil uurimuse teostamises. Dissertatsiooni lõppjärelduste põhjal on tehtud konkreetseid ettepanekuid õpetajate kompetentsuse parandamiseks vasakukäeliste laste õpetamisel.

Nii väitekirja teoreetilist kui ka empiirilist osa saavad kasutada õppejõud, koolitajad, üliõpilased, õpetajad, eripedagoogid, logopeedid, arstid, lapsevanemad ja kõik, kes huvituvad vasakukäelisusest ja nende laste kirjutama õpetamisest.

Lisaks konkreetsetele uurimistulemustele kerkis esile mitmeid küsimusi, millele käesolev töö vastuseid ei anna. Väitekirja teoreetiliste lähtekohtade ja saadud tulemuste alusel on edaspidistes vasakukäelisuse uurimustes oluline keskenduda tasandusklasside/koolide, vasakukäeliste õpilaste ja andekate vasakukäeliste uurimisele. Antud teema puhul võiks jätkata vastuste otsimist järgmistele küsimustele: Kui palju on eliitkoolide/ I kooliastmesse valikuga vastuvõetavate laste hulgas vasakukäelisi õpilasi? Millistes oskustes on nad andekad/silmapaistvad? Kui suure osa moodustavad muusikakoolide õpilastest vasakukäelised? Missuguseid muusikainstrumente nad valdavad paremini/halvemini? Kuidas on nende muusikaõpingud kulgenud?

Teoreetiliseks väljundiks oli selgitada ja esitada neid kesknärvisüsteemist ja keskkonnast tule-
nevaid tegureid, mis mõjutavad vasakukäelise lapse kirjutama õppimist. Praktiliseks väljundiks on
õpetajatele ja lastevanematele mõeldud käsiraamatu koostamine vasakukäeliste laste iseärasuste ja
kirjutama õpetamise kohta, mida oleks võimalik kasutada õppematerjalina õpetajate täiendkoolituses.

REFERENCES

- AHVENAINEN, O. & KARPPI, S. 1993. *Lasten lukemis- ja kirjoittamisvaikeudet*. Jyväskylä: Kirjapaino Oma Ky.
- БЕЗРУКИХ, М. М. 2000. *Проблемные дети*. Москва: издательство УРАО.
- CLARK, M. 1957. Left-handedness. Laterality Characteristics and their Educational Implacations. *Publications of the Schottish Council for Research in Education XXXIX*. University of London Press LTD.
- CLARK, M. 1959. Teaching Left-handed Children. *Publications of the Schottish Council for Research in Education XLIV*. University of London Press LTD
- ДУБРОВИНА, И. В. 1999. *Психокоррекционная и развивающая работа с детьми*. Москва: АСАДЕМА.
- FISCHER, R. 2004. *Õpetame lapsi õppima*. Tartu: Atlex.
- GADDES, W. H. 1985. *Learning Disabilities and Brain Function: A Neuropsychological Approach*. New York, Berlin, Heidelberg, Tokio: Springer-Verlag.
- GADDES, W. H. & EDGELL, D. 1994. *Learning Disabilities and Brain Function: A Neuropsychological Approach*. New York: Springer-Verlag.
- HARRIS, J. & CARLSON, D. 1988. *Pathological Left-handedness: An Analysis of Theories and Evidence*, in *Brain Lateralization in Children, Developmental implications*. Edited by Molfese & Segalowitz 289–357. New York: The Guilford Press.
- HACHMANN, N. 1993. Vasenkätisyys ei ole vamma. –Koti, 9, 7-8.
- НИИПУУ, Е. 2005. *Kirjatehnika õpetamine kirjutamise algastmel*. [Magistritöö]. Haapsalu: TLÜ Haapsalu Kolledž.
- JÄNES, H. 2002. Vasakukäeline paremakäeliste maailmas. – *Kodutohter*, 2, 60–61.
- KANSANEN, T. 1993. Vasemalla kädellä. 1993. – *Hyvä terveys*, 5, 57–58.
- KOPIETZ, G. & SOMMER, J. 1999. *Kas hädas lastega?* Tallinn: Kunst.
- KULA, P. 2000. *Vasakukäeliste algklassiõpilaste toimetulek koolis ja igapäevaelus*. [Magistritöö]. Tallinn: Tallinna Pedagoogikaülikooli eripedagoogika õppetool.
- KULA, P. 2004. Vasakukäeliste laste toimetulek koolis. – *Haridus*, 6/7, 44–45.
- KULA, P. 2006. Vasakukäeliste laste õpiraskused koolis. *Sotsiaal- ja kasvatuseduste doktorantide III teaduskonverents* 21.–22. aprillil 2005 TLÜs Artiklite kogumik. Koost A. Lepik, M. Veisson jt Tallinn: TLÜ Kirjastus, 263–276.
- KULA, P. 2007. Oskus õpetada vasakukäelist last. Õpetajate teadmised ja oskused vasakukäeliste laste õpetamisel Eestis. – *Haridus*, 11/12, 65–69.
- KUNGLA, A. 2001. *Vasakukäelise lapse arengu suunamine*. [Diplomitöö]. Tallinn: Tallinna Pedagoogikaülikooli algõpetuse õppetool.

- KÕVE, I.-M. 1997. Vasakukäelised meie seas. *Põhikooli 1. astme õppekava* 1. osa. Tallinn: EV Haridusministeerium.
- KÄÄRIK, T. 2005. *Vasakukäeliste laste juhendamine kodus ja koolis*. [Diplomitöö]. Tallinn: Tallinna Ülikooli algõpetuse õppetool.
- LAAKSONEN, M. L. 1985. *Vasenkätiset*. Hämeenlinna: Kustannus-Mäkelä Oy.
- LEPPIK, P. 1994. Vasakukäeline õpilane. – *Haridus*, 4, 46–48.
- LEPPIK, P. 1996. Vasakukäeline õpilane. Õpilaste arendamise probleeme. *Eesti pedagoogika ja kool XLVIII*. Koost I. Unt. Tallinn: EEK trükikoda.
- LEPPIK, P. 1997. Vasakukäeline õpilane arvude keeles. – *Haridus*, 1, 26–29.
- LEPPIK, P. 1998. *Uurimistöõ koolis on huvitav*. Tallinn: EKK trükikoda.
- MARTINSON, M. 1995. *Abimaterjal õpetajale tööks kirjutamis- ja lugemiskustega lastega*. Haridustöötajate Koolituskeskus. Tallinn: Transpordi Infokeskuse trükikoda.
- MEYER, R. W. 1998. *Vasakukäelisus? Nõuanderaamat*. Kuressaare: OÜ G.
- PAUL, D. G. 2002. *The Lefthander`s handbook*. England: The Robinswood Press.
- RUUS, R. 1975. *Kõne uurimise materjalid*. Metoodiline kiri. Eesti NSV Haridusministeerium. Tallinn: VÕT-i rotaprint.
- SATTLER, J. B. 1995. *Das Linkshändige Kind in der Grundschule*. München: Staatsinstitut für Schulpädagogik und Bildungsforschung.
- SOUSA, D. A. 2006. *How the Brain Learns*. California: A Sage Publications Company Thousand Oaks.
- SOVAK, M. 1968. *Pädagogische Probleme der lateralität*. Berlin: Veb Verlag Volk und Gesundheit.