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Prediction of Children's Spelling Performance by Metacognition, Motivation for Spelling,
and Home Literacy Experiences

Bertine Gerritsma

Utrecht University

Faculty of Social Sciences

Course: Master Thesis

Supervisor: Moniek Schaars

Second supervisor: Arjan van Tilborg

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Words: 7954

b.gerritsma@students.uu.nl

6312934

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Abstract

The Dutch Inspectorate of Education reported that 4500 children had not achieved the fundamental level of spelling in 2017. These notifications are worrying, as students and adults who have difficulties in spelling are at a disadvantage in this era.

This study examined to what extent metacognition, motivation and home literacy experiences (HLE) predict spelling performance in third-grade children. In total, 37 Dutch third-grade children participated in this study, of which their spelling performance is measured by analysing the results of six different method tests for spelling. The children completed a questionnaire about metacognition and motivation for spelling and the parents completed a questionnaire about HLE. A multiple regression analysis was performed to answer the research question.

Results seem to disprove the prediction of children's spelling performance by metacognition, motivation for spelling and, home literacy experiences. Concluding, to improve the spelling education in the Netherlands, new research on the predictive value of metacognition, motivation for spelling and, home literacy experiences is needed with a sample of minimal 50 children, with more measurement moments on motivation for spelling and, a standardized, reliable spelling test to measure spelling performance among third-grade children.

Keywords: spelling performance, metacognition, motivation, home literacy experiences, elementary school

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The Dutch Inspectorate of Education published a report about the performances of sixth grade students over 2015, 2016 and 2017, including spelling (Dutch Inspectorate of Education, 2018). The report showed that 96 percent of the sixth grade children achieved the reference level of spelling in 2017. However, this also means that still more than 4500 students finished primary school without a fundamental level of spelling. Also, the ambition of the Inspectorate to have 65 percent of the children who score above the fundamental level by the end of primary school has failed in 2017. Only 56,8 percent of the children achieved this ambition (Dutch Inspectorate of Education, 2018).

These facts show that there are opportunities to improve the spelling performance of elementary school children. A sufficient level of spelling is extremely important, because students and adults who have difficulties in writing and spelling are at a disadvantage in today's society (Harris, Graham, Brindle & Sandmel, 2009). Spelling mistakes can lead to misconceptions in communication. Some words look very similar, but have a different meaning, for example tough, though and through (Kessler, 2003). It is important to gain insight in the factors that contribute to children's spelling performance in order to ensure that the spelling skills of children return to a sufficient level. If these influencing factors are known, educational developers, teachers and parents will have more knowledge about the factors on which they can focus to improve students' spelling skills.

The Dutch Inspectorate of Education has already identified some background characteristics that influence spelling performance, such as gender, parents' level of education and the pace at which students going through their school time (Dutch Inspectorate of Education, 2018). In the international literature, only a few studies have investigated the

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predictors of spelling development in depth and this was mostly done in combination with reading (Caravolas, Hulme, & Snowling, 2001). For this reason, this study focused on spelling only and not in combination with other skills, such as reading.

Following from literature there are some characteristics that may correlate with spelling performance as well. First, Vanderswalmen, Vrijders, and Desoete, (2010) showed that metacognition in general is positively correlated with spelling performance of students. Second, achievement motivation is a moderator of academic performances, including spelling (Wilson & Trainin, 2007). Third, research by Niklas and Schneider (2013) concluded that home literacy experiences (HLE) influence the early competencies of children in spelling. Most research about HLE studied early literacy competencies (Davidse, de Jong, Bus, Huijbregts, & Swaab, 2011), but it would be interesting to examine whether HLE also predict the literacy competencies of older elementary school children. In addition, studies about HLE are mostly carried out in English-speaking countries (Niklas & Schneider, 2013). It is questionable if the results about HLE are also applicable to Dutch speaking countries, because the English language has a different correspondence of graphemes and phonemes compared to the Dutch language (Caravolas et al, 2001; Huizenga, 2015). The three named factors were mostly studied separate from each other, however this study aims to combine all three factors together in one regression model.

In conclusion, the Dutch Inspectorate of Education already knows that gender, parents' education and the pace at which students going through their school time influence the spelling outcomes. This research explains to which extent other factors such as metacognition, motivation and HLE predict spelling performance in Dutch-speaking countries.

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Spelling

There is one thing that all spelling systems have in common, namely they are all based on the alphabetic principle (Caravolas, 2004). This principle intends that graphemes (symbols) represent phonemes (sounds) in spoken language (Huizenga, 2015). Despite, this common characteristic, each spelling system has specific characteristics per language (Caravolas, 2004). Therefore it is important to gain insight in the Dutch spelling system, because this study focuses on the Dutch language.

The Dutch language has an alphabetical spelling system with 26 phonemes (Huizenga, 2015). Spelling means turning spoken language into graphic symbols (Aarnoutse, Van Leeuwe, Voeten, & Oud, 2001). The spelling process involves connecting the correct links of phonemes (sounds) into graphemes (symbols) (Steffler, Varnhagen, & Friesen, 1998). It costs more effort for children to learn to spell than to read, particularly when the correspondence of graphemes and phonemes does not quite match, like the English or French language (Caravolas et al., 2001). Dutch has, compared to the English and French language a reasonable systematic spelling (Huizenga, 2015). Dutch is a Germanic language with a limited morphology and a reasonable transparent orthography (Gillis & Ravid, 2006).

The Dutch spelling system is based on four principles. The first principle is called the phonological principle, which means that every phoneme is represented by a separate graph. Second, the morphological principle, which means that words are built up on the basis of conformity and similarity. The third principle is called the syllabic principle and this means that sometimes a letter needs to be removed or add. And last, the etymological principle which means that the origin of a word is decisive for the spelling. (Huizenga, 2015).

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Metacognition

Metacognition in general can be defined as the ability to control your learning and thinking and how to handle difficulties with information processing and problem solving (Vanderswalmen et al., 2010). Research from Hacker, Keener, and Kircher (2009) showed that metacognitive monitoring and control are essential components of proficient writing and spelling. The act of writing is described as: "Writing is the production of thought for oneself or others under the direction of one's goal-directed metacognitive monitoring and control." (Hacker et al., 2009). The process of writing and spelling involves reading, re-reading, reviewing and reflecting and these are all metacognitive strategies (Hacker et al., 2009).

Vanderswalmen et al. (2010) found out that spelling performance is significantly related to metacognitive measures, such as metacognitive knowledge, skills and experiences among bachelor students. The students in the experiment of Vanderswalmen et al. (2010) filled out two metacognition questionnaires and completed two spelling tests. Findings show that good spellers, who make less spelling errors, also appear to perceive themselves as competent spellers. Kruger and Dunning (1999) and Kruger (2002) showed that spelling and metacognition are related to each other. People who were unskilled in spelling, also had an incompetence in metacognition to realise a sufficient spelling. Training these unskilled people in spelling helped to improve their spelling skills, but also improved their metacognitive competences (Kruger, 2002; Kruger & Dunning, 1999).

Motivation

Motivation means that you are committed to do something (Ryan & Deci, 2000). Research shows the important link between motivational goals on the achievement in elementary school children (Miller & Meece, 1997). Watkins and Coffey (2004) remark the

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influence of motivation for reading According to Watkins and Coffey (2004) even the most talented students may not engage in reading if they lack motivation. It is the question whether this also accounts for motivation for spelling. However, research of Wilson and Trainin (2007) shows that motivation is also specifically related to the spelling performance of elementary school children. In their research 198 first-graders responded to questions that measured components of motivation for three literacy activities: reading, writing and spelling. Their level of motivation was higher for writing than for spelling. Wilson and Trainin (2007) emphasized the importance that literacy teachers and primary school teachers understand how social influences from teachers and peers influence the literacy development of children over time, for example compliments from the teacher can increase motivation for spelling.

In addition, Green et al. (2012) examined the effect of motivation on academic performance. Academic performance was measured by a spelling and arithmetic test. Findings indicate that motivated and engaged students show better academic performance. Motivation positively influenced performance, because students showed better class participation and completed their homework (Green et al. , 2012). In short, these two studies of Green et al (2012) and Wilson and Trainin (2007) confirmed the relationship between motivation and spelling achievement in elementary school children and students.

Literacy experiences at home

In order to learn spelling, children need some skills that can be practiced by literacy activities at home (Sénéchal, 2006). The skills that are required among others for a good speller are: phonemic awareness, knowledge of grapheme–phoneme correspondences and reading (Caravolas et al., 2001). However, spelling is not only a technical skill of making the correct links, because orthographic knowledge (correct spelling) is linguistic in nature (Gillis

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& Ravid, 2006). This means that children have to develop mastery in the domain of linguistic literacy (Ravid & Tolchinsky, 2002). For example, children who are better in rhyming, learn to decode words with less difficulty (Niklas & Schneider, 2013). Reading rhymes is also a literacy activity which parents can do with their children at home (Levi, Gong, Hessels, Evans, & Jared, 2005).

Literacy activities take place in many houses with young children (Martini & Sénéchal, 2012). Research showed that the frequency with which parents reported teaching their child to read words is connected to early literacy measures such as alphabet knowledge, beginning reading and invented spelling (Sénéchal et al., 1998). Another study about print exposure, which means the amount of time a child is exposed to written materials, showed that print exposure is a significant predictor of spelling and more skills such as: vocabulary, verbal fluency and word knowledge in fourth-, fifth-, and sixth-grade children (Cunningham & Stanovich, 1991). These findings suggest that print exposure is very important in order to improve spelling.

Two major British longitudinal studies about children's home background in relation to literacy achievement found out that children who perform well at literacy tests, tended to have parents who owned and read more books and read more often with their children (Wells, 1987; Weinberger, 1996). On the other hand, children who had less early literacy experiences at home, had less understanding of the purposes of literacy and the meaning of written texts (Wells, 1987; Weinberger, 1996).

Niklas, Tayler, and Schneider (2015) studied the difference between HLE in Germany and Australia on different outcome variables. Parents who did more literacy activities at home turned out to have higher level of education in both countries. This research confirmed that more literacy activities at home led to better cognitive outcomes in elementary school

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children in both countries. Earlier research of Niklas and Schneider (2013) found that early literacy experience at home can predict linguistic competencies, such as vocabulary, but also specific spelling competencies.

Present study

The spelling performances of third-grade 3 students were used, because research showed that reading performances of third-grade students has more predictive value for higher grades compared to reading performances from first-grade and second-grade students (Butler, Marsh, Sheppard & Shepperd, 1985). This is also related to the well-known Matthew effect (Butler et al., 1985). This Matthew effect means that students who score lower than other students in the early school years, score much lower in later school years (Walberg & Tsai, 1983).

To continue, the Dutch inspectorate of Education already knows that gender, parents' education and the pace at which students going through their school time predict the spelling outcomes. This study wants to examine to which extent metacognition, motivation and HLE predict the spelling performances by third grade elementary children, because spelling skills are very important nowadays. The research question that is central in this research is: To what extent do metacognition, motivation and literacy experiences at home predict the spelling performance of third-grade elementary school children? Based on previous research, which is described in the theoretical framework above, it is expected that metacognition, motivation and literacy experiences at home predict spelling performance in third-graders.

Method

Research Design

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A quantitative field research was conducted to answer the research question. New data was collected by taking three questionnaires about metacognition, motivation for spelling and HLE. Existing data about the spelling performance was gathered from a student monitoring system.

Participants

In this study 37 Dutch third-grade elementary school children from two different classes participated. The third grade is called 'group 5' in the Dutch education system. The participants were selected from one regular elementary school located in the province of Utrecht the Netherlands. The elementary school was located in an affluent neighbourhood. The sample consisted of 21 boys and 16 girls in the age of eight or nine years old ($M = 8.65$, $SD = 0.48$). All participants were born in the Netherlands and spoke Dutch as their native language. Due to the limited amount of time, convenience sampling was used to collect a sample.

All parents received an informed consent form to ask permission for their children's participation in this research. The informed consent form can be found in appendix A. Parents were asked to complete a questionnaire about HLE. This questionnaire was attached to the informed consent.

Instruments

Spelling performance

Spelling was measured by using the results of six method-tests for spelling. The method which is used for teaching spelling is called 'STAAL' (Malmberg, 2012). At the time this study was conducted, the school had used this method for two and a half years. In the first part of these tests students took dictation of 20 words and two sentences. Children

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showed their active knowledge of spelling. In the second part of the tests, children had to make assignments where they had to fill in the correct grammar. This second part of the test was not used, since this study focused in particular on spelling of words and not on grammar or the spelling of verbs.

Children scored a grade from 1 till 10 on each spelling test. The average score of six method-tests for spelling were taken. The mean scores of the participants in this study varied between 2,6 and 8,6, with an average score of 6,2, ($M = 6.2$; $SD = 1.5$). Grades of the spelling performance were gathered from a student monitoring system which was used by the school and is called Parnassys.

In order to reduce the workload of the children with another spelling test, it was chosen to use the method tests from the school. Secondly, the method tests were used instead of the CITO tests, since there was more data on the method tests. Moreover, method tests were chosen as data for the outcome variable, to reduce the workload of teachers. Teachers have a very tight schedule in which they have to complete many lessons, another spelling test would take a lot of time.

Since, the spelling method STAAL (Malmberg, 2012) provided no justification rapport online or in the teacher instruction manual with scores about internal consistency and validity of the tests, an appointment was made with the developers of the method. The publisher of STAAL indicated that the tests were developed in collaboration with experts in spelling and teachers. The whole method was checked by Jose Schraven, who developed the method Staal based on her own methodology called 'Zo leer je lezen en spellen' (How to learn to read and spell). This is a proven methodology for teaching spelling (Bosman, 2007). Tally sheets are used to keep track of the different spelling categories that are asked in the spelling tests. Following from pilot versions, the spelling tests were adjusted if necessary.

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Metacognition

To measure children's' levels of metacognition the subscales of the Metacognitions Questionnaire for Children (MCQ-C) was administered (Bacow, Pincus, Ehrenreich, & Brody, 2009). The MCQ-C is based on the MCQ-A (Cartwright-Hatton et al., 2004), which is a 30-item scale designed for youth between the 13 and 17 years old. The MCQ-C differs from the MCQ-A in sense that it is applicable for a broader age range (7-17) (Bacow et al., 2009). The MCQ-C consists of four subscales: cognitive monitoring, positive meta-worry, negative meta-worry and beliefs about superstition, punishment and responsibility (Bacow et al., 2009). Bacow et al. (2009) showed that this version of the MCQ has a good reliability and validity. The Cronbach's alpha was used to measure the internal consistency. For the metacognition test the Cronbach's alpha was .87.

The MCQ-C was translated into Dutch for the participants in this study. In order to make reliable and valid translations, two forward translations were done by one person without knowledge of the content and by one person with knowledge of the content. Both translators were acquaintances of the researcher. Based on the two forward translations, the MCQ-C was translated into Dutch by the researcher. One example of the items is: "Als ik in de war ben, helpt zorgen maken me om alles weer op een rijtje te krijgen" (When I am confused, worrying helps me sort things out).

The MCQ-C was administered in its original format to a pilot sample of one nine-year old girl, who was an acquaintance of the researcher. This pilot version showed that the child needed more than 20 minutes to complete the questionnaire. Apart from that, the girl indicated that she found the items quite difficult. After ten minutes the concentration to complete the items seemed to decrease. Also, feedback was given that item 12 was too hard to understand. As this item could not be formulated differently, this question was removed.

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Since, there was a limited amount of time to administer the questionnaires in class, the questionnaire in this study was shortened to 13 items. The first fourteen questions of the questionnaire were chosen to keep in the questionnaire, except from item 12. The four subscales were all presented in the 13-item questionnaire.

The answers were given on a four-point Likert Scale, because the absence of a neutral answer ensures that respondents give less socially desirable answers (Garland, 1991). In addition, the amount of points in a Likert Scale makes no difference for the reliability and validity of a test (Garland, 1991). The answer options were: 1) Nee, dat vind ik helemaal niet! (No, I totally don't agree!) 2) Nee, dat vind ik niet echt. (No, I don't really agree) 3) Ja, dat vind ik een beetje. (Yes, I agree a bit) 4) Ja, dat vind ik heel erg! (Yes, I totally agree!). The written answer options were formulated in consultation with the child from the pilot. The questionnaire is translated in Dutch can be found in appendix B. On each item a score between one and four was achieved, hereafter all scores were added. The minimum score a participant can achieve is 13 and the maximum score is 52.

The statistical program SPSS was used to determine the reliability and validity of the three questionnaires. The internal consistency of the three adjusted questionnaires were measured by using the Cronbach's Alpha. The questionnaires were administered on an individual level and no high-stakes decisions depended on the questionnaires. Therefore, the questionnaires are reliable when the reliability is higher or equal to .70.

Cronbach's alpha for the 13-item Metacognition questionnaire was .52. The item-total statistics showed that alpha would increase to .58 if item 9 were removed. This item stated: When I am confused, worrying helps me sort things out. It could be that this question was too difficult to understand for eight and nine year old children. Consequently, this item was deleted from the questionnaire. The internal consistency from the metacognition

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questionnaire cannot be seen as reliable for research purposes. In spite of this low internal consistency score, the data from the metacognition questionnaire is used to answer the research question, as there was no time available to administer an improved version. Due to the low Cronbach's alpha, the results of the multiple regression analysis on metacognition must be taken into account.

Motivation

To measure the extent to which children were motivated in spelling, the children filled in a shortened and translated version of the Questionnaire Measure of Children's Motivations for Reading (Wigfield, Guthrie, & Mc Gough, 1996). The Motivations for Reading Questionnaire (MRQ) is designed to assess different aspects of children's motivations for reading. The original questionnaire consists of 11 subscales and contains 54 items. The study of Wigfield, Guthrie and Mc Gough (1996) provides no internal consistency for the total scale. Although, it provides the internal consistency scores for all the 11 subscales. Scores show that Challenge, Curiosity, Involvement, Social, Competition, and Compliance are the most reliable scales. The reliabilities for the other scales were poorer. Watkins and Coffey (2004) revised the original questionnaire from 54 to 37 items with eight subscales: Competition, spelling involvement, spelling work avoidance, spelling efficacy, recognition, spelling involvement, grades-compliance, social and curiosity.

In this study the items about reading were replaced for items about spelling to measure motivation for spelling instead of reading. The items of the questionnaire were reduced from 37 to 17 items, for the purpose to reduce the workload for the children. Secondly, in some items 'reading' could not be replaced for 'spelling'. For example: "I like to read novels". Those items were not used in this study's questionnaire. In order to make reliable and valid translations, an acquaintance of the researcher with knowledge of the

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content helped to translate and reformulate the 17 items into Dutch. Table 1 shows the items per aspect of motivation.

A pilot version of the translated and shortened version was completed to a pilot sample of one nine-year old girl, who was an acquaintance of the researcher. No adjustments were made after the pilot version, because the child from the pilot sample understood all items and completed the test within 5 minutes. Answers were given on a four-point Likert scale. One example item stated: “Ik hou ervan om complimenten te krijgen voor spelling (I like to get compliments for my spelling). On each item a score between one and four was achieved, hereafter all scores were added. The minimum score a participant can achieve is 17 and the maximum score is 68. The Dutch version of the motivation test can be found in appendix C.

Cronbach’s alpha for the 17-item Motivation for spelling questionnaire was .67. A closer examination of the questionnaire item-total statistics indicated that alpha would increase to .68 if item 2 were removed. This item stated: I like to get compliments for my spelling. An explanation could be that modest children found themselves selfish if they answered the item with a three or four score. Therefore, this item was deleted from the questionnaire. The motivation questionnaire cannot be considered reliable for further research purposes as the Cronbach's alpha is below .70. However, this is not seen as problematic for this research, because this is an exploratory research and the Cronbach’s alpha is near .70.

Table 1

Items per aspect in Motivation for Spelling Questionnaire

Aspect	Item(s)
Grades-compliance	1-4

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Competition	5-8
Involvement	9-10
Efficacy	11-14
Recognition	15-17

Literacy experiences at home

To measure HLE, a shortened version of the questionnaire of the research of Levi et al. (2005) was used. This original questionnaire is subdivided into six components: 1) Practicing reading and writing, 2) Beginning print book activities, 3) Phonics/Phonological awareness, 4) Casual activities with books/print, 5) Reading child advances text and 6) Traditional shared book reading. The internal consistency score, which was measured with Cronbach’s alpha were respectively: .86, .65, .66, .60, .59, and .54.

In order to receive a faster response from parents, the questionnaire in this study was shortened to 14 questions. Questions were selected from each of the six components. The researcher has chosen items with literacy activities that are common to do with third-grade children. One example item stated: “Woordspelletjes doen, zoals Galgje of Scrabble” (Playing word games, for example playing hangman or Scrabble). The questionnaire used in this research can be found in appendix D. Answers were given on a three-point Likert scale, as the original questionnaire also uses this scale. On each item a score between one and three was achieved, hereafter all scores were added. The minimum score a participant can achieve is 14 and the maximum score is 42. Table 2 shows the items per aspect of HLE.

The questions were translated by the researcher and one acquaintance of the researcher without knowledge of the content. A pilot version of the shortened and translated questionnaire was conducted to a pilot sample of two parents, who were acquaintances of the

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researcher. With the feedback some questions were reformulated. Approximately 5 minutes were needed to finish the questionnaire.

Cronbach’s alpha for the 14-item HLE questionnaire was .79. A closer look to the item-total statistics indicated that the Cronbach’s alpha would increase to .80 if item 9 were deleted. This item stated: “Visiting a library”. Item 9 was not deleted from the questionnaire for two reasons. First, this item was not considered as ambiguous, thus it could not be formulated in another way. Second, the Cronbach’s alpha only increases with .01 and the questionnaire is already considered as reliable for research purposes as the Cronbach’s alpha is above .70.

Table 2

Items per aspect in the Literacy experiences at home questionnaire

Aspect	Items
Practising reading and writing	1-7
Beginning print/book activities	8-10
Phonics/Phonological awareness activities	11
Reading child advanced text	12-13
Casual activities with books/print	14

Procedure

First, the parents of the children of the two different third-grade classes were informed about the research by an online message on the social platform of the school. Hereafter, the children received a printed informed consent form and a printed version of the HLE questionnaire and they were asked to bring the forms home and give it to their parents. Each child received a little bag of flower seeds as a small thank you for helping the researcher. At

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the end of the questionnaire parents were asked to bring the informed consent form and questionnaire back to the class teacher within one week. Per child, one parent was asked to complete the questionnaire about HLE. Parents filled in this questionnaire at their own time. The informed consent form was also uploaded online on the social platform of the school in case children or parents lost the printed version.

The metacognition and motivation questionnaire were conducted on the same way to the participants of both classes, but at a different time. First, the children completed the motivation questionnaire, since the pilot version showed that this questionnaire was easier to complete for a child than the metacognition questionnaire. After the children completed the motivation questionnaire, they are probably more familiar with the way of answering the items and this made it perhaps more easy for the children to fill in the metacognition questionnaire.

The researcher administered both questionnaires first by the participants of one class and two days later by the other third-grade class. The questionnaires were conducted in the classrooms of the children during school time and under the presence of the researcher and class teacher. The tests were conducted on printed paper.

First, the researcher introduced herself in class and explained the children something about her research. Also, she asked the children some questions to make them think about the research. This introduction part took 5 minutes. The exact instruction that was told to the children can be found in appendix E. Hereafter, the children received the both questionnaires. The researcher explained the two example items to the children. The children were asked to fill in the first questionnaire by themselves in silence. The children were able to ask questions to the researcher by raising their hands. Children who already finished the questionnaire were asked to do something for themselves in silence (reading, drawing etc.). Children in class

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who did not participate in the research, got some work from the teacher to work on. The children completed the motivation questionnaire within 10 minutes. After all participants finished the motivation questionnaire, all the children played a little game with the whole class to have a little break of 5 minutes. Thereafter, the researcher explained the example questions of the metacognition questionnaire to the children. All items were read aloud by the researcher in order to lighten the workload of the children. Children who understand all items, were allowed to complete the questionnaire for themselves in silence. All completed questionnaires were collected by the researcher and checked if the names of the children were noted.

The parents and children who participated in this study were asked to write down their names on the three questionnaires. This was necessary to connect the outcomes of the questionnaires to the correct participant ID in SPSS. After entering the data in SPSS, all names on the questionnaires were crossed out with a black marker to ensure that the data was anonymized.

Data Analysis

Several assumptions must be met when conducting a multiple regression analysis. First, normal Q-Q plots and histograms were used to visually verify if the regression is normally distributed. Also, the tests of normality was checked to be sure the sample was normally distributed. Second, outliers were detected by boxplots. Third, careful examination of the normal probability plot of standardized residuals as well as the scatterplot of standardized residuals against standardized predicted were used to verify if the assumptions of normality, linearity and homoscedasticity of residuals were met. Fourth, the assumption of multicollinearity was checked by the correlation matrix and collinearity statistics (Tolerance and VIF). Fifth, the sample size must be large enough to be able to make valid conclusions

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about the population. In addition, there was checked if the missing values influence the data too much.

In order to answer the research question, a multiple regression analysis is performed with spelling performance being the dependent variable and metacognition, motivation and HLE as independent variables. The independent variables were on interval level, which is necessary when performing a multiple regression analysis. All analyses are tested on an α -level of .05.

Results

Prior to performing a multiple regression analysis, several assumptions were checked. First, normal Q-Q plots and histograms confirmed as visual indicators that each variable in the regression was normally distributed. In addition, the tests of normality also proved the regression was normally distributed, as there are no significant numbers. Second, boxplots showed two outliers on motivation for spelling, but these scores were not indicated as extreme scores. For this reason, the outliers were not deleted from the sample. Moreover, it is assumed that there is no noise in the data, as the researcher followed the procedure with explanations about the questionnaire. The two outliers were not in the same class, so they did not completed the questionnaire at the same time. Also, only two out of 37 children were outliers, this indicate that the vast majority did understand the questionnaire and were not bothered by noise. Third, careful examination of the normal probability plot of standardized residuals as well as the scatterplot of standardized residuals against standardized predicted values verified that the assumptions of normality of residuals, linearity of residuals and homoscedasticity of residuals were met. Fourth, quite high tolerances (Tolerance and VIF) for all predictors showed by the collinearity statistics in the regression model implies that multicollinearity would not render our ability to interpret the output of the MRA.

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Fifth, the sample size must be large enough. In total, 51 children and their parents were asked to join the research, of these, 37 children were allowed to participate in the study. According to Ghasemi and Zadediasl (2012) the violation of the normality assumption is valid when the sample size is above 30. For pilot studies, a sample between 25-40 participants is necessary to determine the internal consistency for developed instruments (Hertzog, 2008). In statistics some researchers use a rule of thumb when determining a sample size (Statistics Solutions, 2019). For regression analysis one rule of thumb is a minimum of ten participants per variable (Statistics Solutions, 2019). In this study three independent variables are used, so a minimum of 30 participants is essential. On the other hand, VanVoorhis and Morgan (2007) name that a sample size of approximately 50 participants is necessary for a regression analysis. This would mean that the sample size in this study is slightly unpowered. For this reason, the results must be carefully considered. There were only some missing values on the spelling tests. Five children did not had a grade on a particular spelling test. The missing values were not considered as problematic for the results as the children all had a grade on five out of the six tests.

The variables used in this research are: metacognition, motivation for spelling, literacy experiences and spelling performance. In table 3 the minimum scores, maximum scores, means and standard deviations per variable can be found. Striking is the low average grade on spelling performance, namely $M = 6,2$. Also the maximum mean score on spelling is $M = 8,6$. During the conversation with the publisher of STAAL, he indicated that these means for the tests are quite low and should be higher. Interesting is the mean score ($M = 25,97$) on HLE. Scores on HLE could vary between 14 and 43 points and for this study scores varied between 17 and 38 points. As the participants' school is located in an affluent neighbourhood with well-educated parents, it was expected that the mean score on HLE was higher.

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Table 3

Descriptive statistics per variable

Variable	Minimum score	Maximum score	Mean	Standard deviations
Metacognition	23	40	29,92	4,82
Motivation for spelling	34	55	44,24	5,3
HLE	17	38	25,97	5,21
Spelling performance	2,6	8,6	6,2	1,5

The correlation matrix in table 4 shows no significant correlations between the four variables. Intriguing, are the extremely low correlations between the independent variables and the dependent variable. The only substantial correlation is between metacognition and motivation for spelling.

Table 4

Correlations between all variables

		Metacognition	Motivation for spelling	HLE	Spelling performance
Metacognition	Pearson correlation	1	.301	.043	.005
	Sig. (2-tailed)		.070	.800	.976
	N	37	37	37	37
Motivation for spelling	Pearson correlation	.301	1	.203	.011
	Sig. (2-	.070		.228	.950

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	tailed)				
	N	37	37	37	37
HLE	Pearson correlation	.043	.203	1	.079
	Sig. (2-tailed)	.800	.228		.641
	N	37	37	37	37
Spelling performance	Pearson correlation	.005	.011	.079	1
	Sig. (2-tailed)	.976	.950	.641	
	N	37	37	37	37

The hypothesis stated that metacognition, motivation and literacy experiences at home are related to spelling performance. A multiple regression analysis (MRA) was conducted on the data to examine to what extent metacognition, motivation and literacy experiences at home predict the spelling performance of third-grade elementary school children. In combination, metacognition, motivation for spelling, and HLE accounted for a non-significant 0.6 % of the variability in spelling performance of third-grade children, $R^2 = .006$, adjusted $R^2 = -.084$, $F(3, 33) = 0.070$, $p = .976$, with an α -level of .05. In other words, the MRA indicated that the regression is not significant. A R^2 of .006 indicated no effect on spelling performance. In table 5, the unstandardized (B) and standardized (β) regression coefficients, and squared semi-partial correlations for each predictor can be found.

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Table 5

Unstandardized and standardized regression coefficients, and squared semi-partial correlations for each predictor

Variable	B [95% CI]	β	sr ²
Constant	56.58 [4.31, 108.86]		
Metacognition	0.23 [1.14, 1.17]	.08	<.00
Motivation for spelling	-0.02 [-1.09, 1.05]	-.01	<.00
HLE	0.01 [-0.81, 1.27]	.00	.01

Note. N = 37. CI = confidence interval.

* $p < .05$. ** $p < .01$.

The results show no significant effects of metacognition on the spelling performance, $B = -0.23$, $p = .984$, 95% BI[-1.14;-1.17]. Therefore, the results suggest that spelling performance of third-grade children is not related to the level of metacognition among children. The multiple regression analysis showed no significant relationship between motivation for spelling and spelling performances, $B = -0.02$, $p = .972$, 95% BI[-1.09;-1.05]. This study shows no relationship between literacy experiences at home and the spelling performance, $B = 0.01$, $p = .653$, 95% BI[-0.81;-1.27].

Discussion

In this study, the predictive value of metacognition, motivation for spelling and home literacy experiences on spelling performances of third-grade children at a regular elementary school was investigated. Data was collected by having 37 children fill out two questionnaires about metacognition and motivation. Data about HLE was gathered through a questionnaire that one of the parents of the children completed. One research question was leading: To what

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extent do metacognition, motivation and literacy experiences at home predict the spelling performance of third-grade elementary school children? The conclusion of this study rejected the hypothesis that metacognition, motivation for spelling, and home literacy experiences are predictive to the spelling performance. In addition, none of the predictors had a significant explained variance in the regression model.

Metacognition and spelling performance

The hypothesis that metacognition is related to the spelling performance of third-grade children was not supported by this study. This means that there is no relationship between the metacognitive functioning of children and their spelling performances. Consequently, children's level of metacognition makes no major differences in the grades for spelling in third-grade children. In short, a high level of metacognition is not a guarantee for high grades and vice versa leads a low level of metacognition not necessarily to a low grade for spelling. This result is not in line with research from Hacker et al. (2009) who showed that metacognitive monitoring and control are essential components of proficient writing and spelling. Other research of Pintrich and De Groot (1990) proved that self-regulation and self-efficacy seemed to be the best predictors of academic performance in seventh-graders. One component of self-regulated learning is metacognition (Zimmerman & Pons, 1988), therefore one might expect the predictive value of metacognition on academic performance. In addition, metacognitive strategies are useful for spelling (Hacker et al. (2009) as for most children spelling costs effort (Caravolas et al., 2001).

This result could be explained by the questionnaire that was used in this research. Although this questionnaire was a reliable tool that could be used for the age of 7-17 years according to research (Bacow et al., 2009), the questionnaire seemed to be quite challenging for the children. Some children did not understand completely the questions and this probably

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influenced the results. Another possible explanation is that the metacognition questionnaire in the research of Bacow et al. (2009) was administered to a sample of 78 children and adolescents with clinical anxiety disorders and 20 non-clinical youth. Despite Bacow et al. (2009) states that this questionnaire could be used for the age of 7-17 years by non-clinical children, the questionnaire was maybe more focused on older, clinical children as the sample consisted for the major part of clinical children and adolescents.

Motivation and spelling performance

The hypothesis that motivation for spelling can predict the spelling performance among third-grade children is not confirmed by the results. Children who seemed to have more motivation for spelling turned out to not have significantly higher grades for spelling. This result suggest that having more or less motivation does not matter for the spelling performance. Wilson and Trainin (2007) showed contradictory findings in their study. They determined that motivation is specifically related to the spelling performance of children. Not only in elementary school children motivation seemed to have a positive influence on academic performance, also among college students motivation appeared to have a positive effect on academic performance (Kusurkar, Cate, Vos, Westers & Croiset, 2012).

The questionnaire used in this study made no distinction between the two types of motivation: intrinsic and extrinsic motivation (Ryan & Deci, 2000). In literature, intrinsic motivation is mentioned as determining for the academic performances in elementary school (Corpus & Wormington, 2014). The extrinsic motivation is maintained by the grades children receive for spelling. There is a negative influence of extrinsic rewards, like grades, on children's commitment to learning (Covington & Müeller, 2001). A declaration for the non-predictive value of motivation might be explained by difference of children's level of intrinsic and extrinsic motivation which are not detected by the current questionnaire. Maybe,

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a high score on intrinsic motivation is predictive for the spelling performances, but a high score on extrinsic motivation is not.

Home literacy experiences and spelling performance

Third, the relation between HLE and spelling performance was investigated. The hypothesis that HLE is predictive for the spelling performance is disproved by the results. These results suggest that children who had more literacy experiences at home, do not show a better spelling performance. This result is inconsistent with the study of Sénéchal (2006) who clarified the significant contribution parents have on their child's literacy development through informal and formal literacy experiences at home. Researchers suggest that the home environment is a potential place for enhancing the oral and written language in children (Sénéchal, et al., 1998). The study of Sénéchal (2006) and Sénéchal et al. (1998) focused on children's literacy development, but not on spelling specific. Although, spelling can be seen as written language skill, literacy activities at home might only enhance oral language skills and reading, but not the spelling skills. This could be an explanation for the non-predictive value of HLE on children's spelling performance. However, the findings of this study are in line with the results of Bosman and Van Orden's (1997), who showed that mere exposure to print might not be sufficient to build accurate orthographic representations.

Moreover, the non-predictive value of HLE could also be explained by the structure of the HLE questionnaire. The questionnaire had a three-point Likert scale with the answer options: seldom, minimal once a month, and minimal once a week. Due to this small range in answer options it could be harder for parents and children to distinguish themselves. For example there is a big difference in going once a month to the library or going three times a month. Also parents and children who do four times a week a particular literacy activity are not able to distinguish themselves from parents and children who do once a week a particular

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literacy activity. This makes it probably also harder to find a significant result. In further research it would be beneficial to develop a questionnaire with more answer options.

Limitations and future research

First of all, The outcome variable spelling performance was measured by six method tests. The first method test was conducted in September 2018 and the last method test was conducted in May 2019. Consequently, the spelling performance is measured over a period of nine months. However, motivation for spelling was measured at one moment in May. The results say something about the correlation between motivation now and spelling performance a couple of months ago. Starting from the age of nine the stability of motivation increases in children (Gottfried, 1990), however the stability of motivation in children under nine years is not proven. Other research (Gottfried, Fleming & Gottfried, 2001) also confirmed that academic motivation becomes more stable throughout the middle elementary school years (starting from nine years old). At the start of the schoolyear almost all children were eight years old, so it is not sure that the level of motivation was stable during the schoolyear. In future research it would be better to use more measurement moments for motivation or to use one reliable, standardized spelling test which is conducted at the same moment as the motivation questionnaire, for example CITO Spelling at the end of the third-grade.

Secondly, this study used the spelling outcomes of method tests based on a couple of reasons which are described in the method section. Despite these reasons, it is questionable to use the results of method tests for spelling since, there are some disadvantages. It makes it harder to repeat this study, because not every school uses this method for teaching spelling. Also, this method test is less reliable compared to the CITO test or a self-developed test for

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example. This is because of the fact that this method test was not analysed with a reliability analysis to test the internal consistency.

Lastly, the percentage of asked parents who gave permission to let their child join this study was quite high, as 37 out of 51 children participated in the study, this corresponds with 73 percent of the asked children who participated. Despite this fact, it could be possible that the sample was not completely representative. As parents who did not give their permission, often gave the reason that their children already had to do a test for dyslexia or ADHD. This indicates that the children who did not participate were not random. Hereby, most children who participated were regular children without 'problems' in school. This may have caused that the results of this study are less generalizable. In the future, it is advised that researchers take a representative sample with both children with possible learning difficulties and children without.

Besides these three mentioned limitations, there are some small limitations of this study. This study was not able to control for children with dyslexia. In the third-grade children are often for the first time tested for dyslexia when there are presumptions for dyslexia. However, this process of starting tests for dyslexia takes a long time. For this reason, it was not yet known which children had dyslexia. It would be beneficial for further studies to repeat this study design among older children, in order to control for dyslexia. Furthermore, in the HLE questionnaire only a limited amount of literacy experiences were measured. This must be taken into account, because some parents and children may do literacy activities that are not included and the questionnaire and consequently they receive a low score on HLE, which is unfair. At least, the results must be taken into account, because the sample was slightly unpowered. Further work is needed with a sample more than 50 children, because according

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to literature this sample size is necessary to perform a regression analysis (VanVoorhis & Morgan, 2007).

Practical implications

The findings about the non-predictive value of metacognition, motivation for spelling and HLE on spelling performance in third-grade children can be used in education by teachers and educational scientists. The level of metacognition seemed to make no difference in the grades for spelling, this could imply that the teacher doesn't have to learn metacognitive strategies to children in order to increase the spelling results. Also, the level of motivation does not matter for the spelling performances. Therefore, this suggest that class teacher must not focus on increasing motivation as it does not lead to an increase in the spelling performances. Further research is needed to examine predictors that teachers can focus on in order to improve the spelling results. The findings about the relationship between HLE and spelling performance show that teachers and parents must not expect that literacy activities at home increase the spelling performance of third-grade children. However, literacy activities at home may not increase the spelling performance, these activities are still very important to do with children as they can improve the reading skills of children according to literature (Sénéchal et al., 1998).

In April 2019, when this research was already started, the Dutch Inspectorate published a new report with statistics and an analysis of the quality of the Dutch education (Dutch Inspectorate of Education, 2019). The Dutch Inspectorate of Education found out that 80 percent of the elementary schools in the sample meets the standards for teaching spelling that schools need to offer. This means that 20 percent of the schools could not offer children the fundamental spelling instructions, which is alarming. Especially the education and extra support for poor readers and spelling needs to be improved (Dutch Inspectorate of Education,

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2019). Therefore, it is really important to examine which variables are predictive for the spelling performances, because when educators know on what factors they can focus, the spelling performance can be enhanced.

Concluding, the spelling education in the Netherlands needs to be improved. In order to do this, new research on the predictive value of metacognition, motivation for spelling and, home literacy experiences is needed with a sample of minimal 50 children, with more measure moments on motivation for spelling and, a standardized, reliable spelling test to measure spelling performance among third-grade children.

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Appendix A

Toestemming onderzoek

Beste ouders/verzorgers,

Naast het lesgeven in groep 6b ben ik ook bezig met mijn masterscriptie voor mijn studie. Hiervoor wil ik graag een onderzoek doen naar welke factoren van invloed zijn op de spelling uitkomsten van kinderen. Ik wil graag onderzoek doen naar de invloed van metacognitie, motivatie voor spelling en leeservaring thuis op de spelling uitkomsten. Metacognitie en motivatie voor spelling wil ik graag meten door twee vragenlijsten. Voor het meten van leeservaring thuis wil ik u vragen om een korte vragenlijst in te vullen. Deze gegevens wil ik koppelen aan de resultaten van de spelling methodetoetsen. U kunt natuurlijk zelf bepalen of uw kind mee mag doen! Als dat mag, heb ik toestemming nodig. De toestemming kan gegeven worden door het briefje onderaan deze pagina, waarmee je eigenlijk zegt voldoende ingelicht te zijn over het onderzoek. Deze brief is hieronder te lezen.

Ik zorg ervoor dat er na de meivakantie geprinte toestemmingsbrieven in de klas liggen. Deze brieven kunt u bij de leerkracht of bij mij (groep 6b) inleveren. Ik hoop dat de toestemmingsbrieven lukken in de week na de meivakantie, zodat ik in de week van 13-17 mei kan starten met de vragenlijsten.

Ik hoop dat u en uw kind mee kan doen aan het onderzoek. Voor meer informatie en/of vragen kunt u altijd contact opnemen met mij.

Met vriendelijke groet,
Bertine Gerritsma

Beste ouders/verzorgers,

De verzameling van gegevens, de verwerking van de gegevens en de rapportage vinden plaats onder de verantwoordelijkheid van de Universiteit Utrecht. Alle gegevens worden strikt vertrouwelijk behandeld en anoniem verwerkt voor het onderzoek. Het onderzoek wordt afgenomen om mij verder te helpen met mijn studie en me te ontwikkelen wat betreft het uitvoeren van een onderzoek. Het onderzoek zal niet worden gepubliceerd. U en uw kind kunnen te allen tijde voor, tijdens of na het onderzoek aangeven niet verder te willen meewerken. De gegevens zullen dan worden verwijderd.

In te vullen door ouder/verzorger

Toestemmingsverklaring voor gebruik gegevens ten behoeve van het onderzoek

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION,
MOTIVATION FOR SPELLING, AND HOME LITERACY EXPERIENCES

Hierbij geef ik toestemming aan de voor het onderzoek verantwoordelijke onderzoeker van de Universiteit Utrecht om de gegevens die zij hebben verkregen van mijn kind tijdens het experiment te gebruiken voor onderzoek. Alle gegevens worden strikt vertrouwelijk behandeld en de gegevens worden door de onderzoekers volledig anoniem verwerkt.

Ik verklaar hierbij volledig te zijn ingelicht over de procedure van het onderzoek. Ik ben in de gelegenheid gesteld om vragen over het onderzoek te stellen en mijn (eventuele) vragen zijn naar tevredenheid beantwoord.

Ik heb genoeg tijd gehad om te beslissen of ik mijn kind mee zou laten doen of niet.

Ik weet dat meedoen helemaal vrijwillig is en ik weet dat ik en mijn kind op ieder moment kunnen beslissen om toch niet mee te doen. Daarvoor hoeft geen reden te worden opgeven.

Naam kind:

.....

Ik geef wel/geen toestemming om mijn kind mee te laten doen met het onderzoek

Handtekening:

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION,
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Appendix B
Metacognition test student

Vragenlijst 'denken'

Naam:

We zijn geïnteresseerd in hoe jij denkt. Lees elke zin en geef aan of de zin bij jou past of niet bij jou past. Er zijn geen foute of goede antwoorden.

Hieronder zijn twee voorbeelden:

Zin	Nee, dat vind ik helemaal niet!	Nee, dat vind ik niet echt.	Ja, dat vind ik een beetje.	Ja, dat vind ik heel erg!
Ik hou van softijs	1	2	3	4
Ik vind zwemmen leuk	1	2	3	4

OMCIRKEL TELKENS EEN ANTWOORD BIJ ELKE ZIN:

Zin	Nee, dat vind ik helemaal niet!	Nee, dat vind ik niet echt.	Ja, dat vind ik een beetje.	Ja, dat vind ik heel erg!
1. Als ik me nu zorgen maak om dingen, heb ik in de toekomst minder zorgen.	1	2	3	4
2. Het is een slecht idee om me zorgen te maken, want dat is niet goed voor je	1	2	3	4

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION,
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3. Ik merk de gedachten die ik heb in mijn hoofd vaak op	1	2	3	4
4. Als ik me veel zorgen maak, kan ik mezelf daar ziek mee maken.	1	2	3	4
5. Wanneer ik over een probleem denk in mijn hoofd, merk ik hoe mijn gedachten werken	1	2	3	4
Zin	Nee, dit vind ik helemaal niet!	Nee, dit vind ik niet zo	Ja, dat vind ik een beetje	Ja, dat vind ik heel erg!
6. Als ik niet kan stoppen met piekeren en daardoor een fout maak, dan is het mijn schuld.	1	2	3	4
7. Mij druk maken over dingen, helpt me om georganiseerd te zijn	1	2	3	4
8. Als ik me zorgen maak, stop het niet ook al probeer ik dat wel.	1	2	3	4

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION,
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9. Als ik in de war ben, helpt zorgen maken me om alles weer op een rijtje te krijgen	1	2	3	4
10. Ik kan niet stoppen met nadenken over de dingen waar ik me zorgen om maak	1	2	3	4
11. Ik doe heel erg mijn best om mijn gedachten onder controle te houden	1	2	3	4
12. Mezelf druk maken, maakt me gek.	1	2	3	4
13. Ik denk altijd na over mijn gedachten.	1	2	3	4

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION,
MOTIVATION FOR SPELLING, AND HOME LITERACY EXPERIENCES

Appendix C
The Motivations For Spelling Questionnaire

Vragenlijst motivatie voor spelling Naam:.....

Ik wil graag weten wat jij van spelling vindt. Lees elke zin en geef aan of de zin bij jou past of niet bij jou past. Er zijn geen foute of goede antwoorden.

Hieronder zijn twee voorbeelden.

Zin	Nee, dit vind ik helemaal niet!	Nee, dit vind ik niet zo	Ja, dat vind ik een beetje	Ja, dat vind ik heel erg!
Ik vind gym een leuk vak	1	2	3	4
Ik vind spruitjes lekker	1	2	3	4

OMCIRKEL TELKENS EEN ANTWOORD BIJ ELKE ZIN:

Zin	Nee, dit vind ik helemaal niet!	Nee, dit vind ik niet zo	Ja, dat vind ik een beetje	Ja, dat vind ik heel erg!
1. Het afmaken van elke spellingsopdracht is erg belangrijk	1	2	3	4
2. Ik hou ervan om complimenten te krijgen voor spelling	1	2	3	4

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION,
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3. Ik kijk ernaar uit om mijn cijfer te krijgen voor spelling	1	2	3	4
4. Ik probeer altijd om mijn spelling op tijd af te hebben	1	2	3	4
5. Ik hou ervan om mijn spelling eerder af te hebben dan andere kinderen	1	2	3	4
Zin	Nee, dit vind ik helemaal niet!	Nee, dit vind ik niet zo	Ja, dat vind ik een beetje	Ja, dat vind ik heel erg!
6. Ik probeer meer goede antwoorden te hebben dan mijn vrienden	1	2	3	4
7. Ik doe mijn best om hard te werken, zodat ik beter kan spellen dan mijn vrienden	1	2	3	4
8. Ik hou ervan om de enige te zijn die het antwoord weet in de klas	1	2	3	4
9. Het maakt me niet uit hoe moeilijk de spellingsopdracht is, ik maak hem gewoon	1	2	3	4

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION,
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10. Buiten schooltijd doe ik dingen om mijn spelling te verbeteren	1	2	3	4
11. Ik ben goed in spelling	1	2	3	4
12. Mijn vrienden vertellen mij soms dat ik goed ben in spelling	1	2	3	4
13. Ik weet dat ik volgend jaar weer goed zal zijn in spelling	1	2	3	4
14. Ik doe mijn spellingsopdrachten altijd precies zoals de leraar dat wilt	1	2	3	4
Zin	Nee, dit vind ik helemaal niet!	Nee, dit vind ik niet zo	Ja, dat vind ik een beetje	Ja, dat vind ik heel erg!
15 Ik ben blij als andere leerlingen zeggen dat ik goed kan spellen	1	2	3	4
16 Ik ben blij als de leraar zegt dat ik goed kan spellen	1	2	3	4
17 Ik hou ervan om de beste te zijn in spelling	1	2	3	4

Appendix D
Questionnaire HLE

Vragenlijst thuis lezen met kinderen

Naam van kind:.....

OMCIRKEL ÉÉN ANTWOORD BIJ ELKE ZIN

1. Zelden
2. 1 of meerdere keren per maand
3. 1 of meerdere keren per week

Het invullen van de vragenlijst duurt ongeveer drie minuten. Geef aan in welke frequentie je onderstaande activiteiten uitvoert met het kind of welke activiteiten het kind zelfstandig uitvoert:

Vraag	Zelden	1 of meerdere keren per maand	1 of meerdere keren per week
1. Oefenen met het spellen van woorden	1	2	3
2. Oefenen met het hardop lezen van teksten	1	2	3
3. Een notitie of klein verhaaltje op schrijven	1	2	3
4. Oefenen met het opschrijven van losse woorden of namen	1	2	3
5. Het lezen van etiketten en labels	1	2	3
6. Woordspelletjes doen, zoals Galgje of Scrabble	1	2	3
7. Computerspelletjes spelen met lees- en schrijfopdrachten	1	2	3
8. Een woordenboek gebruiken met kinderen	1	2	3

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION,
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9. De bibliotheek bezoeken	1	2	3
10. Het beluisteren van luisterboeken	1	2	3
11. Het lezen van gedichten of versjes die rijmen	1	2	3
12. Voorlezen uit een kinderboek	1	2	3
13. Samen lezen in een kinderboek	1	2	3
14. Samen kijken naar tijdschriften of boeken	1	2	3

Graag inleveren voor dinsdag 14 mei bij de leerkracht van groep 5. Dat zou mij helpen met mijn studie.

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION, MOTIVATION FOR SPELLING, AND HOME LITERACY EXPERIENCES

Appendix E Instruction text researcher

Hoi allemaal, ik ben Bertine en ik ga ook nog naar school toe. Op mijn school leer ik om onderzoek te doen. Om te oefenen ga ik hier een onderzoek doen.

* Ik schrijf de drie factoren op het bord*

Ik ben benieuwd wat ervoor zorgt dat je goed of iets minder goed bent in spelling, dus waarom is het vak spelling voor de een makkelijk en voor de ander moeilijk? Ik denk dat drie dingen ervoor kunnen zorgen dat je spelling makkelijk of moeilijk vindt. Welke dingen kunnen hiervoor zorgen denken jullie? (Ik geef paar kinderen een beurt om hun ideeën te horen)

Ik heb ook over deze vraag nagedacht en als eerste denk ik dat je motivatie voor spelling ervoor kan zorgen dat je cijfer voor spelling hoger of lager is. Motivatie betekent of je graag iets wilt doen of niet. Dus, wil je graag je best doen om spelling goed te leren? Ik weet het antwoord niet en daarom wil ik het graag onderzoeken. Om dit te doen, vullen jullie zo een vragenlijst in

Als tweede denk ik dat je leeservaring thuis ervoor kan zorgen dat je beter of minder goed in spelling bent. Als je veel leest, dan zie je meer woorden en ben je misschien ook beter in spelling. Dit wil ik graag onderzoeken. Om dit te onderzoeken, hebben jullie ouders een vragenlijst ingevuld.

Als derde denk ik dat de manier waarop je denkt over je leren ervoor zorgt dat je spelling makkelijk of moeilijker vindt. Ik weet het antwoord niet en daarom wil ik dit onderzoeken. Om dit te doen, vullen jullie zo een vragenlijst in.

We beginnen zo meteen met de vragenlijst over spelling. Als je je papier krijgt, wil ik graag dat je je naam opschrijft. Daarna gaan we met zijn allen de voorbeeldvraag maken.

vragenlijsten worden uitgedeeld

Heb je je naam opgeschreven? We gaan nu kijken naar de voorbeeldvraag: ik hou van zwemmen. Wat vind jij? Vind jij dat helemaal of helemaal niet? Of vind je dat niet zo of een beetje? Zet een rondje, vierkantje of ander figuurtje om het getal dat jij bij de vraag vindt passen. Nu gaan we naar voorbeeldvraag 2. Lees de vraag eens. Wat vind jij? Zet weer een rondje of iets anders om het getal.

* onderzoeker loopt rond om te kijken of kinderen de voorbeeldvragen hebben gemaakt.

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Nu mag je zelf de vragen lezen en maken. Er zijn geen goede of foute antwoorden. Ik wil graag dat je de vragenlijst in stilte maakt, daarna mag je iets voor jezelf doen aan je tafeltje. Als je je vragenlijst af hebt, leg je hem ondersteboven op de hoek van je tafel neer.

* onderzoeker loopt rond om eventuele vragen van kinderen te beantwoorden*

Ik zie dat iedereen de vragenlijst gemaakt heeft. We gaan even een spelletje doen als pauze en daarna verder met de volgende vragenlijst. Wie weet er een leuk spelletje als pauze?

* we doen een spelletje met de hele klas*

Nu gaan we de tweede vragenlijst doen. Deze is denk ik wat moeilijker dan de tweede vragenlijst. Pak je papier er maar weer bij en ga naar de volgende vragenlijst toe. We maken eerst weer de twee voorbeeldvragen. Voorbeeld vraag 1: ik hou van softijs. Wat vind jij? Zet weer een figuurtje om het getal dat bij jou past. Lees nu voorbeeldvraag 2. Deze vragenlijst is denk ik moeilijker en daarom ga ik elke vraag voorlezen. Als je het al snapt mag je zelf verder gaan. Als je klaar bent pak je weer iets voor jezelf om aan je tafeltje te doen in stilte.

* de onderzoeker leest alle vragen voor en geeft waar nodig nog iets meer uitleg*

Ik zie dat iedereen klaar is met de tweede vragenlijst. Ik kom de vragenlijsten zo ophalen. Ik wil jullie heel graag bedanken voor jullie deelname aan mijn onderzoek!

PREDICTION OF CHILDREN'S SPELLING PERFORMANCE BY METACOGNITION, MOTIVATION FOR SPELLING, AND HOME LITERACY EXPERIENCES

Appendix F Risk Analysis

Potential risks:

1. Recruitment participants: I need informed consents from the parents of the children. It can take some time before all parents received the informed consent and before I got all informed consents back. I cannot start with the questionnaires before I got all informed consents back. I have to keep good contact with the parents and send reminders about the informed consents.
2. Conducting questionnaires: Conducting the questionnaires takes time. In education teachers don't have that much time. So, maybe I have to wait a while before I can conduct the two questionnaires. I have to ask the teachers immediately when there is time to conduct the questionnaires.
3. Objection parents: Maybe parents will object, because the questionnaire about HLE is too personal. Unfortunately, I cannot let them fill in the questionnaire anonymous, because I have to link the questionnaire about HLE to the children's questionnaires. Or they think that the questionnaires are too stressful for the children. I can show parents the questionnaires, so they can see it is a short questionnaire.

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Appendix G FETC form

APPLICATION FORM FOR THE ASSESSMENT OF A RESEARCH PROTOCOL BY THE FACULTY ETHICS REVIEW BOARD (FERB) OF THE FACULTY OF SOCIAL AND BEHAVIOURAL SCIENCES

General guidelines for the use of this form

1. This form can be used for a single research project or a series of related studies (hereinafter referred to as: "research programme"). Researchers are encouraged to apply for the assessment of a research programme if their proposal covers multiple studies with related content, identical procedures (methods and instruments) and contains informed consent forms and participant information, with a similar population. For studies by students, the FERB recommends submitting, in advance, a research programme under which protocol multiple student projects can be conducted so that their execution will not be delayed by the review procedure. The application of such a research programme must include a proper description by the researcher(s) of the programme as a whole in terms of the maximum burden on the participants (e.g. maximum duration, strain/efforts, types of stimuli, strength and frequency, etc.). If it is impossible to describe all the studies within the research programme, it should, in any case, include a description of the most invasive study known so far.
2. Solely the first responsible senior researcher(s) (from post-doctoral level onwards) may submit a protocol.
3. Any approval by the FERB is valid for 5 years or until the information to be provided in the application form below is modified to such an extent that the study becomes more invasive. For a research programme, the term of validity is 2 years and any extension is subject to approval. The researcher(s) and staff below commit themselves to treating the participants in accordance with the principles of the Declaration of Helsinki and the Dutch Code of Conduct for Scientific Practices as determined by the VSNU Association of Universities in the Netherlands (which can both be downloaded from the FERB site on the Intranet[1]) and guarantee that the participants (whether decisionally competent or incompetent and/or in a dependent relationship vis-a-vis the researcher or not) may at all times terminate their participation without any further consequences.
4. The researcher(s) commit themselves to maximising the quality of the study, the statistical analysis and the reports, and to respect the specific regulations and legislation pertaining to the specific methods.
5. The procedure will run more smoothly if the FERB receives all the relevant documents, such as questionnaires and other measurement instruments as well as literature and other sources on studies using similar methods which were found to be ethically acceptable and that testify to the fact that this procedure has no harmful consequences. Examples of studies where the latter will always be an issue are studies into bullying behaviour, sexuality, and parent-child relationships. The FERB asks the researcher(s) to be as specific as possible when they answer the relevant questions while limiting their answers to 500 words maximum per question. It is helpful to the FERB if the answers are brief and to the point.

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6. **Our FAQ document that can be accessed through the Intranet provides background information with regards to any questions.**
7. The researcher(s) declare to have described the study truthfully and with a particular focus on its ethical aspects.

Signed for approval[2]:

Date: January 24, 2019

A. **GENERAL INFORMATION/PERSONAL DETAILS**

1.

1. a. Name(s), position(s) and department(s) of the responsible researcher(s):

Bertine Gerritsma, master student from Utrecht University

2. Title of the study or research programme - Does it concern a single study or a research programme? Does it concern a study for the final thesis in a bachelor's or master's degree course?:

Research for a master degree in Educational Sciences

3. Type of study (with a brief rationale):

This study has a predictive research design. The conditions in the four classrooms are not manipulated. The participants are not divided in two groups, but all participants stay in the natural classroom situation.

4. Grant provider:

Utrecht University

5. Intended start and end date for the study:

Start date: November 1, 2018

End date: June 19, 2019

6. Research area/discipline:

Cognition

7. For some (larger) projects it is advisable to appoint an independent contact or expert whom participants can contact in case of questions and/or complaints. Has an independent expert been appointed for this study?[3]:

No, this is not a large project. Questions/complaints can be mailed to me.

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8. Does the study concern a multi-centre project, e.g. in collaboration with other universities, a GGZ mental health care institution, a university medical centre? Where exactly will the study be conducted? By which institute(s) are the executive researcher(s) employed?:

The study will be performed by one researcher. No other companies or universities are involved in this study.

9. Is the study related to a prior research project that has been assessed by a recognised Medical Ethics Review Board (MERB) or FERB?

No.

B. SUMMARY OF THE BACKGROUND AND METHODS

Background

1. What is the study's theoretical and practical relevance? (500 words max.):

The decrease in students spelling performances are worrying, because students and adults who have difficulties in writing and spelling are at a disadvantage in this era. there is a lot of evidence about the reading development, but less about the spelling development. Also only a few investigated the predictors of spelling development in depth. Little research has been done on a combination of cognitive, motivational and environmental factors that contribute to spelling performance.

2. What is the study's objective/central question?:

To what extent does metacognition, motivation and literacy experiences at home influence the spelling performance of third grade elementary school.

3. What are the hypothesis/hypotheses and expectation(s)?:

It is expected that metacognition, motivation and literacy experiences at home are related to spelling performance.

Design/procedure/invasiveness

4. What is the study's design and procedure? (500 words max.):

This study has a predictive research design. First, parents were informed about the research per email and they were asked to fill in the informed consent. The informed consent was send as an attachment per email, but were also printed given to the children. Hereafter, a pilot version of the cognitive test, motivation questionnaire and literacy experiences questionnaire was done to check whether the tests were good to use in practice and if there were any uncertainties. Following this, some adjustments have been made to improve the cognitive test and questionnaires. One parent filled in the literacy experiences questionnaire and one child filled in the motivational test and did the cognitive test.

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The activities described below were done in a chronological order. The literacy experiences test was sent per e-mail to the parents, but was also given on printed paper in the classroom. Per child one parent was asked to complete the questionnaire about literacy experiences at home. Parents filled in this questionnaire at home or at another chosen location.

The cognitive tests were taken during school time. All participants made the cognitive tests in the morning between nine and twelve o'clock. For practical reasons administering the tests to the four classes was spread out over four/eight days. One by one, children were taken out of the classroom. The test was conducted under the presence of the leader of the study. The test took place in a room where extra supervision is normally provided. In this room the participants have no distraction from other children. The tests were conducted on printed paper.

The motivational tests were also taken during school time and were spread out over four days. The questionnaires were conducted in the own classroom of the children. Per class the children filled in the questionnaire at the same time under presence of the leader of the research and the class teacher. During the questionnaire children were asked to fill in the questionnaire by themselves and in silence. The children were able to ask questions to the research leader by raising their fingers.

5.

1. Which measurement instruments, stimuli and/or manipulations will be used?[4]:

- To measure the level of metacognition subscales of the Metacognitions Questionnaire for Children (MCQ-C) was administered
- To measure the extent to which children were motivated the children filled in the Questionnaire Measure of Children's Motivations for Reading
- To measure literacy experiences at home a questionnaire is used.

1. What does the study's burden on the participants comprise in terms of time, frequency and strain/efforts?:

- About 40 minutes. The children have to put effort in making the tests and questionnaires. The parents need maximum ten minutes for completing the HLE questionnaire.

1. Will the participants be subjected to interventions or a certain manner of conduct that cannot be considered as part of a normal lifestyle?:

- No, fill in questionnaires and making tests belong to a normal lifestyle.

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1. Will unobtrusive methods be used (e.g. data collection of uninformed subjects by means of observations or video recordings)?:

No, children are asked to participate in a research.

1. Will the study involve any deception? If so, will there be an adequate debriefing and will the deception hold any potential risks?:

No.

6. Will the participants be tested beforehand as to their health condition or according to certain disorders? Are there any inclusion and/or exclusion criteria or specific conditions to be met in order for a participant to take part in this study?:

No.

7. Risks for the participants -

- a. Which risks does the study hold for its participants?:

Less time for learning other things.

- b. To what extent are the risks and objections limited? Are the risks run by the participants similar to those in daily life?:

This limited time to learn other things is an objection. When children are a day ill, they also have less time to learn things.

1. How does the burden on the participants compare to the study's potential scientific contribution (theory formation, practical usability)?:

This is in balance.

9. Will a method be used that may, by coincidence, lead to a finding of which the participant should be informed?[5] If so, what actions will be taken in the case of a coincidental finding?:

The research will not lead to findings that really have to be shared with participants.

Analysis/power

10. How will the researchers analyse the data? Which statistical analyses will be used?:

Hierarchical regression

11. What is the number of participants? Provide a power analysis and/or motivation for the number of participants. The current convention is a power of 0.80. If the study deviates from this power, the FERB would like you to justify why this is necessary:

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The present study doesn't meet the current convention to have a power of 0.80. In total, 51 children and their parents were asked to join the research, of these, 37 children were allowed to participate in the study. According to Ghasemi and Zadediasl (2012) the violation of the normality assumption is valid the sample size is above 30. For pilot studies, a sample between 25-40 participants is necessary to determine the internal consistency for developed instruments (Hertzog, 2008). In statistics some researchers use a rule of thumb when determining a sample size (Statistics Solutions, 2019). For regression analysis one rule of thumb is a minimum of ten participants per variable (Statistics Solutions, 2019). In this study three independent variables are used, so a minimum of 30 participants is essential. On the other hand, VanVoorhis and Morgan (2007) name that a sample size of approximately 50 participants is necessary for a regression analysis. This would mean that the sample size in this study is slightly unpowered. For this reason, the results must be carefully considered.

C. PARTICIPANTS, RECRUITMENT AND INFORMED CONSENT PROCEDURE

1. The nature of the research population (please tick):

1. General population without complaints/symptoms

2. Age category of the participants (please tick):

- 12 years or younger

3. Does the study require a specific target group? If so, justify why the study cannot be conducted without the participation of this group (e.g. minors): No.

4. Recruitment of participants -

1. How will the participants be recruited?

Inconvenient sampling

1. How much time will the prospective participants have to decide as to whether they will indeed participate in the study?:

1 week.

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5. Does the study involve informed consent or mutual consent? Clarify the design of the consent procedure (who gives permission, when and how). Does the study involve active consent or passive consent? If no informed consent will be sought, please clarify the reason:

Yes, the parents of the children fill in an informed consent, because the participants are under the age of eighteen.

6. Are the participants fully free to participate and terminate their participation whenever they want and without stating their grounds for doing so?:

Yes.

7. Will the participants be in a dependent relationship with the researcher?:

No, the participants aren't in a dependent relationship with the researcher, but they do are acquaintances of the researcher.

8. Compensation

1. Will the participants be compensated for their efforts? If so, what is included in this recompense (financial reimbursement, travelling expenses, otherwise). What is the amount?

No.

1. Will this compensation depend on certain conditions, such as the completion of the study?

No.

D. PRIVACY AND INFORMATION

1.

1. Will the study adhere to the requirements for anonymity and privacy, as referred to in the Faculty Protocol for Data Storage[6]?:

- anonymous processing and confidential storage of data (i.e. storage of raw data separate from identifiable data): **yes/no**
- the participants' rights to inspect their own data: **yes/no**
- access to the data for all the researchers involved in the project: **yes/no**

If not, please clarify.

1. Has a Data Management Plan been designed?

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No.

2.

1. Will the participant be offered the opportunity to receive the results (whether or not at the group level)?:

This is not offered, but parents can ask for results on an individual level.

1. Will the results of the study be fed back to persons other than the participants (e.g. teachers, parents)?:

Only to parents at an individual level if they want.

If so, will this feedback be provided at the group or at the individual level?

Individual level.

3.

1. Will the data be stored on the faculty's data server?: **yes/no**

1. Will the data that can be traced back to the individual be stored separately on the other faculty server available for this specific purpose?:

Yes.

If not, please clarify where will the data be stored instead?:

E. ADDITIONAL INFORMATION

Optional.

F. FORMS TO BE ENCLOSED (CHECKLIST)

- Text (advert) for the recruitment of participants
- Information letter for participant
- Informed consent form for participants
- Written or oral feedback information (debriefing text)
- (Descriptions of) questionnaires
- (Descriptions of) measurement instruments/stimuli/manipulations
- Literature/references

Signature(s): Bertine Gerritsma

Date and place: June 10, 2019

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Name, position:

[1] See: <https://intranet.uu.nl/facultaire-ethische-toetsingscommissie-fetc>

[2] The senior researcher (holding at least a doctoral degree) should sign here.

[3] This contact may, in principle, also be a researcher (within the same department, or not) who is able to respond to the question or complaint in detail. Independent is to say: not involved in the study themselves. The FERB upholds that an independent contact is not obligatory, but will be necessary when the study is more invasive.

[4] Examples: invasive questionnaires; interviews; physical/psychological examination, inducing stress, pressure to overstep important standards and values; inducing false memories; exposure to aversive materials like a unpleasant film, video clip, photos or electrical stimulus; long-term of very frequent questioning; ambulatory measurements, participation in an intervention, evoking unpleasant psychological or physical symptoms in an experiment, denial, diet, blood sampling, fMRI, TMS, ECG, administering stimuli, showing pictures, etc. In case of the use of a device (apparatus) or administration of a substance, please enclose the CE marking brochure for the relevant apparatus or substance, if possible.

[5] For instance: dementia, dyslexia, giftedness, depression, extremely low heartbeat in an ECG, etc. If coincidental findings may be found, this should be included in the informed consent, including a description of the actions that will be taken in such an event.

[6] This can be found on the Intranet: <https://intranet.uu.nl/wetenschappelijke-integriteit-facultair-protocol-dataopslag>

[7] The senior researcher (holding at least a doctoral degree) should sign here.