Masterthesis

Designing an observation and registration instrument for monitoring executive functions in primary school students.

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Mirte Bergman

1st supervisor: Alieke van Dijk
2nd supervisor: Marieke van Geel

External organization: Bazalt
Supervisors: Liesbeth van Waas &
Anne-Marie Dogger-Stigter

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Abstract

Teachers must be able to gain insights about their students' executive function skills, in order to provide the right conditions and support needed to strengthen them. These insights can be obtained by structural monitoring the development of the executive function skills using an adaptive student tracking system. The aim of the current study is on designing an observation and registration instrument for monitoring executive functions in primary school students.

To determine which elements such an instrument should contain, a needs assessment is conducted among teachers. The results from the needs assessment have been analyzed thematically. Regarding the instrument in general, the results show that it should monitor the executive functions of all students in class, be time efficient, be proactive in use and able to be interpreted by teachers themselves, and provide interventions based on the results. Furthermore, five core elements are distinguished from the results: 1) information, 2) observation, 3) teacher registration, 4) student registration, and 5) reports. Literature review is performed on the important aspects of these five elements to determine what should be included within each one of them. Subsequently, based on the findings from the needs assessment and literature review, design recommendations are given.

To visualize the recommendations, sample pages have been designed and a detailed design of the *KIJK! Verder – EF* instrument is made. An expert focus group has been held to gather feedback on this initial design, whereafter recommendations for the second version of the design are given.

The design from the current study is a solid foundation for developing the online environment and pilot-testing with the target audience. A recommended next step for the *KIJK! Verder – EF* instrument, is to research and design the 'output-side' concerning the data one wants to obtain from the instrument. Once this element is also established, the design from the current study can be refined.

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Introduction

Problem statement

Executive functions are important for students'[1] success in all aspects in life (Delis et al., 2007). They help students to regulate their behavior, allow them to organize their behavior over time, override immediate demands in favor of long-term goals, plan and organize activities, and sustain attention. Moreover, executive functions help students to persist to complete a task and enable them to manage their emotions and monitor thoughts to work more efficiently and effectively (Dawson & Guare, 2018, p.3).

Executive functions are used daily for performing different tasks (Cartwright, 2012). To complete these tasks and manage their own behavior, individuals must purposefully guide their mental processes and actions to meet goals. However, students are not always capable to consciously use their own executive function skills (Thorell et al., 2009) and find it difficult to transfer these skills to real-world situations (Guare, 2014). Moreover, it is hard for students to determine when certain skills need support. They are often unaware of deficits and when they are aware, they find it difficult to indicate to others what exactly needs improvement (Thorell et al., 2009). Therefore, the development of executive functions will require 'surrogate assistance' in the form of environmental support or scaffolding (Guare, 2014). Individual differences in the development of executive functions preclude absolute rules for the types of support that need to be provided by any particular age (Guare, 2014). Teachers must be able to gain insights about their students' executive function skills, in order to provide the right conditions and support needed to strengthen them. Therefore, behavior analyses (e.g., observations of the child's behavior in a particular context) are required to understand what executive challenges are impacting school performance. With this information, the degree of support needed to facilitate successful execution of behavior can be determined (Guare, 2014; Dawson & Guare, 2018, p.11).

In Dutch primary education, student tracking systems (e.g., *Cito LOVS or IEP LVS*) are used to gain insight into the academic progress of students over the years (Wij-leren.nl, 2021). However, the information received by the teacher using these systems tends to focus only on basic achievement skills and intellectual functions (Delis et al., 2007). An adequate and comprehensive evaluation of other important skills, such as executive function skills, are

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[1] When referring to 'students', the current study focuses on the elementary school age group.

usually not provided by these more regular systems. To monitor executive function skills over the years, a more adaptive student tracking system would need to be addressed.

The Center for the Developing Child at Harvard University (2011, p.13) clearly notes that educational professionals would be better equipped to understand and adjust behavioral and learning challenges in their classrooms if there were easy to use tools for evaluating the development of executive function skills. Two instruments that are currently available for screening students' executive functioning at school and for detecting high-risk factors that can cause learning difficulties, are the Executive Functions Questionnaire; EFQ (Executieve Functies Vragenlijst) and the Behavior Rating Inventory of Executive Function version 2; BRIEF-2 (Scholte & Van der Ploeg, 2019; Gioia et al, 2000). Although both the EFQ as the BRIEF-2 are useful for assessing cognitive functions, they are less suitable for teachers as a classical screening or tracking instrument (Verhoeven & Andersen-Boers, 2008).

First, both instruments are aimed at the individual student and take a reactive problem-solving approach. Reactive problem-solving deals with a problem after it has occurred and became cause of one or more incidents (Kush, 2013). The questionnaires are deployed at the time that a student already struggles with executive functioning tasks or shows problem behavior in one or more of these areas. In a more ideal situation, when taking a more proactive problem-solving approach, struggles are actively looked for and occurrence of problems or incidents can be prevented, instead of solved (Kush, 2013).

Second, filling in the EFQ or BRIEF-2 for one student alone is extremely time consuming and there are certain costs involved. It is not feasible to use these questionnaires for all children in class. Lengthy questionnaires are not desirable for frequent use, as Dutch primary school teachers already experience high workload (van Droogenbroeck, Spruyt & Vanroelen, 2014; Meindertsma & van der Parre, 2017).

Third, the results from the instruments may only be interpreted by experts. For the EFQ it is specifically mentioned that it can only be interpreted by a psychodiagnostics expert. For the BRIEF-2 a qualification level B is required for the interpreter: extensive knowledge of test construction, application, and interpretation. This qualification can only be obtained via a master's degree or doctorate in psychology or (ortho)pedagogy. As few teachers have these qualifications, an external party has to be called in to interpret the results. This makes the teacher dependent on the availability and timeframe of the external party and therefore cannot act on the exposed behavior immediately.

Fourth, the EFQ and BRIEF-2 do not directly lead to recommendations for action; a translation step is necessary to determine what interventions are needed, which takes extra time and effort. As stated before, teachers already experience high workload. Thus, it is desirable to have an integrated system in which interventions are proposed.

In conclusion, the Dutch educational system currently contains no practical screening of the executive functions and provides no tracking instrument that: 1) monitors the executive functions of all students in class, 2) is time efficient, 3) can be proactively used and interpreted by teachers themselves, and 4) provides interventions based on the results. Therefore, the focus of the current study is on designing an observation and registration instrument that meets these four requirements. The primary goal of the instrument is to assess executive function skills and create more understanding of how challenges associated with executive functioning can have an impact on school performance (Dawson & Guare, 2018, p.11). By assessing executive function skills with enough precision, one can create effective intervention strategies either to reduce the negative impact or to help the student overcome those challenges to become a more successful student (Dawson & Guare, 2018, p.11).

Theoretical framework

Many definitions of executive functions exist in the field of educational research. In general, there is consensus that executive functions are all the cognitive skills needed to regulate your thinking, feeling, and behavior, often to reach a goal (Branstetter, 2013, p. 14; Dawson & Guare, 2018).

There are four executive functions that help to select and achieve goals or to develop problem solutions (Dawson & Guare, 2018): 1) *working memory*; the ability to hold information in mind while performing complex tasks, 2) *planning and organization*; the ability to create a roadmap to reach a goal, complete a task and design and maintain systems for keeping track of information or materials, 3) *time management*; the capacity to estimate how much time one has, how to allocate it, and how to stay within time limits and deadlines, and 4) *metacognition*; the ability to reflect on oneself, self-monitor the process and self-evaluate the product.

Above that, there are six executive functions that help students to guide their behavior as they move along the path (Dawson & Guare, 2018; Herrewijn & Monfils, 2020): 1) *response inhibition*; the capacity to think before you act hold back, and control one's impulses,

2) *emotional control*: the ability to manage emotions in order to achieve goals, complete tasks, or control and direct behavior, 3) *sustained attention*; the capacity to maintain attention for a situation or task without getting distracted by internal or external stimuli, 4) *task initiation*; the ability to begin a task without undue procrastination, in a timely fashion, 5) *flexibility*; the ability to revise plans in the face of obstacles, setbacks, new information, or mistakes, and 6) *goal-directed persistence*; the drive to follow through to the completion of a goal and not be put off by other demands or competing interests.

The terms used for the executive functions are rather complex and therefore difficult for elementary school students to understand. Herrewijn and Monfils (2020) state that the technical terms of the executive functions are meaningless to primary school students. Though, it is important that the students become familiar with the executive functions to gain more insight in them and to be able to recognize and deploy them. To explain complicated concepts like executive functions to children, it may be helpful to use imagery and simplified terms (Branstetter, 2013, p. 17). In the teaching method *Brain Heroes* (Herrewijn & Monfils, 2020), the executive functions are explained in a child-friendly language and the 'meaningless' executive functions are converted into so called *Brainpowers*. Table 1 provides an overview of the executive functions and their corresponding Brainpowers.

Table 1. *Translation of executive functions into Brainpowers*

Executive function	Brainpower
Working memory	Remember and Do-power
Planning and organization	Plan and Organize-power
Time management	Time-power
Metacognition	Mirror-power
Response inhibition	Stop-power
Emotional control	Feeling-power
Sustained attention	Attention-power
Task initiation	Start-power
Flexibility	Bend-power
Goal-directed persistence	Perseverance power

Note. Translated from Dutch

The potential for executive functions is essentially innate (Dawson & Guare, 2018). The functions begin to develop in early infancy and continue to develop well into adolescence and early adulthood (Dawson & Guare, 2018; Severson, 2021a, Juric et al., 2013). A number of factors, both biological and environmental, influence how executive function skills are actually developed (Dawson & Guare, 2018). What can influence the development of the executive functions biologically are a child's genes. For example, if parents do not have good organization or time management skills, there is reasonable chance that the child will evidence these weaknesses. Of course, this also applies the other way around: when the parents themselves have good emotional control, they are more likely to pass this on to their children. Environmental factors that can influence a child's executive function development include anything from the social-economic status to the home environment.

At the primary school age (six to twelve years), children are quickly developing executive functions that relate to academic work (Dawson & Guare, 2018). They use their working memory to recall and integrate information into their current knowledge, planning and organization to keep track of their own things and manage their own time with school-based assignments, and they develop initiation to begin a task, even if it is not motivating. Moreover, children are starting to internalize time (they are learning to estimate how long tasks should take) and continue to develop emotional control and inhibition. Students become more aware of their executive function skills at the primary school age (Guare, 2014). Teachers need to respond to this by offering the opportunity to enhance those skills. In order to create the right conditions that will strengthen the development of executive functions, teachers must have insight into the executive functions that require support. These insights can be obtained by structural monitoring the development of the executive function skills (Dawson & Guare, 2018). With this information, the right degree of support can be determined, and the needs of the students can be met. Research (Jolles, 2016) has shown that the use of various activities and interventions is effective in the strengthening of executive function skills. In doing so, teachers stimulate learning motivation and study performance and can provide students with a solid, broad basis for their personal development (Van der Donk & Jolles, 2017). By training and strengthening the executive function skills of students, they will gradually improve to manage themselves in a better way. Teachers will have to spend less time on directing students and will therefore have more time for guidance and extended instruction.

Research question

To support teachers in monitoring the executive functioning of their students and provide them with a practical tool, the following research question is answered in the current study: *"Which elements does an observation and registration instrument need to contain, to monitor executive functioning in primary school students (aged 6 to 12)?"* The current study aims to deliver a detailed design of the *KIJK! Verder – EF* instrument.

Research Design and Methods

The current study is performed by using a qualitative research design, namely the educational design research (EDR). EDR is a genre of research in which the iterative development of solutions to complex educational problems provides the setting for scientific inquiry (McKenney & Reeves, 2012). The solutions that result from EDR can be educational products, processes, programs, or policies (McKenney & Reeves, 2012). The visual model that portrays the overall process of EDR from the researcher perspective is shown in Figure 1.

Figure 1. *Generic model for conducting design research in education*
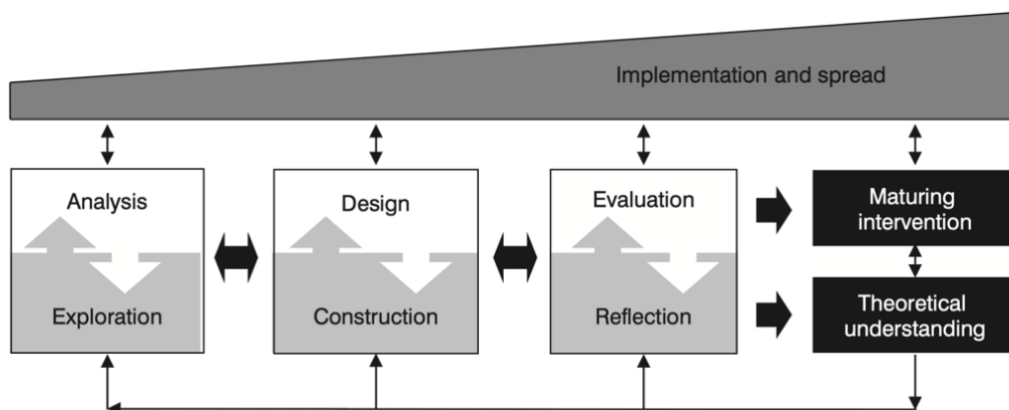
EDR consists of three core phases: 1) Analysis and Exploration, 2) Design and Construction, and 3) Evaluation and Reflection. In the current study, the Analysis and Exploration phase was used for preliminary research: identifying the problem, developing a conceptual and theoretical framework, and conducting a needs analysis. The Design and Construction phase consisted of the interpretation of results and review of literature in order to make recommendations based on substantiated design choices. These design choices were subsequently incorporated in an extensive instrument-design. The Evaluation and Reflection

phase was used to perform a semi-summative evaluation of the design. The results from this phase resulted in recommendations for improvement of the design.

The entire process was iterative and flexible. For example, the results from the needs assessment (first phase) fed into the second phase, and the design from the second phase again served as input for the third phase. Moreover, interaction with practice (implementation and spread) was present form the start and played a great role throughout the single, integrated research and design process.

Analysis and Exploration

Respondents

Nine primary school employees from schools throughout the Netherlands have participated in the needs assessment of the current study. Although specifically teachers of grade 3 to 8 were asked to fill in the questionnaire, one of the respondents was not a teacher at the time of participation. This respondent was an internal supervisor on a primary school but has taught in the past. Therefore, the answers of this respondent were still included. The other eight respondents were all primary school teachers. Two respondents teach several grades (namely grade 3/4/5, and grade 7/8), two respondents teach grade 3 and four respondents teach grade 7. Hereby, all the grades are represented in the results except for grade 6. Six of the respondents are familiar with the educational teaching method Brain Heroes. Three of them use the method in their classroom.

Instrumentation
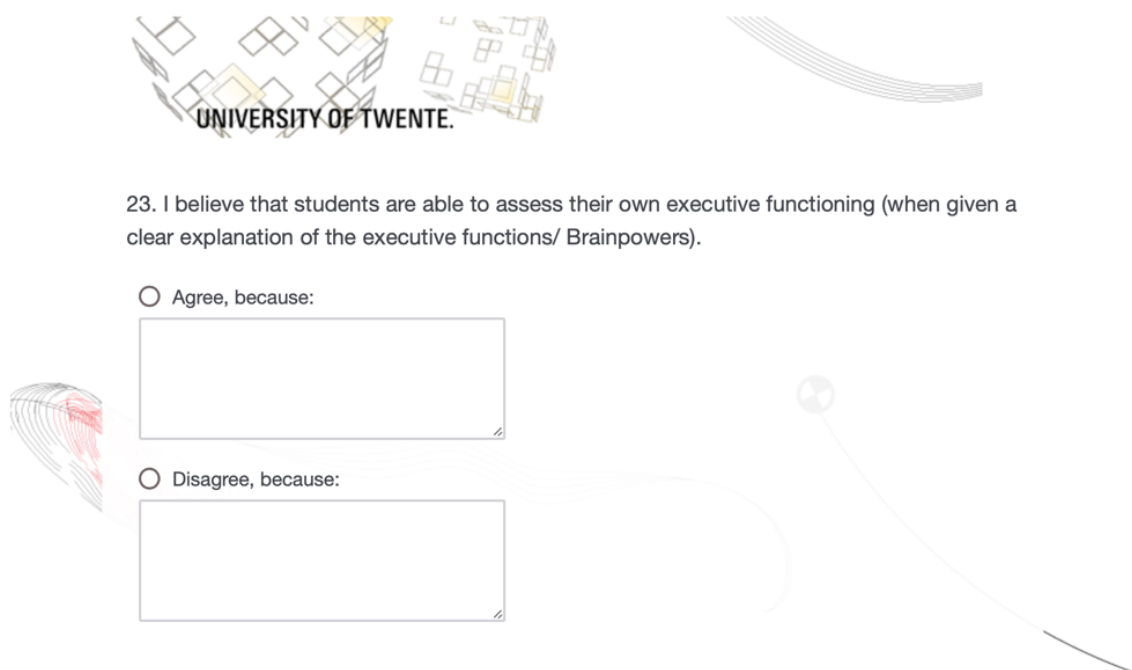
A newly developed questionnaire (see appendix A) was used during the analysis and exploration phase to conduct a needs analysis among primary school teachers. A needs assessment gives insight into the wants and needs of the target audience (Kaufman & English, 1979). The questionnaire was set up using the online survey tool Qualtrics.

The questionnaire started with a brief explanation of the project, information about the structure of the questionnaire and an informed consent form. The first part of the instrument consisted of three general questions, focusing on what grade the respondent teaches, what the teaching staff within the class consists of (e.g., teacher assistants, interns), and if the respondent is familiar with the Brain Heroes method.

The purpose of the second part of the questionnaire was to identify specific problems, define services currently not being provided and determine the wants and needs of the target population. The respondents were asked fifteen open-ended questions, covering four main topics: 1) aspects of the executive functions, e.g. '*What would you like to measure about your students' executive functioning?*', 2) means of information processing, e.g. '*What do you prefer regarding the way of assessing a student's mastery of an executive function?*', 3) likes and dislikes concerning the useability of the instrument, e.g. '*When is the instrument valuable to you?*', and 4) student involvement, e.g. '*What would you like to know from the students themselves; what kind of input should the students be able to give?*'. The questions were drafted in collaboration with two experts of Bazalt Publishing.

The third part of the questionnaire consisted of four statement-questions. These questions focused on gathering the opinion and preferences of the target audience about four topics: 1) the use of real-life situation examples, 2) student self-assessment, 3) the deployment of the instrument, and 4) the level of monitoring. For topic 1 and 2, respondents needed to indicate whether they agreed or disagreed with the given statement and why (see figure 2). For topic 3 and 4, respondents needed to express their preference by making a choice between two given statements and explain their choice (see figure 3).

Figure 2. *Agree or disagree statement-question*

Note. Translated from Dutch

Figure 3. *Preference statement-question*

21. Which statement about the use of the 'KIJK! Verder- EF' instrument applies to you?

Statement 1: I would especially like to use the 'KIJK! Verder – EF' instrument to identify and monitor problems in the field of executive functioning in some children in my class.

Statement 2: I would like to use the 'KIJK! Verder – EF' instrument for all children in my class, to monitor both problems and excellence in the field of executive functioning.

◯ Statement 1, because:

◯ Statement 2, because:

Note. Translated from Dutch

On the closing page of the questionnaire, respondents were thanked for their participation. Furthermore, the respondents were given the opportunity to register for the focus group. They could therefore click on a link that forwarded them to another short questionnaire, in which their contact details (name and e-mail) were asked. By forwarding participations to a new questionnaire, the anonymity of the main questionnaire could still be guaranteed.

Procedure

An open weblink to the questionnaire was distributed by the researcher via e-mail, LinkedIn, and WhatsApp. The weblink was also forwarded by people from the researcher's network. Along with the weblink was a short text with an explanation of the project and the requirements to participate in the needs assessment. The respondents could fill in the questionnaire online at a preferred time and place. It took the respondents an average of 19 minutes to fill in the questionnaire. Informed consent to use the data derived from the answers was given by the respondents prior to answering the questions. The questionnaire was available for a period of four weeks.

Data analysis

The data from the needs assessment was used to determine what should be included in the instrument and what the core elements were going to be. In order to distinguish recurring topics in the answers given, the data must be organized. The answers from the questionnaire were downloaded into an Excel document and then organized using thematic analysis. Thematic analysis is a method for identifying, analyzing, and interpreting patterns of meaning ('themes') within qualitative data (Clarke & Braun, 2017).

At the start of the analysis, the responses were thoroughly read to get an early understanding of the respondent's answers. Themes were made up based on what the researcher saw in the data (inductive coding). Answers that fell within the same theme were given the same color. The themes were reviewed multiple times, and then defined and named. The five generated themes were: 1) Information, 2) Observation, 3) Registration, 4) Student involvement, and 5) Reports.

Information. This theme included the needs regarding the information teachers would like to have prior to observing or registering. The answers scaled under this theme mentioned something about a learning trajectory (linked to age, compared to peers, or by goals), the learning process and thinking steps of students, and/or the explanation of the executive functions (definition, situation examples, characteristic behavior, etcetera). For example: *'Which behavior belongs to which EF; at what age should they be able to do something', 'What are the thinking steps that a student uses',* and *'Clear description of the various executive functions, preferably with an example'.*

Observation. This theme included the needs regarding the way of observing executive functions and what is needed to do so. The answers scaled under this theme mentioned something about observed behavior and/or assessing students based on observations. For example: *'Preferably a list in which observation points can simply be checked. Possibly with an option to add a short note', 'What I see in class. For example, multiple assessment moments on different days with different subject',* and *'Clear statements in the instrument: e.g., The student can work quietly and concentrated for 5 minutes'.*

Registration. This theme included the needs regarding the ways of determining where students stand in terms of executive functioning. The answers scaled under this theme mentioned something about skill scores, the development of executive function skills, and/or

the mastery level of executive functions. For example: *'Which EF are most, and which are least mastered'* and *'A particular skill score that indicates the degree of mastery'*.

Student involvement. This theme included the needs regarding the role of the students within the instrument and students assessing their own executive functioning. The answers scaled under this theme mentioned something about the ways of gathering input from students and/or what students can say about their own executive function skills. For example: *'A separate questionnaire completed by the children could help', 'Students should rate or indicate how they think they are doing by means of example statements',* and *'Students are perfectly capable of looking at themselves and pointing out areas for improvement'*.

Reports. This theme included the needs regarding the steps that could be taken after the observation and registration are completed. The answers scaled under this theme mentioned something about the kind of results and interventions the instrument should provide for teachers to be able to improve the executive functioning of students. For example: *'What would be the next step to encourage students to train these executive functions', 'Make visible which interventions you can take in case a student lags',* and *'Personal learning plans. Although children all have their own strengths and weaknesses, they must be able to function within the group'.*

The five themes formed the core elements of the instrument. Per element, the opinions and suggestions that were brought up by more than one respondent were considered relevant output. This choice was made, due to the low number of respondents. Answers that were only given once, were individually assessed by the researcher on relevance. The researcher checked whether such an answer was in line with other relevant statements and if it therefore was of value.

Design and Construction

Instrumentation

A literature review was conducted to gain information about the generated themes and to gather findings to substantiate design choices. In order to carry out this literature review, the researcher benefited mainly from two publication databases (Google Scholar and Scopus) to cover related publications about executive functioning.

To compose example pages for the *KIJK! Verder – EF* design, Canva Pro was used. This is an online graphical design platform.

The findings from the needs assessment were mainly directive for the subjects literature review was performed on. For each element, research was done on the needs of the respondents, to see if these needs could be justified and validated. Additional research was done on the characteristics of the element. For example, research on the Observation element was done using keywords like *classroom observation, Behavior Rating Scales, Likert scale, even numbered Likert-type scales,* and *assessment student learning.* The findings were described per element. Subsequently, based on the findings from the needs assessment and literature review, design recommendations could be given. To visualize these recommendations, sample pages have been designed. Screenshots from the existing observation and registration instrument *KIJK!* were used to get the look and feel of the digital environment. Contents for the example pages were mainly derived from the Brain Heroes teaching method by Herrewijn and Monfils (2020). This preference was expressed by the client of current project; Bazalt Publishing.

After the findings from both the needs assessment and literature review were described, recommendations were given and the example pages were designed, an initial design for the K*IJK! Verder* – EF instrument was constructed. This design describes what each page looks like, what can be clicked on, where to find certain information and how to provide input. Basically, it talks the reader of the design through the steps of how to use each element within the instrument. The contents (texts and example pages) within the *KIJK! Verder – EF* design were originally written in Dutch. In the current study, they have been translated to English.

Evaluation and Reflection

Respondents

Six experts participated in the focus group. Expert A participated in the needs assessment and signed herself up for the focus group. She is a primary school teacher and contributed to the focus group as field-expert. Both Expert B and C are educational advisors at Bazalt Group and provide training on the executive functions. They contributed to the focus group as executive functions-experts. Moreover, Expert C contributed her expertise of the digital environment of *KIJK!*. Expert D is an orthopedic pedagogue, and she too provides training on the executive functions. Expert D contributed to the focus group as expert of the

development (of executive functions) of children. Expert E is a learning and development specialist and contributed to the focus group as didactical expert. Lastly, Expert F is a health care psychologist and one of the authors of the Brain Heroes teaching method. She contributed to the focus group as expert of executive function awareness with kids.

Instrumentation

An expert focus group was organized to gather feedback on the initial design of the *KIJK! Verder – EF* instrument. A focus group is a small group of carefully selected respondents who contribute to open discussions for research. During the *KIJK! Verder – EF* focus group, the feedback, opinions, knowledge, and insights of a group of experts was gathered on the first version of the design.

Procedure

The experts were approached via e-mail to ask if they could participate in the focus group. Eventually, six experts agreed to participate. Prior to the focus group, the experts received an invitation with the link to the Microsoft Teams environment, the initial *KIJK! Verder – EF design* and an overview of the executive functions.

The focus group was held online and moderated by the researcher. After a short introduction, the respondents were asked to give active informed consent for recording the session. All respondents agreed to the recording and the processing of their answers.

A PowerPoint presentation was used to moderate the focus group (see Appendix G). To give the respondents some background information, the reason behind the project was described and the problem statement was outlined. However, the main focus of the meeting was on discussing the design. First, the general recommendations for the *KIJK! Verder – EF* instrument were explained by the researcher. Hereafter, there was room for the experts to ask questions and give feedback. Second, each element within the design (information, observation, teacher registration and student registration) was discussed separately. The following structure was maintained in discussing each element: The researcher presented the findings from the needs assessment and literature review, followed by the design recommendations. Next, the worked-out examples were shown on screen and the respondents were walked through the use within the instrument. After this short 'presentation' there was again room for the respondents to ask questions and give feedback.

Three open-ended questions were asked: 1) *What is your opinion on this element?,* 2) *Which points of improvement would you have?*, and 3) *Which aspects do you like?*. Lastly, the respondents were given the opportunity to bring up additional feedback-points.

Data analysis

During the focus group, the researcher made notes of the expert-feedback, organized per element. The researcher double-checked for each point of feedback, whether the other experts agreed with it. The points of feedback were noted down when there was joint agreement. These notes, and the recording of the session, were used to write an evaluation of the initial design and give recommendations for a second version of the design.

Implementation and Spread

The development and implementation of the instrument lays beyond the scope of current project and is therefore not run through. The design can be used to develop the instrument in the online environment of *KIJK! Verder*. Implementation in the classroom will take place after the instrument is validated and approved by educational developers and other stakeholders.

Results

The most significant findings from the needs assessment and literature review are discussed below, together with the recommended design choices that could be concluded from these finding. Some general issues regarding the usability of the *KIJK! Verder – EF* instrument will be discussed first. Thereafter, each of the recommended elements for the *KIJK! Verder – EF* instrument is discussed separately (e.g., Information, Observation, Teacher registration, Student registration and Reports). Per element, findings from the needs assessment and literature review concerning the contents and components within the element are discussed. Based on these findings, recommendations for the element are described (e.g., what should it include, what aspects benefit the usability, etc.) and visualized with examples pages. Moreover, it is explained how the initial design of the *KIJK! Verder* instrument was set up and which elements and aspects are covered in the design. This design

was presented to a focus group. The main points of feedback, together with recommendations for the next version of the design are discussed in the last part of the results section.

Instrument in general
Time efficiency

Findings. In the needs assessment, each respondent mentioned at least once that using the instrument should not take up a lot of time. Respondent 4 states: '*The instrument should be directed at user friendliness. Especially in big classes, inventorying the knowledge and skills of all your students is a lot of work.*' For it to be valuable, the instrument needs to be as time efficient as possible and needs to speak for itself. Teachers should not have to do a lot of research before being able to use the instrument.

The administrative burden, such as keeping files and student tracking systems, is by far the most frequently mentioned cause of high workload (Meindertsma & van der Parre, 2017). A solution to this problem may be to make the classes smaller (less to administer), to get more help in the class or to make the systems better connected and less demanding (Meindertsma & Van der Parre, 2017).

Recommendations. Recommended is to make sure that the *KIJK! Verder – EF* instrument only takes the teacher a couple of minutes a day to keep up with. How this takes shape is discussed for each element separate below.

Access

Findings. Multiple respondents mentioned that it can be valuable if other teaching staff members can enter their observations of students' executive functioning into the instrument. For example, teaching assistants, internal supervisors or other child supervisors that work intensively with (a group of) students.

Literature shows that judgements based on multiple observations by multiple observers have strong face validity (Harris et al., 2017). Strong face validity means that the instrument measures what it is supposed to measure. Furthermore, the reliability of an assessment increases when multiple encounters are being assessed by multiple assessors in multiple settings (Singh & Sood, 2013). Thus, when multiple observers give input, the more confident you can draw conclusions about students' executive functioning.

<u>Recommendations</u>. The instrument should provide the possibility to assign teaching staff members to specific students or the whole class to make observations. Teachers can choose to enter observations of others themselves (they have to be shared with them on paper or the like) and not give access rights to others. Of course, this will take on extra time. By giving others access, input can easily be gathered from everyone involved with the students. To make clear who made which observation, the instrument should distinguish between the people giving input. For example, the text color could be different for each user, or the name of the user could be shown along the provided input.

The General Data Protection Regulation (GDPR) rules must be considered in providing access right. Therefore, it is recommended to only provide other observers access rights to the Information and Observation elements within the instrument. Access to the information element is needed for a full understanding of the executive functions. Access to the observation element is needed for the observers to enter their own observations into the instrument. The teacher(s) should be the only one(s) having access to the Teacher registration, Student registration and Reports elements. Moreover, some limitations probably have to be set for the other observers (e.g., only being able to see their own observations).

Inclusiveness

<u>Findings</u>. The majority of the respondents wants to use the *KIJK! Verder – EF* instrument for all the students in class, not only in particular 'problem-cases'. The respondents highlight that it is important to get a clear image of all students, because good executive function skills are important for everyone. By 'screening' all students, even the ones that may not stand out on a first look or do not necessarily show problem behavior, executive function deficits can be traced early on.

This point of view is supported by research as an increasing number of studies point to the importance of screening executive function skills (Oosterman et al., 2010). Executive functions are of great importance in successful adaptive living, what makes correct identification crucial to ensure adequate treatment, compensation, and support (Manchester, Priestly & Jackson, 2004). Therefore, the goal is to let the screening and the determination of deficits take place before real problems start to occur.

Recommendations. Recommended is to make a design of the *KIJK! Verder – EF* instrument with the intention that it should be used for the entire class. How this takes shape is discussed for each element separate below.

Information

Most important concepts

Findings. From the needs assessment can be concluded that teachers need a clear description of the executive functions to know what to pay attention to in the classroom, to make good observations and to classify observed behavior under the right executive function.

A widely adapted strategy to increase the reliability and validity of ratings, is by training raters to reduce common psychometric errors in their rating (Pulakos, 1986). The crucial criterion in judging performance rating quality, is accuracy. Accuracy of observation is often measured by interrater agreement (Thornton & Zorich, 1980), which is the extent to which different raters assign the same value for each item being rated (Gisev et al., 2013). Accuracy might be increased by training raters to a common frame of reference for observing, interpreting, and judging ratee performance (Pulakos, 1986; Thornton & Zorich, 1980).

Recommendations. Recommended is to include an informative table with an explanation for each executive function within the first element of the instrument. With this table, teachers are provided with the same background information, what leads to more accurate and reliable observations (Thornton & Zorich, 1980). Moreover, it is recommended to add the student-explanation (in Brainpowers) to the table. This creates a complete concept explanation about the executive functions, both in 'teachers- and student language'. When having a teacher-student-conversation about the executive functions, the teachers can use this description of the executive functions to talk about them in a child friendly way. Appendix B contains an example of the executive function information table that can be used within the instrument for grade 7 and 8. The teacher-explanation of the executive skills in this table is based on the overview provided by Dawson and Guare (2018, p. 3-4), the student-explanation is based on the information given by Herrewijn & Monfils (2020, p. 21-29).

Figure 4 shows an example of how the *Most important concepts* page could look like within the digital *KIJK! Verder* environment. The teacher must first choose which concepts he or she wants to consult by selecting the right grade and module. All concepts of a module (in this case the module 'Executive functions') are presented together in one table on a scrollable

page. This ensures that all concepts are easily accessible on one page (no need to click back and forth) and teachers are provided a complete, clear, and simple overview. It is possible for the teacher to print the overview to keep it at hand in the classroom.

Figure 4. *Example page 'Information: Most important concepts'*

Real-life situation examples

      <u>Findings</u>. Expanding on the need for clear descriptions of the executive functions, the needs assessment showed that teachers want real-life situation examples, to help them with recognizing characteristic behavior that belongs to a certain executive function. Using example situations, it can be explained how difficulties with the various executive functions manifest themselves in problem behavior (Herrewijn & Monfils, 2020, p. 11). It is often difficult to depict a situation in which only one executive function underlies the exhibited (mis)behavior, thus teachers do not only need real-life situation examples for each executive function separate, but also for situations in which interrelationships between executive functions exist.

      <u>Recommendations</u>. It is recommended to include real-life situation examples of executive function behavior to the information element. First, these real-life situation examples should be written brief, but clear. A brief example is more inviting to consult and contributes to the time efficient use of the instrument. Second, the examples should be taken

on in the digital environment as a separate part of the information element. It can be that a teacher wants to know a little more about the situation regarding a certain executive function. Therefore, it should be possible to consult examples belonging to an individual executive function on itself. Third, there also need to be real-life situation examples that show the interrelationship between executive functions.

An example of the contents for the executive function 'Working memory' can be found in Appendix C. The contents are derived from the information provided by Herrewijn and Monfils (2020, p. 11-17).

Figure 5 and 6 show examples of how the *Real-life situation examples* pages could look like within the digital *KIJK! Verder* environment. The teacher must first choose which real-life situation example he or she wants to consult by selecting the right grade, module, and skill. Figure 5 shows what will appear when selected: grade 7, Executive Functions, Working memory. On the left side of the page, the real-life situation example is shown (in the pink frame) and a short explanation of what strikes in this situation. On the right side of the page, themes portraying the inter-relationship between working memory and other executive functions are shown. By clicking on one of the themes, a pop-up screen appears with a full explanation. This layout portrays all information belonging to one specific executive function together on one page, which creates a complete overview.

Figure 5. *Example page 'Information: Real-life situation examples'*
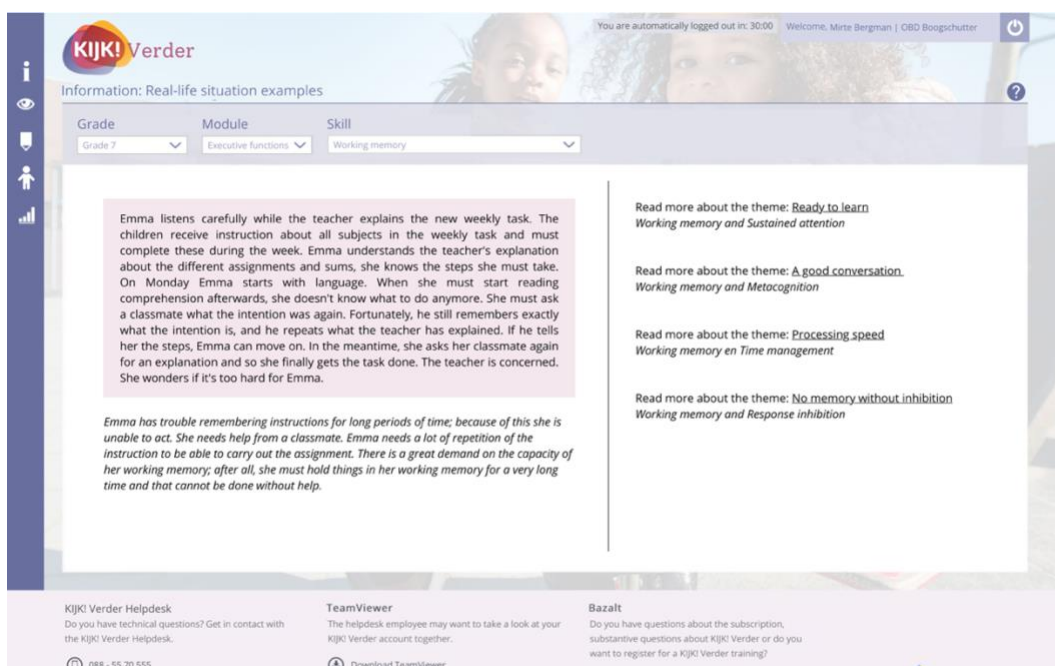
Figure 6. *Example pop-up screen theme 'Ready to learn'*
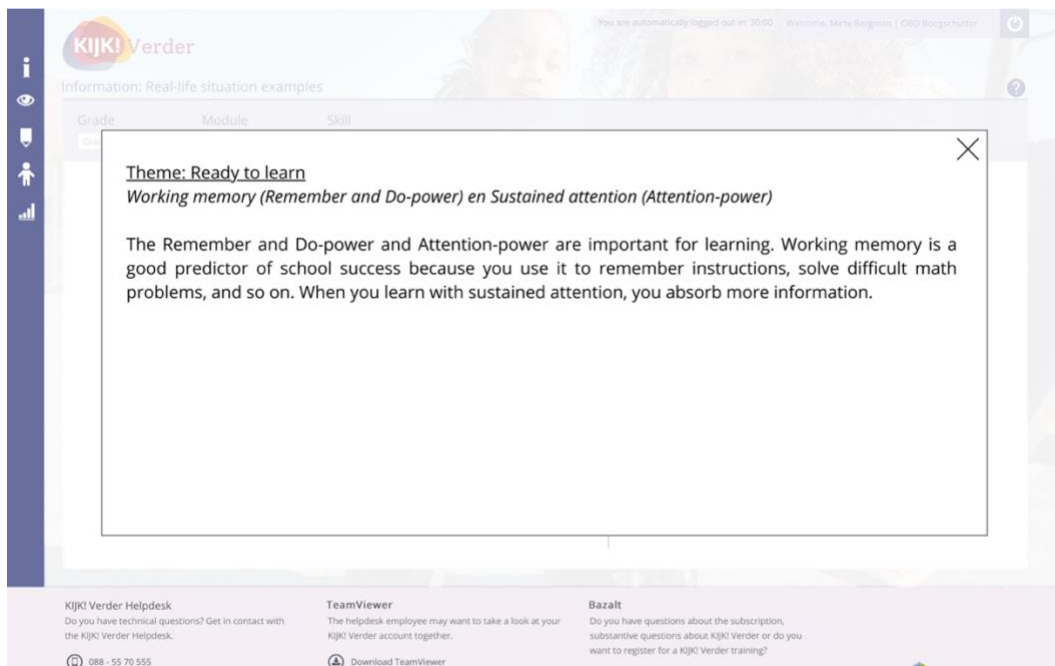
Development trajectory

    <u>Findings</u>. The needs assessment showed that teachers would want to know at what age the students should be able to do what; what level of executive functioning is expected of what age or in which grade? Multiple respondents indicated that they would like to assess their students' mastery of an executive function by putting them along a development trajectory with milestones/measuring points indicated per age.

    Research shows that executive function skills are constantly developing, but not all individuals develop them in the same way and at the same rate (Severson, 2021a; Sippl, 2021). There are developmental variations among children (Dawson & Guare, 2018). At any given age some children can perform tasks at an independent level while other children will require cuing, supervision, or even assistance to perform the same task (Dawson & Guare, 2018). Furthermore, everyone has strengths and weaknesses in their executive function profile (Severson, 2021a). A child can be very clean and tidy (organization), but on the other hand have a hard time getting started on a task (initiation) (Severson, 2021a).

    Numerous studies have reported that executive functions progress in a stage-like manner (Anderson, 2001). The development trajectory of executive function skills is not linear but is marked by stages of acceleration and deceleration (Juric et al., 2013). These stages vary from one component to the other, leading to the conclusion that executive development is

not a uniform process (Juric et al., 2013). Because of this, it is not achievable to set up a fixed development trajectory per age, but only per age category. In describing what could be expected from each age category, researchers (Dawson & Guare, 2018; Sippl, 2021; Severson, 2021c; Korzeniowski et al., 2021) made the distinction between the following age categories: infants (0-2 years), toddlers (2-4 years), early learners (5-12 years), teens (13-18 years) and (young) adults (18+ years).

Recommendations. Recommended for the *KIJK! Verder – EF* instrument is to provide teachers with an overview of executive function skills of all age categories mentioned above. An example of such an overview, drawn up by Sippl (2021), can be found in Appendix D. This overview can act as a guideline to the end goals of primary education; where should the students approximately stand at the end of grade 8. The table should be considered as approximate rather than explicit guidelines for behavioral expectations at any age (Dawson & Guare, 2018). Later on, it will be explained how more explicit critical incidents can be used to determine the level of executive functioning in students.

Figure 7 shows an example of how the *Development trajectory* page could look like within the digital *KIJK! Verder* environment. The teacher must first choose which development trajectory he or she wants to consult by selecting the right grade and module. The complete development trajectory (for all skills falling under the module; in this case the Executive functions) are presented together in one table on a scrollable page. Just like the most important concepts, this ensures that all aspects are easily accessible on one page (no need to click back and forth) and teachers are provided a complete, clear, and simple overview. It is also possible for the teacher to print this overview.

Observation

Findings. From the needs assessment can be concluded that teachers want to be able to record striking executive functioning behavior of students they have observed in the classroom. In ways of doing so, the respondents propose: '*A clear and simple system that connects different colors to the executive functions*' or '*A list in which observations can simply be checked, possibly with an option to add a short note*'. These statements support the general comment about the instrument needing to be easy to use and time efficient. Respondent 4 states: '*I definitely do not want to have to fill out something for every student that takes fifteen minutes or more*'. Administering observations should thus not be very time consuming.

Figure 7. *Example page 'Information: Development trajectory'*

Dawson & Guare (2018) state that classroom observation can play a key role in assessment and intervention since it provides the opportunity to see executive functions in their most important context, namely the daily demands of school. An effective method for assessing social skills and emotional functioning in educational settings, is the use of Behavior Rating Scales (BRS) (Hosp et al., 2003). BRS capture observations of every day, real-world behaviors (Isquith et al., 2013) and are used to plan behavioral interventions, support plans, and monitor behavior over time (Hosp et al., 2003). The use of BRS is a compatible assessment method that is reliable yet also feasible for repeated use (Riley-Tillman et al., 2008).

BRS comprise critical incidents (e.g., 'remembers the steps as explained in the instruction'); the rater's task is to indicate the frequency with which each behavior occurred, using a Likert-type rating scale (Murphy et al., 1982). The use of Likert scales, which call for a graded response to a series of statements, is a common means of assessing people's attitudes, values, internal states, and judgments about their own or others' behaviors (Mellor & Moore, 2014). Usually with Likert-type scales, there are 5 categories of responses ranging from 5 = strongly agree to 1 = strongly disagree with a 3 = neutral type of response (Croasmun & Ostrom, 2011). However, there is debate among researchers concerning the optimum of choices on a Likert-type scale. Some researchers prefer scales with an even number of response items (Croasmun & Ostrom, 2011). Since they have no neutral point, even-

numbered Likert scales force the respondent to commit to a certain position and can therefore be useful if a respondent needs to express a definite opinion (Brown, 2006).

Many argue that only providing students with a score is not enough evidence to say something about their knowledge and skills. The assessor must be able to explain how he came up with this score. The bigger the variety and amount of assessment evidence, the more confident one can draw conclusions about student development (Suskie, 2018). In using multiple assessment strategies, one must be sure to include direct evidence of student development (Suskie, 2018), in other words: direct observations.

Recommendations. Recommended for the *KIJK! Verder – EF* instrument is to use Behavior Rating Scales in means of gathering observational data. Using BRS not only ensures that every day, real-world behaviors are observed, but also saves time. With BRS, teachers can make targeted observations using the critical incidents and provide those with a score. Moreover, not all critical incidents have to be rated at once. The rating can be spread over time and scores can be altered at all times until a registration is done. After registration, a new observation begins. This ensures that the observation-score is an accurate reflection of all observed behavior over a certain period of time. An additional advantage is that the observation-scores are not dependent on the moment (that it is a 'snapshot') but are based on behaviors over a longer period.

The items from the BRIEF-2 Screeners (Gioia et al., 2020) and the teacher rating scale provided by Herrewijn & Monfils (2020) can be used as the foundation for the BRS within the *KIJK! Verder – EF* instrument. To illustrate, the critical incidents used within the BRS for the executive function 'working memory' could be*: 1) Can find stuff, 2) Remembers what was told/said (also a longer message), 3) Remembers an instruction, even if it consists of several parts, 4) Can briefly retell an instruction,* and *5) Can solve complex tasks (consisting of several steps)*

Recommended is to use a 4-point Likert scale. Teachers want to be able to see which executive function skills needed improving and which ones the students already master to some extent. By omitting the mid-point from the Likert scale, teachers are forced to form an opinion about the level of mastery. An imaginary line can be drawn between the two and four: critical incidents scored left from the line (a score of 1 or 2) means that they are skills that still needs some practice. Critical incidents scored right from the line (a score of 3 or 4) means that the student already masters these skills. Please note that there is no 'good' or 'bad' side. Each

numeric value on the scale represents the frequency with which each behavior occurred: 1 = never, 2 = seldom, 3 = often, 4 = always.

To substantiate the given score, recommended is to add an optional field where notes about directly observed behavior can be written down, together with the name of the observer and the date of the observation. For example: *A teacher scores her students a two on the critical incident 'can always find it's stuff' (working memory). She came to this score because the student lost his mathematics workbook three times this week. Last week he had to borrow a pencil twice form his neighbor because he could not find its own pencil. She wrote these direct observations down in the notes-field.* By writing down their notes about directly observed behavior, teachers collect additional assessment evidence. Moreover, it helps them explain the underlying reason for the score given.

Lastly, it is recommended to add an empty writing surface to the page where additional observations about executive functioning can be written down. This provides teachers with the opportunity to gather even more assessment evidence, for example on behavior caused by a combination of executive functions.

Figure 8 shows an example of how the Observation page for the executive function 'working memory' could look like within the digital *KIJK! Verder* environment. Teachers can choose whether they want to fill out the BRS per student or per skill based on their preference. The contents stay the same for both options. When filling out per student, the teacher must first select for which grade, module, and student he or she wants to do an observation. Thereafter, the necessary skill can be selected on the left side of the page. When filling out per skill, the selection of the skill and student are reversed. In line with the recommendations, the page contains around five critical incidents with a 4-point Likert scale. For each critical incident, there is the opportunity to add observational notes. The observer of the note is selected and the date of observation. The added notes stay available and visible underneath each critical incident. On the right side of the page, there is also the possibility to add observation notes without having to put them under one of the critical incidents. This can be notes about interrelationships between executive functions, general striking behaviors, or the like. Adjustments need to be saved using the buttons in the lower right corner. By clicking 'Save & Next' or 'Next', the instrument jumps automatically to the next skill or student in the menu on the left.

Figure 8. *Example page 'Observation: per student'*

Teacher registration

    <u>Findings</u>. From the needs assessment can be concluded that teachers want to register where their students stand in terms of executive functioning. Different from making observations (where specific behaviors are rated) this registration should give an indication of the mastery degree of the executive function as a whole. Teachers want to determine the outliers; which executive function skills do students already master (to some extent) and which executive function skills still need developing? This gives them an overview of the executive functioning of all the students in their classroom on a more generic level. A majority of the respondents prefer to register by assigning a score to the executive function skills.

    Dawson and Guare (2020) state that the purpose of assessing executive functions is not to make a diagnosis; executive dysfunction is not a disability. The primary purpose should be to understand what executive skills challenges are impacting school performance with enough precision that one can create effective intervention strategies either to reduce the negative impact or to help the student overcome those challenges in order to become a more successful student. To assess executive functioning with enough precision, as stated before, a great variety and amount of assessment evidence is needed (Suskie, 2018).

    Flórez and Sammons (2013) describe a kind of assessment that looks forward as well as back; Assessment for Learning (AfL). Teachers who assess in this way do not just confirm

and verify what their students have learnt, but also help their students understand what the next steps in learning should be and how they might be attempted. Good quality feedback is viewed as a fundamental aspect in the use of AfL. Research (Butler, 1987) showed that students who were given comment-on-marking-centered feedback performed better on achievement tests than the students who had received only marking-centered feedback. Beside a score, students should receive constructive feedback on their skill development to be able to grow.

Research showed that not all individuals develop executive function skills in the same way and at the same rate (Severson, 2021a; Sippl, 2021). About executive functioning cannot be said that a child is lagging or has poor executive function skills, because it is not a uniform process for each individual.

Recommendations. Recommended is to let teachers give general scores to the children's executive functions, based on the observation scores they have assigned to the critical incidents belonging to each executive function. The associated observational notes can contribute as additional assessment evidence for the general registration score. The choice was made to let teachers give a score themselves, instead of letting the program calculate an average of the observation scores. This way, teachers can 'weigh' the observation scores. For example, a student scores all fours and a single one. The teacher feels like that this single score should not bring down the general score. She has seen that this aspect is a challenge for all the students in this age category. It is recommended to add an notes-field, where teachers can add constructive feedback an give an extra explanation about how they 'weighed' the observation scores and came to the registration score.

Second, it is recommended for Registration element within the *KIJK! Verder - EF* instrument to use a 4-point Likert scale. Executive function skills cannot be rated based on quality, because its development is different for each student. Therefore, each numeric value on the scale should represent the frequency and degree of support needed to facilitate successful execution of behavior: 1 = always needs support, 2 = needs support often, 3 = needs support sometimes, 4 = never needs support.

Figure 9 shows an example of how the Registration page for the executive function 'working memory' could look like within the digital *KIJK! Verder* environment. Teachers can choose whether they want to register per student or per skill based on their preference. The contents stay the same for both options. When filling out per student, the teacher must first

select for which grade, module, and student he or she want to do a registration. Thereafter, the necessary skill can be selected on the left side of the page. When filling out per skill, the selection of the skill and student are reversed. In line with the recommendation, the page contains a 4-point Likert scale and a notes field. On the bottom of the page, the filled in observation scores and associated notes can be consulted. Adjustments need to be saved using the buttons in the lower right corner. By clicking 'Save & Next' or 'Next', the instrument jumps automatically to the next skill or student in the menu on the left. When registration is done for all students and skills, it can be closed via the main menu.

Figure 9. *Example page 'Registration: per student'*

Student registration

Findings. A great preference could be established from the needs assessment to include a student evaluation element within the KIJK! Verder – EF instrument. All respondents stated they saw the value of taking into account a student's opinion about his or her own executive functioning. Moreover, they agreed that students are capable of saying something about their own executive functioning. However, they indicated that a clear explanation must be given about the executive functions and the way of assessment. Furthermore, they disliked the idea of asking the students open questions and they liked the idea of letting the students give themselves a score. A general point of attention was to use a positive approach throughout the element.

McMillan and Hearn (2008) define self-assessment as a process by which students identify strategies that improve their understanding and skills. Self-assessment occurs when students judge their own behavior to improve performance as they identify discrepancies between current and desired behavior. Self-assessment enhances student motivation and achievement (McMillan & Hearn, 2008). It is a good strategy for students to develop greater autonomy in relation to their own learning along with promoting their metacognition (Flórez & Sammons, 2013).

Just like the teachers, students need rater-training to increase the accuracy of the assessment. They need a common frame of reference (e.g., definition of the executive functions) and clear assessment criteria for interpreting their performance (Pulakos, 1986). According to Bell (2007), in order for a child to provide an optimal response the following must be true: 1) the child must be able to understand the words and the sentences that forms the question statement, 2) the child must be able to associate the question statement with a past experience of their own, 3) the child must understand that the questionnaire is asking them to make a judgement of their past experience against the question statement, and 4) the child must be provided with an effective method to communicate their judgement. The fourth requirement can be met by using a pictorial Likert- scale with images as anchor points (Hall, Hume & Tazzyman, 2016).

<u>Recommendations</u>. Recommended is to use the child-friendly language of the Brain Heroes method (Herrewijn & Monfils, 2020) throughout the entire student environment.

Recommended is to remind students at the beginning of the student environment what executive functions are and which different functions there are. For example, Effi and Furon (the mascots of the Brain Heroes method) can give a general explanation of the Brainpowers (Herrewijn & Monfils, 2020, p.21), followed by an overview of all the Brainpowers.

Before students can assess their own executive functioning, they need an explanation of the executive functions/Brainpowers at hand. The explanation of the Brainpowers (Herrewijn & Monfils, 2020, p.21-29) should provide a clear picture of what each power entails and how a student might use it in his or her daily life. The authors of the Brain Heroes method made explanatory videos per Brainpower that are publicly accessible on YouTube. These can be added to the explanatory page too. Examples of the explanations per Brainpower are included in Appendix E. Figure 14 shows the example page for the Remember and Do-power.

Moreover, a guide for the use of the instrument should be included. Students need to be told what is to come and what is expected of them to do. Guided instruction of the assessment method, including an example statement, should be used to make sure students gain a full understanding of the self-assessment and know the meaning of the scales.

For the self-assessment, it is recommended to use a pictorial Likert scale with images (for example stars) as anchor points. In line with the teacher registration, a 4-point Likert scale is handled. For each statement, the students will need to indicate how frequent they use the Brainpower in order to show the described behavior from the statement: 1 star = never, 2 stars = seldom, 3 stars = often, 4 stars = always. The statements used must include past behavior, written from the self. Recommended is to use the Brainpower-characteristics from the Brain Heroes method (Herrewijn & Monfils, 2018, p. 138). To illustrate, the statements for the Brainpower 'Remember and Do-power' could be: *1) After the instruction, I know what to do, 2) I understand the instructions and I still remember it while working, 3) I don't forget steps. I do everything I'm told, 4) It helps me if I remember key words of what to do*, and *5) I can find my stuff*

Lastly, it is recommended to add a 'read-out-loud' option on every page within the student environment to make it easier to use for students with dyslexia or other reading problems. The texts being read out loud should be de default setting for students from grade 3 and 4.

Figure 10 to 15 show examples of how the pages of the student environment could look like within the digital *KIJK! Verder* environment. The teacher must first select for which grade, module, and student he or she want to open the secured environment and start the registration. The student walks through the rest of the environment independently. First, there are several pages that explain the skills. Clicking on 'Continue' takes the student to the next page. The student is then given an explanation of the operation of the program and the assessment is explained using an example. After the explanation, the student goes through all skills step by step. First, he/she receives information about the skill. The student is then given 5 statements about the same skill and scores itself using stars. When the student has completed all skills and has assessed itself on all statements, he/she will arrive at the closing page. The student clicks on 'close' and then asks the teacher for help to close the environment. When registration is done by all students, it can be closed via the main menu.

Figure 10. *Example page 'Student environment: general explanation Brainpowers'*

Figure 11. *Example page 'Student environment: Brainpower-overview'*

Figure 12. *Example page 'Student Environment: user guide'*

Figure 13. *Example page 'Student Environment: guided instruction'*

Figure 14. *Example page 'Student environment: Explanation Remember and Do-power'*

Figure 15. *Example page 'Student environment: Self-assessment Remember and Do-power'*

Reports

The needs assessment showed that the *KIJK! Verder – EF* instrument should include an element that displays reports of the results and gives intervention options based on these results. However, in consultation with the client (Bazalt Publishing) it was decided that this element is a research project on itself and therefore lays beyond the scope of the current study.

The design

The results from the needs assessment and literature review, together with the recommendations have led to an initial design for the *KIJK! Verder – EF* instrument. This design can be found in Appendix F. The design consists of 'screenshots' of the different pages within the instrument. This are the examples pages as portrayed earlier, but also the underlying pages you pass through to come to these main pages. Together with the screenshots are guided texts, which talk the reader through the steps of using each element of the instrument.

Within Bazalt Publishing's instruments, certain user-technical aspects are used, which also needed to be applied in the *KIJK! Verder* instrument. Aspects that had to be taken on in the *KIJK! Verder* instrument were: 1) a menu with icons on the left side of the screen with all the elements of the instrument, 2) the possibility to fill in observations and registrations per student and per skill, 3) a bar on top of each page where the group, module, and student/skill are selected, and 4) a question mark-button on top of each page with an additional explanation about the page. The design covers the following elements:

Homepage. In this chapter of the design, it is clarified which elements are part of the instrument and what they entail. It is explained how to navigate to these elements through the menu on the left.

Information. The paragraphs in this chapter of the design explain the steps that need to be followed to reach 1) the overviews with most important concepts, 2) the real-life situation examples, and 3) the development trajectories belonging to a certain module. Furthermore, it is explained what aspects can be found on each of the pages and how they can be used.

Observation. In this chapter of the design, the steps are explained on how to fill in observations, either per student (first chapter) or per skill (second chapter). Furthermore, it is

clarified what aspects can be found on the main observation page and how to use them: the critical incidents, the 4-point Likert scale, and the additional notes fields.

Teacher registration. In this chapter of the design, the steps are explained on how to fill in a teacher registration, either per student (first chapter) or per skill (second chapter). Furthermore, it is clarified what aspects can be found on the main teacher registration page and how to use them: the 4-point Likert scale, the observation scores and added notes, and the registration notes field. Lastly, the third chapter explains how to close the registration.

Student registration. In this chapter of the design, the steps are explained on how to open the student environment in which the student assess their own executive functioning. Furthermore, the contents of the student environment are clarified, and it is explained which path the students follow in the student environment. Lastly, it is explained how to close the student environment and, eventually, close the student registration.

The initial design (see Appendix F) was discussed during a focus group. The most important feedback per element is mentioned below. Moreover, recommendations for the next version of the *KIJK! Verder – EF* design are given.

Instrument in general

Focus group feedback. No comments were made about the general recommendations presented. However, the experts came up with some general feedback themselves. The first recommendation from the experts was to use more cueing within the instrument to find the needed information quicker. For example, underlining the most important indicators in the real-life examples.

It was unclear for the experts when it was expected of the teachers to read or consult certain pages, especially within the Information element. The experts wondered if the teachers are obligated to read it all in advance before they can use the instrument or if they consult the pages when they feel the need for it themselves. The experts felt that prior reading was indeed necessary for the '*most important contents*'-page*,* as this shapes a uniform and correct image of the executive functions observed and registered. Prior reading is less important for the *real-life examples* and *development trajectory*. These pages can also be consulted when they are needed. The experts preferred for the information icon to move a little lower in the menu bar. Because the icon is on top of the menu right now, it might give

the impression that all the contents must be read before continuing with the next elements. Additional instructions are needed about the use of this element to set the right expectations.

Recommendations. Based on the general feedback, it is recommended for the next version of the design to: 1) implement cues throughout the instrument, 2) let the information icon stay on top of the menu bar. Not all information has to be read prior to using the instrument, only the 'most important contents'-page. Because this is the first step in the process, it is logical to let it be the first portrayed icon. 3) Add a note on top of each information page, that tells the teacher when it has to be consulted and how the information should be interpreted.

Information

Most important concepts

Focus group feedback. The aim was for the *KIJK! Verder – EF* instrument to be usable for schools that use the Brain Heroes method and are familiar with the terms used, but also for schools that do not use the method and may not be familiar with it. The experts spoke out their concerns about using the explanation from the Brain Heroes method for the child friendly concept explanation. Although the Brainpowers are explained clearly, teachers that do not use the Brain Heroes method in daily practice, will probably not use this explanation either while talking to their students about them. The experts recommended to include a more general child-friendly explanation. Expert C proposed: *'a switch could be incorporated into the instrument that determines what kind of explanation you see. You turn the switch on when you use the Brain Heroes method, which makes you see the explanation using Brainpowers. You turn it off when you do not use this method, which makes you see the more general explanation'.* Expert A, however, mentioned that she is very happy that both a teacher and student explanation are included. This makes it very workable in the classroom.

Recommendations. Based on the feedback on the 'most important concepts'-page, it is recommended for the next version of the design to either replace the student explanation within the overview (the third column) to a more general explanation or to explore the opportunity for a 'I work with the Brain Heroes method versus I do not work with the Brain Heroes method-switch'. Whether the switch is turned on or off determines which contents are displayed. This switch can be included in the settings of the instrument.

Real-life examples

Focus group feedback. The experts mentioned that the real-life examples are very useful for all teachers, but especially for just graduated teachers with little experience. They appeal to the imagination and show well what kind of situations can arise in the classroom. It is a good means of support.

Recommendations. Based on the feedback on the 'real-life examples'-page, it is recommended for the next version of the design to keep it as it is.

Development trajectory

Focus group feedback. The only point of improvement the experts mentioned for the *development trajectory*-page, is to include an explanation of how the trajectory needs to be interpreted; the points mentioned in the trajectory are no hard demands, but an indication.

Recommendations. Based on the feedback on the 'development trajectory'-page, it is recommended for the next version of the design to keep it as it is.

Observation

Focus group feedback. It was recommended by the experts to include the option for teachers to add critical incidents themselves to the list that is already available. They should be able to do this for an individual student but should also have the possibility to add critical incidents that pops up for the whole group. This is something different than making notes, as these critical incidents added by the teacher need scoring too.

Expert A mentioned that there should be around five critical incidents for each executive function. More than five would ask too much of the teachers.

The experts all found the notes-fields very valuable. They mentioned that the notes and given scores should also be saved for later use. They can be useful, for example, in the exchange with the next grade teacher of the students.

Recommendations. Based on the feedback on the Observation element, it is recommended for the next version of the design to add an option to the Observation page where teachers can add critical incidents, which they can score just like the pre-set incidents.

Teacher registration

Focus group feedback. The experts wondered how often the teacher registration was supposed to be done during the school year and what the preference of the teachers herein was. Unfortunately, this need was not asked in the needs assessment and thus no clear answer could be given. The recommendation of the experts concerning this issue was to let the teachers register twice a year. The first registration can be done around November, when the teacher has had a few weeks to get to know the students and form a clear image of them. The second registration can be done around May. This second registration can also be used by the next grade teacher at the beginning of the schoolyear. The experts advised to still question the teachers' desires concerning this matter. However, they mentioned that it indeed was good that the option is there to close the registration per student and per group. This way, when teachers find it necessary to register more frequently for individual students, they can do that.

Recommendations. Based on the feedback on the Teacher registration element, it is recommended for the next version of the design to: 1) keep the Teacher registration page as it is, and 2) conduct another needs assessment among teachers concerning the practical use of the instrument and the frequency of doing observations and registrations.

Student registration

Focus group feedback. Expert F mentioned that they are currently extending the Brain Heroes method to new primary schools. They noticed during the pilot tests that the higher grades (7 and 8) do not always respond that well on Effi and Furon (the mascots). When newly introduced to the method, the Brain Heroes explanation may not be the best fit. A more general student environment may be a better match for students that are not familiar with the Brain Heroes method. This point of discussion came back to the same recommendation as earlier to implement an on/off switch for 'Brain Heroes-language'.

All the experts agreed that the scale indication above the stars (never, seldom, often, always) can be left out, because the meaning of the stars has already been covered elaboratively on the previous pages. Children understand that one star is less than four stars, the additional text is not necessary.

In the initial design it was described that the student environment must be closed by a teacher. Currently, this is done by the teacher logging in with its username and password.

Expert A noted that it will take a lot of time if the teacher needs to do that for each student that is done with his or her registration. She suggested to use a combination of keys, for example Ctrl + L, to close the student environment more quickly.

Recommendations. Based on the feedback on the Student registration element, it is recommended for the next version of the design to: 1) replace the content within the student environment with a more general explanation, or (as mentioned before) explore the opportunity for a switch that determines which kind of contents are displayed, 2) delete the scale indications above the stars, and 3) let teachers close the student environment using a combination of keys.

Discussion

Limitations

In consultation with Bazalt Publishing, it was decided to only focus on the parts of the observation and registration instrument that are considered the 'front-side' of the instrument. This are the elements that teachers and students use to provide input and to gather data. All agreed that these elements were of first importance, because they form the heart of the instrument. Given the time available for the current study, it was considered achievable to only make a design of the front-side. The design process was going to be partly dependent on the cooperation of the target audience, and it was expected that many more iterations would have to be made after the first design was created.

How the gathered data is processed and how the results are presented and accessed, belong to the 'output-side'. The choice was made to not include this side of the instrument in the current study, wherefore the Reports element of the instrument was not researched and included in the design. Often, this made it difficult to determine how -and what kind of- input should be processed and how behavior should be assessed, because this co-depends on the wanted results. This limitation means that the design probably needs to be refined once the Reports element is researched and designed. It should be taken under consideration that the design from the current study can only be put into use once the Reports element has also been researched. Looking back, it would have been desirable if designing the input-side and output-side had happened simultaneously (by multiple researchers).

As stated before, the design process was partly dependent on the cooperation of the target audience. In the relative short period that the questionnaire -belonging to the needs assessment- was available, only nine respondents have had the opportunity to complete the questionnaire. If there was more time available, the questionnaire could have been made available for a longer period and higher number of respondents could have been reached. This would have benefitted the generalizability of the results. Moreover, the opinion of only one teacher was represented in the expert focus group. With more time and resources, a focus group with teachers and a focus group with students could have been organized to gather their feedback on the initial design too.

Further research

A recommended next step for further research is to process the recommendations of the expert focus group and make a second version of the design of the *KIJK! Verder – EF* instrument. This version of the design can thereafter be a solid foundation for actually developing the online environment and pilot-testing it with teachers and students. Moreover, research can be set up to design the output-side of the instrument (including the Results element). Once both sides of the instrument are established, the instrument as a whole can be reviewed and refined.

In the current study, no research is done concerning the validity and reliability of the instrument. For further research, it is recommended to check the validity and reliability for the items within each element (e.g., the critical incidents within the Teacher observation element) and the instrument as a whole. The items currently used in the design, are retrieved from the Brain Heroes method (Herrewijn & Monfils, 2020, p.174-175). Herrewijn & Monfils (2020) do not describe how these items were selected and if they are validated. An attempt was made to get in contact with the authors to gain this information. At the time of writing there was no response yet

During the focus group it was noted that there were quite some comments about how the user experience can be different for teachers who are familiar with the Brain Heroes method and those who are not. Further research can focus on explicitly looking into the different needs of these two groups and explore the opportunities to adjust the instrument based upon them.

For further research about this subject, performed at Bazalt Publishing, it is recommended to bring the researcher in contact with operating employees (designers and developers) of Bazalt Publishing. These employees can provide information about the internal processes and internal processes and methods used within the company. More extensive contact between these parties ensures that the research meets the specific needs and regulations of the company. Moreover, the researcher can be included in already made design choices, and the considerations that preceded them, during the design processes of other (similar) company products. For further research, it is recommended to let the researcher perform the research in-company at Bazalt Publishing.

When *the KIJK! Verder – EF* instrument eventually has been implemented in primary schools, and it has been in use for some years, the gathered data (anonymized) can be used for further research. E.g., researching patterns in the development of the executive function skills or expanding current development trajectories. With this, more scientific knowledge is gained about the executive functions, which subsequently contributes to practical employability.

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<center>**Appendices**</center>

Appendix A. Questionnaire Needs Assessment

<u>Informed Consent</u>
You are invited to participate in the study entitled 'Designing a digital measurement instrument for monitoring executive functions in primary school students'. This research is being conducted by master's student Mirte Bergman of the Faculty of Behavioral, Management and Social Sciences at the University of Twente.

The aim of this research is to design an instrument that supports teachers in measuring and monitoring the executive functions of students. Filling in the current questionnaire will take approximately 15 minutes. The data will be used to determine the needs of teachers in practice.

Your participation in this study is completely voluntary and you can withdraw at any time. You are also free to ask questions.

We believe that there are no risks associated with this study; but as with any online related activity, the risk of a breach is always possible. Your answers in this survey will remain confidential to the best of our ability. Any risks are minimized by downloading your answers to the questionnaire and then removing them from the program. No personal data is requested; your answers cannot be traced back to you and are processed anonymously.

By continuing to complete this questionnaire, you agree to using your answers in the study.

For more information, please contact:
Mirte Bergman, m.h.bergman@student.utwente.nl

Background information

My name is Mirte Bergman, and I am currently working on my graduation project for the Master Educational Science and Technology at the University of Twente. Commissioned by Bazalt, I am designing a new observation and registration instrument, namely 'KIJK! Verder'. This will eventually become a system to monitor important skills other than, for example, language and math skills of students. For example, soft skills (broad skills), life skills (such as resilience & creativity) and executive functions (such as emotion regulation & task initiation). For my master's thesis I chose to focus on executive functions. 'KIJK! Verder – EF' will be used to monitor the executive functions in children, to determine the degree of control and to determine which next steps are necessary to promote development. This will be based on the Brain Powers from the Brain Heroes method (for more information, see: breinhelden.nl).

Your input is very important for developing the instrument! In this way we can ensure that the instrument meets the needs of the target group as closely as possible; you as a teacher, but also the students.

In this questionnaire I will, among other things, ask you about wishes & preferences in the field of the usability of the instrument, the aspects of executive functions that in your opinion should be included in the instrument and the desired output after filling in data.

The questionnaire consists of 3 parts:
1. <u>General questions</u>
2. Open questions: Answer the question in your own words and indicate your personal need/preference.
3. Statements: For each statement, indicate whether you agree or disagree OR which of the given statements applies to you. You then provide an explanation of your chosen answer.

You can write your remaining comments at the end of each section.

Your answers to the questionnaire are automatically saved in the meantime. If you have any questions or concerns, you can send a Whatsapp message to 06-22770994. I will answer you as soon as possible.

1. **I teach grade:**
   (multiple answers possible)
   - 3
   - 4
   - 5
   - 6
   - 7
   - 8
   - Else, namely:

2. **Who is, besides you, present in your classroom on a normal day?**
   (multiple answers possible)
   - Nobody else
   - My paired colleague(s)
   - Teaching assistant(s)
   - Intern(s)
   - Else, namely:

3. **I am familiar with the Brain Heroes method:**
   - Yes, I work with the method myself
   - Yes, I know about it, but I do not work with it myself
   - No, I do not know it

4. **Remaining comments:**

Part 2: Open questions

It is important to know what you as a teacher want to measure and track about the executive functioning of your students. What requirements must the instrument meet to be able to use it as effectively as possible? This is asked in the questions below.

5. **What would you like to know about the executive functioning of your students; what information and returns should the instrument provide you?**

6. **What would you like to measure about your students' executive functions?**

7. **What information do you, as a teacher, want to be able to write down about the executive functioning of a student in an observation and registration instrument such as KIJK! Verder?**

8. **What other options would you like to see in the 'KIJK! Verder - EF' instrument?**

The following questions are about the necessary parts within the instrument and the way information is processed. What does it take to make a correct assessment?

9. **What do you prefer regarding the way of assessing a student's mastery of an executive function?**

Think, for example, of determining based on established milestones/measuring points (laying a student along a 'learning line') or by giving a student a score from 1 to 10 on certain themes.

10. **What do you need within the instrument to get a clear picture of the executive functions and the distinction between the functions?**

11. **What do you need within the instrument to be able to determine which executive function belongs to the behavior you have observed?**

12. **Would you like other stakeholders to be able to provide input within the instrument in addition to the group teacher(s)? If so; what form would you prefer?**

What must absolutely be in the instrument and what absolutely not? Let us know below.
13. **When is the instrument valuable to you?**

14. **What would you absolutely not want in the instrument?**

15. **Additional comments:**

Most likely there will also be a section within the instrument in which students can provide input about their executive functioning. The next 3 questions are about this part of the instrument.

16. **What would you like to know from the students themselves; what kind of input should the students be able to give?**

17. **At what times would you like students to provide input?**
   Think of fixed times in the year, when you deem it necessary, etcetera.

18. **What do you think is particularly important in the student section?**

19. **Additional comments:**

Part 3: Statements
Please indicate for each statement whether you agree or disagree OR which of the statements given applies to you. In addition, provide an explanation for your chosen answer.

20. **To get a clear picture of a situation in which a problem can arise in the field of executive functioning, I would like to be able to read real-life situation examples (see below) about executive functions.**
   Below is an example of the real-life situation example that belongs to the executive function of working memory (Source: Breinhelden, Herrewijn & Monfils).

> *"Emma listens carefully while the teacher explains the new weekly task. The children receive instruction about all subjects in the weekly task and must complete these during the week. Emma understands the teacher's explanation about the different assignments and sums, she knows the steps she has to take. On Monday Emma starts with language. When she has to start reading comprehension afterwards, she doesn't know what to do anymore. She has to ask a classmate what the intention was again. Fortunately, he still remembers exactly what the intention is, and he repeats what the teacher has explained. If he tells her the steps, Emma can move on. In the meantime, she asks her classmate again for an explanation and so she finally gets the task done. The teacher is concerned. She wonders if it's too hard for Emma."*

- Agree, because:
- Disagree, because:

21. Which statement about the use of the 'KIJK! Verder- EF' instrument applies to you?

Statement 1: I would especially like to use the 'KIJK! Verder – EF' instrument to identify and monitor problems in the field of executive functioning in some children in my class.

Statement 2: I would like to use the 'KIJK! Verder – EF' instrument for all children in my class, to monitor both problems and excellence in the field of executive functioning.

- Statement 1, because:
- Statement 2, because:

22. Which statement about the level of monitoring applies to you?
See below an example of the main and sub-themes discussed in the statements.

> *Buigkracht (flexibiliteit)*
> *Hoofdthema: De leerling weet mee te buigen*
> *Subthema's: De leerling…*
> - o …weet een alternatief te bedenken als oplossing 1 niet werkt.
> - o …weet een alternatief te bedenken als een plan verandert.
> - o …kan ermee omgaan als er iets verandert (regels, afspraken).
> - o …begrijpt dat andere kinderen dingen op een andere manier kunnen doen.
> - o …kan zich verplaatsen in het standpunt van de ander.
> - o …kan goed schakelen van de ene activiteit naar de andere.
> - o …kan vriendschappen sluiten en onderhouden.
> - o …kan ermee omgaan dat anderen in zijn/haar persoonlijke ruimte komen.

Statement 1: I would like to assess and monitor the executive functioning of my students based on the main themes. The next step can then be to go in depth with the help of the sub-themes (for example, only for the students needed).

Statement 2: I would like to assess and monitor the executive functioning of my students using the sub-themes. Based on the score on this, I can determine on which main theme(s) a child falls out or excels.

- Statement 1, because:
- Statement 2, because:

23. I believe that students are able to assess their own executive functioning (with a clear explanation of the executive functions/ Brainpowers)
- Agree, because:
- Disagree, because:

24. Additional comments:

Thank you for completing the questionnaire!

Would you like to receive the findings resulting from this needs assessment? Or do you have other questions/comments? Send an email to m.h.bergman@student.utwente.nl.

To finalize the design of the 'KIJK! Verder – EF' instrument and provide it of feedback, an online focus group will be organized. I will gladly invite you to this at that time. Leave your contact details via this link so that I can contact you. I hope to see you then!

Mirte Bergman

Appendix B. Overview most important concepts Executive Functions

	Teacher-explanation	Student-explanation
Working memory (Remember and Do-power)	The ability to hold information in mind while performing complex tasks. It incorporates the ability to draw on past learning or experience to apply to the task at hand or to project into the future.	This power helps us to remember, act and think at the same time. That is why you also see a brain in the picture. It is important to remember how to do a task when the teacher explains it. We also use this Remember and Do-power when we sing a son.
Flexibility (Bend-power)	The ability to revise plans in the face of obstacles, setbacks, new information, or mistakes. It involves adaptability to changing conditions.	Bend-power helps us to be pliable. As flexible as a tree in the wind. You need bending power when things suddenly turn out differently than you thought, or when something does not work out the first time and you have to come up with a new solution. If you can bend well, you will get less tension and stress and it is fun to keep practicing.
Response inhibition (Stop-power)	The capacity to think before you act. This ability to resist the urge to say or do something allows us the time to evaluate a situation and how our behavior might impact it.	Stop-power helps us to stop. For example, not speaking out of turn. Or not paying attention to your neighbor when work has to be finished. Stop Power teaches us to restrain ourselves so that we can get to work and learn.
Planning & Organization (Plan and Organize-power)	The ability to create a roadmap to reach a goal or to complete a task, and to design and maintain systems for keeping track of information or materials. It also involves being able to make decisions about what's important to focus on and what's not important.	This power teaches us to plan and arrange all our things in advance so that we can start well and finish things. It is nice to be able to work step by step, so you understand how an assignment works.
Time management (Time-power)	The capacity to estimate how much time one has, how to allocate it, and how to stay within time limits and deadlines. It also involves a sense that time is important.	This power teaches us to watch the time and get things done on time. When is it important to be ready on time? For example: getting dressed so that you are at school on time.
Emotional control (Feeling-power)	The ability to manage emotions in order to achieve goals, complex tasks, or control and direct behavior.	Feeling-power teaches us to deal with our feelings. You can feel happy, angry, sad, or scared.
Sustained attention (Attention-power)	The capacity to attend to a situation or task in spite of distractibility, fatigue, or boredom.	Attention-power teaches us to be there with our attention. We pay attention to our own work or task and not to others or other things.

Goal-directed-perseverance (Perseverance-power)	The capacity or drive to follow through to the completion of a goal and not to be put off by other demands or competing interests.	Perseverance-power teaches us to persevere. Do not give up when something gets difficult. For example, if a puzzle fails, or if things keep going wrong during a craft project. Perseverance works better if you divide the task into steps. Then it is better to oversee. Every step is a victory then.
Task initiation (Start-power)	The ability to begin a task without undue procrastination, in a timely fashion.	Start-power helps you get off to a good start with your task, work, or game. No delays: ready, set… go!
Metacognition (Mirror-power)	The ability to stand back and take a bird's-eye view of oneself in a situation. It is an ability to observe how you problem solve. It also includes self-monitoring and self-evaluative skills (e.g., asking yourself, "How am I doing?" or "How did I do?").	Mirror-power teaches us to take a good look at ourselves. Not by how we look, but by how we do things. For example, you use your Mirror-power if you want to say something about how you worked.

Appendix C. Real-life situation example and Interrelationships (working memory)

Working memory (Remember and Do-power)

Emma listens carefully while the teacher explains the new weekly task. The children receive instruction about all subjects in the weekly task and must complete these during the week. Emma understands the teacher's explanation about the different assignments and sums, she knows the steps she must take. On Monday Emma starts with language. When she must start reading comprehension afterwards, she doesn't know what to do anymore. She must ask a classmate what the intention was again. Fortunately, he still remembers exactly what the intention is, and he repeats what the teacher has explained. If he tells her the steps, Emma can move on. In the meantime, she asks her classmate again for an explanation and so she finally gets the task done. The teacher is concerned. She wonders if it's too hard for Emma.

Emma has trouble remembering instructions for long periods of time; because of this she is unable to act. She needs help from a classmate. Emma needs a lot of repetition of the instruction to be able to carry out the assignment. There is a great demand on the capacity of her working memory; after all, she must hold things in her working memory for a very long time and that cannot be done without help.

Interrelationships

- Working memory (Remember and Do-power) & Sustained attention (Attention-power)*:*
  Ready to learn
  The Remember and Do-power and Attention-power are important for learning. Working memory is a good predictor of school success because you use it to remember instructions, solve difficult math problems, and so on. When you learn with sustained attention, you absorb more information.

- Working memory (Remember and Do-power) & Metacognition (Mirror-power):
  A good conversation
  When you have a good conversation, you use your Remember & Do-power and your Mirror-power. With your Remember & Do-power, you keep the line of the conversation in mind. You use Mirror-power for listening critically and asking additional questions. During

a conversation there is a chance that your conversation partner will wander off. If you're not careful, you'll go astray. Summarizing helps with that. It also offers the opportunity to hold up a figurative 'mirror' to the speaker. You also check whether you have understood it correctly.

- Working memory (Remember and Do-power) & Time management (Time-power):

  <u>Speed of processing</u>

  If you need more time to process material, you put more strain on the working memory. After all, you must retain information for a longer period of time. By increasing your pace, you relieve the working memory again. That's easier said than done. It sometimes takes a while before the proverbial quarters drop. It is good to realize that within this theme developing a good Time Power can help with Memory and Doing Power.

- Working memory (Remember and Do-power) & Response inhibition (Stop-power):

  <u>No memory without inhibition</u>

  Our Stop-power is desperately needed. Without this inhibition, our memory is overloaded with information and stimuli and our memory cannot handle that. The Stop-power acts as a filter of what is and is not worth remembering. The Stop Power is therefore necessary to be able to remember better. Working memory, our Remember and Do-power, is important for success at school. It is therefore good for the Remember and Do-power to develop a good Stop-power.

Appendix D. Development trajectory of Executive Functions per Age Category

	Working memory	Flexibility	Response inhibition	Planning and organization	Time management	Emotional control	Sustained attention	Goal-directed persistence	Task initiation	Metacognition
Infant (0-24 months)	Plays hide-and-seek and simple recall games. Participates and enjoys familiar rhymes and songs.	Older children in this age range play simple role play or imaginative play games.		Focusing for objects. Pointing & grabbing. Shows interest in color, size, shapes. Beginning matching skills.			Plays simple games like peek-a-boo and pat-a-cake. Imitation and copying behaviors emerge.	Engages in cause-and-effect play. Figuring out 'how things work' though simple body movement and basic play skills.		
Toddler (2-4 years)	Follows along to songs and fingerplays with many steps and movements.	Beginning skills to shift between activities. Sometimes able to manage transitions and unexpected changes without upset.	Plays active inhibition games like musical chairs and freeze dance. Learns to inhibit safety-related behaviors like touching a hot stove and street safety.	Understands simple instructions and can run simple errands. Understands categories and patterns. Can sort toys and objects by function, form, and class. Cleans up toys and belongings with adult assistance.	Beginning understanding of time concepts including seasons, days, weeks, etc. Follows visual picture schedules to order tasks. Practices waiting.	Labels own emotions and the emotions of others. May often have tantrums or upset when frustrated, tired, or overwhelmed requiring adult comfort to soothe.	Able to direct attention to objects and activities for longer periods of time. Responds to adult cues and redirections back to 'pay attention' when needed.	Completes simple puzzles and games that combine language and movement to accomplish a goal. Decision making and turn-taking during play promote basic problem solving.	Able to independently start and complete tasks that take up to 10 minutes.	Talks about own feelings and connects simple behaviors with emotions. Plays along with children, directing play and accepting play ideas.
Early learner (5-12 years)	Independent with puzzles, logic games, and coordinated group activities. Able to collect information and apply it to new settings.	Participates in organized social activities like sports, clubs, and activities where unpredictable events occur. Often uses adult support to dynamically adjust.	Follows safety rules and most social norms for behavior. Behavior maintains when teachers or adults are not around.	Able to follow a planned out set of steps to meet an and goal. Plays fast moving games and games requiring strategy and planning ahead. Organize and sequence stories. Can follow simple checklists. Gathers materials for familiar routines, often with adult assistance and reminders.	Developing time estimation and a sense of how long tasks will take. Beginning skills to manage leisure time and required tasks.	Learns to control tantrums and frustrations without adult comfort.	Able to save money for desired objects. Developing note taking, reminder, and planning tools to help sustain attentional control.	Identifies and defines problems to many simple social and academic tasks. Emerging skills to brainstorm and break apart problems to identify solutions.	Able to independently start and complete tasks that take up to 30-60 minutes.	Able to complete activities like journaling to reflect on own behavior. Checks own work for simple mistakes.
Teen (13-18 years)	Able to collect information and apply it to new settings. Independent with puzzles, logic games, and coordinated group activities.	Able to manage many unpredictable changes to schedules and routines but may sometimes need adult support to identify strategies to dynamically adjust.	Greater risk-taking behaviors. May begin to test some adult safety behaviors and social norms. May engage in self-talk to help manage impulses.	Follows complex school schedules combined with home routines. Able to use systems for organizing schoolwork and activities.	Estimates how long it takes to complete tasks and adjusts working speed to fit. Understands and works to avoid the consequences of ineffective time management.	Greater understanding of others' emotions, including empathy and desire for social change. May experience 'adult feelings' but not have experience yet in how to manage them.	Able to save money for desired objects as well as creates and executes plans to earn money for desired items. Beginning mindfulness of distractions but may need adult support to avoid them.	Independently identifies problems at home, work, and with friends. Able to sort out many conflicts and make decisions about complex problems independently, make seek adult guidance.	Able to independently start tasks that take up to 60-90 minutes to complete.	Able to monitor performance and adjust/improve. Uses tools to monitor behavior. May recruit adult feedback or need reminders from coaches, parents, friends, teachers, etc.
Young adult (18+ years)	Greatest working memory capacity in early adulthood. Able to collect, store, and synthesize information from multiple sources to accomplish tasks and goals.	Modifies schedules dynamically to meet changing demands. Unpredictability causes occasional stress, but able to handle most changes easily.	Manage impulsive behaviors across a variety of settings. Withholds rushing through things. Inhibits reckless and dangerous behaviors.	Maintains neat and orderly systems for daily living tasks. When areas of life like email household chores get out of hand, can re-organize as needed.	Seeks out and implements tools and systems to manage time more efficiently. Uses routines and modifies schedules dynamically to meet changing demands.	Emotional modulation in most settings including controlling outbursts and managing frustration in healthy ways	Able to sustain attention in the face of many distractions. Eliminates or reduces distractions when needed.	Generates solutions to complex problems. Persists in developing new and creative strategies to ongoing problems.	Initiates and completes tasks despite adverse conditions and distractions. Prioritizing and planning occurs ahead of beginning most activities.	Checks work for mistakes. Monitors and compares own behavior to others performance.

Appendix E. Explanation per Brainpower

Remember and Do-power

'Keep your head in the game!'

This power helps us to remember, act and think at the same time. That is why you also see a brain in the picture. It is important to remember how to do a task when the teacher explains it. We also use this Remember and Do-power when we sing a son.

Onthoud- & Doekracht ||
Breinhelden

In your daily life, you use your Remember and Do-power, for example, when remembering things from class and then doing them when your parents ask you to pack your bag for sports lessons or riding your bike in traffic.

Bend-power

'I bend'

Bend-power helps us to be pliable. As flexible as a tree in the wind. You need bending power when things suddenly turn out differently than you thought, or when something does not work out the first time and you have to come up with a new solution. If you can bend well, you will get less tension and stress and it is fun to keep practicing.

Buigkracht || Breinhelden

In your daily life you use your Bend-power, for example, when there is a substitute in the class, something changes during the day or when you play a game.

Stop-power

'Stop, stand still and do nothing'

Stop-power helps us to stop. For example, not speaking out of turn. Or not paying attention to your neighbor when work has to be finished. Stop Power teaches us to restrain ourselves so that we can get to work and learn.

In your daily life you use your Stop-power, for example, when you have to wait your turn, during games or during quarrels.

Stopkracht || Breinhelden

Plan and Organize-power

'I know which steps I'm taking and what I need to do that!'

This power teaches us to plan and arrange all our things in advance so that we can start well and finish things. It is nice to be able to work step by step, so you understand how an assignment works.

In your daily life you use your Plan- and Organize-power, for example, when doing work in the classroom or when cleaning up your room.

Plan- & Regelkracht || Breinhelden

Time-power

'Pay attention to the time!'

This power teaches us to watch the time and get things done on time. When is it important to be ready on time? For example: getting dressed so that you are at school on time.

In your daily life you use your Time-power, for example, to be ready on time to go to school, to arrive on time and to finish schoolwork.

Tijdkracht || Breinhelden

Feeling-power

'Breath in, breath out, I make a wise decision'

Feeling-power teaches us to deal with our feelings. You can feel happy, angry, sad, or scared.

In your daily life you use your Feeling-power, for example if you empathize with someone, if you manage not to remain angry or sad for very long or if you understand that not everyone feels the same.

Gevoelskracht || Breinhelden

Attention-power

'Keep your focus!'

Attention-power teaches us to be there with our attention. We pay attention to our own work or task and not to others or other things.

Aandachtkracht || Breinhelden

In your daily life you use your Attention-power, for example, when working, riding your bike in traffic, or playing games.

Perseverance-power

'Perseverance powerrrrrr'

Perseverance-power teaches us to persevere. Do not give up when something gets difficult. For example, if a puzzle fails, or if things keep going wrong during a craft project. Perseverance works better if you divide the task into steps. Then it is better to oversee. Every step is a victory then.

Doorzetkracht || Breinhelden

In your daily life you use your Perseverance, for example, when something is difficult, when something is boring or when you no longer feel like doing something.

Start-power

'Are you ready to go?'

Start-power helps you get off to a good start with your task, work, or game. No delays: ready, set… go!

Startkracht || Breinhelden

In your daily life you use your Start-power, for example, when working at school or in friendships.

Mirror-power

'Mirror, mirror tell me quickly: how well did I do my job?'

Mirror-power teaches us to take a good look at ourselves. Not by how we look, but by how we do things. For example, you use your Mirror-power if you want to say something about how you worked.

Spiegelkracht || Breinhelden

In your daily life you use your Mirror Power, for example, when you check whether you have filled in all the answers or when you speak out arguments.

Design of the new observation and registration instrument:

Module: Executive Functions

Inhoudsopgave

1. Homepage

This is the homepage. On this page you will find the latest news about KIJK! Verder in the form of tips & facts and notifications. From this page you can navigate quickly to the different elements within KIJK! Verder.
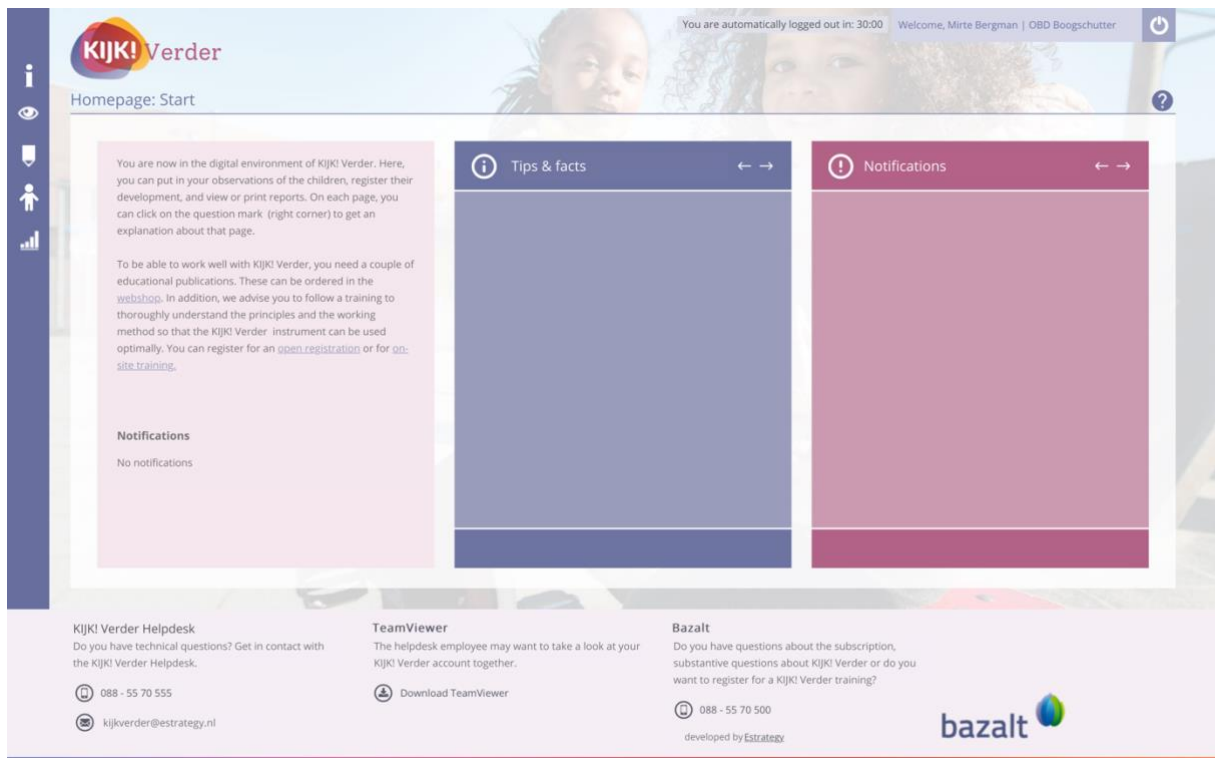
The menu on the left lists the different elements:
1. Information
2. Observation
3. Teacher registration
4. Student registration
5. Reports

Clicking on an icon in the menu will open it, giving the textual explanation. If you click on one of the main titles, the submenu will open, and you can click on the desired element.

Information
In this section you will find all information about the skills that are central within the KIJK! Verder modules. At the moment, this are only the Executive Functions. For each module there is a page with the explanation of the most important concepts, a page with real-life situation examples and a page with the development trajectory. These pages are intended as background information in order to be able to carry out focused observations and registrations.

Observation
In this section you can enter your observations of the students. You can choose to do this per student or per skill. Depending on the observations you have made, you choose the most appropriate way of entering.
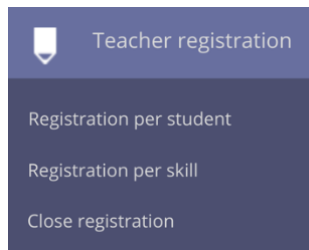
Teacher registration

In this section you register the mastery of the skills of the students. Here too you can choose to do this per student or per skill. The data you entered in the 'observation' section will be available in the 'registration' section. You can work in both parts at the same time.

When you are <u>done</u> with the registration, you can click on 'close registration' in the menu. After closing, only the administrator can reopen the registrations. After registration you can observe and register again.
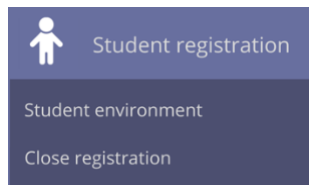
Student registration

In this section the students assess their own skills. Via the menu you as teacher open the student environment where students fill in a questionnaire about their skills.

When the students have finished the registration, you can click on 'close registration' in the menu. After closing, only the administrator can reopen the registrations. After registration the students can register again.

Reports

In this menu you can view and print reports, both for open registrations and for registrations that have been closed.

2. Information
2.1 Most important concepts

This page provides overviews of the most important concepts within a certain module. These overviews ensure that you as a teacher have a clear picture of the skills and recognize associated (problem) behavior more quickly. This helps you to observe and register.
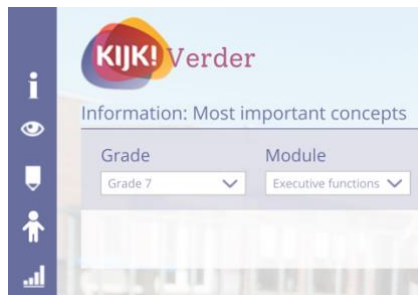
Step 1

Select:
- A grade
- A module

E.g., This design only focuses on the 'Executive Functions' module. When selecting a module, this is the only possible option for now.

Step 2

The overview appears directly on your screen. For use in daily practice, the overviews can also be printed via the print icon.

	Teacher-explanation	Student-explanation
Working memory (Remember and Do-power)	The ability to hold information in mind while performing complex tasks. It incorporates the ability to draw on past learning or experience to apply to the task at hand or to project into the future.	This power helps us to remember, act and think at the same time. That is why you also see a brain in the picture. It is important to remember how to do a task when the teacher explains it. We also use this Remember and Do-power when we sing a son.
Flexibility (Bend-power)	The ability to revise plans in the face of obstacles, setbacks, new information, or mistakes. It involves adaptability to changing conditions.	Bend-power helps us to be pliable. As flexible as a tree in the wind. You need bending power when things suddenly turn out differently than you thought, or when something does not work out the first time and you have to come up with a new solution. If you can bend well, you will get less tension and stress and it is fun to keep practicing.
Response inhibition (Stop-power)	The capacity to think before you act. This ability to resist the urge to say or do something allows us the time to evaluate a situation and how our behavior might impact it.	Stop-power helps us to stop. For example, not speaking out of turn. Or not paying attention to your neighbor when work has to be finished. Stop Power teaches us to restrain ourselves so that we can get to work and learn.
Planning & Organization (Plan and Organize-power)	The ability to create a roadmap to reach a goal or to complete a task, and to design and maintain systems for keeping track of information or materials. It also involves being able to make decisions about what's important to focus on and what's not important.	This power teaches us to plan and arrange all our things in advance so that we can start well and finish things. It is nice to be able to work step by step, so you understand how an assignment works.
Time management (Time-power)	The capacity to estimate how much time one has, how to allocate it, and how to stay within time limits and deadlines. It	This power teaches us to watch the time and get things done on time. When is it important to be ready on time? For

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Do you have technical questions? Get in contact with the KIJK! Verder Helpdesk.

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TeamViewer
The helpdesk employee may want to take a look at your KIJK! Verder account together.

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Bazalt
Do you have questions about the subscription, substantive questions about KIJK! Verder or do you want to register for a KIJK! Verder training?

2.2 Real-life situation examples

This page contains practical examples that describe (problem) behavior associated with a particular skill. These real-life situation examples ensure that you as a teacher recognize situations more quickly in which (problem) behavior occurs that belongs to a certain skill. This helps you to observe with more focus.
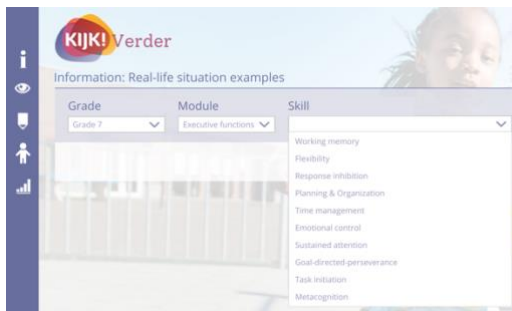
Step 1
Select:
- A grade
- A module
- A skill

Step 2
The real-life situation example associated with the selected skill appears immediately on your screen (in the pink box). Below the real-life situation example, it is described which problems the teacher can encounter. Which skills are interrelated is shown using themes. These are included on the right side of the screen.

Step 3

Click on one of the underlined themes. A pop-up screen will appear describing a situation where two or more skills are being addressed at the same time.

2.3 Development trajectory

This page contains the development trajectory for the skills belonging to a module. In the development trajectory you can see what the students are working towards during their primary school days. You can also look back and forward to see what development the students are going through in other age categories.
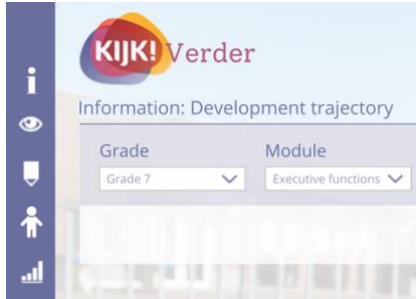
Step 1
Select:
- A grade
- A module

Step 2
The development trajectory associated with the selected module appears immediately on your screen.

3. Observation
3.1 Per student

On this page you enter your observations per student. Here you can write down what you saw, what you noticed and what you want to make a note of. These notes give you information about the development process and about the effects of your interventions. The comments can support you later on during the registration. If you do not make registrations for the observations, they will remain open.

Step 1
Select:
- A grade
- A module
- A student

Step 2
The observation screen appears immediately. On the left you can select the needed skill. Then, the critical incidents appear on your screen. These are predetermined statements. You can give a student a score of 1 to 4 per critical incident. The score indicates how often certain behavior occurs:
- 1 = never
- 2 = seldom
- 3 = often
- 4 = always

You can adjust the scores at any time until a registration is made. It is not necessary to score all observation points at one time. The critical incidents can be scored when they are observed.

Step 3

You can add notes about observed behavior in the note fields below each critical incident. With these notes you can substantiate the given score. This way you will still know why you assigned a certain score to a student in the future. You can add as many notes as you want. For each note, you select who the observer was and adjust the date using the calendar icon.

Previous notes (with entered observer and date) remain available under the critical incidents. You can duplicate, edit, or delete these with the appropriate icons.

Step 4

Are there any other notes you would like to write down? On the right side of the screen is a note field where you can enter those. Again, with these notes you select who the observer was, and you adjust the date.

Step 5

Click on 'Save' or 'Save & Next' to save your observations.

When closing a registration, the observations are being closed too.

3.2 Per skill

On this page you enter your observations per skill. Here you can write down what you saw, what you noticed and what you want to make a note of. These notes give you information about the development process and about the effects of your interventions. The comments can support you later on during the registration. If you do not make registrations for the observations, they will remain open.
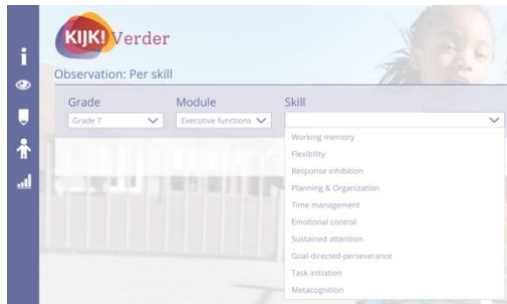
Step 1
Select:
- A grade
- A module
- A skill

Step 2
The observation screen appears immediately. On the left you can select a student. Then, the critical incidents belonging to the selected skill appear on your screen. These are predetermined statements. You can give a student a score of 1 to 4 per critical incident. The score indicates how often certain behavior occurs:
- 1 = never
- 2 = seldom
- 3 = often
- 4 = always

You can adjust the scores at any time until a registration is made. It is not necessary to score all observation points at one time. The critical incidents can be scored when they are observed.

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You can add notes about observed behavior in the note fields below each critical incident. With these notes you can substantiate the given score. This way you will still know why you assigned a certain score to a

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Previous notes (with entered observer and date) remain available under the critical incidents. You can duplicate, edit, or delete these with the appropriate icons.

Step 4
Are there any other notes you would like to write down? On the right side of the screen is a note field where you can enter those. Again, with these notes you select who the observer was, and you adjust the date.

Step 5
Click on 'Save' or 'Save & Next' to save your observations.

When closing a registration, the observations are being closed too.

4. Teacher registration

4.1 Per student

On this page you register the mastery of the skills belonging to a module per student.

Step 1
Select:
- A grade
- A module
- A student

Step 2

The registration screen will appear automatically. On the left side you can select the desired skill. At the bottom of the page, you can see the entered observation scores. Click on 'View entered notes' to view those as well. Based on your observations, you give an overall score for the skill as a whole.

Write down any notes (e.g., considerations and decisions) in the note field below the registration score.
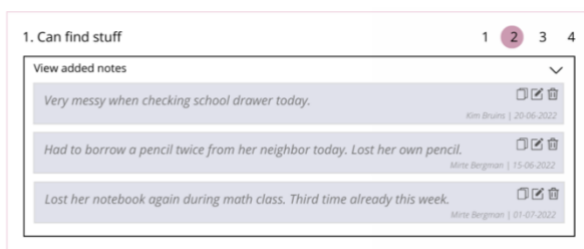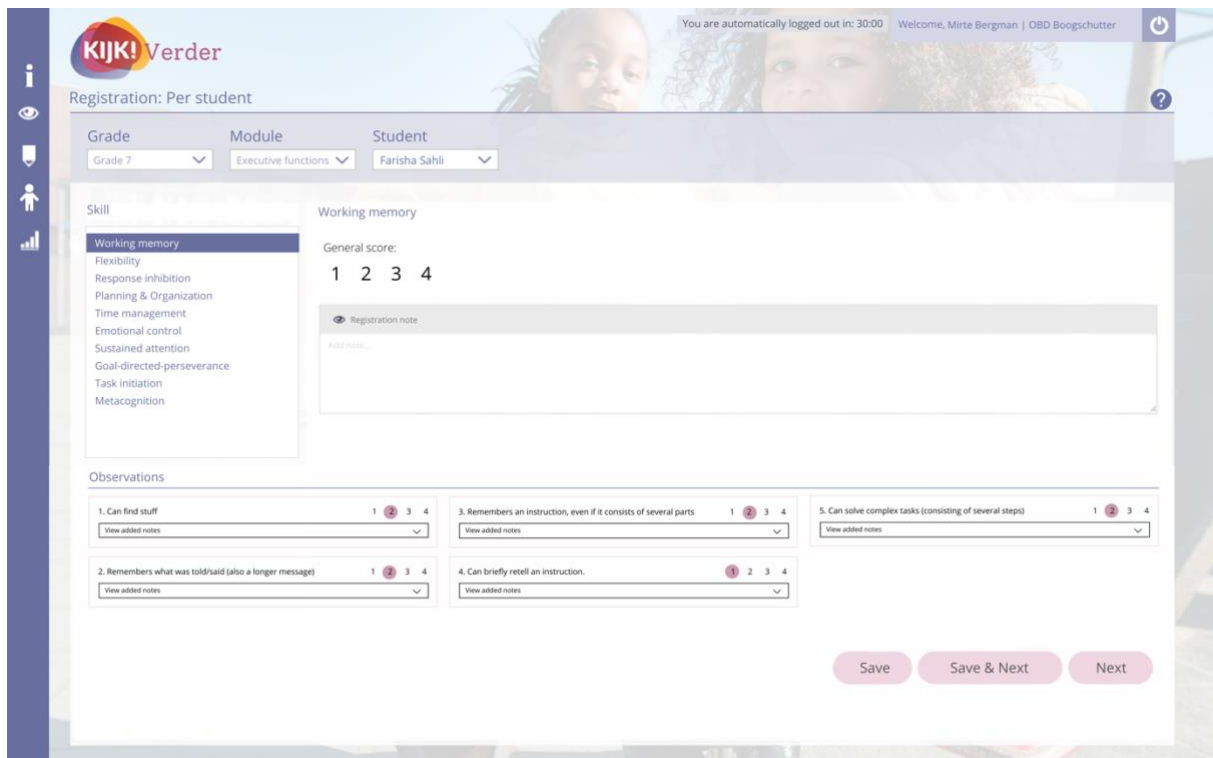
Always click on 'Save' or 'Save & Next' when you have entered any data. You can still make changes as long as a registration has not been closed.

4.2 Per skill

On this page you register the mastery of the skills belonging to a module per skill.
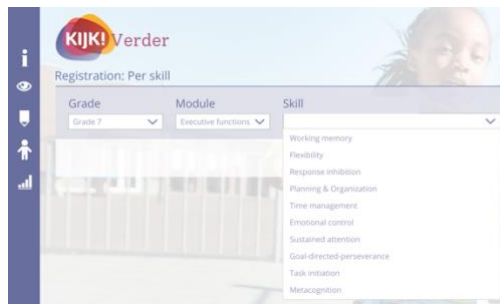
Step 1
Select:
- A grade
- A module
- A skill

Step 2

The registration screen will appear automatically. On the left side you can select the student at hand. At the bottom of the page, you can see the entered observation scores. Click on 'View entered notes' to view those as well. Based on your observations, you give an overall score for the skill as a whole.

Write down any notes (e.g., considerations and decisions) in the note field below the registration score.
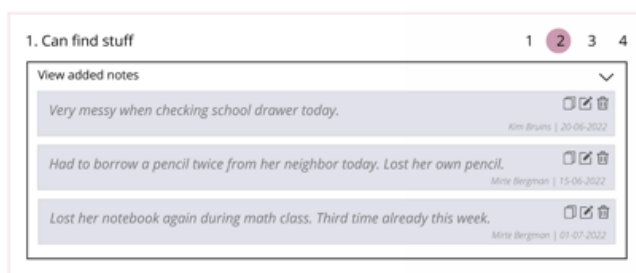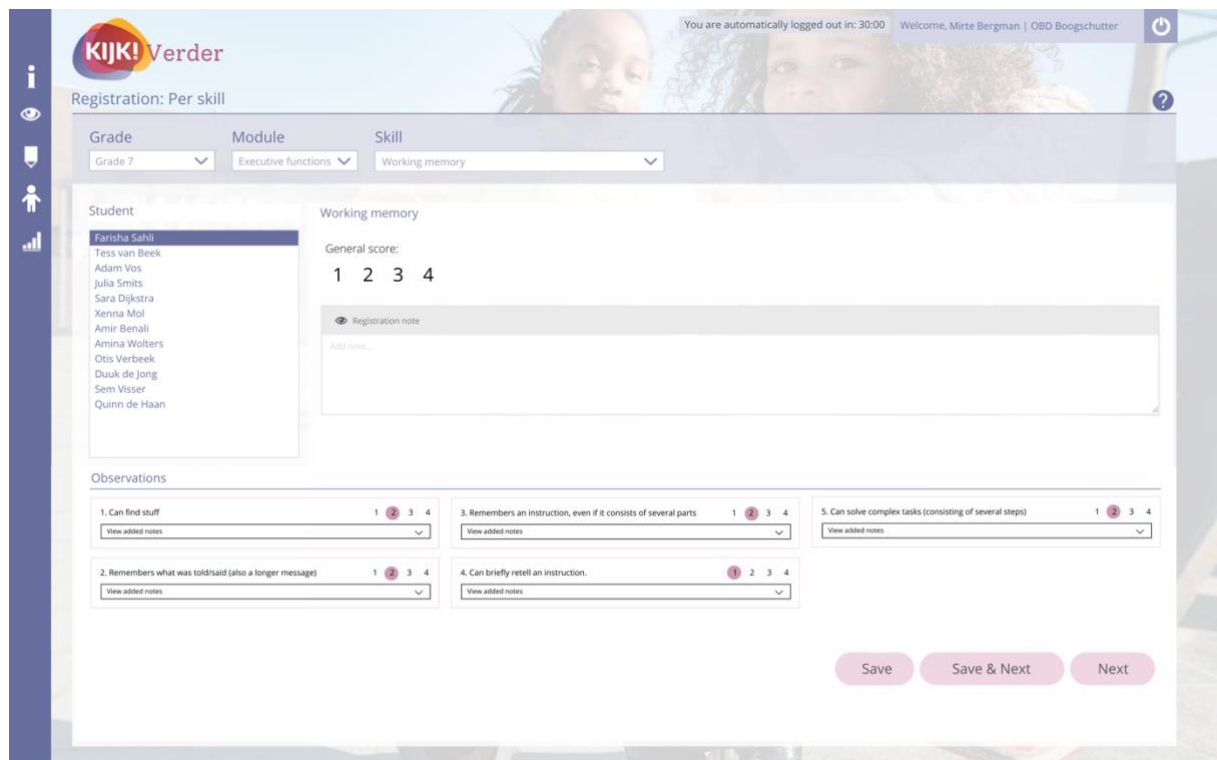
Always click on 'Save' or 'Save & Next' when you have entered any data. You can still make changes as long as a registration has not been closed.

4.3 Close registration

On this page, you close the teacher registration. After closing a registration, only an administrator can reopen it. **Before closing, check that you have completed ALL skills in a module for ALL children.**
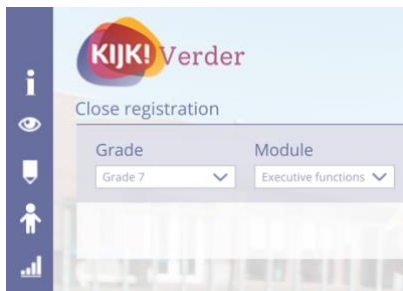
Step 1
Select:
- A grade
- A module

Step 2
In the overview on the page, you can see by the colored dots whether the registration is complete (green), almost complete (orange) or incomplete (red).
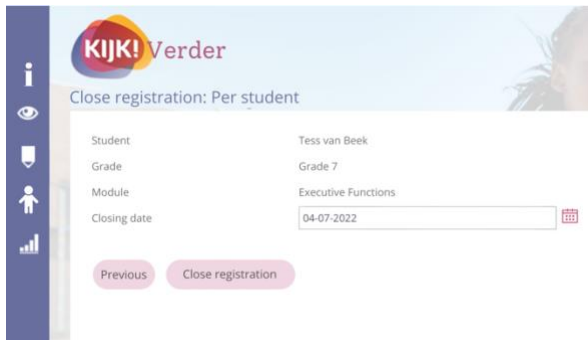
By clicking on the pink i icon behind a student's name, you get an overview in which you can see which skills are NOT registered. If you still want to complete this skill, go back to 'registration per student' to complete the registration.

Step 3
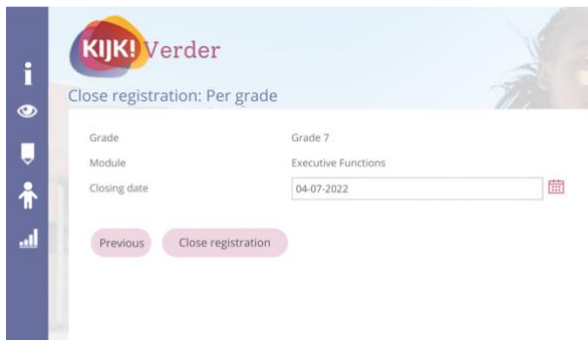
If you want to close the registration, you can choose to: close per student or close per grade. **Even if skills are not completely filled in, you can still close the registration if you wish.**

Close per student
- Click on the student you want to close down the registration for
- Click on 'Close student'
- Adjust the date to the date you want the registration to close
- Click on 'Close registration'

Close per grade
- Pay attention: if you choose this option, the registration will be closed for all students, regardless of whether the registration has been completed or not.
- Click on 'Close grade' to close the registration at once for the entire grade
- Adjust the date to the date you want the registration to close
- Click on 'Close registration'

After you have closed the registration, you can start with the next period.

5. Student registration

5.1 Student environment

On this page you start the registration that the students fill in themselves.
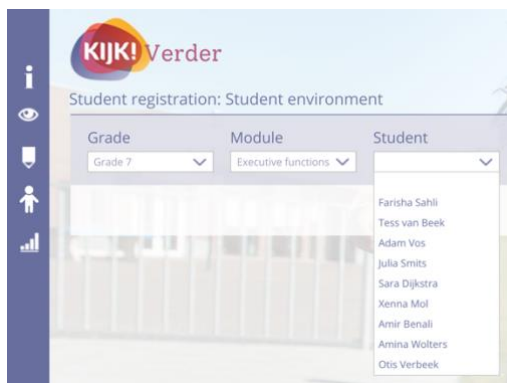
Step 1

Select:

- A grade
- A module
- A student

Step 2

The homepage appears. By clicking on the button, you open the registration for the student. A secure student environment will then be opened. You can start the registration for several students at the same time.

By clicking on the button below you will enter the secured student environment.
Here, the student will fill out a questionnaire for the skill of your choice.
The student cannot leave this environment himself. It must be closed off by you as a teacher.

Start registration for:
Farisha Sahli

Step 3

The student walks through the rest of the environment independently. First, there are several pages that explain the skills. In case of the executive functions; the Brainpowers. Clicking on 'Continue' takes the student to the next page.

Hi Farisha!

We are Effi and Furon and we would like to know more about your Brainpowers! Brainpowers are important for learning and doing things. They have to do with the brain. Everyone has Brainpowers, but some powers could use some extra practice. Just like working out at the gym; your muscles grow and become stronger as you exercise and use them often. It is the same with Brainpowers. You can become a Brainhero if you work on improving your Brainpowers.

Verder

Step 4
The student is then given an explanation of the operation of the program and the assessment is explained using an example.

Example

How do you determine the number of stars? We give you an example based on the statement: *'I can wait for my turn. I raise my finger.'*

Think about how often you use your Stop-power to make sure you wait your turn quietly during class and raise your hand if you want to say something. Based on that, you give yourself the appropriate number of stars. Below is written what the stars mean for this statement approximately. You can make such a classification for each statement. Click on the number of stars that suits your feeling.

1 star = never	2 stars = seldom	3 stars = often	4 stars = always
You <u>never</u> use your Stop-power; actually, you always speak out of turn without raising your hand.	You often need to be reminded to raise your finger. You <u>rarely</u> use your Stop-power.	You can wait your turn well and use your Stop-power <u>often</u>. If you are enthusiastic you can forget your finger.	You <u>always</u> raise your hand and don't speak out of turn. You always use your Stop-power.

Next

Step 5

After the explanation, the student goes through all skills (executive functions) step by step. First of all, he/she receives information about the skill. The student reads what the skill entails and what you use it for in daily life. There is also a video that the student can watch.

'Keep your head in the game!' Remember and Do-power

This power helps us to remember, act and think at the same time. That is why you also see a brain in the picture. It is important to remember how to do a task when the teacher explains it. We also use this Remember and Do-power when we sing a son.

In your daily life, you use your Remember and Do-power, for example, when remembering things from class and then doing them when your parents ask you to pack your bag for sports lessons or riding your bike in traffic.

Onthoud- & Doekracht || Breinhelden

Next

The student is then given 5 statements about the same skill. The student scores itself using stars. Each star represents how often a student uses the skill in class; 1 star = never, 2 stars = seldom, 3 stars = often, and 4 stars = always.
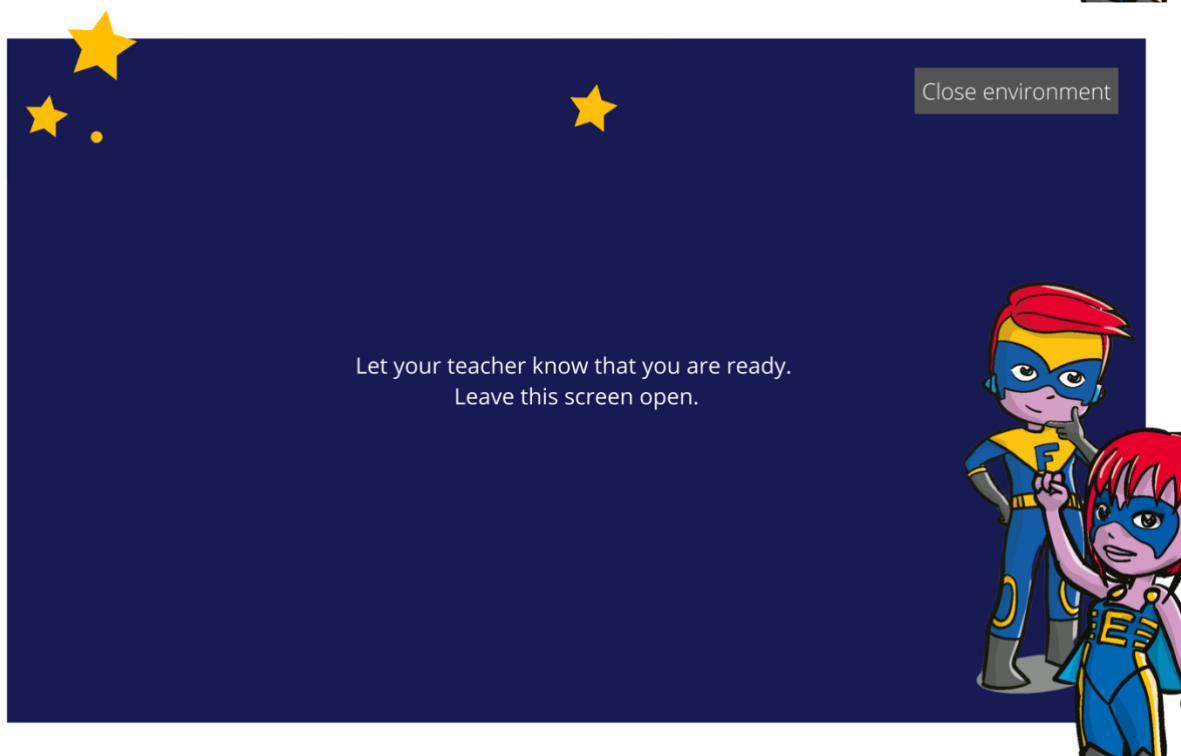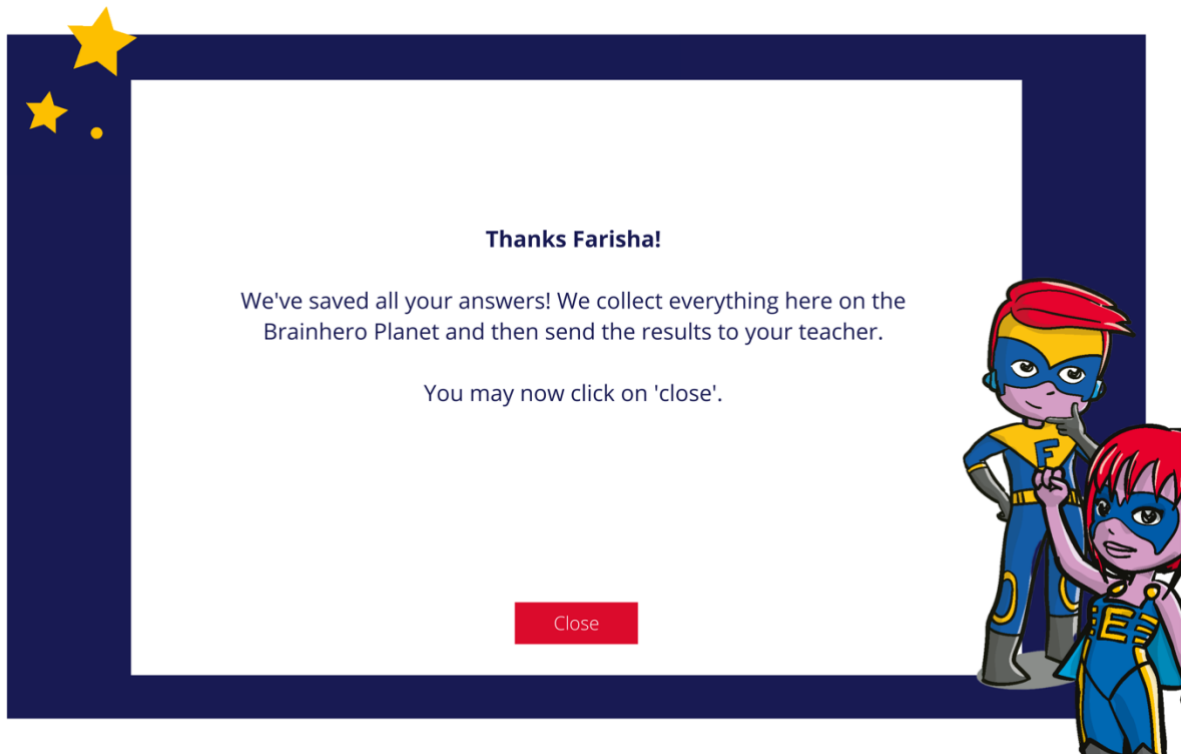
By clicking the red i in the top right corner, the student can read the skill explanation once more.

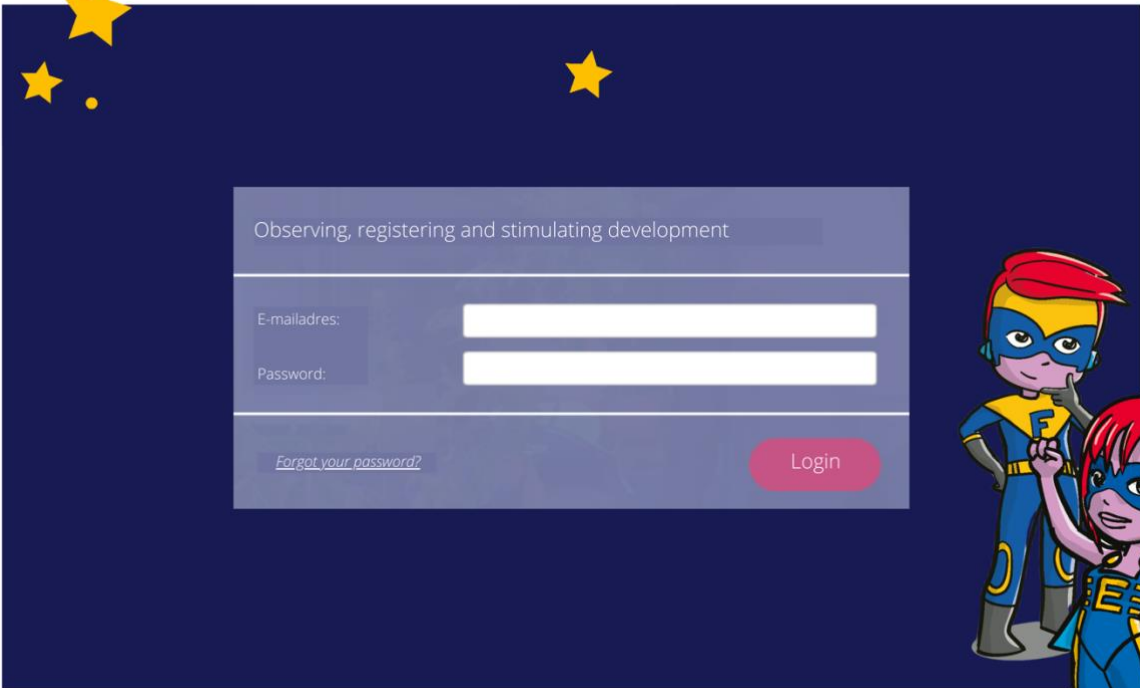**The learner goes through the remaining skills in the same way as described above.**

Step 6

When the student has completed all skills and has assessed itself on all statements, he/she will arrive at the closing page. The student clicks on 'close' and then asks the teacher for help to close the environment.


Thanks Farisha!

We've saved all your answers! We collect everything here on the Brainhero Planet and then send the results to your teacher.

You may now click on 'close'.

Close

Close environment

Let your teacher know that you are ready.
Leave this screen open.

Step 7

Click on the 'Close environment' button. The KIJK! Verder login screen will appear. By logging in, the student environment is closed, and you can return to the teacher environment of KIJK! Verder.

Observing, registering and stimulating development

E-mailadres:

Password:

Forgot your password?

Login

5.2 Close registration

On this page, you close the student registration. After closing a registration, only an administrator can reopen it. **Before closing, check that ALL students have completed a registration.**
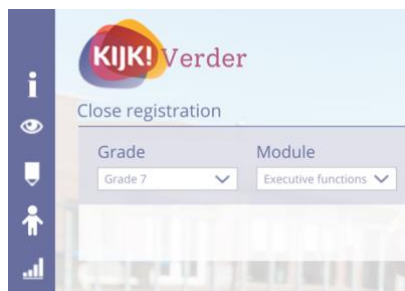
Step 1

Select:
- A grade
- A module

Step 2

In the overview on the page, you can see by the colored dots whether the student has completed a registration (green), has started a registration but has not yet completed it (orange) or has not made a registration (red).

By clicking on the pink i icon behind a student's name you get an overview in which you can see where a student has left off. If you still want the student to fill in or complete his registration, go back to 'student environment' to complete the registration.

Step 3

If you want to close the registration, you can choose to: close per child or close per grade. **Even if the student registration is not (completely) filled in, you can still close the registration if you wish.**

Close per student

- Click on the student you want to close down the registration for
- Click on 'Close student'
- Adjust the date to the date you want the registration to close
- Click on 'Close registration'

Close per grade

- Pay attention: if you choose this option, the registration will be closed for all students, regardless of whether the registration has been completed or not.
- Click on 'Close grade' to close the registration at once for the entire grade
- Adjust the date to the date you want the registration to close
- Click on 'Close registration'

After you have closed the registration, you can start with the next period.

6. Reports

The reports pages are outside the scope of the design (focused on input). This description will be added later on.

Appendix G. PowerPoint presentation focus group

Slide 1:

KIJK! Verder
Module: Executieve Functies

Focusgroep 6/7/2022

Slide 2:

KIJK! Verder

Programma

- Voorstelronde
- Aanleiding van het project
- Bespreken ontwerp
  - Algemeen
  - Onderdeel 1: informatie
  - Onderdeel 2: observatie
  - Onderdeel 3: leerkracht registratie
  - Onderdeel 4: leerling registratie
- Afsluiting

1. Bevindingen uit het behoefte- en literatuuronderzoek
2. Aanbevelingen voor het instrument
3. Ontwerpvoorbeelden
4. Tips & Tops

Slide 3:

KIJK! Verder

Voorstelronde

- Wie ben je?
- Wat voor werk doe je?
- Wat is jouw expertise?

Slide 4:

KIJK! Verder

Aanleiding van het project

Observatie- en registratie instrument nodig dat:
- door leerkrachten zelf te gebruiken en interpreteren is
- makkelijk te gebruiken en tijd efficiënt is
- in te zetten is voor alle leerlingen
- interventies op basis van de resultaten geeft

Slide 5:

KIJK! Verder

Algemene aanbevelingen

- Het KIJK! Verder instrument moet makkelijk te gebruiken zijn en niet te veel tijd in beslag nemen van leerkrachten.

- Leerkrachten moeten ander onderwijspersoneel, zoals IB'ers en onderwijsassistenten toegang kunnen geven tot (onderdelen van) het KIJK! Verder instrument.

- Het KIJK! Verder instrument moet preventief ingezet kunnen worden om de executieve functies van alle kinderen te monitoren.

- Het KIJK! Verder instrument moet de volgende onderdelen bevatten:

| i Informatie | Observatie | Leerkracht registratie | Leerling registratie | Rapportage |

Slide 6:

KIJK! Verder

Informatie

Behoefte- en literatuuronderzoek
- Leerkrachten: Duidelijke beschrijving nodig van executieve functies om goede observaties te kunnen maken. Praktijk voorbeelden kunnen helpen om karakteristiek gedrag behorend bij een Executieve Functie te herkennen. Willen weten waar een leerling zou moeten staan op welke leeftijd.

- Literatuur: Interrater agreement verhogen door observatoren te 'trainen'. Praktijkvoorbeelden laten inderdaad zien hoe problemen met Executieve Functies zich kunnen uiten in probleemgedrag. Moeilijk een situatie te onderscheiden waarin maar 1 Executieve Functie de onderliggende factor is. Iedereen ontwikkelt Executieve Functies op andere manier en tempo. Alleen ontwikkelings-leerlijn per leeftijdsgroep mogelijk.

Aanbevelingen
- Overzicht met de beschrijving van de 10 Executieve Functies. Ook kindvriendelijke beschrijving toevoegen aan overzicht.
- Heldere situatieschetsen met probleembeschrijving. Ook voorbeelden opnemen die relatie tussen executieve functies weergeven.
- Ontwikkelings-leerlijn per leeftijdsgroep opnemen als richtlijn naar 'einddoel'.

Slide 7:

KIJK! Verder

Informatie

Het ontwerp: Informatie– Belangrijkste concepten

Slide 8:

KIJK! Verder
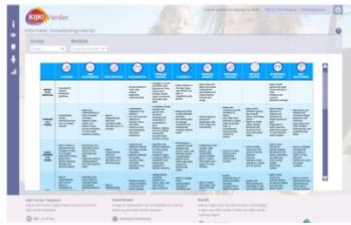
Informatie

Het ontwerp: Situatieschetsen

Slide 9:

KIJK! Verder

Informatie

Het ontwerp: Ontwikkelings-leerlijn

Slide 10:

KIJK! Verder

Observatie

Behoefte- en literatuuronderzoek
- Leerkrachten: Mogelijkheid hebben tot vastleggen van geobserveerd gedrag, bij voorkeur middels het toekennen van een score.
- Literatuur: Gebruik van Behavior Rating Scales (BRS) is een haalbare en effectieve manier om gedrag te beoordelen. Beoordelaar moet ook uit kunnen leggen hoe hij tot deze score is gekomen. Hoe groter de verscheidenheid aan beoordelingsbewijs, hoe zelfverzekerder je conclusies kunt trekken over de ontwikkeling van leerlingen.

Aanbevelingen
- BRS gebruiken; natuurlijk gedrag wordt geobserveerd + het tijd efficiënt.
- Items uit de BRIEF-2 Screeners (Gioia et al., 2020) of de Breinhelden methode (Herrewijn & Monfils, 2020) kunnen gebruikt worden als observatiepunten.
- 4-punt Likertschaal (nooit, zelden, vaak, altijd) zodat geen neutrale optie gekozen kan worden.
- Opmerkingenvelden toevoegen voor toelichting van de gegeven score.

Observatie

Het ontwerp: Observatie per kind & per vaardigheid

Leerkracht registratie

Behoefte- en literatuuronderzoek
Veel overlap tussen 'observatie' en 'registratie'.

- Leerkrachten: Uitschieters vaststellen. Bij voorkeur registreren door middel van toekennen van een score.
- Literatuur: Enkel score toekennen niet voldoende bewijs om conclusies te trekken over ontwikkeling.

Aanbevelingen
- Score laten toekennen voor executieve functie in zijn geheel.
- Beoordelingsbewijs in de vorm van de ingevoerde observatiescores + opmerkingen.
- Leerkracht bepaalt hoe zwaar observatiescores 'wegen' en wat de uiteindelijke algemene score wordt.
- Opmerkingenveld toevoegen voor toelichting van score

Leerkracht registratie

Het ontwerp: Registratie per kind & per vaardigheid

Leerling registratie

Behoefte- en literatuuronderzoek
- Leerkrachten: Kinderen in staat zichzelf te beoordelen mits een heldere uitleg over de Executieve Functies. Geen open vragen stellen, maar kinderen zichzelf een score laten geven.
- Literatuur: Belangrijk om leerling te betrekken bij proces + eigenaarschap te geven. Kinderen kunnen zichzelf alleen beoordelen als zij duidelijke criteria meekrijgen. In zelf-evaluatie werken voorbeelden goed, numerieke Likertschalen niet.

Aanbevelingen
- Kindvriendelijke omschrijving uit de Breinhelden methode (Herrewijn & Monfils, 2020) gebruiken als inhoud.
- Uitleg van Breinkrachten toevoegen (niet iedereen mee bekend).
- Schaalverdeling uitleggen aan de hand van een voorbeeld.
- Beoordeling aan de hand van stellingen uit de dagelijkse schoolpraktijk (ik-vorm).
- Likert-schaal in de vorm van sterren; hoe meer sterren, hoe vaker een leerling zijn Breinkrachten inzet om het gedrag uit de stelling te kunnen vertonen.

Leerling registratie

Het ontwerp: Leerling omgeving

Rapportage

Buiten scope van project, zullen we nu niet bespreken.

Zal in ieder geval:
- Inzicht geven in de resultaten
- Mogelijke interventies geven

Afsluiting

Dank voor jullie expertise!

Nog nabranders?
Altijd te bereiken via m.h.bergman@student.utwente.nl