# Academic Primary School Teachers' Research Competencies and Attitudes Towards Evidence-Based Teaching

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**Abstract**

Improving teaching and learning calls for implementing evidence-based teaching (EBT) practices in Dutch primary education. To translate research evidence into teaching practices, academic primary school (APS) teachers are expected to play a crucial role as brokers between these subcultures. Following the paradigm from the medical field, we recognized the importance of cognitive and affective characteristics to EBT implementation and explored the extent to which APS teachers' research competencies (cognitive) and attitudes (affective) influence their intention to use EBT. Additionally, we aimed to explain the underlying dynamics between the variables under investigation. This study employed a quantitative design and collected data from $N = 43$ APS teachers. A regression analysis revealed no significant predictive associations between APS teachers' research competencies, attitudes, and intention to use EBT. Also, no significant interaction effect was found between APS teachers' research competencies and attitudes on their intention to use EBT. The results reveal a holistic approach, addressing not only APS teachers' cognitive and affective characteristics but also organizational factors, is required to implement EBT in primary education. This study highlights the need for future research on the factors necessary to support APS teachers' adoption of EBT.

*Keywords:* research competencies, attitudes towards research, evidence-based practice

To provide the best education for our children, the most rigorous research evidence should be used (Slavin, 2002). Evidence-based teaching (EBT) assumes that teaching and learning improve through teachers' consideration of current educational research, which constitutes a sound basis for action (Brown & Zhang, 2016; Davies, 1999). In the Netherlands, since 2006, the Dutch Education Council put a strong emphasis on the implementation of evidence into teaching practices to enhance primary school students' learning outcomes (Onderwijsraad, 2006). Educational practices are often shaped by practitioners' ideology or personal experience (Beder & Medina, 2001; Slavin, 2008) and a shift is required to a culture in which practitioners acknowledge the need to put evidence into practice (Groccia & Buskist, 2011).

Academic primary school (APS) teachers can contribute enormously to this change of culture by acting as brokers between research and practice (Onderwijsraad, 2011). APS teachers have completed an academic teacher education program or obtained a master's degree at a university in addition to the regular teacher education program (Coenen et al., 2021; Schouten, 2020). Thus, APS teachers are suitable for the role of brokers, because of their understanding of the subcultures of teaching and research (Shavelson, 2020), which should enable them to implement EBT and transfer scientific knowledge to their fellow teachers (Baan et al., 2019; Schouten, 2020). Specifically, it is expected that APS teachers' education, provides them with research competencies and fosters positive attitudes towards evidence-based teaching practices (Baan et al., 2020a; Sluijsmans & Stokhof, 2010). Research shows that such positive attitudes are common among practitioners who are not researchers but have previously been exposed to research (Czerniawski et al., 2017; Tack & Vanderlinde, 2014).

In the medical field, where the evidence-based movement began, several studies supported the notion that practitioners' research competencies and attitudes are related to the

use of evidence in practice (Brown et al., 2009; Eller et al., 2003; Nakamura et al., 2011). In primary education, limited research has been done on the link between APS teachers' research competencies and attitudes, and their intention to use EBT. The few existing studies, for example, explored pre-service teachers' attitudes towards research, measured qualitatively in-service teachers' self-reported research competencies, or descriptively investigated the use of research evidence in teaching practices (Baan et al., 2019, 2020a, 2020b; Schulz & Mandzuk, 2005). To fill this knowledge gap and based on evidence from the medical field, this study aims to shed light on the extent to which APS teachers' research competencies and attitudes influence their intention to put evidence into practice. Specifically, this study delivers valuable insights by sampling in-service APS teachers, adopting a quantitative approach, distributing a test to measure research competencies, and connecting research competencies and attitudes to APS teachers' intention to use evidence-based practice. Our findings contribute to the scarce literature in the field of EBT focusing on APS teachers.

**Evidence-Based Teaching**

It has been argued for years that primary school teachers should integrate research evidence into their teaching to improve their practices (Groccia & Buskist, 2011) and to enhance students' outcomes (Brown & Zhang, 2016). Incorporating research evidence into teaching practices is particularly necessary for a society in which education is continuously changing and facing multiple challenges (Ellis & Castle, 2010; Munthe & Rogne, 2015). By using evidence to shape education, changes in didactics or pedagogical approaches become progressive improvements based on recent scientific insights instead of the usual shifts in practices due to ideology and fashion (Slavin, 2002). Successful implementation of EBT could support students' learning through effective practices (Brown & Zhang, 2016), for example when teachers consult research evidence when considering a new strategy for teaching math (Scheerens & Kirschner, n.d.).

Defining research evidence does not go without controversy (Davies, 1999). In this study, we recognize the importance of EBT and we define evidence as scientifically replicable knowledge derived from research (Slavin, 2008). Based on the adopted definition we assume that primary school teachers who use evidence in their teaching can continually evaluate, innovate, and improve their teaching to provide the best education (Baan et al., 2019).

## Primary School Teachers in the Netherlands

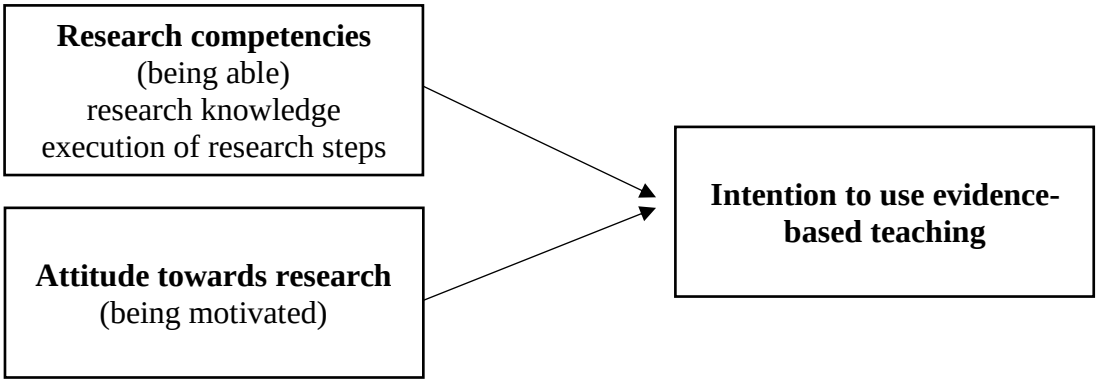
In the Netherlands, most primary school teachers have completed a teacher education program at a university of applied sciences (Van der Linden et al., 2012), which is referred to as the regular teacher education program. The regular teacher education program pays limited attention to research (Baan et al., 2020b) and has a practical orientation, meaning that students do internships a few days a week and develop knowledge and skills that are directly applicable when teaching (Kaskens et al., 2018). Since 2006, the Netherlands has been making efforts to promote further education opportunities to academically educate teachers (Onderwijsraad, 2006) and to enable them to translate research evidence to educational practices (Claessens & Viëtor, 2019; Maaranen & Krokfors, 2008). Individuals can become APS teachers by completing the academic teacher education program at university or a master's program at university in addition to the regular teacher education program (Schouten, 2020). The academic teacher education program and the master's program both focus on acquiring scientific knowledge and skills, which APS teachers can apply within educational settings (Doolaard et al., 2018; Mittelmeier et al., 2021). Research indicates that this higher degree (in comparison to a degree obtained at a university of applied sciences) might increase teachers' research competencies and supports positive attitudes towards research (Brown et al., 2010; Jette et al., 2003).

## Building a Framework on Academic Primary School Teachers' Research Competencies and Attitudes Towards Research

Since evidence-based practice has its roots in medicine (Georgiou et al., 2020; Groccia & Buskist, 2011), this study builds on the knowledge of this field. In medicine, considerable research can be found on cognitive (e.g., competencies) and affective (e.g., attitudes) personal characteristics that are important to consider not only for medical professionals but also for APS teachers to reach their full potential as brokers between research and practice (Brown et al., 2009; Mallidou et al., 2018; Nakamura et al., 2011). Rousseau and Gunia's (2016) systematic review on the psychology of evidence-based practice implementation serves as a framework to organize these personal characteristics. This framework integrates elements of the theory of planned behavior (Ajzen, 1991) and workplace learning (Vroom, 1964). We follow the interpretation of Diery et al. (2021) and argue that for APS teachers to optimally incorporate EBT strategies, two personal factors are crucial. First, APS teachers should be able to implement EBT (Diery et al., 2021). This is captured by the term *research competencies*, which includes both research knowledge and the execution of research steps (Gess et al., 2017). Second, APS teachers should be motivated (i.e., having a positive attitude) to implement EBT practices, because an individual's attitude towards a certain idea determines their readiness to act (Diery et al., 2021). In medicine, these cognitive and affective personal factors have been shown to contribute to the intention to use evidence-based practices (Dugdall & Watson, 2009; Eller et al., 2003). Based on the abovementioned theories and research evidence, we expect that APS teachers' research competencies and attitudes towards EBT affect their intention to use evidence in their teaching practices (Figure 1).

**Figure 1**

*Schematic Representation of the Hypothesized Model Based on Elements of The Theory of Planned Behavior (Ajzen, 1991), Workplace Learning (Vroom, 1964), and Research Competencies (Gess et al., 2017)*




***Research Competencies***

Research competencies are needed to be able to generate new knowledge based on scientific methods (Borg, 2010). Three research knowledge domains were distinguished as the cognitive dispositions that underly the research competency required for successful social research: research process knowledge, knowledge of research methods, and knowledge of methodologies (Koeppen et al., 2008). Additionally, experts identified three research steps as particularly important for research competencies within each knowledge domain: finding and defining a research problem, planning a research project, and analyzing and interpreting data (Gess et al., 2017). For example, the research process knowledge needed for the identification of a research problem includes the criteria for selecting and judging research questions. The methodical knowledge needed for the identification of a research problem encompasses the estimation of the effort required to perform specific research methods. Finally, the methodological knowledge required for the identification of a research problem includes knowing basic methodological terms (Gess et al., 2017).

In the medical field, research competencies have been shown to influence the use of evidence-based practice in nursing (Burke et al., 2005). Studies found a positive relationship between nurses' knowledge of using evidence and their actual use of evidence in practice (Brown et al., 2009; Myakava et al., 2021). Research on evidence-based practice in education found that, unlike regular teachers, APS teachers were exposed to research designs and data

analysis (Baan et al., 2020a). This exposure to research contributes to the integration of research and practice-based knowledge and the use of evidence (Afdal & Spernes, 2018; Estabrooks et al., 2003). Furthermore, recently graduated APS teachers self-rated their research competencies higher than teachers without an academic grade and were also found to use research more often (Baan et al., 2019). Based on these studies, we expect a positive relationship between APS teachers' research competencies and their intention to use EBT.

### *Attitudes Towards Evidence-Based Teaching*

Attitudes refer to the expressions of affective reactions that an individual experiences (Rokeach, 1968; Wyer & Albarracín, 2005). Teachers' attitudes towards research consider whether they positively appraise being involved in research processes to develop new skills, approaches, and strategies (Impedovo & Malik, 2016). These attitudes drive classroom actions, influence teachers' change processes (Nespor, 1987; Pajares, 1992), and are therefore important to consider when understanding classroom practices (Richardson, 1996). Thus, teachers need to have a positive attitude towards using research to enhance evidence-based practices (Diery et al., 2021; Georgiou, 2020).

Research in the medical field has also provided insights considering the influence of attitudes on the adoption of evidence-based practice. Several studies have shown that medical practitioners with a positive attitude towards evidence-based practice are more likely to seek out scientific information to support their performance (Dugdall & Watson, 2009; Nakamura et al., 2011; Ryan, 2016). Research among preservice APS teachers has shown that these teachers have a more positive attitude towards research and they seem more motivated to use research in their practices than preservice teachers in the regular teacher track (Baan et al., 2020a). Additionally, research revealed that teacher educators with a more positive attitude towards evidence-based practice showed higher use of evidence (Diery et al., 2020). Since attitudes of practitioners in applied settings play an important role in the success of EBT

efforts (Nelson et al., 2006), negative attitudes are expected to result in lower usage of evidence-based practice. Research showed that preservice teachers' deteriorated attitude towards research resulted in lower expected use of evidence in practice (Schulz & Mandzuk, 2005). Based on the above-mentioned studies we assume a potential positive relationship between academic teachers' attitudes towards research and their intention to use evidence-based practices.

### *The Association Between Research Competencies, Attitudes, and Intention to Use Evidence*

Studies focusing on the association between research competencies, attitudes, and intention to use research evidence are contradictory (Malik et al., 2015; Nelson et al., 2006). On the one hand, research indicates that if practitioners have the necessary research competencies, but lack a positive attitude towards using research they are less likely to engage in evidence-based practices. For example, mental health practitioners, who did have the necessary knowledge to use research, still had little intention to use research evidence in their teaching practice, because of the belief that research ignored the human context of mental health problems (Bilsker & Goldner, 2004; Nelson et al., 2006). Similar results were identified in medical research comparing the effects of research competencies and attitudes revealing that research competencies have a stronger influence on practitioners' intention to use evidence in comparison to attitudes (Eller et al., 2003; Myakava et al., 2021). On the other hand, a study among nursing educators showed that if practitioners have a positive attitude towards evidence-based practices, but they lack research competencies, they use little scientific evidence in their practices (Malik et al., 2015). A study among physicians showed similar results, with positive attitudes towards research, but lower use of evidence in practice due to the lack of knowledge and competencies (Barghouti et al., 2009). In teacher education, research among teacher educators found that to be able to effectively put evidence into practice teacher educators need to show both research competencies and positive attitudes

towards EBT (Diery et al., 2021). It is evident that findings are contradictory and more research especially in primary education is necessary to be able to understand the complex relationship between attitudes and research competencies to effective implementation of evidence-based practice. Based on the aforementioned studies, we assume that the variables (research competencies and attitudes) affect the relationship of one another to APS teachers' intention to use evidence in their teaching practice.

### Present Study

Gaining insights into APS teachers' research competencies and attitudes towards research plays a pivotal role in enhancing EBT in primary schools. The main research question in this study is to what extent APS teachers' research competencies and attitudes influence their intention to put evidence into practice. Specifically and to explore the magnitude of influence of the aforementioned variables on EBT implementation, we first investigate the predictive value of APS teachers' research competencies and attitudes to their intention to use evidence in their teaching practice. Based on the literature review, we hypothesize a positive predictive relationship between APS teachers' research competencies and attitudes to their intention to use EBT practices. Secondly, to explain the underlying dynamics among the variables under investigation, we explore interactions between APS teachers' research competencies and attitudes on their intentions to incorporate research findings in their teaching practice. We hypothesize that the independent variables (research competencies and attitudes) affect the relationship of one another to APS teachers' intention to use evidence in their teaching practice.

## Method

### Research Design

In this study, a cross-sectional quantitative design including two surveys and a test was used to answer the research questions. A quantitative design was chosen because it

allows for measuring a variety of variables, after which calculations and analyses can be performed (Watson, 2015). Surveys are used for measuring attitudes towards evidence-based practice and intention to use evidence-based practice because of their cost-efficiency, animosity, and comparability with other studies using similar questions (Nardi, 2018). A test was used for measuring research competencies because tests allow for obtaining more reliable results when assessing competencies (Gess et al., 2017).

**Participants**

A priori power analysis was conducted using the G*power analysis tool (version 3.1) revealing that 119 participants were required to perform the *F* tests for multiple linear regression (Faul et al., 2007). Eventually, 89 APS teachers entered the survey and a total of *N* = 43 (93% female) completed the survey (48.31% response rate). The participants ages ranged from 21 to 66 (*M* = 32.28, *SD* = 12.63). The high percentage of women observed reflects the population of primary school teachers in the Netherlands since 85% are female (Kluit, 2021). The final sample included APS teachers with different educational backgrounds (16.3 % academic teacher education program, 41.9% university master and regular teacher education program, 41.9% academic teacher education program and university master).

**Instrumentation and Pilot Study**

All instruments used to measure APS teachers' research competencies, attitudes, and intention to use evidence in their teaching practice were translated into Dutch. To enhance validity, the instruments were translated from English to Dutch by a collaborating researcher (whose native language is Dutch) and then translated back to English by the researcher. Finally, the English translation was compared to the original version to check for differences. This technique is commonly used to check the accuracy of a translation (Brislin, 1970; Douglas & Craig, 2007).

The survey was pilot tested by four participants to resolve possible issues (clarity, comprehensiveness) with the translated instruments (Slattery et al., 2011) and to calculate the estimated time needed to complete the survey. As a result of the pilot, minor reformulations took place e.g., "*ogenschijnlijk*" was changed to "*schijnbaar*" (English: apparently). After careful consideration, the option "*Ik weet het niet*" (English: I do not know the answer) was added to the questions in the instrument for testing research competencies to provide more reliable information about the individual's knowledge (Burton, 2001). We also decided to test research competencies last because participants mentioned during the pilot that this is preferable due to this instrument's difficulty.

***Research Competencies***

To measure research competencies, the Berlin test (Gess et al., 2017) was used (Appendix A), which consists of nine multiple-choice questions related to research process knowledge, methods, and methodologies of research in social science. For each question, participants were presented with four answer possibilities and the option "I do not know the answer".

The psychometric quality of this test was assessed using item-test correlations (Wieland et al., 2017) and reliability analysis. Item-test correlations below 0.3 were considered for omission but only item 5 and item 9 were deleted since deleting more items did not contribute to reliability. Furthermore, we aimed to include as many questions as possible to properly cover the total domain of research competencies and thus adhere to content validity (Salkind, 2010) as was intended in the original scale (Gess et al., 2017). Looking into item 5 ("Which of the following research questions fits the qualitative research traditions best?") raised the question of whether this was an appropriately formulated question. The correct answer to this question referred to another context (dropping out of school and the role parents play in it) than the other answer options which were about drop-out amongst doctoral

candidates. This might have confused the participants. Item 9 (“What is the biggest problem of the presented research project?”) was deleted because it was the last question of the questionnaire and some participants mentioned that they did not concentrate when answering this question. The final test with seven items (items 1, 2, 3, 4, 6, 7, and 8) (Appendix B) showed sufficient reliability ($\alpha$ = .52) (Lienert & Raatz, 1994). In the final test, scores from zero to three were considered low, scores from three to five were considered moderate and scores above five were considered to be high.

### *Attitudes Towards Evidence-Based Practice*

Attitudes towards evidence-based practice were measured using the subscale attitudes towards evidence-based teaching (Georgiou, 2020) (Appendix C). This subscale included ten negatively formulated statements regarding attitudes towards evidence-based practice (Georgiou, 2020). Participants indicated their levels of agreement with the statements using a six-point Likert scale, ranging from *strongly disagree* (1) to *strongly agree* (6).

To provide support for the construct validity of this scale, a confirmatory factor analysis (CFA) was conducted (DiStefano & Hess, 2005) in Rstudio, version 2022.02.2+485. A CFA is a structured equation model that measures the relationship between latent variables and the observed item scores (Brown & Moore, 2012). The purification of the model can be found in Appendix D. Based on statistical criteria (i.e., comparing quantitative data with cut-off values) (Guide & Ketokivi, 2015), by looking into items with factor loadings < .5 (Awang et al., 2015; Hair, 2009; Stevens, 2012), and judgmental criteria (i.e., qualitative assessment of the appropriateness of textual data) (Nevo, 1985) items 3, 4, 5, 8, and 10 were removed. We believe these items covered a different topic in comparison to the core characteristics of APS teachers’ attitudes towards evidence-based practice. Items 3 (“Teachers should decide based on their experience if and how they want to make use of current research evidence.”, 4 (“The judgment of esteemed colleagues offers a better basis than current research evidence.”),

and 5 (“Experienced teachers should disregard research evidence when it conflicts with their intuition.”), might have captured beliefs about how teachers, in general, should position themselves towards evidence-based practices, instead of whether how they believe they themselves should appraise EBT. Items 8 (“I know what is best for my students without examining the current research evidence.”) and 10 (“My teaching experience influences how I judge evidence-based recommendations.”), might have covered the relationship between APS teachers’ intuition and EBT. The factor loadings for the remaining items are presented in Table 1. The final scale had a minimum and maximum score of respectively five and thirty and a confirmatory factor analysis indicated a good fit ($\chi^2(5) = 3.811$, $p = .577$, RMSEA = .000, CFI = 1.000, TLI = 1.024) (Jackson et al., 2009). This subscale has shown good reliability ($\alpha = .84$) (Evers et al., 2009).

**Table 1**

*Factor Loadings Final Subscale Attitudes Towards Evidence-Based Teaching*

| Item | Factor loading |
|---|---|
| 1. Previous teaching experience is more important than the use of current research evidence | .50 |
| 2. Teachers, in general, should not practice teaching based on current evidence because teaching is about people and students, not statistics | .56 |
| 6. Teaching based on current research evidence is a waste of time | .97 |
| 7. There is no reason for me to implement evidence-based teaching because it is just a fad that will pass with time | .82 |
| 9. Teaching based on current research evidence ignores the art of teaching | .77 |

*Note.* $N = 43$.

***Intention to Use Evidence-Based Practice***

To measure the intention to use evidence-based practice, the self-use of evidence-based practice scale was used (Al Zoubi et al., 2018) (Appendix E). This scale originally included nine questions regarding the use of evidence in practice during the past six months. Participants responded to the questions using five answer options ranging from *never* to *more than ten times a month*. Some questions were altered from therapist practice to the teaching practice, for example, "patient and client situation" was changed to "student or educational setting" (Appendix F).

Again, a CFA was performed in Rstudio, version 2022.02.2+485. The purification of the model can be found in Appendix G. Based on statistical (factor loadings < .5) (Guide & Ketokivi, 2015) and judgmental criteria (Nevo, 1985) several items (1, 5, and 6) were removed. Considering the content of these items, we believe that item 1 ("Identify a gap in your knowledge related to a student or educational setting?") mainly referred to the experience of a knowledge gap than the use of EBT. Items 5 ("Critically appraise the measurement properties, e.g., reliability and validity, sensitivity and specificity, of standardized tests or assessment tools you are considering using in your practice?") and 6 ("Interpret study results obtained using statistical tests and procedures, e.g., t-tests, logistic regression?") contained very specific research terms which might be difficult to understand when working outside research. We assumed that these terms referred to a very sophisticated use of research evidence, which might differ from the way scientific evidence is used in primary schools by APS teachers. The factor loadings for the remaining items are presented in Table 2. The minimum and maximum scores for the altered scale, were respectively six and thirty. For the final scale, confirmatory factor analysis indicated a good fit ($\chi^2(9) = 12.522$, $p = .185$, RMSEA = .095, CFI = .976, TLI = .961) (Jackson et al., 2009). The final self-use of evidence-based practice scale has shown good reliability ($\alpha = .88$) (Evers et al., 2009).

**Table 2**

*Factor Loadings Final Scale Intention to Use Evidence-Based Practice*

| Item | Factor loading |
|---|---|
| 2. Formulate a question to guide a literature search based on a gap in your knowledge? | .69 |
| 3. Effectively conduct an online literature search to address the question? | .83 |
| 4. Critically appraise the strengths and weaknesses of study methods (e.g., appropriateness of study design, recruitment, data collection, and analysis)? | .57 |
| 7. Determine if evidence from the research literature applies to your teaching situation? | .97 |
| 8. Decide on an appropriate course of action based on integrating research evidence, professional judgment, and the student's preferences? | .80 |
| 9. Continually evaluate the effect of your course of action? | .68 |

*Note.* $N = 43$.

**Procedure**

The survey was developed using Qualtrics. To recruit participants, this study used non-probable voluntary sampling, which entails that the sample is selected from volunteered and qualified potential respondents in the target population (Murairwa, 2015). This meant recruiting APS teachers in the Netherlands by posting the survey online using LinkedIn and Facebook and asking individuals to distribute the survey. Additionally, snowball sampling was used, meaning that participants were asked to nominate APS teachers known to them, after which they were invited to participate as well (Goodman, 1961). By combining both ways of sampling for four weeks it was intended to find as many participants as possible. Before taking the survey, participants read the information letter (Appendix H), subsequently filled out the informed consent form (Appendix I), and provided demographic information

regarding their gender, age, and education (Appendix J). Participants could decide to quit taking the survey at any time. To ensure anonymity, the participants were referred to using numbers that could not be traced back. The raw data were stored for at least ten years, which is according to the guidelines provided by the VSNU Association of Universities in the Netherlands.

### Data Analysis

Data analyses were performed in SPSS statistics (version 27). Before conducting the analyses, assumptions for multiple linear regression were checked: normal distribution of the variables, outliers, multicollinearity, and normality of residuals. To investigate the predictive value of APS teachers' research competencies and attitudes to their intention to use evidence in their teaching, a multiple linear regression analysis was performed with the dependent variable being APS teachers' intention to use EBT (sum score) and the independent variables being APS teachers' research competencies (sum score) and APS teachers' attitudes (sum score). To examine interactions between APS teachers' research competencies and attitudes to their intention to use EBT multiple regression analysis with interactions was performed. In this analysis, the interaction between the independent variables (sum scores of research competencies and attitudes) and the dependent variable (sum score of APS teachers' intention to use EBT) was explored. To interpret the outcomes of these analyses, the alpha level was set at 0.05, which is commonly used in educational research (Van Aalst et al., 2017).

## Results

Table 3 provides the descriptive statistics of APS teachers' research competencies, attitudes, and intention to use evidence-based practice. Overall, the results indicated that APS teachers' research competencies are moderate. The sample mean for the Berlin test was 3.60 (*SD* = 1.50) out of a possible seven points. Based on the sample mean of 12.63 (*SD* = 4.98) with a possible minimum score of five points, APS teachers showed strong positive attitudes

towards research (*SD* = 4.98), since a high score indicates a negative attitude due to the negatively worded items in the attitudes subscale. The sample mean of 15.21 (*SD* = 4.98) on the self-use of evidence-based teaching scale indicates that teachers scored lower than average on their intention to use evidence based-practices, whereas the minimum and maximum scores were respectively six and thirty. Additionally, no APS teacher indicated to perform all actions related to evidence implementation more than ten times a month, resulting in a maximum sample score of 28.

**Table 3**

*Descriptive Statistics*

| Variable | *M* | Median | *SD* | Minimum | Maximum |
|---|---|---|---|---|---|
| Research competencies | 3.60 | 4.00 | 1.50 | .00 | 7.00 |
| Attitudes | 12.63 | 11.00 | 4.98 | 5.00 | 30.00 |
| Intention to use evidence-based practice | 15.21 | 14.00 | 4.98 | 6.00 | 28.00 |

*Note.* $N = 43$. The possible minimum and maximum scores for research competencies are zero and seven. The possible minimum and maximum scores for attitude are five and thirty. The possible minimum and maximum scores for intention to use evidence-based practice are six and thirty.

Prior to interpreting the results of the multiple linear regression analyses, several assumptions were evaluated. Firstly, stem-and-leaf plots (Allen et al., 2014) indicated that each variable in the regression was normally distributed. Secondly, outliers were found, but they were not removed since no compelling reasons could be found to delete these data (e.g., participants using very limited time used to complete the survey or participants choosing the

same answer option for each question) (Aguinis et al., 2013; Osborne & Overbay, 2004). Thirdly, relatively high tolerances (> .01) and low variance inflation factors (< 10) (Field, 2013) were found for all predictors in the regression model, which indicated that multicollinearity was excluded (Tolerance = .88, VIF = 1.14). Finally, a non-significant Kolmogorov-Smirnov test (Hanusz & Tarasińska, 2015) indicated that normality of residuals was met ($p$ = .200).

The results of the multiple linear regression analysis with the dependent variable being APS teachers' intention to use EBT and the independent variables being APS teachers' research competencies and attitudes are reported in Table 4. Overall, 3% of the variance in the outcome was explained by APS teachers' research competencies and attitudes towards EBT, which could be seen as a small effect (Cohen, 1988), but was not statistically significant ($F$(2, 40) = .658, $p$ = .523, $R^2$ = .03). Concerning the effects of the predictors, APS teachers' research competencies had a negative effect on their intention to use research evidence in their teaching practice (β = -.07, $p$ = .696), but this effect was not statistically significant. Finally, the results of this regression analysis indicated that APS teachers' attitudes towards EBT had a negative effect on their intention to use evidence-based practices (β = -.19, $p$ = .258), but this effect was not statistically significant. These results indicate that neither research competencies, nor attitudes towards EBT predict APS teachers' intention to use evidence in their teaching practices.

**Table 4**

*Regression Coefficients of APS Teachers' Research Competencies and Attitudes on Intention to Use Evidence-Based Practice*

| Variable | *B* | β | *SE* | *t* | *p* | 95% CI |
|---|---|---|---|---|---|---|
| Constant | 18.40 | | 3.45 | 5.33 | <.001 | [11.42, 25.39] |

| | | | | | | |
|---|---|---|---|---|---|---|
| Research competencies | -.22 | -.07 | .55 | -.39 | .696 | [-1.34, 0.90] |
| Attitudes | -.19 | -.19 | .17 | -1.15 | .258 | [-0.53, 0.15] |

*Note.* CI = confidence interval.

In addition, interactions between APS teachers' research competencies and attitudes to their intention to use EBT were explored using multiple linear regression. Table 5 shows the results of the regression analysis with the interaction between research competencies and attitudes included. In this regression model, again 3% of the variance in the outcome was explained ($F(3, 39) = .432$, $p = .731$, $R^2 = .03$). The interaction had a positive effect on APS teachers' intention to use research evidence in their teaching practice ($\beta = .05$, $p = .910$), but this effect was not statistically significant. This indicates that the interaction between APS teachers' research competencies and attitudes, fails to predict APS teachers' intention to use evidence in their teaching practice. These results suggest that the effects of the independent variables (research competencies or attitudes) on APS teachers' intention to use evidence in their teaching practice are not affected by the other independent variable.

**Table 5**

*Regression Coefficients of the Regression that Included the Interaction Research Competencies * Attitudes*

| Variable | *B* | β | *SE* | *t* | *p* | 95% CI |
|---|---|---|---|---|---|---|
| Constant | 18.89 | | 5.41 | 3.49 | .001 | [7.92, 29.83] |
| Research competencies | -.36 | -.11 | 1.37 | -.26 | .794 | [-3.13, 2.41] |
| Attitudes | -.23 | -.23 | .34 | -.66 | .514 | [-0.92, 0.47] |
| Research competencies * attitudes | .01 | .05 | .10 | .11 | .910 | [-0.18, 0.20] |

*Note.* CI = confidence interval.

## Discussion

The present study aimed to shed light on the extent to which APS teachers' research competencies and attitudes influence their intention to put evidence into practice. In detail, we aimed to investigate the predictive value of APS teachers' research competencies and their attitudes to their intention to use evidence in teaching practices. Additionally, to explain the underlying dynamics among the variables under investigation, we explored interactions between APS teachers' research competencies and attitudes on their intention to incorporate research findings in their teaching practices. The results showed that APS teachers, in general, possess moderate research competencies, strong positive attitudes, and a lower than average intention to use evidence-based practices. A multiple linear regression analysis indicated there were no significant predictive associations between APS teachers' research competencies and attitudes, and their intention to use evidence in their teaching practices. Multiple linear regression analysis also revealed that there was no significant predictive association between the interaction of APS teachers' research competencies and attitudes, and their intention to use evidence-based practices.

**The Unique Predictive Association Between APS Teachers' Research Competencies, Attitudes, and Intention to Use Evidence-Based Practice**

Firstly, this study investigated the predictive value of APS teachers' research competencies and attitudes towards their intention to use evidence in their teaching practice. Our findings show that APS teachers' research competencies and attitudes towards EBT do not predict their intention to use evidence-based practices. This finding contradicts existing literature on the associations between research competencies and attitudes towards evidence-based practices (e.g., Burke et al., 2005; Dugdall & Watson, 2009). A possible explanation for this finding may relate to the fact that APS teachers base their decision to teach based on evidence on certain organizational factors (i.e., the availability of the necessary infrastructure to sustain and support evidence-based practices) as suggested by the school they are working

at (Baan et al., 2019) and less or not at all on their own competencies and attitudes towards research. When teachers are requested to follow a ready-made curriculum and they are not able to make evidence-based modifications the contribution of their own attitudes and competencies might be irrelevant. This assumption is supported by relevant research on cognitive and affective characteristics of medical professionals which do not seem to predict their use of evidence in their professional practices (Brookman-Frazee et al., 2010; Higa-McMillan et al., 2015) and studies showing that organizational factors may better predict whether medical professionals use evidence-based practices (Aarons & Sawitzky, 2006; Gerrish & Clayton, 2004; Sadeghi-Bazargani et al., 2014). Studies in medicine found that such organizational factors consist of sufficient time, professional autonomy, and easy access to scientific literature (Heiwe et al., 2011; Rojjanasrirat & Rice, 2017; Tacia et al., 2015). Like medical practitioners, primary school teachers often report suffering from time constraints (Kokkinos, 2007) and experience EBT as extra work on top of their primary teaching task (Deluca et al., 2018; Willegems et al., 2017). Primary school teachers in the Netherlands also often struggle with the lack of autonomy (Ax & Ponte, 2008; Imants & Zoelen, 1995) and do not have free access to scientific databases (PO Raad, 2019).

The absence of a significant predictive association between APS teachers' research competencies and their intention to use evidence-based practices, might also relate to this study's focus on traditional research competencies (i.e., being able to demonstrate research competencies unrelated to the practical context). Research found that these traditional research competencies are not directly transferable to put evidence into professional practices (Stichler et al., 2011). For example, APS teachers might know which steps to take to find a meaningful research question (traditional research competencies), but that might not necessarily mean that they can actually implement this process in their current educational practice. Instead of traditional research competencies, competencies related to this transfer

from research evidence to educational practices might allow APS teachers to successfully implement evidence-based practices (Reimer, et al., 2005; Snoek & Schenke, 2019). These transferable research competencies can be recognized in teachers' ability to consciously and deliberately consult educational literature, and their ability to subsequently apply these insights to the specific educational practice at hand (Ashman, 2021; Simons & Verschaffel, 1992).

Additionally, the absence of predictive value of APS teachers' attitudes on their intention to engage in evidence-based practices, might also be explained by the collaborative nature of the teaching profession (Tallman, 2021). In detail, APS teachers' attitudes could be influenced by their non-academic peers who are not familiar with EBT (Baan et al., 2019). Academic teachers are the minority in Dutch primary schools and the desire to fit in could affect their intention to use certain teaching practices (Gray, 2013), like EBT. Attitudes are affected by significant others (Dunn et al., 2001). APS teachers might have a positive attitude towards research, but when it comes down to putting evidence into practice they are exposed to significant others who avoid using research (Baan et al., 2019). Thus, their attitudes might be negatively affected once in practice and surrounded by other teachers (mostly non-academic) who do not want to engage in EBT.

Secondly, due to the contradictory findings on the relationships between the variables under investigation in previous research (e.g., Malik et al., 2015; Nelson et al., 2006), this study explored interactions between APS teachers' research competencies and attitudes on their intention to use evidence-based practices. Our hypothesis stating that the independent variables (research competencies and attitudes) affect the relationship of one another on APS teachers' intention to use evidence in their teaching practices was not confirmed. The findings in this study suggest that EBT knowledge does not necessarily guarantee teachers' positive attitudes towards EBT and vice versa. This result contradicts most available research on this

topic, targeting other types of professionals like nurses or teacher educators (e.g., Alqahtani et al., 2020; Diery et al., 2021), but is in line with research by (Çelebi, 2021) who found a negative relationship between high school teachers' attitudes and competencies. This rather puzzling effect might have several explanations: the small sample size, the instruments might not have captured the concepts clearly, or the fact that we did not distinguish between different educational backgrounds. In fact, it might also be the case that when an APS teacher has research competencies, it does not mean he or she has a positive attitude towards the implementation of EBT.

**Limitations**

There are some limitations that should be considered when interpreting the results of this study. The results of the G Power analysis revealed that for satisfactory statistical power to be achieved, data of 119 participants were required. Small sample sizes lead to a lower power (Jones et al., 2003), which can significantly affect the results of analyses (Fitzner & Heckinger, 2010). The small sample size might have led to low power and non-significant results observed in our study. It should be noted though that in the Netherlands there are only a limited number of APS teachers (Van der Linden et al., 2012). Also, to achieve a large sample size, this study did not use simple random sampling to recruit participants, which might have caused non-response bias (Colombo, 2000; Groves & Peytcheva, 2008). For example, only APS teachers that find the subject of this study (i.e., EBT) important might have participated, which in turn could have affected the results.

Another potential shortcoming of this study involves the instruments used for measuring research competencies, attitudes, and intention to use evidence-based practice. Considering the Berlin test for measuring research competencies, the reliability might cause some concerns. Some researchers would consider the reliability of $\alpha = .52$ sufficient (Lienert & Raatz, 1994), but most researchers consider it to be too low (Evers et al., 2009; Frost et al.,

2007; Tsigilis et al., 2002). However, there are also researchers indicating that statistics based on a single test administration do not convey much information about the accuracy of individuals' test performance at all (Sijtsma, 2009). As for the subscale attitudes towards evidence-based teaching, a CFA revealed that five items had to be deleted, which might have negatively affected content validity (Salkind, 2010). To use the evidence-based practice scale in research among APS teachers, we changed the wording referring to the medical situation to the educational situation, but the required validation studies of this scale (Breaux et al., 2003) in the educational setting are missing. Also, both scales used in this study contain only negatively phrased items (subscale attitudes towards evidence-based teaching) or positively phrased items (intention to use evidence-based practice), which might have led to response bias (Sonderen et al., 2013). However, by not including both reverse-worded and non-reverse worded items, we avoided a potential correction bias that is associated with the inclusion of both types of items (e.g., resultant method effects leading to scoring complexities, confusion regarding dimensionality) (Brown, 2003; Marsh, 1996). Finally, the self-reported measures we used, might have been prone to social desirability biases (Desimone, 2009), which we tried to counteract by assuring participants absolute confidentiality.

APS teachers are a diverse group with different educational backgrounds (Schouten, 2020). In this study, we did not distinguish between APS teachers' educational backgrounds. This might have affected the results given that the educational background of our participants differed since some teachers have completed a university master's degree and others have just completed a bachelor's degree. In this study, only a relatively small percentage of APS teachers fell within this second group. However, it is important to keep in mind that acquiring a master's degree may further deepen teachers' scientific understanding (Mittelmeier et al., 2021) and supports mastering the culture of scientific research (Obedkova et al., 2020). Thus, teachers who acquired a master's degree might have more positive views towards research

and might be more research competent than their counterparts without a master's degree. In addition, a relatively large percentage of our sample completed both the academic teacher education program and a university master's degree. This might also have affected the results because a higher degree usually leads to better research competencies and attitudes towards research (Brown et al., 2010; Jette et al., 2003).

**Directions for Future Research**

Future research is necessary to broaden the understanding of EBT by APS teachers in the Netherlands and to address this study's limitations. In contrast to our study, research on the predictive value of cognitive and affective characteristics like attitudes and competencies in the medical field showed that those factors do matter in the incorporation of research evidence into professional practice (e.g., Dugdall & Watson, 2009; Myakava et al., 2021). Follow-up studies should provide a clear view of which factors need to be further enhanced to put evidence into teaching practice in primary schools. These studies should explore both cognitive and affective characteristics and organizational factors, such as providing APS teachers with sufficient time, professional autonomy, and easy access to scientific literature because they seem to be decisive in professionals' use of research evidence (e.g., Aarons & Sawitzky, 2006; Heiwe et al., 2011).

Future research should also aim for a larger sample size to achieve higher statistical power. Using a similar data collection approach (i.e., online data and self-report measures), provides a cost-efficient way of collecting data from a large sample size (Sassenberg & Ditrich, 2019). Considering the data collection, participants should be recruited using random sampling, by which participants are selected purely by chance (Bhardwaj, 2019; Martino et al., 2018). This way, it could be prevented that only APS teachers who find EBT important participate, for example by involving several schools in the study and then randomly selecting APS teachers working at those schools to participate.

Additionally, research regarding the psychometric quality of the instruments to measure research competencies, attitudes towards EBT, and intention to use evidence-based practice is needed. The use of validated instruments leads to more trustworthy findings (Straub, 1989) and can prevent wrong interpretation, decreased statistical power, and inability to generalize the study results (Boparai et al., 2018). Rasch analysis might provide more insights into the psychometric quality of the Berlin test for measuring research competencies (Boone, 2016; Muis et al., 2009). Regarding the scales used, both validity (i.e., content, construct, and criterion validity) and reliability (i.e., stability, internal consistency, and equivalence) should be further examined in the population under investigation (Boparai et al., 2018).

Finally, future research should examine whether APS teachers' research competencies, attitudes, and intention to use evidence-based practices are influenced by their educational background. Research in the medical field has found that the educational background of professionals might play an important role in the incorporation of evidence-based practice (Aarons, 2004; Brown et al., 2010; Jette et al., 2003; Schreiber & Stern, 2005). Comparing APS teachers' intention to use EBT based on their educational background might provide beneficial and more accurate insights into this diverse group of teachers.

**Practical Implications**

Despite its limitations, this study has raised the question of whether aiming for more academically educated teachers is sufficient to successfully implement EBT in Dutch primary education. The expectation that their current research-oriented education allows them to translate research into practice by the development of adequate research competencies and positive attitudes towards research might need to be adjusted. Instead, a more holistic approach, in which not only APS teachers' cognitive and affective characteristics but also organizational factors are addressed, is perhaps more appropriate. Next to providing education

that enables the development of research competencies and attitudes, this approach might consider providing APS teachers with the infrastructure to sustain and support evidence-based practice. Teachers might need sufficient time to consult research, the professional autonomy to make independent decisions based on scientific insights, and free access to scientific databases to consult research at any time. To be able to actually use research competencies for the translation of evidence into teaching practices, teachers might need opportunities to practice this transfer, for example by finding relevant literature to support the educational practice at hand (e.g., to teach self-regulated learning strategies). Finally, APS teachers might benefit from communities of practice that enable them to meet like-minded professionals (Patton & Parker, 2017) to support a positive attitude towards EBT and in the long run the adoption of EBT practices in their own classrooms.

**Conclusion**

The present study expanded the limited existing literature in the field of EBT focusing on APS teachers. The results revealed that APS teachers' research competencies are moderate, their attitudes are strongly positive, and their intention to use evidence-based practices is lower than average. No significant predictive associations were found between APS teachers' research competencies, attitudes, and their intention to use evidence in their teaching practices. The results also revealed a non-significant interaction effect of APS teachers' research competencies and attitudes to their intention to use EBT. Thus, we conclude that a more holistic approach needs to be adopted where future studies take into account both cognitive and affective characteristics and organizational factors to deepen our understanding of the factors affecting APS teachers' intention to use EBT. Understanding all about the factors influencing EBT implementation may support future professional development efforts targeting EBT implementation in primary schools in the Netherlands and foster evidence implementation at large. Our study does not provide readymade solutions for

the adoption of EBT practices but aims to initiate a discussion on the importance of EBT and the factors necessary to be considered to support APS teachers' adoption of evidence into teaching practices.

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## Appendix A

## Berlin Test

**English version**

**RESEARCH KNOWLEDGE**
In the following questions you will be presented with the tasks related to various methods and methodologies of research in social sciences. If you can not answer the questions yet – don't worry, it is not a problem!

### 1. QUESTION

**Which of the following steps is the most important one in preparing a questionnaire for a quantitative study, i.e. which step should be most thorough?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | The optimization of the questionnaire's length and the length of the questions |
| ❍ | The optimization of the text's comprehensibility / coherence to the questions |
| ❍ | The translation of theoretical terms and constructs into indicators and questions |
| ❍ | The translation of the answer formats to the questions into variable characteristics and levels of measurement |
| ❍ | I do not know the answer |

### 2. QUESTION

**Master Thesis**

**Research topic:**
„Postnatal Depression" (Depression of a Mother after the Birth of a Child)

**Literature on the Subject:**
There is already plenty of theoretical and empirical research literature on postnatal depression.

**Completed Steps:**
- Review of the lecture materials on depression as a topic
- Reading the medical information on postnatal depression

**Which of the following steps would you take to find a meaningful research question?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | Search in research literature for explicitly formulated desiderata and open questions and derive a research question from them |

| | |
|---|---|
| ❍ | Check theoretical literature for similarities in content and derive a research question |
| ❍ | Search in research literature for heavily discussed topics and select one of them |
| ❍ | Search for heavily discussed topics in theoretical literature and choose one of them |
| ❍ | I do not know the answer |

### 3. QUESTION

**What does a following finding mean in terms of traditional <u>quantitative</u> methods, when a significant effect is found at a significance level of 5 percent?**
(Please mark exactly <u>one</u> answer option)

| | |
|---|---|
| ❍ | The probability of observing this or even more extreme effect is at most 5 percent, although in reality there is no effect. |
| ❍ | The probability of observing no effect is at most 5 percent, although in reality there is an effect. |
| ❍ | The probability that an actually existing effect can be detected is at least 95 percent. |
| ❍ | An effect is only present if at least 5 percent of the respondents deviate from the confidence interval. |
| ❍ | I do not know the answer |

### 4. QUESTION

**Research question:**
„Can academic satisfaction be improved through mentoring?"

**Research design:**
- An existing and validated questionnaire measuring academic satisfaction is already available and has been used in several other research projects. This questionnaire is slightly modified (individual formulations) and shortened (from 18 to 12 questions, 5-point Likert-scale).
- Control group design (1 experimental group, 1 control group, random assignment), measurement of academic satisfaction before and after the introduction of mentoring
- Comparison of the effect achieved (increase in academic satisfaction) with the effect of existing studies.

**What is the biggest problem of the presented research project?**
(Please mark exactly <u>one</u> answer option)

| | |
|---|---|
| ❍ | The already existing and validated questionnaire should have been used. |
| ❍ | More questions should have been used in the questionnaire. |
| ❍ | Assignment to the trial group should have been made according to relevant external criteria. |
| ❍ | There should have been a second experimental group. |
| ❍ | I do not know the answer |

**5. QUESTION**

**Which of the following research questions fits the qualitative research traditions best?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | „What is the process of considering dropping out and what role do parents play in it?" |
| ❍ | „Is there a connection between dropping out and the class affiliation of a doctoral candidates' parents?" |
| ❍ | „Is the probability of dropping out of a doctoral project lower among doctoral students from higher social classes than among other doctoral students?" |
| ❍ | „To what extent does the drop-out probability of doctoral students with parents of better socio-economic living conditions differ from the drop-out probability of other doctoral students?" |
| ❍ | I do not know the answer |

**6. QUESTION**

**Student research project** (4 students, 3 months processing time)

**Research question:**
„What subjective theories do gambling addicts have about slot machines?"

**Research design:**
- Observation of participants in 4 casinos in Stuttgart
- Observation protocols on the behavior of the players (only observation of frequently returning players)
- Evaluation of the protocols by means of Grounded Theory

**What is the biggest problem of the presented research project?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | The chosen data collection method does not match the research question. |

| | |
|---|---|
| ❍ | The evaluation method does not match the research question. |
| ❍ | The preparation of observation protocols is too unsystematic as a data collection method. |
| ❍ | The number of casinos is too low for the research method. |
| ❍ | I do not know the answer |

**7. QUESTION**

**Research project** on behalf of the Federal Association of German Inland Navigation (duration: 2 years)

**Research topic:**
Norms and values of inland barge navigators

**State of research**:
So far there have been hardly any studies on the subject; existing theories are still very undifferentiated, i.e. they explain little of the connections and facts.

**Research design:**
- Methodology: Grounded Theory (qualitative research traditions)
- Execution of 10 narrative interviews
- Development of a theory on standards and values in inland navigation based on the interview transcripts

**Concerning the research design: when and according to which criteria the interview partners should be selected? Which decision should be made for the project presented?**
(Please mark one answer for each question, i.e. give a total of 2 answers)

**Selection criteria:**

| It would be desirable for the researcher to choose the interview partner… | |
|---|---|
| ❍ | on the basis of a random draw. |
| ❍ | on the basis of theoretical considerations. |
| ❍ | I do not know the answer |

**Time of selection:**

| It would be desirable for the researcher to choose the interview partner… | |
|---|---|
| ❍ | In advance, i.e. before the first interview begins. |

| | |
|---|---|
| ❍ | Successively, i.e. during the survey and evaluation phase. |
| ❍ | I do not know the answer |

**8. QUESTION**

**Various criteria are important for the formulation of a research question in empirical research in social sciences. In your opinion, which of the following criteria is most important for student research projects?**
(Please mark exactly one answer option)

| The research question should… | |
|---|---|
| ❍ | … compare different empirical theories |
| ❍ | … should be able to be answered by empirical findings. |
| ❍ | … have not been empirically tested yet. |
| ❍ | … address empirically determined practical problems. |
| ❍ | I do not know the answer |

**9. QUESTION**

**Bachelor thesis**

**Research question:**
„What mechanisms of social control do squatters have?“

**Research design:**
- Fragebogenerhebung mit 100 Hausbesetzer/innen (Fragebogen bereits mehrfach validiert)
- Interviews mit 4 Hausbesetzer/innen
- im Vorfeld Besprechung der Erhebungsinstrumente im Kolloquium
- Data collection with a questionnaire with 100 squatters (questionnaire has already been validated several times)
- Interviews with 4 squatters
- Prior discussion of the survey instruments in the colloquium.

**Results of the research**:
- The findings from the quantitative data collection and qualitative data collection are apparently contradictory: indications of social control are found in the interviews, but not in the questionnaire.

The contradictory research findings are described equally in the bachelor thesis. Reasons for the contradiction are not dealt with.

**What is the biggest problem of the presented research project?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | Only the quantitative results should have been presented in the bachelor thesis. |
| ❍ | Only the qualitative results should have been presented in the bachelor thesis. |
| ❍ | Possible reasons for the contradiction should have been investigated in an additional interview study and for this purpose an extension of the processing time should have been applied for. |
| ❍ | Possible reasons for the contradiction should have been discussed with the supervisor or with fellow students and discussed in the bachelor thesis. |
| ❍ | I do not know the answer |

**Dutch version**

**ONDERZOEKSKENNIS**
De volgende vragen gaan over uw kennis over methoden en methodologieën binnen de sociale wetenschappen. Mocht u de antwoorden niet weten, maakt u zich dan geen zorgen, dat is geen probleem!

1. **VRAAG**

**Welk van de volgende stappen is het meest belangrijk bij het opstellen van een vragenlijst voor een kwalitatief onderzoek, d.w.z. Welke stap moet het meest grondig zijn doordacht?**
(Kruis alstublieft slechts één antwoord aan)

| | |
|---|---|
| ❍ | Het optimaliseren van de lengte van de vragenlijst en de lengte van de vragen zelf |
| ❍ | Het optimaliseren van de begrijpelijkheid van de tekst en de samenhang van de tekst en de vragen |
| ❍ | Het omzetten van theoretische begrippen en concepten naar indicatoren en vragen |
| ❍ | Het omzetten van het antwoordmodel behorend bij de vragen naar variabelen en meetniveaus |
| ❍ | Ik weet het niet |

2. **VRAAG**

**Master Thesis**

**Onderzoeksonderwerp:**
„Postnatale depressie“ (Depressie van een moeder na de geboorte van het kind)

**Literatuur over het onderwerp:**
Er is al veel theoretische en empirische onderzoeksliteratuur beschikbaar over postnatale depressie.

**Voldane stappen:**
- Herzien van het lesmateriaal met als onderwerp depressie
- Het lezen van medische informatie over postnatale depressie

**Welk van de volgende stappen zou u ondernemen om een zinvolle onderzoeksvraag op te stellen?**
(Kruis alstublieft slechts één antwoord aan)

| | |
|---|---|
| ○ | Zoeken in onderzoeksliteratuur naar expliciet geformuleerde wensen en open vragen en daaruit de onderzoeksvraag afleiden |
| ○ | Theoretische literatuur controleren op inhoudelijke overeenkomsten en daaruit een onderzoeksvraag afleiden |
| ○ | Zoeken in de onderzoeksliteratuur naar veelbesproken onderwerpen en één daarvan selecteren |
| ○ | Zoeken naar veelbesproken onderwerpen in de theoretische literatuur en één daarvan selecteren |
| ○ | Ik weet het niet |

**3. VRAAG**

**Wat betekent de volgende bevinding binnen de traditioneel kwantitatieve methode: "als er een significant effect is gevonden bij een significantieniveau van 5 procent?"** (Kruis alstublieft slechts één antwoord aan)

| | |
|---|---|
| ○ | De kans om dit effect of zelfs een extremer effect te vinden is maximaal 5%, terwijl er in de werkelijkheid geen sprake is van een effect |
| ○ | De kans om geen effect waar te nemen is maximaal 5%, terwijl er in de werkelijkheid wel een effect is |
| ○ | De kans dat een daadwerkelijk bestaand effect gevonden wordt is minimaal 95% |
| ○ | Er is alleen sprake van een effect als minimaal 5% van de participanten afwijkt van het betrouwbaarheidsinterval |
| ○ | Ik weet het niet |

**4. VRAAG**

**Onderzoeksvraag:**
„Kan de academische tevredenheid verbeterd worden door de inzet van het mentorschap?"

**Onderzoeksopzet:**
- Een bestaande en gevalideerde vragenlijst die de academische tevredenheid meet is al beschikbaar en voor eerdere projecten gebruikt. De vragenlijst is enigszins aangepast (individuele (persoonlijke) formulering) en ingekort (van 18 naar 12 vragen, 5-punts Likert-schaal)

- Opzet controlegroep (1 experimentele groep, 1 controlegroep, participanten zijn willekeurig toegewezen) meting van de academische tevredenheid gebeurt voor en na de introductie van het mentorschap
- Vergelijking van het bereikte effect (toename in academische tevredenheid) met het gevonden effect uit bestaande onderzoeken

**Wat is het grootste probleem van het hierboven genoemde onderzoeksproject?** (Kruis alstublieft slechts één antwoord aan)

| | |
|---|---|
| ❍ | De al bestaande en gevalideerde vragenlijst had gebruikt moeten worden |
| ❍ | Meer vragen hadden gebruikt moeten worden in de vragenlijst |
| ❍ | Het toewijzen van participanten aan de controlegroep of de experimentele groep had op basis van relevante externe criteria moeten geschieden |
| ❍ | Er had een tweede experimentele groep moeten zijn |
| ❍ | Ik weet het niet |

**5. VRAAG**

**Welke van de volgende onderzoeksvragen past het beste bij de kwalitatieve onderzoekstraditie?** (Kruis alstublieft slechts één antwoord aan)

| | |
|---|---|
| ❍ | Wat is het proces van overwegen om te stoppen met school en welke rol spelen de ouders daarin? |
| ❍ | Is er een verband tussen stoppen met school en de sociale klasse van de ouders van een promovendus? |
| ❍ | Is de kans op uitval bij een promotieonderzoek lager bij promovendi uit een hogere sociale klasse dan bij andere promovendi? |
| ❍ | In hoeverre verschilt de uitvalkans van promovendi met ouders met betere sociaaleconomische leefomstandigheden van de uitvalkans van andere promovendi? |
| ❍ | Ik weet het niet |

**6. VRAAG**

**Studenten Onderzoeksproject** (4 studenten, 3 maanden verwerkingstijd)

**Onderzoeksvraag:**
„Welke subjectieve theorieën hebben gokverslaafden over gokautomaten?“

**Onderzoeksopzet:**
- Observatie van de participanten in 4 casino’s in Stuttgart
- Observatieprotocollen over het gedrag van de spelers (allen observatie van de vaak terugkerende spelers)

- Evaluatie van de protocollen d.m.v. Grounded Theory

**Wat is het grootste probleem van het bovengenoemde onderzoeksproject?** (Kruis alstublieft slechts één antwoord aan)

| | |
|---|---|
| ❍ | De gekozen manier van datacollectie komt niet overeen met de onderzoeksvraag |
| ❍ | De evaluatiemethode komt niet overeen met de onderzoeksvraag |
| ❍ | Het opstellen van de observatieprotocollen is te onsystematisch als methode van dataverzameling |
| ❍ | Het aantal casino's is te weinig voor de onderzoeksmethode |
| ❍ | Ik weet het niet |

**7. VRAAG**

**Onderzoeksproject:** Namens de Federale Vereniging van de Duitse Binnenvaart (duur: 2 jaar)

**Onderzoeksonderwerp:**
Normen en waarden van binnenvaartnavigators

**Staat van onderzoek**:
Tot zover zijn er nauwelijks onderzoeken naar het onderwerp; bestaande theorieën zijn nog erg ongedifferentieerd, d.w.z. ze verklaren weinig van de verbanden en feiten.

**Onderzoeksontwerp:**
- Methodologie: Grounded Theory (kwalitatieve onderzoekstraditie)
- Uitvoering van 10 verhalende interviews
- Ontwikkeling van een theorie over normen en waarden binnen de binnenvaart op basis van de interviews

**Wat betreft de onderzoeksopzet: Wanneer en volgens welke criteria moeten de participanten voor het interview geselecteerd worden? Welke beslissing moet er gemaakt worden omtrent het genoemde project?**
(Kruis alstublieft slechts één antwoord per vraag aan, d.w.z. in totaal twee antwoorden)

**Selectiecriteria:**

| Het zou wenselijk zijn dat de onderzoeker een participant voor het interview kiest … | |
|---|---|
| ❍ | Op basis van willekeurige trekking |
| ❍ | Op basis van theoretische overwegingen |

| | |
|---|---|
| ❍ | Ik weet het niet |

**Tijd van selectie:**

| Het zou wenselijk zijn dat de onderzoeker een participant voor het interview kiest … | |
|---|---|
| ❍ | Vooraf, d.w.z. voordat het eerste gesprek begint |
| ❍ | Achtereenvolgens, d.w.z. tijdens de onderzoeks- en evaluatiefase |
| ❍ | Ik weet het niet |

**8. VRAAG**

**Voor het formuleren van een onderzoeksvraag in empirisch onderzoek binnen de sociale wetenschappen zijn verschillende criteria van belang. Welk van de volgende criteria is volgens u het belangrijkst binnen een studenten onderzoeksproject?**
(Kruis alstublieft slechts één antwoord aan)

| De onderzoeksvraag zou… | |
|---|---|
| ❍ | … verschillende empirische theorieën moeten vergelijken |
| ❍ | … beantwoord moeten kunnen worden door empirische bevindingen |
| ❍ | … nog niet empirische getest moeten zijn |
| ❍ | … gericht moeten zijn op praktische problemen die op empirische wijze zijn vastgesteld |
| ❍ | Ik weet het niet |

**9. VRAAG**

**Bachelor thesis**

**Onderzoeksvraag:**
„Welke mechanismen van sociale controle hebben krakers?“

**Onderzoeksontwerp:**

- Vragenlijstonderzoek onder 100 krakers (vragenlijst is al meerdere keren gevalideerd)
- Interviews met 4 krakers
- Vooraf: bespreking van de onderzoeksinstrument tijdens een discussie college aan de universiteit (colloquium).

**Onderzoeksresultaten**:

- De bevindingen uit de kwalitatieve en kwantitatieve dataverzameling zijn schijnbaar tegenstrijdig: aanwijzingen voor sociale controle wordt wel gevonden in de interviews, maar niet in de vragenlijsten.

| |
|---|
| De tegenstrijdige onderzoeksbevindingen worden beschreven in de bachelor thesis. De redenen voor de tegenstrijdige bevindingen worden niet genoemd. |

**Wat is het grootste probleem van de hierboven genoemde onderzoeksaanpak?**
(Kruis alstublieft slechts één antwoord aan)

| | |
|---|---|
| ❍ | Alleen de kwantitatieve resultaten hadden getoond moeten worden in de bachelor thesis |
| ❍ | Alleen de kwalitatieve resultaten hadden getoond moeten worden in de bachelor thesis |
| ❍ | Mogelijke redenen voor de gevonden tegenstrijdigheid in de resultaten hadden onderzocht moeten worden in een aanvullend interviewonderzoek en hiervoor had verlenging van de verwerkingstijd aangevraagd moeten worden |
| ❍ | Mogelijke redenen voor de gevonden tegenstrijdigheid in de resultaten hadden besproken moeten worden met de begeleider of medestudenten en daarna hadden deze besproken moeten worden in de bachelor thesis |
| ❍ | Ik weet het niet |

## Appendix B

## Remaining Items Berlin Test

### 1. QUESTION

**Which of the following steps is the most important one in preparing a questionnaire for a quantitative study, i.e. which step should be most thorough?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | The optimization of the questionnaire's length and the length of the questions |
| ❍ | The optimization of the text's comprehensibility / coherence to the questions |
| ❍ | The translation of theoretical terms and constructs into indicators and questions |
| ❍ | The translation of the answer formats to the questions into variable characteristics and levels of measurement |
| ❍ | I do not know the answer |

### 2. QUESTION

**Master Thesis**

**Research topic:**
„Postnatal Depression" (Depression of a Mother after the Birth of a Child)

**Literature on the Subject:**
There is already plenty of theoretical and empirical research literature on postnatal depression.

**Completed Steps:**
- Review of the lecture materials on depression as a topic
- Reading the medical information on postnatal depression

**Which of the following steps would you take to find a meaningful research question?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | Search in research literature for explicitly formulated desiderata and open questions and derive a research question from them |
| ❍ | Check theoretical literature for similarities in content and derive a research question |
| ❍ | Search in research literature for heavily discussed topics and select one of them |
| ❍ | Search for heavily discussed topics in theoretical literature and choose one of them |

| | |
|---|---|
| ❍ | I do not know the answer |

**3. QUESTION**

**What does a following finding mean in terms of traditional quantitative methods, when a significant effect is found at a significance level of 5 percent?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | The probability of observing this or even more extreme effect is at most 5 percent, although in reality there is no effect. |
| ❍ | The probability of observing no effect is at most 5 percent, although in reality there is an effect. |
| ❍ | The probability that an actually existing effect can be detected is at least 95 percent. |
| ❍ | An effect is only present if at least 5 percent of the respondents deviate from the confidence interval. |
| ❍ | I do not know the answer |

**4. QUESTION**

**Research question:**
„Can academic satisfaction be improved through mentoring?"

**Research design:**
- An existing and validated questionnaire measuring academic satisfaction is already available and has been used in several other research projects. This questionnaire is slightly modified (individual formulations) and shortened (from 18 to 12 questions, 5-point Likert-scale).
- Control group design (1 experimental group, 1 control group, random assignment), measurement of academic satisfaction before and after the introduction of mentoring
- Comparison of the effect achieved (increase in academic satisfaction) with the effect of existing studies.

**What is the biggest problem of the presented research project?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | The already existing and validated questionnaire should have been used. |
| ❍ | More questions should have been used in the questionnaire. |
| ❍ | Assignment to the trial group should have been made according to relevant external criteria. |
| ❍ | There should have been a second experimental group. |

| | |
|---|---|
| ❍ | I do not know the answer |

**6. QUESTION**

**Student research project** (4 students, 3 months processing time)

**Research question:**
„What subjective theories do gambling addicts have about slot machines?“

**Research design:**
- Observation of participants in 4 casinos in Stuttgart
- Observation protocols on the behavior of the players (only observation of frequently returning players)
- Evaluation of the protocols by means of Grounded Theory

**What is the biggest problem of the presented research project?**
(Please mark exactly one answer option)

| | |
|---|---|
| ❍ | The chosen data collection method does not match the research question. |
| ❍ | The evaluation method does not match the research question. |
| ❍ | The preparation of observation protocols is too unsystematic as a data collection method. |
| ❍ | The number of casinos is too low for the research method. |
| ❍ | I do not know the answer |

**7. QUESTION**

**Research project** on behalf of the Federal Association of German Inland Navigation (duration: 2 years)

**Research topic:**
Norms and values of inland barge navigators

**State of research**:
So far there have been hardly any studies on the subject; existing theories are still very undifferentiated, i.e. they explain little of the connections and facts.

**Research design:**
- Methodology: Grounded Theory (qualitative research traditions)
- Execution of 10 narrative interviews
- Development of a theory on standards and values in inland navigation based on the interview transcripts

**Concerning the research design: when and according to which criteria the interview partners should be selected? Which decision should be made for the project presented?**
(Please mark one answer for each question, i.e. give a total of 2 answers)

**Selection criteria:**

| It would be desirable for the researcher to choose the interview partner… | |
|---|---|
| ❍ | on the basis of a random draw. |
| ❍ | on the basis of theoretical considerations. |
| ❍ | I do not know the answer |

**Time of selection:**

| It would be desirable for the researcher to choose the interview partner… | |
|---|---|
| ❍ | In advance, i.e. before the first interview begins. |
| ❍ | Successively, i.e. during the survey and evaluation phase. |
| ❍ | I do not know the answer |

**8. QUESTION**

**Various criteria are important for the formulation of a research question in empirical research in social sciences. In your opinion, which of the following criteria is most important for student research projects?**
(Please mark exactly one answer option)

| The research question should… | |
|---|---|
| ❍ | … compare different empirical theories |
| ❍ | … should be able to be answered by empirical findings. |
| ❍ | … have not been empirically tested yet. |
| ❍ | … address empirically determined practical problems. |
| ❍ | I do not know the answer |

## Appendix C

### Subscale Attitudes Towards Evidence-Based Teaching

**English version**

**Attitudes towards evidence-based teaching**
To what extent do you agree with the following statements?

1= strongly disagree
2= disagree
3= slightly disagree
4= slightly agree
5= agree
6= strongly agree

1. Previous teaching experience is more important than the use of current research evidence
2. Teachers, in general, should not practice teaching based on current evidence because teaching is about people and students, not statistics
3. Teachers should decide based on their experience if and how they want to make use of current research findings
4. The judgment of esteemed colleagues offers a better basis than current research evidence
5. Experienced teachers should disregard research evidence when it conflicts with their intuition
6. Teaching based on current research evidence is a waste of time
7. There is no reason for me to implement evidence-based teaching because it is just a fad that will pass with time
8. I know what is best for my students without examining the current research evidence
9. Teaching based on current research evidence ignores the 'art' of teaching
10. My teaching experience influences how I judge evidence-based recommendations

**Dutch version**
**Houding ten opzichte van evidence-based onderwijs (het gebruik van onderzoeksbewijs in het onderwijs)**
In hoeverre bent u het eens met de volgende stellingen? Kies uit:

1= volledig oneens
2= oneens
3= enigszins oneens
4= enigszins eens
5= eens
6= volledig eens

1. Eerdere ervaring in lesgeven is belangrijker dan het gebruik van het huidige onderzoekbewijs
2. Leraren zouden in het algemeen geen les moeten geven op basis van huidig onderzoeksbewijs, omdat lesgeven over mensen en leerlingen gaat en niet over statistieken
3. Docenten moeten op basis van hun ervaringen beslissen of en hoe zij gebruik willen maken van het huidige onderzoeksbewijs

4. Het oordeel van gewaardeerde collega’s biedt een betere basis dan het huidige onderzoeksbewijs
5. Ervaren leraren moeten het onderzoeksbewijs negeren wanneer dit in strijd is met hun intuïtie
6. Lesgeven op basis van huidig onderzoeksbewijs is tijdsverspilling
7. Er is voor mij geen reden om evidence-based onderwijs (het gebruik van onderzoeksbewijs in het onderwijs) te implementeren omdat het een rage is die met de tijd zal verdwijnen
8. Ik weet wat het beste is voor mijn leerlingen zonder het huidige onderzoeksbewijs te onderzoeken
9. Lesgeven op basis van huidig onderzoeksbewijs negeert de kunst van het onderwijzen
10. Mijn ervaring als docent beïnvloedt hoe ik aanbevelingen vanuit onderzoeksbewijs beoordeel

## Appendix D

## Purification Subscale Attitudes Towards Evidence-Based Teaching

*Step 1: Factor Loadings All Items Included*

| Item | Factor loading |
|---|---|
| 1. Previous teaching experience is more important than the use of current research evidence | .57 |
| 2. Teachers, in general, should not practice teaching based on current evidence because teaching is about people and students, not statistics | .58 |
| 3. Teachers should decide based on their experience if and how they want to make use of current research evidence | .25 |
| 4. The judgment of esteemed colleagues offers a better basis than current research evidence | .52 |
| 5. Experienced teachers should disregard research evidence when it conflicts with their intuition | .45 |
| 6. Teaching based on current research evidence is a waste of time | .89 |
| 7. There is no reason for me to implement evidence-based teaching because it is just a fad that will pass with time | .87 |
| 8. I know what is best for my students without examining the current research evidence | .46 |
| 9. Teaching based on current research evidence ignores the art of teaching | .75 |
| 10. My teaching experience influences how I judge evidence-based recommendations | .27 |

*Note.* $N = 43$.

*Step 2: Factor Loadings Item 3 Excluded*

| Item | Factor loading |
|---|---|

| | |
|---|---|
| 1. Previous teaching experience is more important than the use of current research evidence | .56 |
| 2. Teachers, in general, should not practice teaching based on current evidence because teaching is about people and students, not statistics | .58 |
| 4. The judgment of esteemed colleagues offers a better basis than current research evidence | .51 |
| 5. Experienced teachers should disregard research evidence when it conflicts with their intuition | .43 |
| 6. Teaching based on current research evidence is a waste of time | .91 |
| 7. There is no reason for me to implement evidence-based teaching because it is just a fad that will pass with time | .87 |
| 8. I know what is best for my students without examining the current research evidence | .45 |
| 9. Teaching based on current research evidence ignores the art of teaching | .75 |
| 10. My teaching experience influences how I judge evidence-based recommendations | .25 |

*Note.* $N = 43$.

*Step 3: Factor Loadings Items 3 and 10 Excluded*

| Item | Factor loading |
|---|---|
| 1. Previous teaching experience is more important than the use of current research evidence | .56 |
| 2. Teachers, in general, should not practice teaching based on current evidence because teaching is about people and students, not statistics | .57 |
| 4. The judgment of esteemed colleagues offers a better basis than current research evidence | .51 |

| | |
|---|---|
| 5. Experienced teachers should disregard research evidence when it conflicts with their intuition | .42 |
| 6. Teaching based on current research evidence is a waste of time | .91 |
| 7. There is no reason for me to implement evidence-based teaching because it is just a fad that will pass with time | .87 |
| 8. I know what is best for my students without examining the current research evidence | .44 |
| 9. Teaching based on current research evidence ignores the art of teaching | .75 |

*Note.* $N = 43$.

*Step 4: Factor Loadings Items 3, 10 and 5 Excluded*

| Item | Factor loading |
|---|---|
| 1. Previous teaching experience is more important than the use of current research evidence | .54 |
| 2. Teachers, in general, should not practice teaching based on current evidence because teaching is about people and students, not statistics | .58 |
| 4. The judgment of esteemed colleagues offers a better basis than current research evidence | .49 |
| 6. Teaching based on current research evidence is a waste of time | .93 |
| 7. There is no reason for me to implement evidence-based teaching because it is just a fad that will pass with time | .86 |
| 8. I know what is best for my students without examining the current research evidence | .42 |
| 9. Teaching based on current research evidence ignores the art of teaching | .76 |

*Note.* $N = 43$.

*Step 5: Factor Loadings Items 3, 10, 5, and 8 Excluded*

| Item | Factor loading |
|---|---|
| 1. Previous teaching experience is more important than the use of current research evidence | .52 |
| 2. Teachers, in general, should not practice teaching based on current evidence because teaching is about people and students, not statistics | .57 |
| 4. The judgment of esteemed colleagues offers a better basis than current research evidence | .46 |
| 6. Teaching based on current research evidence is a waste of time | .95 |
| 7. There is no reason for me to implement evidence-based teaching because it is just a fad that will pass with time | .83 |
| 9. Teaching based on current research evidence ignores the art of teaching | .77 |

*Note.* $N = 43$.

*Step 6: Final Subscale Attitudes Towards Evidence-Based Teaching with Items 3, 10, 5, 8, and 4 Excluded*

| Item | Factor loading |
|---|---|
| 1. Previous teaching experience is more important than the use of current research evidence | .50 |
| 2. Teachers, in general, should not practice teaching based on current evidence because teaching is about people and students, not statistics | .56 |
| 6. Teaching based on current research evidence is a waste of time | .97 |
| 7. There is no reason for me to implement evidence-based teaching because it is just a fad that will pass with time | .82 |
| 9. Teaching based on current research evidence ignores the art of teaching | .77 |

*Note.* $N = 43$.

## Appendix E

### Self-Use of Evidence-Based Practice Scale

**English version**

**Self-use of evidence-based practice**

For each of the following activities, how often have you done the following in the past 6 months? (5-point scale)

| | Never | 1 to 2 times | Almost every month | 2 to 10 times a month | More than 10 times a month |
|---|---|---|---|---|---|
| 1.Identify a gap in your knowledge related to a student or educational situation? | | | | | |
| 2.Formulate a question to guide a literature search based on a gap in your knowledge? | | | | | |
| 3.Effectively conduct an online literature search to address the question? | | | | | |
| 4.Critically appraise the strengths and weaknesses of study methods (e.g. appropriateness of study design, recruitment, data collection, and analysis)? | | | | | |
| 5.Critically appraise the measurement properties (e.g. reliability and validity, sensitivity and specificity) of standardized tests or assessment tools you are considering using in your practice? | | | | | |
| 6.Interpret study results obtained using statistical tests and procedures (e.g. t tests, logistic regression)? | | | | | |
| 7.Determine if evidence from the research literature applies to your educational situation? | | | | | |
| 8.Decide on an appropriate course of action based on integrating research evidence, professional judgment, and the students' preferences? | | | | | |
| 9.Continually evaluate the effect of your course of action on your intended outcomes? | | | | | |

**Dutch version**

**Zelfgebruik van evidence-based teaching (het gebruik van onderzoeksbewijs in het onderwijs)**

Geef voor elk van de volgende activiteiten aan hoe vaak u dit hebt gedaan in de afgelopen zes maanden. (Gebruik de onderstaande 5-punts schaal)

| | Nooit in de afgelopen zes maanden | 1 a 2 keer in de afgelopen zes maanden | Bijna iedere maand | 2 tot 10 keer per maand | Meer dan 10 keer per maand |
|---|---|---|---|---|---|
| 1.Een hiaat geconstateerd in uw kennis wat betreft een leerling of een onderwijssituatie? | | | | | |
| 2.Een onderzoeksvraag opgesteld, naar aanleiding van een hiaat in uw kennis, welke u begeleidde bij het gericht zoeken naar literatuur? | | | | | |
| 3.Effectief online literatuur gezocht om uw onderzoeksvraag te beantwoorden? | | | | | |
| 4.De sterke en zwakke punten van een onderzoeksmethode kritisch beoordeeld (denk hierbij aan het beoordelen van de geschiktheid van de onderzoeksopzet, werving van participanten, data collectie en analyse)? | | | | | |
| 5.De meeteigenschappen (validiteit, betrouwbaarheid, gevoeligheid en specificiteit) van de gestandaardiseerde testen of andere beoordelingsinstrumenten die u overwoog te gebruiken in de praktijk, kritisch beoordeeld? | | | | | |
| 6.De onderzoeksresultaten die verkregen zijn uit de statistische testen (zoals t-test, logistische regressie) geïnterpreteerd? | | | | | |
| 7.Vastgesteld of de resultaten uit de onderzoeksliteratuur van toepassing zijn op uw onderwijssituatie? | | | | | |
| 8.Een keuze gemaakt voor de juiste handelswijze, gebaseerd op een integratie van onderzoeksresultaten, uw professionele oordeel en de behoeften van de leerling? | | | | | |
| 9.Het effect van uw handelwijze op de gewenste resultaten geëvalueerd? | | | | | |

## Appendix F

## Changes to the Self-Use of Evidence-Based Practice Scale to Fit the Educational Practice

| **Medical Practice (Original Scale)** | **Educational Practice** |
|---|---|
| 1. Identify a gap in your knowledge related to a patient or client situation (e.g., history, assessment, treatment)? | 1.Identify a gap in your knowledge related to a student or educational situation? |
| 2. Formulate a question to guide a literature search based on a gap in your knowledge? | 2. No changes required |
| 3. Effectively conduct an online literature search to address the question? | 3. No changes required |
| 4.Critically appraise the strengths and weaknesses of study methods (e.g., appropriateness of study design, recruitment, data collection, and analysis)? | 4. No changes required |
| 5. Critically appraise the measurement properties (e.g. reliability and validity, sensitivity and specificity) of standardized tests or assessment tools you are considering using in your practice? | 5. No changes required |
| 6.Interpret study results obtained using statistical tests and procedures (e.g., t tests, logistic regression)? | 6. No changes required |
| 7. Determine if evidence from research literature applies to your patient's/client's situation | 7. Determine if evidence from the research literature applies to your educational situation? |
| 8. Decide on an appropriate course of action based on integrating research evidence, clinical judgement, and patient's/client's preferences | 8. Decide on an appropriate course of action based on integrating research evidence, professional judgment, and the students' preferences? |
| 9. Continually evaluate the effect or your course of action on your patient's/client's outcomes | 9. Continually evaluate the effect of your course of action on your intended outcomes? |

## Appendix G

## Purification Self-Use of Evidence-Based Practice Scale

*Step 1: Factor Loadings All Items Included*

| Item | Factor loading |
|---|---|
| 1. Identify a gap in your knowledge related to a student or educational setting? | .13 |
| 2. Formulate a question to guide a literature search based on a gap in your knowledge? | .69 |
| 3. Effectively conduct an online literature search to address the question? | .82 |
| 4. Critically appraise the strengths and weaknesses of study methods (e.g., appropriateness of study design, recruitment, data collection, and analysis)? | .57 |
| 5. Critically appraise the measurement properties, e.g., reliability and validity, sensitivity and specificity, of standardized tests or assessment tools you are considering using in your practice.") | .41 |
| 6. Interpret study results obtained using statistical tests and procedures, e.g., t-tests, logistic regression?") | .14 |
| 7. Determine if evidence from the research literature applies to your teaching situation? | .98 |
| 8. Decide on an appropriate course of action based on integrating research evidence, professional judgment, and the student's preferences? | .79 |
| 9. Continually evaluate the effect of your course of action? | .68 |

*Note.* $N = 43$.

*Step 2: Factor Loadings Item 1 Excluded*

| Item | Factor loading |
|---|---|

| | |
|---|---|
| 2. Formulate a question to guide a literature search based on a gap in your knowledge? | .68 |
| 3. Effectively conduct an online literature search to address the question? | .83 |
| 4. Critically appraise the strengths and weaknesses of study methods (e.g., appropriateness of study design, recruitment, data collection, and analysis)? | .57 |
| 5. Critically appraise the measurement properties, e.g., reliability and validity, sensitivity and specificity, of standardized tests or assessment tools you are considering using in your practice.) | .41 |
| 6. Interpret study results obtained using statistical tests and procedures, e.g., t-tests, logistic regression?) | .14 |
| 7. Determine if evidence from the research literature applies to your teaching situation? | .98 |
| 8. Decide on an appropriate course of action based on integrating research evidence, professional judgment, and the student's preferences? | .79 |
| 9. Continually evaluate the effect of your course of action? | .68 |

*Note.* $N = 43$.

*Step 3: Factor Loadings Items 1 and 6 Excluded*

| Item | Factor loading |
|---|---|
| 2. Formulate a question to guide a literature search based on a gap in your knowledge? | .68 |
| 3. Effectively conduct an online literature search to address the question? | .83 |
| 4. Critically appraise the strengths and weaknesses of study methods (e.g., appropriateness of study design, recruitment, data collection, and analysis)? | .57 |

| | |
|---|---|
| 5. Critically appraise the measurement properties, e.g., reliability and validity, sensitivity and specificity, of standardized tests or assessment tools you are considering using in your practice.) | .41 |
| 7. Determine if evidence from the research literature applies to your teaching situation? | .98 |
| 8. Decide on an appropriate course of action based on integrating research evidence, professional judgment, and the student's preferences? | .79 |
| 9. Continually evaluate the effect of your course of action? | .68 |

*Note. N* = 43.

*Step 4: Factor Loadings Final Scale Intention to Use Evidence-Based Practice with Items 1, 6 and 5 Excluded*

| Item | Factor loading |
|---|---|
| 2. Formulate a question to guide a literature search based on a gap in your knowledge? | .69 |
| 3. Effectively conduct an online literature search to address the question? | .83 |
| 4. Critically appraise the strengths and weaknesses of study methods (e.g., appropriateness of study design, recruitment, data collection, and analysis)? | .57 |
| 7. Determine if evidence from the research literature applies to your teaching situation? | .97 |
| 8. Decide on an appropriate course of action based on integrating research evidence, professional judgment, and the student's preferences? | .80 |
| 9. Continually evaluate the effect of your course of action? | .68 |

*Note. N* = 43.

## Appendix H

## Information Letter

**English version**
Dear academic primary school teacher,

First of all, I would like to thank you for reading this information letter. Since I started a pre-master after working fulltime as a primary school teacher, I became interested in the use of research evidence in primary schools, which is the topic of this research. In this information letter, the topic of this study will be briefly elaborated after which procedural information is shared. I invite you to partake in this research by completing the survey after reading this information letter.

**This study**
Since 2006, there has been more emphasis on the implementation of evidence into the teaching practice to enhance primary school students' learning outcomes. Academic teachers have an important role in this respect, because of their experience with both education and research. This study aims to shed light on academic primary school teachers' research competencies, attitudes, and the use of evidence-based teaching. Thus, the first part of the survey contains ten questions regarding attitudes towards research. The second part contains nine questions regarding the use of evidence-based teaching. Finally, the third part of the survey contains nine questions regarding research competency. Completing the survey will take between fifteen and twenty minutes. The answer categories differ per part and there will be a short explanation at the beginning of each part. All questions must be completed before you can proceed to the next page.

**Procedural information**
Participation in this study is voluntary. You can end your participation in the study at any time, without any explanation and any negative consequences. If you decide to quit the survey, your data will be deleted. Before you can start with the questionnaire, you will be asked to sign the informed consent form. The collected data will be stored completely anonymously on the secure servers of the University of Utrecht. The computer on which your personal details are stored is secured to the highest standards, and only the researchers involved will have access to this data. Your data will be stored for at least 10 years. This is in accordance with the guidelines provided by the VSNU Association of Universities in the Netherlands. Please refer to the website of the Authority for Personal Data: https://autoriteitpersoonsgegevens.nl/nl/onderwerpen/avg-europese-privacywetgeving, for more information about privacy.

If you have an official complaint about the study, you can send an email to the complaints officer at klachtenfunctionaris-fetcsocwet@uu.nl. If you would like to gain additional information, please contact me through email: r.a.vantergouw@students.uu.nl. Note that this research is conducted in light of a student dissertation for Utrecht University, thus making it student research.

Best regards,

Roxanna van Tergouw

**Dutch version**

Beste academische leerkracht basisonderwijs,

Allereerst wil ik u bedanken voor het lezen van deze informatiebrief. Sinds ik een pre-master begon na een fulltime baan als leerkracht basisonderwijs, raakte ik geïnteresseerd in het gebruik van onderzoeksbewijs in het basisonderwijs, het onderwerp van dit onderzoek. In deze informatiebrief wordt kort ingegaan op het onderwerp van dit onderzoek, waarna procedurele informatie wordt gedeeld. Ik nodig u uit om deel te nemen aan dit onderzoek door na het lezen van deze informatiebrief de enquête in te vullen.

**Deze studie**

Sinds 2006 is er meer nadruk gelegd op de implementatie van onderzoeksbewijs in de onderwijspraktijk om de leerresultaten van basisschoolleerlingen te verbeteren. Academische docenten hebben hierin een belangrijke rol, vanwege hun ervaring met zowel onderwijs als onderzoek. Deze studie heeft als doel inzicht te verkrijgen in het gebruik van evidence-based onderwijs door academische basisschoolleerkrachten. Tevens richt dit onderzoek zich op de onderzoekscompetenties en attitudes van academische basisschoolleerkrachten. Zo bevat het eerste deel van de enquête tien vragen over attitude jegens onderzoek. Het tweede deel bevat negen vragen over het gebruik van evidence-based onderwijs. Ten slotte bevat het derde deel van de enquête negen vragen omtrent onderzoekscompetentie. Het invullen van de enquête duurt tussen de vijftien en twintig minuten. De antwoordcategorieën verschillen per onderdeel en aan het begin van elk onderdeel staat een korte toelichting. Alle vragen moeten zijn ingevuld voordat u door kunt gaan naar de volgende pagina.

**Procedurele informatie**

Deelname aan dit onderzoek is vrijwillig. U kunt uw deelname aan het onderzoek op elk moment beëindigen, zonder enige uitleg en zonder negatieve gevolgen. Als u besluit te stoppen met het invullen van de vragenlijst, worden uw gegevens verwijderd. Voordat u met de vragenlijst kunt beginnen, wordt u gevraagd om akkoord te gaan met de voorwaarden (informed consent). De verzamelde gegevens worden volledig anoniem opgeslagen op de beveiligde servers van de Universiteit Utrecht. De computer waarop uw persoonlijke gegevens zijn opgeslagen, is volgens de hoogste normen beveiligd en alleen de betrokken onderzoekers hebben toegang tot deze gegevens. Uw gegevens worden minimaal 10 jaar bewaard. Dit is in overeenstemming met de richtlijnen van de VSNU Vereniging van Universiteiten. Voor meer informatie over privacy verwijzen wij u naar de website van de Autoriteit Persoonsgegevens: https://autoriteitpersoonsgegevens.nl/nl/onderwerpen/avg-europese-privacylegislation.

Als u een officiële klacht heeft over het onderzoek, kunt u een e-mail sturen naar de klachtenfunctionaris via Klachtenfunctionaris-fetcsocwet@uu.nl. Als u meer informatie wilt, neem dan contact op via e-mail: r.a.vantergouw@students.uu.nl. Dit onderzoek is uitgevoerd in het licht van een studentenscriptie voor de Universiteit Utrecht, waardoor het een studentenonderzoek is.

Met vriendelijke groet,

Roxanna van Tergouw

# Appendix I

## Informed Consent Form

### English version

**Title of the study:** Academic primary school teachers' research competencies and attitudes towards evidence-based teaching

**Document version date:** January 9th, 2022

I volunteer to participate in this research project conducted by Roxanna van Tergouw from Utrecht University. I understand that the project is designed to gather information about academic primary school teachers' research competencies, attitudes, and self-use of evidence-based teaching.

I understand that this research study has been reviewed and approved by the Faculty Ethics Review Board (FERB) for Studies Involving Human Subjects: Behavioral Sciences Committee at the Utrecht University. For research problems or questions regarding subjects, the Institutional Review Board may be contacted through klachtenfunctionarisfetcsocwet@uu.nl.

I have been fully informed, through the information letter, about the study's purpose and the manner in which the data will be handled.
I understand that I can withdraw from the study without any explanation or consequences at any given time.

Do you consent to these terms? Yes/No. (option in Qualtrics)

### Dutch version

**Titel van het onderzoek:** Onderzoekscompetenties en attitudes van academische leraren in het basisonderwijs ten aanzien van evidence-based onderwijs

**Documentversiedatum:** 9 januari 2022

Ik neem vrijwillig deel aan dit onderzoeksproject van Roxanna van Tergouw van de Universiteit Utrecht. Ik begrijp dat het project bedoeld is om informatie te verzamelen over het gebruik van evidence-based onderwijs door academische basisschoolleraren en hun onderzoekscompententies en attitudes jegens evidence-based onderwijs.

Ik begrijp dat dit onderzoek is beoordeeld en goedgekeurd door de Facultaire Ethische Beoordelingscommissie (FERB) voor Studies met Mensen: Gedragswetenschappen Commissie van de Universiteit Utrecht. Voor onderzoeksproblemen of vragen over onderwerpen kan contact worden opgenomen met de Institutional Review Board via klachtenfunctionarisfetcsocwet@uu.nl.

Ik ben via de informatiebrief volledig geïnformeerd over het doel van het onderzoek en

de wijze waarop met de gegevens zal worden omgegaan. Ik begrijp dat ik mij op elk moment kan terugtrekken uit het onderzoek zonder enige uitleg of consequenties.

Gaat u akkoord met deze voorwaarden? Ja/Nee. (optie in Qualtrics)

## Appendix J

## Demographic Questions

**English version**

1. What is your gender (men, woman, other)?
2. What is your age?
3. What is your educational background (academic teacher education program/academic master and regular teacher education program/ academic teacher education program and academic master).

**Dutch version**

1. Wat is uw geslacht (man, vrouw, anders)?
2. Wat is uw leeftijd?
3. Wat is uw onderwijsachtergrond (academische pabo/ pabo en universitaire master/ academische pabo en universitaire master)

# Appendix K

## Assignment 4 Academic Integrity

### Sample Characteristics and Consent Procedures

The sample in this study contains APS teachers in the Netherlands. All participants are of age to decide whether to participate and to give their informed consent. APS teachers are highly educated (at the university level), and are therefore familiar with the procedures that come along with doing research. Before participating in this study, the participants can read a letter that provides information about the topic of the study and procedural information (e.g., how the data is handled). After reading the information letter, the participants can give their informed consent and participate in the study. Also, participants are made aware that they can quit taking the survey at any time without any negative consequences.

It is known that teachers working in primary schools in the Netherlands, usually experience a high workload. Hence, we provided information on this study using the information letter with the aim to make the relevance clear. Participants were also given the time to complete the survey where and when they pleased.

### Choice of Instruments and Possibly Sensitive Questions

The instruments chosen in this study are all validated instruments translated to Dutch. All instruments are translated to the official language in the Netherlands because we assume this makes it easier and costs less time for APS teachers to participate. The Berlin test on research competencies measures APS teachers' research competencies. To reassure participants, at the beginning of the questionnaire a sentence is included that states that participants should not worry if they do not know an answer. We assume that the other two instruments (subscale attitudes and self-use of evidence-based practice) do not contain possible sensitive questions. Therefore, the survey starts with these two instruments to make participants feel comfortable before taking the Berlin test. During the pilot test, participants

mentioned that this order was preferable. For each of the instruments, a short instruction is included so the participants know what is expected of them.

**Effort Required from Participants and How This Weighs Against the Relevance of the Study**

Participants are required to read the information letter, give their informed consent, provide demographic information (gender, age, and education), and complete the survey that takes between fifteen and twenty minutes. We argue that this effort is reasonable given the relevance of this study. Since 2006, the Dutch government aims to educate more APS teachers because these teachers are expected to act as brokers between research and practice. However, limited research is available on evidence-based teaching by APS teachers in the Netherlands. This study contributes to the scarce literature in the field of evidence-based teaching by APS teachers.

**Data Handling and Storage**

This study contains data derived from the informed consent form, demographic questions, and the survey. The collected data will be stored completely anonymously on the secure servers of the University of Utrecht. The computer on which the data is stored is secured to the highest standards and only the researchers involved will have access to this data. The data will be stored for at least 10 years, which is in accordance with the guidelines provided by the VSNU Association of Universities in the Netherlands. Data of participants that quit during the survey will be deleted.

**Any Other Issues Concerning the Academic Integrity of Your Study**

All issues concerning the academic integrity of this study have already been addressed. This study strongly aims to adhere to honesty, scrupulousness, transparency, independence, and responsibility.

## Appendix L

## Timetable

| Activity | Date |
|---|---|
| Pilot testing the instruments with 4 students and adjusting the instruments based on the pilot | January 17 - 21 |
| Finalizing the research plan based on provided feedback | January 17 - 30 |
| Sending requests to participate in the study to organizations where APS teachers work | January 17 - 30 |
| Creating the final survey in Qualtrics | January 31 – February 6 |
| Planning a meeting with the methods lab in march (see below) | When approved by the FERB and the supervisor |
| Finding participants through:<br><br>- Personal network (LinkedIn and Facebook)<br>- Sending the survey to the institutions that have agreed to participate<br><br>Regularly check how many APS already participated and send reminders if necessary after two weeks. | February 16 - March 16 |
| Working on the analysis<br><br>If needed: meet with the methods lab | March 16 – march 26 |
| Working on the draft thesis | March 26 – May 18 |
| Submitting a draft thesis | **Deadline: May 18** |
| Working on the final thesis | May 18 - June 10 |
| Sign up for the thesis conference (registration) | **Deadline: May 25 (3 weeks before the conference)** |
| Submitting the final thesis | **Deadline: June 10** |
| Assessment period of the second assessor | Takes 2 weeks |
| Presentation at the thesis conference | **Deadline: June 15 (11-17)** |