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The Halo Effect as a Teaching Tool for Fostering Research-Based Learning

Lars Behrmann *

University of Muenster, GERMANY

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Abstract: Teachers' use of everyday cognitive heuristics can lead to biases in information processing and, thus, to unfair assessments of student characteristics. This problem can be addressed by a core aspect of research-based learning, i.e., by making use of principles and methods of empirical research in order to systematically collect information. However, pre-service teachers' attitude towards the use of empirical research methods is usually rather low. To foster their attitudes, a total of 444 student teachers were confronted with their own biased perception during a methodology course. Biased perception was triggered by a halo effect inducing experiment. In a subsequent semester, n = 113 of these students participated in an online survey. They answered questions about their cognitive activity and affective reaction following the presentation of the results of the experiment. Moreover, they reported about perceived attitude changes towards systematic thinking and research methods. The results demonstrate the successful implementation of the halo effect, which affected the students cognitively and emotionally. Structural equation modelling showed that attitude change was dependent on both cognitive and affective reactions. The findings indicate that the halo effect is not only easy to implement in university courses but also appears to have substantial impact on students' attitudes towards research-based learning.

Keywords: *Halo effect, research-based learning, teacher education, research methods, teacher attitudes.*

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Introduction

The German constitution determines that teacher education is decentrally governed by the federal states. Thus, each federal state has the right to decide autonomously on how teachers are educated at universities. A standing conference of the respective Ministers of Education and Cultural affairs, though, ensures that teacher education is fundamentally similar between federal states (cf. Cortina, Baumert, Leschinsky, Mayer & Trommer, 2008). Nevertheless, each state has to pass its own respective laws on teacher education. In this regard, the federal state of North-Rhine-Westphalia established a new law on teacher education in 2009 (Lehrerausbildungsgesetz, 2009), that requires pre-service teachers to undertake a practical semester at school during their master studies.

A main objective that is pursued with this mandatory practical semester is that the pre-service teachers try out how to empirically answer school-related research questions that arise from practical experiences (cf. Lehramtszugangsverordnung, 2009). Nowadays, students' needs as well as the classroom environment itself become more and more diverse (cf. Fischer, Rott & Veber, 2014). Therefore, future teachers need to be able to develop and adapt their professional knowledge and competencies continuously and autonomously. That is, a teacher has to be able to independently obtain the information needed to consecutively adjust his or her lessons to meet the varying needs of the students (cf. van Ophuysen, Behrmann, Bloh, Schmidt & Homt, 2017). During this process, teachers are supposed to employ a systematic approach to data collection and data analysis in order to avoid common errors and biases during information processing. For that reason, student teachers at the University of Muenster have to attend a course about empirical research methods that is supposed to provide them with the required competencies.

Everyday information processing

In day-to-day life, people tend to process new information without spending much time on contemplating about it. This happens for reasons of parsimony: the human cognitive system hesitates to invest more effort than essentially necessary to make judgments, form impressions, or come up with appropriate explanations. Instead, people regularly rely on what is called a heuristic (cf. Myers, 2005), a mental shortcut that allows us to make sufficiently good decisions without taking all available information into account. Rather, only those data are processed that our cognitive system

* **Correspondence:**
Lars Behrmann, University of Muenster, Institute for Educational Science, Muenster, Germany.
✉ lars.behrmann@uni-muenster.de

instantaneously perceives as important for the task at hand. However, such casual information processing often involves the risk of failure during decision making. For example, people tend to presume that a person belongs to a certain group or category if resembling features of a typical group member (representativeness heuristic; Kahneman & Tversky, 1972). Thus, we are prone to accept that a student wearing neat clothing and glasses is probably an overachiever, regardless of the fact that we actually do not have any achievement-relevant information available on the student's actual IQ scores, test achievements or grades. Consequently, this student is expected to achieve high whereas another student, who might actually be more capable but who does not look like it, is anticipated to achieve less. Teachers' cognitive heuristics have repeatedly been shown to affect student achievement (e.g. Friedrich, Flunger, Nagengast, Jonkmann & Trautwein, 2015; Kuklinski & Weinstein, 2001; Rosenthal, 1994). Therefore, being aware of these heuristics and – if necessary – how to avoid them, is particularly important. In order to do so, teachers need to know how to come to objective conclusions without falling victim to errors in information processing. One way to achieve this goal is to teach student teachers an encompassing set of empirical research methods. This approach appears promising because knowledge about empirical research methods has been shown to improve reasoning abilities about real-life events (VanderStoep & Shaughnessy, 1997). Moreover, a solid knowledge about research methods also enables teachers to improve their performance in tasks that are particularly important for the teaching profession such as judging children's achievement, evaluating their own instruction as well as being able to understand evaluations from others and how to benefit from them (cf. Altrichter & Mayr, 2004). Such an attempt to teach empirical research methods in order to help students develop a scientific method of thinking and working, corresponds to the didactic concept of research-based learning (cf. Fichten, 2017).

Research-based learning

Research-based learning is a specific type of learning in which the learning process is embedded in actual research practices (Fichten, 2017). It employs approaches and techniques derived from empirical social science in order to gain objective information that would otherwise not be accessible. Nevertheless, research-based learning should not be misunderstood as an encompassing research process. Science is typically pursued in order to obtain knowledge about universal principles of life, meaning that the acquired insights are generalizable across various (but comparable) situations. The process of research-based learning, however, primarily generates findings that are of professional interest only to the learner – i.e. the teacher – him- or herself (cf. Schneider & Wildt, 2009; Weyland & Busch, 2009). Applicability of findings regarding persons and situations other than the observed ones is not intended. In this, the idea of professionalization becomes apparent, as answering research questions is mainly supposed to aid the learner (i.e. a teacher) in closing his or her knowledge gaps in order to optimize his or her own professional actions. Hence, research-based learning is not a genuine process of scientific discovery. Nonetheless, research-based learning requires the learner to learn and employ elementary empirical research methods (Fichten, 2017; Schneider & Wildt, 2009).

Although there is no consensus between researchers about the exact definition as well as about the most reasonable implementation (cf. Huber, 2009), most concepts of research-based learning in teacher education have in common that teacher candidates are supposed to examine their initial school-related experiences as a teacher by means of empirical research methods (Fichten, 2017). The varying concepts of research-based learning taught at German universities mostly differ in how empirical research methods are introduced to the student teachers. In most of these concepts, it is preferred to focus on individual methods that are suitable for addressing a specific research question (cf. Schussler et al., 2017). In contrast to this, students at the University of Muenster have to acquire a more encompassing set of research methods that allows to answer a broad field of research questions, autonomously (van Ophuysen et al., 2017).

Teacher education at the University of Muenster

Pre-service teachers at the University of Muenster have to attend a research methodology course. In this course, the students are taught the principles of "research-based learning" in order to prepare them for their research tasks during the practical semester, (cf. van Ophuysen et al., 2017). These principles describe a process of professionalization, in which pre-service teachers apply empirical research methods to answer research questions that mainly arise from their own experiences at school. In order to do so, teacher candidates have to acquire basic competencies in research methodology. To be more specific, they have to learn 1) how to derive research questions, 2) how to plan a suitable research design, 3) how to collect data, and 4) how to analyze and interpret the data appropriately (University of Muenster, 2014).

These basic competencies are taught in a course conceptualized by the work group "Research Methods/ Empirical Educational Research". This course comprises eight lectures (each 90 minutes) in which following topics are addressed:

- research designs (which research design is appropriate for my research question?)
- data collection (construction and application of standardized tests, questionnaires and observation instruments)
- data analysis (qualitative content analysis, conditional frequencies, effect sizes, and correlations, depending on the respective research question)
- data interpretation (are confounding variables considered? Is a causal statement valid?)

In addition, four three-hour tutorial sessions are provided in which the theoretical knowledge from the lectures can be practically applied under guidance of experienced student teachers.

Teacher education, teachers' beliefs and attitudes and teacher change

Teacher beliefs and attitudes are of vital importance to any basic and advanced teacher education effort. This is due to the fact that beliefs and attitudes are assumed to filter perceptions, affect interpretations, influence decision making, and, eventually, teachers' classroom behavior (Calderhead, 1996; Kagan, 1992; Rubie-Davies, 2014). Thus, during the methodology course, the student teachers are constantly reminded that a systematical approach to gathering information aids in avoiding errors and biases in information processing. However, the students have to be actually convinced, that a systematical approach is important for them to meet the professional challenges of an in-service teacher. Hence, they first have to be made aware that unsystematic everyday information processing might lead to flawed appraisals and decisions. In this context, it can be assumed that the majority of teacher candidates does not already value a systematical strategy to collect and process information prior to the abovementioned methodology course. This is due to the fact that student teachers in North-Rhine-Westphalia regularly receive – if any – only small amounts of instruction in empirical methodology. Thus, it appears reasonable to employ a theoretical framework about how to induce changes in teachers' attitudes and beliefs.

Teacher's beliefs are generally regarded as very resilient. Therefore, changes in teachers' beliefs are neither expected during their education period at university (e.g. Kennedy, 1997; Peacock, 2001) nor during in-service educational measures (e.g. Duffy & Roehler, 1986, Kagan, 1992). Nevertheless, under certain circumstances, teachers can be stimulated to rethink their previous ideas. For example, Cobb, Wood, and Yackel (1990) explain, that a "cognitive conflict" in the mind of a teacher could motivate changes in convictions and beliefs. Such a conflict arises, if a teacher realizes that a new idea or information contradicts what was previously believed true. In addition, teacher beliefs also encompass affective-emotional components that might play a particularly important role when it comes to a shift in beliefs (Fives & Buehl, 2012). That is, chances are that a conflict of cognitions will only lead to changes in beliefs if there is an emotional importance to it. Therefore, if beliefs and attitudes are to be stimulated to change, cognitive as well as affective factors should be addressed. Complementary, the interconnected model of teacher change by Clarke and Hollingsworth (2002) assumes that change occurs on four interrelated different domains: First, the external domain describes an external (from the teacher's perspective) source of information or a stimulus that becomes available to the teacher. Second, the domain of practice encompasses the cognitive and physical activities the teacher undertakes with the stimulus. Third, the domain of consequence comprises the noticeable outcomes of the teacher activities and fourth, the personal domain, describes teachers' knowledge, beliefs and attitudes with regard to the three other components. In the model, all four domains influence and reinforce each other. Thus, a new stimulus (external domain) most likely will only elicit changes in teachers' beliefs (personal domain), when the teacher is actively engaged with the stimulus (domain of practice) and this engagement leads to considerations on the side of the teacher that are meaningful on a cognitive and on an emotional level (domain of consequence). Thus, if student teachers are supposed to question their typically unelaborated previous beliefs on a systematic approach of gathering and processing information, a didactic element should be applied that particularly targets the cognitive and emotional components of these beliefs and attitudes in the framework of teacher change by Clarke and Hollingsworth (2002).

The halo effect as a teaching tool to induce changes in beliefs and attitudes

The so-called "halo effect" has been scientifically established for almost one hundred years (Thorndike, 1920). Since then, it was extensively researched and documented (e.g. Johnson & Vidulich, 1956; Nisbett & Wilson, 1977; Forgas, 2011). The effect occurs, if the appraisal of a salient trait of a person (a person's halo) emanates to another trait of the same person. This can yet happen, when both traits are essentially independent from each other. As a consequence, a student that is deemed pretty by a teacher might also be rated smart, even if he or she is actually rather not. It has been shown that the halo-effect can considerably influence teachers' judgments' of student performances (Dompnier, Pansu & Bressoux, 2006). For that reason, experiencing the halo effect should elicit a "cognitive conflict" in the sense of Cobb et al. (1990).

In order to stimulate the teacher candidates to rethink their convictions, it has to be revealed to them that they are subject to biases and judgment errors. Given that the halo-effect is presented in a way that addresses a topic important to the student teachers, this should also affect the students' beliefs and attitudes on an emotional level. The halo-effect as a teaching tool is consistent with the framework of Clarke and Hollingsworth (2002) in that inducing the effect by providing the students with an assessment task serves as a stimulus from the external domain. Moreover, the students working on their appraisal can be located in the domain of practice, and the realization of their flawed reasoning lies in the domain of consequence. Thus, changes in the personal domain, i.e. in knowledge, beliefs and attitudes, might be expected when applying the halo-effect as a teaching tool.

Research questions

From these considerations, three main research questions arise:

1) Is it possible to successfully trigger a halo-effect during a methodology course for pre-service teachers?

2) a) If the halo-effect can be elicited, to what extent are the student teachers cognitively and emotionally affected by being showcased its results?
   b) From the perspective of the student teachers, to what extent does the halo effect influence their beliefs and attitudes on a systematic approach to information processing and on the attended methodology course?
3) According to models of teacher change, pre-service teachers should be addressed on a cognitive (Cobb et al., 1990) and on an emotional level (Fives & Buehl, 2012) in order to entail changes in their beliefs and attitudes. Thus, the third research question is: can the impact on the student teachers' attitudes be predicted by the degree of which the teacher candidates are cognitively and emotionally affected by the halo effect?

Methodology

Study procedures, sample description and instruments

From the first run of the methodology course in the winter semester of 2014/15 up to the summer semester of 2016, a total of *n* = 444 student teachers (21% male, 79% female; M = 24.50 years of age, SD = 3.18†) have attended the lectures and, thus, participated in this study.

During each first session of a semester, we have attempted to elicit a halo effect from the students. This was done by randomly handing out one of two versions of a short vignette‡ to the pre-service teachers. The vignettes bade them to imagine themselves as teachers, who had to give their first impressions about one of their students on their first day in a class of fourth graders. Both versions provided essentially the same information about a boy named Tobias. He is freckle-faced, wears a white polo shirt as well as blue jeans and sits in the front row of the class. Moreover, the boy responds to the teacher's invitation to put nameplates on display by loudly calling out his name. Afterwards, Tobias asks the teacher in front of the class if he/she would tell them his/her first name.

However, both versions of the vignettes differed in that in the first version, Tobias is depicted as an athletic child. In the other version, he was described as being 10kg (roughly 22 pounds) overweight. Following the description of Tobias, the teacher candidates were asked to characterize the boy on a 4-point semantic differential scale consisting of 18 bidimensional items. These items were selected because – in the eye of the author – they allow for a sufficient description of the social position of a school child. After the student teachers had answered the items, the vignettes were collected and not discussed further in the session. One week later, at the beginning of the second session of the course, the students were shown a diagram of their group-specific answers. This was done in order to demonstrate to them how a single varying attribute in the description of a schoolboy could influence how he is generally perceived by the teachers-to-be (Figure 1).

In the spring of 2017, all former participants of the previous methodology courses were contacted by e-mail in order to ask if they would be willing to answer a set of follow up questions on the impact the experiment had on them. In total, n = 113 students answered to the request and completed an online survey consisting of 18 items on a 5-point rating scale (1 = strongly disagree to 5 = strongly agree)§. All items had been developed by the author and checked for face validity by his colleagues. The items were sorted into four scales regarding content.

The effects the experiment had on an emotional (α = .68**) as well as on a cognitive level (α = .73) were assessed with three items each. Example items: "The result of the experiment has shattered me", respectively "I have talked to others about the experiment".

The scale on changes in attitudes towards systematic thinking consisted of 9 items (α = .89). Example item: "The experiment made me proceed in a more systematic way when I form an opinion about something".

The changes in attitudes towards the methodology course were assessed via three items (α = .72). Example item: "Experiencing the experiment motivated me to learn more about the contents of the methodology course"††.

† Data on gender ratio and age from the winter semester of 2014/15 are not available, thus, values are approximated by reporting the values of the students from subsequent semesters.

‡ The idea of this experimental design is derived from a university course held by Prof. Dr. Bettina Hannover.

§ There were no differences in the participants' responses between the four cohorts. Therefore, all participants were treated as one group.

** An α-value slightly below the common threshold of .70 was accepted here. This is because – considering that only three items constitute the scale – the α-value is still quite large. In fact, an α = .68 indicates a mean inter-item-correlation of around r = .4 which is considered an optimal value for reliability measures (see Briggs et al., 1986)

†† As no compulsory attendance is required to pass the course, this scale might provide an indication on the number of students that voluntarily attended the course.

Results

Research question 1

The vignettes were handed out in a random fashion to the teacher candidates. Thus, the student teachers were randomly assigned to one of two groups ("athletic" vs. "overweight"). During the course of the experiment, the pre-service teachers had to rate 18 attributes describing the schoolboy Tobias. Thus, for every one of the 18 items, an independent samples *t*-test with group assignment as grouping variable was conducted. Of these analyses, 14 yielded statistically significant results in the first place. As multiple testing procedures may lead to type I error accumulation, false discovery rate control procedures were applied (cf. Glickman, Rao & Schultz, 2014). False discovery rate control tailors the *p*-threshold to the specific analytical situation at hand and, thus, is a more powerful alternative to common and more conservative Bonferroni adjustment procedures. In this study, 18 *t*-tests were conducted. Therefore, the maximum false discovery rate was defined as 100/18 = 5.56%, meaning that the p-values were adjusted in a way that, at the maximum, only one of the 18 statistical decisions might lead to a false positive result. After having applied the false discovery approach, still 13 of 18 analyses lead to statistically significant results. Therefore, it can be deduced that for the majority of rated attributes, a halo effect actually occurred (Figure 1).

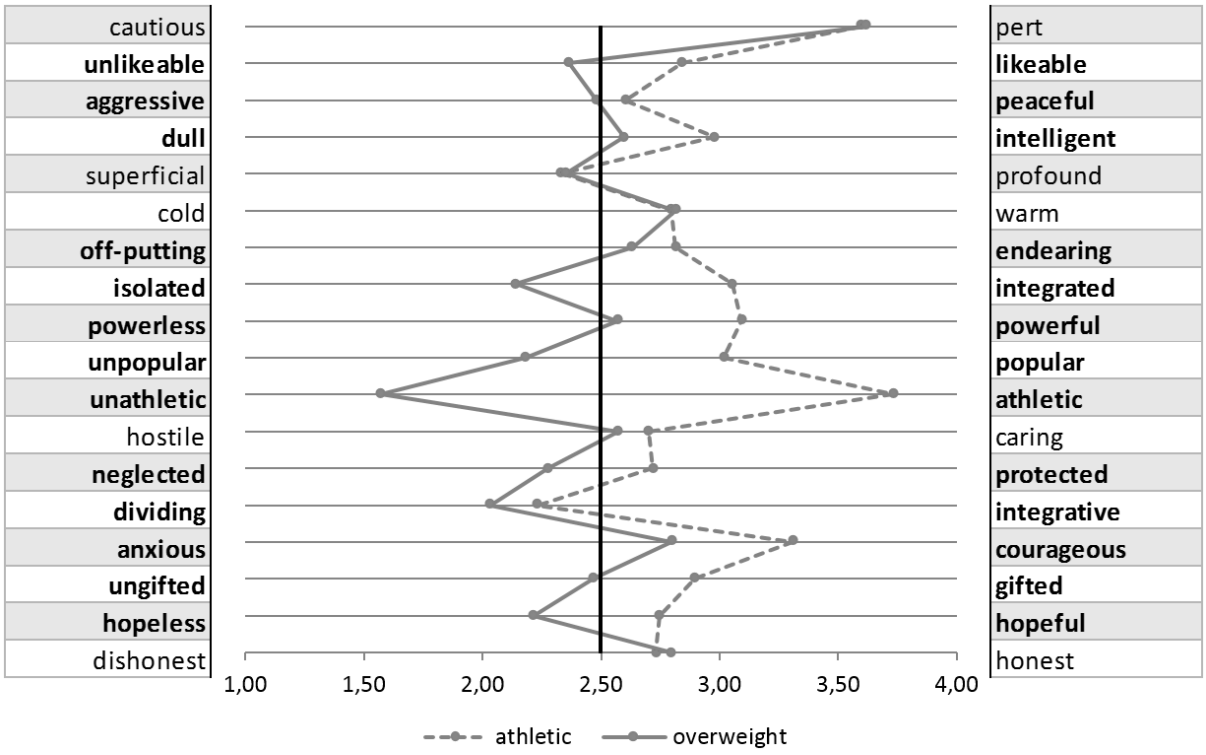

Figure 1. Visualization of the halo effect. Significant between-group differences in ratings of the attributes are highlighted with bold fonts.

Research questions 2a) and 2b)

Regarding the question to what extent the pre-service teachers were influenced by experiencing the halo effect, only students' ratings of their subjectively perceived changes were assessed. That is, no actual longitudinal data on the impact of the halo effect are available. Hence, no elaborated repeated measures procedures but only a descriptive approach could be applied.

For each of the four scales from the online survey, the theoretical mean of "3" was assigned as a threshold value for the estimation of the magnitude of the halo-effect on the student teachers. Thus, a mean score above 3 per scale indicated that the experimentally induced halo effect had the intended impact on the teacher candidates. A score equal to or below 3 indicated that such an effect did not occur. The descriptive results of the frequency analysis of the four scales from the survey are depicted in Table 1.

Table 1. The descriptive results of the frequency analysis of the four scales from the survey

Score\ Effect on	Cognitive activity	Emotional affect	Changes in attitudes towards systematic thinking	Changes in attitudes towards the methodology course
No. of scores > 3	63 (55.8%)	31 (27.4%)	72 (63.7%)	49 (43.4%)
No. of scores ≤ 3	50 (44.2%)	82 (72.6%)	41 (36.3%)	64 (56.6%)
Mean (*SD*)	3.30 (1.02)	2.69 (0.84)	3.37 (0.75)	2.89 (0.97)

Note. $N = 113$.

The results indicate that the experienced halo effect mostly affected student teachers' changes in attitudes towards systematic thinking as well as their cognitive activity. In addition, about 30% of the students stated that the experiment considerably affected them on an emotional level. Over 40% of the students reported that experiencing the halo effect made them desire to learn more about the content of the methodology course.

Research question 3

The third research question asks if the impact of the halo effect on a cognitive and on an emotional level can predict the degree of change in pre-service teachers' beliefs. As this research question encompasses a number of regression equations, a structural equation model was used for analysis. In addition, by analyzing the data on a latent level, the measurement error could be eliminated. It has to be acknowledged, though, that the sample size available to answer this research question is quite small in this study albeit not too small (cf. Kelloway, 2015). Nevertheless, in order to remove parameters from the estimation model, the 9 items that form the scale on the students' beliefs about their systematic thinking were parceled into three averaged indicator variables on the basis of similar factor loadings. With an RMSEA of .067, a CFI of .965, a TLI of .951 and a SRMR of .065, fit indices suggest an acceptable model fit (Schermelleh-Engel, Moosbrugger, & Muller, 2003). As can be seen in Figure 2, cognitive engagement with the halo effect significantly predicted the pre-service teachers' changes in attitudes towards systematic thinking as well as towards the methodology course. Emotional affect also significantly predicted the changes in attitudes towards systematic thinking, but changes in attitudes towards the methodology course were only predicted tendentially (p = .058).

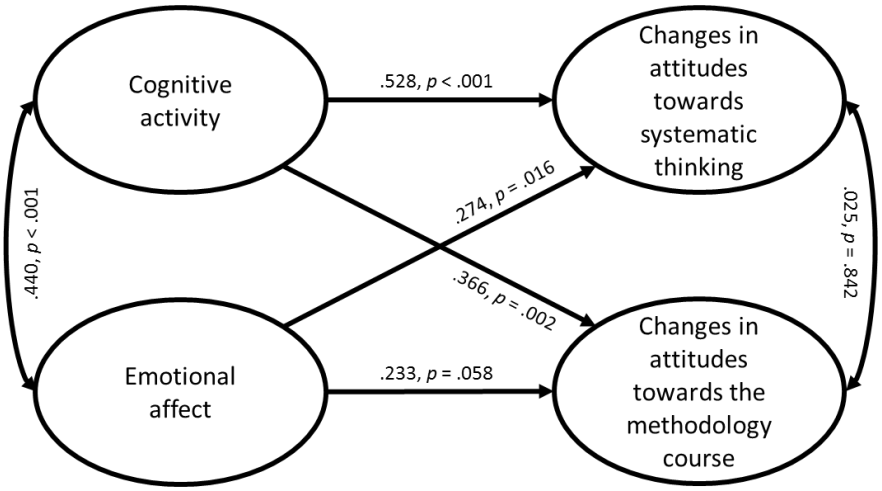

Figure 2. Structural equation model of self-reported cognitive activity and emotional affect predicting the self-reported changes in teachers' beliefs.

Discussion and conclusion

In this study, it was outlined that errors in human information processing pose a vital threat to teachers' objective decision making. The teaching concept of research-based learning offers an opportunity to handle these impediments: in teaching teacher candidates an encompassing basic knowledge of empirical research methods, the students are enabled to approach everyday research questions in a systematic fashion. This is supposed to minimize the occurrence of subjective and flawed decisions. It is important, though, that student teachers realize that they actually succumb to biases in information processing in order to motivate them to engage in corrective measures like research-based learning. Therefore, it was tested in this study if a halo effect could be experimentally induced during a methods course at university (research question 1). It was then examined if having experienced the halo effect had an influence on the students' cognition and emotion (research questions 2a and 2b) and if these influences were related to self-rated changes in attitudes towards the methodology course as well as towards systematic thinking in general (research question 3).

Research question 1.

With regard to research question 1, significant between-group differences in 13 of the 18 rated attributes were found. The assessment of athleticism yielded the strongest effect, which should be interpreted as indicator of a successful implementation of the experimental manipulation. The remaining 12 significant differences can be looked upon as evidence for an induced halo effect. Thus, the basis for subsequent research questions is established.

Research questions 2a) and 2b).

The results of research question 2a) show that more than half of the pre-service teachers stated that they have concerned themselves cognitively with the experiment and its consequences. In addition, roughly 30% of the students claimed that the experiment has affected them on an emotional level. Thus, at least for a moderate number of student teachers, it appears that the theoretical prerequisites for change in the sense of Cobb et al. (1990) and Clarke and Hollingsworth (2002) have been realized during the lectures. Regarding research question 2b), 60% of the students' responses concerning the changes in their attitudes towards systematic thinking were above a mean score of 3. Hence, the idea that some information should be collected and analyzed in a systematic way, was apparently adopted by a majority of the students. Acknowledging that participants were asked to classify their experiences in direct relation to the experiment, this interpretation is likely but not the only possible one. Strictly speaking, causal statements cannot be made safely because no untreated control group was employed in this study. Thus, to a certain extent it remains unclear if the self-reported changes of the teacher candidates can actually be traced back to the induced halo effect or if they are based on something else.

In addition, a substantial part of the students (>40%) responded that they wanted to know more about the contents of the methodology course after the experiment took place. The results suggest that the experiment was largely considered very interesting. Therefore, this might have transferred to an improved general perception of the methodology course. Moreover, it was regularly communicated during the lectures that applying empirical research principles is helpful in reducing cognitive biases. Considering the impact the halo effect apparently had on the students, this might be another reason for their increased interest in the methodology course. If this was true, though, this would mean that the students' ratings about the impact of the halo effect were confounded with other experiences from throughout the semester. This is a consequence of the assessment instrument retrospectively asking about subjective effects of the experiment. It is possible that observations of actual changes from pre- to post-scores manifest in a different way than the recollection of cognitive changes from memory. Thus, this might have resulted in content validity restrictions of the used items. On top of this, the lack of actual longitudinal data resulted in non-availability of traditional significance tests or measures of effect size. This might have led to somewhat imprecise estimations of the findings. However, it remains unclear if an actual pre-to-post effect size measure would effectively produce more conservative results. This inference might be questioned, considering that many of the assessed values lay right below or precisely at the threshold value of 3 (averaged across all five scales, 21.4% of all values lay between 2.66 and 3.0).

Another possible constraint might have occurred with regard to the results from research questions 2a and b: It is possible that the participants of the online survey responded due to a self-selection bias. Thus, it might be that particularly those participants answered the online survey that wanted to give some kind of positive (or negative) feedback, which, in turn, could have been influenced by social desirability. Unfortunately, the extent to which this had consequences on and the interpretability of this study's findings remains unclear.

Research question 3

Theories about teacher change (Clarke & Hollingsworth, 2002; Cobb et al., 1990; Fives & Buehl, 2012) predicted that cognitive engagement with the experiment as well as its impact on an emotional level will lead to changes in the pre-service teachers' attitudes. Our empirical data is principally in line with this theoretical assumption. It has to be stated, though, that the interrelations found in the structural equation model do not necessarily imply a causal nature. For that reason, the results have to be interpreted somewhat carefully. Nevertheless, our findings in no way contradict the assumption that addressing cognitive engagement as well as emotional affect is effective in influencing various attitudes of pre-service teachers concerning the need for and the application of systematical research methods. Hence, a cause-effect relationship appears comparatively likely in this context.

Conclusion

Taken all findings of this study together, we succeeded in inducing a considerable number of halo effects on teacher candidates during a methodology course. Moreover, as predicted by the literature on teacher change, experiencing the halo effect apparently had repercussions on changes in the student teachers' beliefs and attitudes. The halo effect proved valuable in demonstrating to the students that their everyday information processing might easily be biased. Thus, in some situations, there is a need for the application of a systematic approach to data acquisition, analysis and interpretation. Even though the research design applied in this study does not strictly allow for causal claims, the success of the halo effect in making the pre-service teachers aware of these issues appears quite impressive. This is due to the fact the implementation and the presentation of the halo effect took only about 15 minutes, altogether. The halo

effect seems to be a very potent method to demonstrate to student teachers, that it is sometimes necessary to approach school-related and everyday problems in a methods-oriented and systematic fashion. Thus, the results of this study might be of particular interest to teacher educators who are specialized in the teaching of research methods and/or the field of research-based learning.

References

Altrichter, H., & Mayr, J. (2004). Forschung in der Lehrerbildung [Research within teacher education]. In S. Blomeke, P. Reinhold, G. Tulodziecki & J. Wildt (Eds.), *Handbuch lehrerbildung* [Manual Teacher Education] (pp. 164-184). Kempten, Germany: Julius Klinkhardt.

Briggs, S. R., & Cheeck, J. M. (1986). The role of factor analysis in the development and evaluation of personality scales. *Journal of Personality, 54*(1), 106-148. doi:10.1111/j.1467-6494.1986.tb00391.x

Calderhead, J. (1996). Teachers: Beliefs and knowledge. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology: A project of division 15, the division of educational psycology of the American psychological association* (pp. 709–725). New York, NY: MacMillan Library Reference USA.

Clarke, D., & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education, 18*(8), 947–967. doi:10.1016/S0742-051X(02)00053-7

Cobb, P., Wood, T., & Yackel, E. (1990). Chapter 9: Classrooms as learning environments for teachers and researchers. *Journal for Research in Mathematics Education. Monograph, 4*, 125-210. doi: 10.2307/749917

Cortina, K. S., Baumert, J., Leschinsky, A., Mayer, K. U., & Trommer, L. (Eds.) (2008). *Das Bildungswesen in der Bundesrepublik Deutschland* [The educational system of the Federal Republic of Germany]. Reinbek, Germany: Rowohlt.

Dompnier, B., Pansu, P., & Bressoux, P. (2006). An integrative model of scholastic judgments: Pupils' characteristics, class context, halo effect and internal attributions. *European Journal of Psychology of Education, 21*(2), 119-133. doi:10.1007/BF03173572

Duffy, G., & Roehler, L. (1986). Constraints on teacher change. *Journal of Teacher Education, 37*(1), 55–58. doi: 10.1177/002248718603700112

Fichten (2017). Forschendes Lernen in der Lehrerbildung [Research-based learning within teacher education]. In R. Schussler, A. Schoning, V. Schwier, S. Schicht, J. M. Gold & U. Weyland (Eds.), *Forschendes Lernen im Praxissemester: Zugange, Konzepte, Erfahrungen* (pp. 30-38). Kempten: Julius Klinkhardt.

Fischer, C., Rott, D., & Veber, M. (2014). Diversitat von Schuler/-innen als mogliche ressource fur individuelles und wechselseitiges lernen im unterricht [Students' diversity as a potential ressource for individual and reciprocal learning in the classroom]. *Lehren und Lernen, 40*(8/9), 22–28.

Fives, H., & Buehl, M. M. (2012). Spring cleaning for the "messy" construct of teachers' beliefs: What are they? Which have been examined? What can they tell us? In K. R. Harris, S. Graham, T. Urdan, S. Graham, J. M. Royer, & M. Zeidner (Eds.), *APA educational psychology handbook, Vol 2: Individual differences and cultural and contextual factors* (pp. 471–499). Washington, DC: American Psychological Association.

Forgas, J. P. (2011). She just doesn't look like a philosopher…? Affective influences on the halo effect in impression formation. *European Journal of Social Psychology, 41*(7), 812–817. doi: 10.1002/ejsp.842

Friedrich, A., Flunger, B., Nagengast, B., Jonkmann, K., & Trautwein, U. (2015). Pygmalion effects in the classroom: Teacher expectancy effects on students' math achievement. *Contemporary Educational Psychology, 41*, 1–12. doi: 10.1016/j.cedpsych.2014.10.006

Glickman, M. E., Rao, S. R., & Schultz, M. R. (2014). False discovery rate control is a recommended alternative to Bonferroni-type adjustments in health studies. *Journal of Clinical Epidemiology, 67*(8), 850-857. doi: 10.1016/j.jclinepi.2014.03.012

Huber, L. (2009). Warum Forschendes Lernen notig und moglich ist [Why research-based learning is necessary and possible]. In L. Huber, J. Hellmer & F. Schneider (Eds.), *Forschendes Lernen im Studium – Aktuelle Konzepte und Erfahrungen* (pp. 09-35). Bielefeld, Germany: Universitatsverlag Webler.

Johnson, D. M., & Vidulich, R. N. (1956). Experimental manipulation of the halo effect. *The Journal of Applied Psychology, 40*(2), 130–134. doi: 10.1037/h0042887

Kagan, D. M. (1992). Implication of research on teacher belief. *Educational Psychologist, 27*(1), 65–90. doi: 10.1207/s15326985ep2701_6

Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. *Cognitive Psychology, 3*(3), 430–454. doi: 10.1016/0010-0285(72)90016-3

Kelloway, E. K. (2015). *Using Mplus for structural equation modeling: A researcher's guide* (2nd ed.). Los Angeles, CA: Sage.

Kennedy, M. M. (1997, March). *Defining an ideal teacher education program*. Paper presented at the National Council for the Accreditation of Teacher Education, East Lansing, MI. Retrieved from https://www.msu.edu/~mkennedy/publications/docs/Teacher%20Ed/Kennedy%20to%20NCATE.pdf

Kuklinski, M. R., & Weinstein, R. S. (2001). Classroom and developmental differences in a path model of teacher expectancy effects. *Child Development, 72*(5), 1554–1578.

Ministerium des Innern des Landes Nordrhein-Westfalen [Ministry of the Interior of North Rhine-Westphalia] (2009). Lehrerausbildungsgesetz [Law on Teacher Education].

Ministerium des Innern des Landes Nordrhein-Westfalen [Ministry of the Interior of North Rhine-Westphalia] (2009). Lehramtszugangsverordnung [Teacher Admission Act].

Myers, D. G. (2005). *Social Psychology* (8th ed.). New York, NY: McGraw-Hill.

Nisbett, R. E., & Wilson, T. D. (1977). The halo effect: Evidence for unconscious alteration of judgments. *Journal of Personality and Social Psychology, 35*(4), 250–256. doi: 10.1037/0022-3514.35.4.250

Peacock, M. (2001). Pre-service ESL teachers' beliefs about second language learning: a longitudinal study. *System, 29*(2), 177–195. doi: 10.1016/S0346-251X(01)00010-0

Rosenthal, R. (1994). Interpersonal expectancy effects: A 30-year perspective. *Current Directions in Psychological Science, 3*(6), 176–179.

Rubie-Davies, C. (2014). Teachers' instructional beliefs and the classroom climate: Connections and conundrums. In H. Fives & M. G. Gill (Eds.), *International handbook of research on teachers' beliefs* (pp. 266–283). New York, NY: Routledge.

Schermelleh-Engel, K., Moosbrugger, H., & Muller, H. (2003). Evaluating the Fit of Structural Equation Models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online, 8*(2), 23–74.

Schneider, R., & Wildt, J. (2009). Forschendes lernen und kompetenzentwicklung [Research-based learning and competence development]. In L. Huber, J. Hellmer & F. Schneider (Eds.), *Forschendes lernen im studium – aktuelle konzepte und erfahrungen* (pp. 53-68). Bielefeld, Germany: Universitatsverlag Webler.

Schussler, R., Schoning, A., Schwier, V., Schicht, S., Gold, J. M., & Weyland, U. (Eds.). (2017). *Forschendes lernen im praxissemester: zugange, konzepte, erfahrungen* [Research-based learning during the practical semester]. Kempten, Germany: Julius Klinkhardt.

Thorndike, E. L. (1920). A constant error in psychological ratings. *Journal of Applied Psychology, 4*(1), 25–29. doi: 10.1037/h0071663

Universitat Munster [Munster University] (2014). *Orientierungsrahmen praxissemester fur die ausbildungsregion Munster* [Orientation framework for the educational region of Muenster]. Retrieved from https://www.uni-muenster.de/imperia/md/content/lehrerbildung/praxisphasen/ps/orientierungsrahmen_praxissemester.pdf

Van Ophuysen, S., Behrmann, L., Bloh, B., Schmidt, J., & Homt, M. (2017). Die universitare vorbereitung angehender lehrkrafte auf forschendes lernen im schulischen berufsalltag [Academic preparation of teachers-to-be for research-based learning in everyday professional work]. *Journal for Educational Research Online, 9*(2), 276-305.

Weyland, U., & Busch, K. (2009): Forschendes lernen in schulpraktischen studien unter dem fokus von ‚lehrergesundheit' und ‚lehrerbelastung' [Learning through research in teaching practice with a focus on 'teacher health' and 'teacher stress']. *Berufs- und Wirtschaftspadagogik-Online*, (17), 1-23. Retrieved from www.bwpat.de/ausgabe17/weyland_busch_bwpat17.pdf