Enhancing Students' Skill and Will for Academic Writing – Evaluation of a Writing Intervention in Higher Education

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Abstract

Academic writing poses high demands on students' skills as well as on their will when it comes to regulating their writing activities. Writing centers offer manifold interventions that ought to help students dealing with those demands. Evaluation of these interventions are rather scarce and little is known about their effects. In our study, we focused on three aspects that are closely related to writing performance: self-efficacy for self-regulation of academic writing, implicit theories about writing ability, and metacognitive strategy knowledge about writing. We investigated the variables in a pretest-posttest design including three points of measurement to track down the effects of a standardized intervention that is regularly offered by a writing center at a midsized German university. We hypothesized significant positive effects after workshop attendance. Results indicate that students perceive themselves as being more able to regulate their writing activities after taking part in the intervention. Furthermore, their theories about writing ability became more malleable. Students' metacognitive strategy knowledge did not significantly change after the intervention. Based on the results, we outline suggestions for the evaluation of writing center interventions in higher education.

Keywords: academic writing, self-efficacy for self-regulation, implicit theories, metacognitive strategy knowledge, evaluation

Academic writing poses high demands on students' skills as well as on their will when it comes to regulating their writing activities. Writing centers offer manifold interventions (e.g., individual counselling such as one-to-one-tutoring, interventions for groups such as workshops) that ought to help students dealing with those demands. Unfortunately, many of these interventions have not yet been systematically evaluated and consequently little is known about their effects. Regarding writing tutoring, research has shown that tutors can e.g., support writers in generating new ideas, clarifying their objectives, and exploring ways for mastering the writing process which is assumed to result in better texts (Limberg, Modey, & Dyer, 2016). However, the validity of writing center research has been discussed due to the diversity between individual tutoring sessions (e.g., no session will be held twice since it is a highly interactive and problem oriented intervention format) as well as between different writing centers (e.g., using different theoretical grounds for their practices; cf. Jones, 2001). Thus, it seems reasonable to focus on standardized interventions and to assess changes in a psychometrically sound way to gain evidence for those interventions. In this study, we focused on a writing intervention that is offered for groups. We evaluated a writing workshop by concentrating on the changes in three variables, namely, self-efficacy for self-regulation of academic writing (SSAW), implicit theories about writing ability, and metacognitive strategy knowledge about writing.

Conceptual Framework

Academic Writing

Academic writing is an important and essential instance of learning in higher education. In the context of self-regulated learning, it supports students in their knowledge acquisition (e.g., Bangert-Drowns, Hurley, & Wilkinson, 2004). Moreover, by practicing academic writing, students get to know the special demands and standards of writing and sharing knowledge in a scientific community. Among others, Hyland (2006) underlined that academic

writing as a practice differs considerably between disciplines. In this regard, it paves the way for students' academic enculturation (Prior & Bilbro, 2012).

However, writing poses high demands on students' cognitive (e.g., Hayes & Flower, 1980) and self-regulatory skills (e.g., Zimmerman & Kitsantas, 2007). This makes it a very complex activity that is not easy to handle (e.g., Rijlaarsdam et al., 2012). Not surprisingly, many students struggle with handling the various demands of academic writing. The Stanford Study of Writing indicates that, for most writers, the transition from high school to college writing is enormously challenging (Rogers, 2008, p. 171). University students report a variety of problems associated with academic writing. These problems encompass cognitive aspects (e.g., structuring the material; Dittmann, Geneuss, Nennstiel, & Quast, 2003), motivational aspects (e.g., not being able to motivate oneself to start writing; Dittman et al. 2003), and self-evaluative aspects (e.g., being aware of not being able to meet expected standards; Achieve, 2005, p.4).

Good academic writing performance is often equated with and measured by text quality. Text quality is an indicator for writing ability, but writing ability (especially defined its broad sense; cf. Rijlaarsdam et al., 2012) and writing performance are determined by effectively handling the cognitive, self-regulative, and motivational processes that are crucial for mastering assignments. Thus, by solely evaluating the product of writing, certain aspects of performing while writing remain unnoticed, as they require other forms of measurement.

As of yet, various factors influencing writing performance and writing ability have been identified. For instance, self-regulation is a vital force for success and failure in writing performance (e.g., Graham & Perin, 2007). Self-regulation is the key to organize the writing process as well as the transitions between its recursive phases of preparing, initiating, performing, and evaluating writing activities (Hidi & Boscolo, 2006; Zimmerman & Kitsantas, 2007). Self-regulative strategies encompass cognitive, metacognitive, and motivational aspects (Zimmerman & Kitsantas, 2007). Being aware of how well self-

regulatory skills are coordinated and maintained is conceptualized as self-efficacy for self-regulation (Bandura, 1997, p. 38). Self-efficacy for self-regulation is a predictor for performance in various domains (cf. Bandura, 1986) and in the context of writing, it is even a predictor of writing competence (cf. Pajares, Valiante, & Cheong, 2007).

Cognition, metacognition, and motivation are important instances of self-regulation (cf. Boekaerts, 1999; Zimmerman, 2000). Even though each instance is crucial, none of them is sufficient for self-regulation on its own (cf. Schraw, Crippen, & Hartley, 2006, p. 112). The knowledge about regulating cognitive and metacognitive strategies is defined as metacognitive strategy knowledge (MSK; Efklides, 2008; Karlen, 2017). It can encompass knowledge about strategies, persons, or tasks (Flavell, 1979). Also, it is declarative knowledge that can become procedural knowledge if it is deliberately applied (Efklides, 2008). Research has shown that knowledge about the effective use of writing strategies in different phases of the writing process is positively associated with writing performance (Karlen, 2017). Karlen (2017) suggests that metacognitive strategy knowledge „might be an important prerequisite for the use of strategies while planning, monitoring, and evaluating an academic paper" (p. 74).

Metacognitive strategy use can be influenced by epistemological beliefs (Dahl, Bals, & Turi, 2005). In contrast to self-efficacy beliefs, epistemological beliefs focus on the function of writing, its quality (e.g., what are the [personal] criteria for *good* writing), and how writers can/cannot/or should act (Sanders-Reio, Alexander, Reio, & Newman, 2014). If writers believe that writing is a gift or talent and that they are not able to learn how to write they hold a fixed theory of writing ability (Karlen & Compagnoni, 2017). In contrast, writers thinking of writing as a task in which they can enhance their skills hold malleable beliefs about writing ability. Malleable theories indicate more sophisticated epistemological beliefs. Sophisticated epistemological beliefs are positively associated with problem solving in general (Schraw et al., 2006, p. 129) as well as with setting oneself learning goals (to enhance one's competence)

and mastery goal orientations (Dweck & Leggett, 1988). In the context of academic writing, research has also focused on the influence of transmission beliefs (transmitting the knowledge of experts in a text) in contrast to transaction beliefs (constructing meaning and gaining new knowledge in one's text). Transaction beliefs—being more complex and sophisticated than transmissional ones—are associated with higher text quality (White & Bruning, 2005), a finding that also pertains to writing at school level (Limpo & Alves, 2014). In sum, these examples illustrate the complex interplay of factors that influence writing ability and performance.

Writing Interventions and Their Evaluation

Evaluating the effects of the interventions offered by writing centers is a relevant field of writing intervention research. In higher education, various interventions are offered to struggling writers. Prominent ones are workshops for different aspects of academic writing and individual writing counseling (for an overview of interventions offered at German writing centers cf. Knorr, 2016). Mostly, these interventions aim to foster cognitive, self-regulative, and motivational aspects to improve students' writing performance. Efforts evaluating whether these goals are achieved are rather scarce. This might be due to the large heterogeneity regarding writing centers' practices and offers (cf. Jones, 2001), limited psychometrically sound instruments for assessing outcomes, and missing guidelines on how to conduct evaluation studies available for practitioners working in writing centers.

Graham and Harris (2014) emphasize that writing intervention research "is a critical form of scholarship that informs both theory and practice" (p. 90). The authors also provide a guideline for designing intervention research studies, including several recommendations. These suggestions address various empirical steps for designing research studies—beginning with developing adequate research questions, then choosing the methods and material, and afterwards analyzing the data and deriving implications for refining and retesting the interventions. In the guideline, experimental randomized control trials (RCTs) are referred to

as the "gold standard" for conducting intervention studies (Graham & Harris, 2014, p. 95). Those suggestions are parallel to the basic recommendations for evidence-based medicine (EBM; cf. Rosenberg & Donald, 1995; Sackett & Rosenberg, 1995). The EBM principle of tracking down the best evidence for information about diagnosis, prognosis, intervention, etc. nurtured the development of a hierarchy regarding the levels of evidence. The level of evidence is determined by the design of the study used to generate this evidence. According to this perspective, multiple RCTs and meta-analyses are regarded as highest level of evidence (cf. Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). The lower levels of evidence range from being based on at least one RCT to case studies. Quasi-experimental and non-experimental designs (such as pretest-posttest designs) are in the continuum between RCTs and case studies.

In addition to these guidelines, we recommend defining the perspective an evaluation study is designed from. A helpful framework for identifying a study's perspective and aim is provided by the evaluation model suggested by Kirkpatrick and Kirkpatrick (2006). It distinguishes between four levels of evaluation—reaction, learning, behavior, and results. The reaction level focuses on how participants immediately respond to an intervention and how satisfied they are. The learning level encompasses changes in the participants' attitude, knowledge, or skills. The third level represents the actual behavior, which is influenced by increased knowledge or enhanced skills. Finally, the fourth level deals with the measurable changes of the participants' performance, such as improvements in the quality of participants' work or their efficiency.

Concerning the evaluation of writing interventions, each level offers different insights which are accompanied by possible advantages and disadvantages. In the following, we will outline some possibilities to assess changes or improvements on a certain level. The following examples illustrate that a level is not defined by the methods used for assessment but rather by the variables a method focusses on. The reaction level (1st level) focuses on participants'

immediate response to an intervention (e.g., in terms of their satisfaction). For this level, brief surveys might be implemented immediately after the intervention. Those might include Likert-scaled questions assessing participants' satisfaction as well as open questions asking for constructive criticism. By investigating whether an intervention improves the quality of students' texts, writing intervention research aims at the performance level (4th level). Rating scales (e.g., the Six-Subgroup-Quality Scale; Ransdell & Levy, 1996) or benchmarking procedures are exemplary approaches for analyzing text quality. For both approaches, high interrater reliabilities need to be obtained. Drawing on rating procedures is very time consuming and prone to errors due to low interrater reliabilities. To evaluate whether an intervention changes the actual behavior (3rd level), thinking aloud techniques (for instance, as used by Hayes & Flower, 1980) can be implemented. This approach provides insight into the writer's cognitive processes and skills, and offers an in situ observation of the writing process. It also links the behavioral evaluation level to the learning level (2nd level). Unfortunately, writers might be interrupted by the technique and results can be biased. These exemplary approaches might also lead to very comprehensive and complex data sets (for recommendations on how to deal with issues associated with some methods of qualitative writing research cf. Rijlaarsdam et al., 2012). Because rating techniques focus on the results of text production and observations as well as thinking aloud techniques try to capture the writing process in situ, other process-related and intrinsic aspects—such as motivation, self-regulation, and attitudes that are per se not observable—remain unobserved or might be biased due to the chosen reporting mode. These factors are related to the learning level (2nd level). To assess them, self-report instruments can be implemented. Of course, self-report measures are also prone to certain biases (e.g. social desirability). Nonetheless, if thoroughly constructed, some of them hold the valuable benefit of being economical, standardized, and reliable. By implementing these instruments in an evaluation design, researchers can detect

changes in the writer's internal processes. Those changes are assumed to be key prerequisite for behavioral changes (Kirkpatrick & Kirkpatrick, 2006).

To sum up, writing research is characterized by its heterogeneity of methods. However, not every method seems reasonable to apply when attempting to evaluate a writing center intervention in its real-life context. We consider the learning level to be promising for the evaluation of writing center interventions in higher education because it enables researchers to assess factors influencing writing performance. In the present contribution, we evaluated a writing center intervention on the learning level and focused on self-efficacy for self-regulation of academic writing (SSAW), implicit theories about writing ability, and metacognitive strategy knowledge (MSK) about writing.

Aims and Hypotheses

The intervention that has been evaluated for this contribution was a writing workshop in which participants are introduced to the demands of writing their Bachelor or Master thesis. They get to know the writing process including its recursive phases. Learning objectives aim for example at reflecting already existing writing strategies as well as at extending this repertoire with further strategies that allow an adaptive application to a specific task or situation. Students were also sensitized for the fact of writing performance being dependent on one's effort and willingness to deal with challenging demands. Thus, we expected students' self-efficacy for self-regulation of academic writing (SSAW), their metacognitive strategy knowledge (MSK) about writing, and their implicit theories about writing ability to change due to this workshop. We investigated these three variables in a pretest-posttest design including three points of measurement. We assessed all variables in two pretests (T1 & T2) and one posttest (T3). Regarding the effects of the writing intervention, we expected significant gains for the intervention group for all three variables from pre to post measurement (T2 & T3). This lead to the following hypotheses:

H1: Because students get to know various strategies for planning, monitoring, and evaluating their writing activities, their self-efficacy for self-regulation of academic writing (SSAW) is significantly higher after attending the intervention.

H2: Students also experience that the writing process is one that needs to be handled individually and adaptively. Thus, students' implicit theories about writing are significantly more malleable after attending the intervention.

H3: Considering that students learn how to implement various writing strategies effectively, their metacognitive strategy knowledge (MSK) about writing is significantly higher after attending the intervention.

Method

Intervention and Data collection

Intervention. We conducted the study at a writing center of a midsized German university and focused on a single writing intervention. The writing center was established in 2008. It was conceptualized as a service institution that offers various interventions for students of all faculties who are in need to improve their writing skills. The interventions encompass individual counseling, peer tutoring, and workshops covering various aspects of academic writing. The university provides no mandatory *writing across the curriculum* program and students attend the interventions on a voluntary basis.

The intervention we focused on was a standardized two-day workshop for students who write their Bachelor or Master thesis (which is the final assignment needed for finishing one's course of studies). During the semester, this intervention is offered on a monthly basis. The workshop is conducted as a group session in which a maximum of 16 students is allowed to participate. Participation is voluntary and students do not receive any incentive (e.g., in form of additional credit points). Participants can choose a date published in the workshop schedule and sign up for the workshop in which they want to participate. Information about the workshop contains the note that students should already be working on their thesis because

exercises carried out during the workshop require e.g. knowing one's topic and having already read some literature. A week prior to the workshop, participants receive a reminder via e-mail including relevant information for the workshop (e.g., regarding material participants should bring along).

All workshops are held by writing center employees and follow a standardized and structured program consisting of four blocks. The first block introduces the students to the writing process and its various accompanying tasks when writing a thesis. The second one focusses on content-related aspects, such as generating a research question and evaluating its quality. In the third block, they learn how to find and incorporate research literature into their thesis. Finally, in the fourth block, participants get to know strategies for evaluating various aspects of text quality and for revising their work with regard to higher order as well as lower order concerns. To enhance standardization, power point slides are used in each block and participants receive readers containing the exercises and handouts. Table 1 provides an exemplary overview of the workshop's contents.

Table 1

Exemplary Overview of the Workshop's Contents and Exemplary Learning Objectives

Block	Main topic	Exemplary Learning Objectives *Participants …*
1	Writing Process – Theories and Demands	… get to know various writing practices … reflect on their own writing practice … learn how to analyze demands that may result from different phases of the writing process … explore the alternating process of creating and controlling during writing

2	From Topics to Meaningful Research Questions	… know the differences between a topic, a research question, and a hypothesis … know how to narrow down a topic … know how to develop a research question … can apply the principle of how to create a research space
3	Reading and Incorporating Literature	… know different reading strategies … explore the benefits and limitations of a reading strategy and its interdependency to text genres … know how to build an argument … can incorporate and cite literature
4	Revisions With and Without Feedback	… know different functions of writing (e.g., writing for communicating in a disciplinary discourse, epistemic writing) … know higher and lower order concerns that can be addressed in the revision process … can apply various strategies for addressing higher and lower order concerns … learn how to give solid text feedback … can implement received text feedback

Data collection. Because participants need to sign up for the workshops, data collection was integrated into the regular registration process. When signing up for a workshop, participants received a confirmation via e-mail and were asked to take part in a survey (T1). They followed a link to an online survey that was included in the confirmation e-mail. A week prior to the workshop, participants received a reminder including an invitation to take part in the survey for a second time (T2). Immediately after the workshop, participants filled in the survey for a third time while participants were still in the room where the workshop had been conducted (T3). Afterwards, workshop sessions were officially closed. Data collection incorporated a total of 10 workshops and took place over 13 month.

Sample

A total of 183 students (M_{age} = 24.60, *SD* = 3.17; 67.2% female) completed data collection at T1. Of these participants, 59 participants (M_{age} = 24.31, *SD* = 3.71; 67.8% female) took part in the workshops and in all three points of measurement. They constitute the intervention group. Participants were on average in their 9th semester (*M* = 8.47, *SD* = 3.22, min = 5, max = 17) and had different writing experiences ranging from no writing experience at all to having worked on more than three different assignments (e.g., essays, protocols, term/seminar papers) during their studies. They were enrolled in a variety of different majors, of which economic sciences (28.8%), educational sciences (18.6%), and engineering economics (11.9%) were the top three.

Data of the remaining sample represent the no-shows who did not engage in the workshop. We compared the data of the no-show group with the intervention group to check for systematic differences between the two groups. There were no statistically significant differences concerning sociodemographic variables, such as age, $t(181) = -.85$, $p = .39$, duration of studies (operationalized as number of semesters), $t(181) = .09$, $p = .93$, and writing experience, $t(181) = -.57$, $p = .57$, between both groups. Also, there were no differences regarding their self-efficacy for self-regulating their writing, $t(181) = .81$, $p = .42$, their

implicit theories about writing ability $t(181) = 1.08$, $p = .28$, and their metacognitive knowledge about writing strategies $t(181) = 1.31$, $p = .19$. Table 2 presents the details concerning the sample.

Table 2

Demographic Variables

	Intervention Group $n = 59$		No-show Group $n = 124$	
	M	*SD*	*M*	*SD*
Age	24.31	3.71	24.73	2.89
Duration of Studies	8.47	3.22	8.43	3.58
Writing Experience	.68	.45	.73	.57

Note. *M* = means; *SD* = standard deviation.

Instruments

In the following, psychometric properties for all instruments are given for T1. Table 3 shows the psychometric properties for all three points of measurement.

Self-efficacy for self-regulation in academic writing. To measure the self-efficacy for self-regulation of academic writing (SSAW) we implemented the SSAW scale (Golombek, Klingsieck, & Scharlau, 2018). The SSAW scale is based on the cyclical model of self-regulation in academic writers (Zimmerman & Kitsantas, 2007) and encompasses three subscales corresponding to the model's phases in writing: (1) forethought (6 items, $a = .86$; range of item-total correlation $r_{it} = .57–.71$), (2) performance (9 items, $a = .90$, $r_{it} = .55–.75$), and (3) self-reflection (7 items, $a = .87$, $r_{it} = .58–.76$). According to the model, the forethought

subscale focusses on aspects of analyzing the writing task and motivating oneself (exemplary item "I can motivate myself to start writing"). The performance subscale assesses aspects of self-control and self-observation (e.g., "I can monitor myself while writing"). The self-reflection subscale comprises self-evaluative aspects, such as self-judgement and self-reaction (e.g., "I can judge what I have to do differently next time.").

Participants indicated their perceived self-efficacy on an 11-point response scale ranging from 0 (*no chance*) to 100 (*completely certain*). The internal consistency of the total SSAW scale including all 22 items was $a = .95$. Internal consistency of the SSAW scale and its subscales can be evaluated as good to excellent at all three points of measurement, with Cronbach's a ranging between $.86 < a < .97$.

Implicit theories about writing. We assessed students' implicit theories about writing ability with a short scale (Karlen & Compagnoni, 2017). The scale includes three items in form of statements (e.g., "Everybody has academic writing skills and those skills ...") and uses a six-point Likert-type scale (1 = *cannot be trained* and 6 = *can be trained*). The scale showed good internal consistency ($a = .71$, $r_{it} = .43–.61$). With respect to the three points of measurement, the implicit theories scale yields acceptable to good internal consistency ($.71 < a < .88$).

Metacognitive strategy knowledge. We assessed students' metacognitive strategy knowledge (MSK) with a scenario-based test for MSK in academic writing (Karlen, 2017). The MSK test includes a total of 20 items that are assigned to three scenarios. The scenarios address the phases of self-regulated writing: (1) planning (8 items), (2) composing (6 items), and (3) evaluating the writing process (6 items). For example, in the *planning* scenario participants read various actions that can be carried out when preparing for writing (e.g., creating a timetable containing milestones). Participants then have to rate each item regarding its usefulness for the given scenario on a six point Likert-type scale (1 = *not useful at all* and 6 = *very useful*). In each scenario, multiple pair comparisons are used. Participants receive one

point if their estimation is in line with an expert rating for a distinct comparison. The total MSK score is calculated based on the scoring for all pair comparisons. The total MSK score can range between 0 and 1. The MSK test yielded a good internal consistency at all three points of measurement ($.84 < a < .85$). Item-total correlations calculated for each pair comparison ranged between $.24 < r_{it} < .60$.

Additional variables. In addition to the scales, we also asked participants to indicate how many written assignments they already had accomplished during their course of studies. We used a 5-point response format to facilitate participants' retrieval (0 = *I have not finished any written assignment yet*, 1 = *I have finished one assignment*, 2 = *I have finished two assignments*, 3 = *I have finished three assignments*, and 4 = *I have finished more than three written assignments*).

Table 3

Scale and Item Characteristics

	T1				T2		T3	
	Whole Sample (N = 183)		Intervention Group (n = 59)		Intervention Group (n = 59)		Intervention Group (n = 59)	
	a	r_{it}	*a*	r_{it}	*a*	r_{it}	*a*	r_{it}
SSAW	.95	.52 – .75	.95	.47 – .77	.95	.50 – .81	.97	.51 – .84
Forethought	.86	.57 – .71	.85	.53 – .74	.87	.59 – .78	.91	.62 – .83
Performance	.90	.55 – .75	.90	.45 – .81	.88	.53 – .76	.93	.51 – .81
Self-Reflection	.87	.58 – .76	.86	.53 – .73	.87	.50 – .77	.89	.53 – .79
Implicit Theories	.71	.43 – .61	.73	.50 – .59	.83	.58 – .81	.88	.75 – .82
MSK Test	.85	.24 – .60	.85	.17 – .65	.85	.05 – .66	.84	.12 – .71

Note. *a* = Cronbach's alpha; r_{it} = item-total-correlation.

Results

Descriptive Statistics

By and large, all students (N = 183) already reported feeling fairly self-efficacious concerning regulating their academic writing activities at T1. On item level, scores on the 11-point scale SSAW ranged between 5.33 (SD = 2.31) and 8.01 (SD = 2.46). The scores corresponded to a self-efficacy with an intensity of 40–70%. On the implicit theories scale, the mean score of M = 5.17 (SD = .75) showed that students tended to have a rather malleable theory of writing ability. Regarding students' MSK, the mean score of M = .62 (SD = .24) indicated 62% correspondence with the experts' strategy rating. Table 4 provides the descriptive statistics for each scale and subscale with respect to the whole sample, the intervention group and the no-shows at T1. Additionally, the table displays descriptive statistics for each scale and subscale at T2 and T3.

Table 4

Descriptive Statistics for the SSAW Scale, Implicit Theories About Writing Ability Scale, and MSK Test

	T1						T2				T3	
	Whole Sample (N = 183)		Intervention Group (n = 59)		No-show Group (n = 124)		Intervention Group (n = 59)		No-show Group (n = 30)		Intervention Group (n = 59)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
SSAW	6.64	1.56	6.77	1.50	6.57	1.59	6.75	1.40	6.15	1.71	7.45	1.42
Forethought	6.27	1.85	6.49	1.66	6.17	1.94	6.31	1.62	6.06	1.70	7.14	1.66
Performance	6.65	1.64	6.87	1.59	6.54	1.66	6.76	1.44	6.02	1.71	7.39	1.48
Self-Reflection	6.94	1.57	6.90	1.54	6.96	1.59	7.12	1.42	6.40	1.97	7.79	1.34
Implicit Theories	5.17	.75	5.25	.69	5.13	.77	5.21	.70	5.09	.82	5.58	0.56
MSK Test	.62	.24	.65	.23	.60	.24	.69	.23	.61	.27	.69	.22

Note. *M* = means; *SD* = standard deviation.

Correlations Among the Variables

Table 5 presents the intercorrelations of all (sub)scales and their correlations with age, duration of studies, and average number of written assignments at T1. The SSAW scale correlates with age and duration of studies. The older the students were, the less self-efficacious they felt. Additionally, the longer the students had been studying, the lower they assessed their self-efficacy for regulating themselves in various phases of writing. For the scale assessing implicit theories about writing ability, we did not find significant correlations with age or duration of studies. We found significant correlations between the MSK test and students' age indicating that the older students' were, the less their knowledge about which metacognitive strategies are more effective in different writing scenarios corresponded with the experts' opinion.

Furthermore, we found significant positive correlations between the implicit theories short scale and the SSAW scale and its subscales forethought and performance. They indicated that students who had more malleable theories about writing ability perceived themselves as more efficient in regulating themselves in the phases of planning and carrying out academic writing activities. The MSK test did not significantly correlate with one of the other two instruments. Also, none of the scales and subscales correlated with the average amount of written assignments. As correlations between the variables ranged from .29 to .49, correlation coefficients indicated small to medium effect sizes (Cohen, 1988).

Table 5

Correlations Among Age, Duration of Studies, Writing Experience, the SSAW Scale, Implicit Theories About Writing Ability Scale, and MSK Test

	1.	2.	3.	4.	4.1	4.2	4.3	5.	6.
1. Age	-								
2. Duration of Studies	.49**	-							
3. Writing Experience	.02	.07	-						
4. SSAW	-.34**	-.41**	-.02	-					
4.1 Forethought	-.36**	-.45**	.01	.94**	-				
4.2 Performance	-.30*	-.40**	-.05	.95**	.86**	-			
4.3 Self-Reflection	-.29*	-.31*	.00	.92**	.82**	.79**	-		
5. Implicit Theories	-.15	-.05	.18	.29*	.29*	.29*	.24	-	
6. MSK Test	-.33**	-.01	.02	.03	.01	.05	.03	.14	-

Note. $^{**}p < .01$; $^{*}p < .05$.

Differences Between Points of Measurement

To detect differences between the three points of measurement for the intervention group, we used repeated measure analysis of variance (rmANOVA) and planned contrasts based on our hypotheses. Furthermore, we calculated the effect size partial Eta-square (η^2) for all rmANOVAs and planned contrasts. Results of the analysis are summarized in Table 6.

First, we analyzed the SSAW scale and its subscales. Analyses yielded significant differences for the total SSAW scale, $F(1.63, 94.34) = 13.08$, $p < .01$, partial $\eta^2 = .18$, and for its subscales forethought, $F(1.82, 105.65) = 12.21$, $p < .01$, partial $\eta^2 = .17$, performance, $F(1.60, 92.69) = 7.88$, $p < .01$, partial $\eta^2 = .12$, and self-reflection. $F(1.70, 98.81) = 15.85$, $p < .01$, partial $\eta^2 = .22$. Partial η^2 for the rmANOVAs ranged between .12 and .22 indicating medium to strong effects. Planned contrasts confirmed hypothesis H1 in that they solely show

significant differences regarding the comparison of T1 with T3 and of T2 with T3. There were no significant differences for the comparison of T1 with T2. According to Cohen (1988), effect sizes for planned contrasts indicated medium to strong effects ($.10 < \eta^2 < .36$).

There was also a statistically significant difference between the three points of measurement for implicit theories, $F(2, 116) = 12.35$, $p < .01$, partial $\eta^2 = .18$. Planned contrasts revealed that scores are significantly higher at T3 compared to T1 or T2 ($.22 < \eta^2 < .26$). Effect sizes for planned contrasts indicated strong effects (Cohen, 1988). Thus, hypothesis H2 on students' implicit theories about writing was confirmed.

Regarding metacognitive strategy knowledge, we found no statistically significant differences between the points of measurement, $F(2, 116) = 1.53$, $p = .22$, partial $\eta^2 = .026$. So, hypothesis H3 was not confirmed.

Available data of the no-shows for T1 and T2 was analyzed with paired *t*-tests. There were no significant differences between the two points of measurement for the SSAW scale, $t(29) = .20$, $p = .84$, $d = .04$, and for its subscales forethought $t(29) = -1.06$, $p = .30$, $d = .19$, performance, $t(29) = .95$, $p = .35$, $d = .17$, and self-reflection, $t(29) = .53$, $p = .60$, $d = .10$. The same applied to implicit theories about writing ability, $t(29) = 1.32$, $p = .20$, $d = .24$, and to the MSK test, $t(29) = -.66$, $p = .51$, $d = .12$.

Table 6

Results of the Repeated Measure Analyses of Variance for the SSAW Scale, Implicit Theories About Writing Ability Scale, and MSK Test

	df	MS	*F*	*p*	η^2	η^2 for contrast T1 vs. T3	η^2 for contrast T2 vs. T3
SSAW	1.63, 94.34	11.33	13.08	.000	.18	.18	.36
Forethought	1.82, 105.65	12.54	12.21	.000	.17	.15	.32
Performance	1.60, 92.69	8.20	7.88	.002	.12	.10	.27
Self-Reflection	1.70, 98.81	14.83	15.85	.000	.22	.27	.33
Implicit Theories	2, 116	2.32	12.35	.000	.18	.22	.26
MSK Test	2, 116	.03	1.53	.220	.03	-	-

Note. df = degrees of freedom; MS = mean squares; η^2 = partial Eta-square. All contrasts were significant at $p < .01$.

Discussion

Writing interventions in higher education aim to help students struggling with academic writing by fostering various factors that are conducive for writing ability and performance. In this study, we evaluated a writing center intervention on the learning level (cf. Kirkpatrick & Kirkpatrick, 2006) in an authentic setting. We implemented a pretest-posttest design including three points of measurement to evaluate a workshop offered by a writing center at a midsized German University. We tracked down the intervention's effects on three factors: we assessed students' self-efficacy for self-regulation of academic writing with the SSAW scale (Golombek et al., 2018), their implicit theories about writing ability with a short scale (Karlen & Compagnoni, 2017), and their metacognitive strategy knowledge about writing with the MSK test (Karlen, 2017).

Results show that participating in a writing intervention positively affects students' self-efficacy for regulating their academic writing activities and their implicit theories about writing ability. Students perceive their abilities for planning, initiating, carrying out, and evaluating their writing activity as better after workshop attendance. In addition, students' theories about writing ability have significantly changed after workshop attendance. Results show that students' theories about writing ability become more malleable and thus more sophisticated. Schraw and colleagues (2006) reason that "students with more sophisticated epistemological beliefs are more likely to reflect on problems and reach more sophisticated conclusions" (p. 129). Applying this to our findings, the results support the assumption that students are more aware of being responsible for improving their writing performance by putting more effort into writing assignments and handling the accompanying demands. Consequently, after having attended the workshop, they might see writing tasks as learning opportunities in which new strategies can be explored and tested for their effectivity. This might point towards a conceptual change.

Contrary to our hypotheses, we did not find changes in students' metacognitive strategy knowledge about writing. With regard to the positive results of students' increased self-efficacy for regulating their writing activities in different phases of the writing process, this result seems rather surprising at first sight. Our hypothesis that students' implicit theories about writing ability become more malleable after attending the intervention (H2) was based on the assumption that students learn how to effectively implement various writing strategies (H3). However, it seems like students got to know various strategies for different writing phases (H1) and thereby realized the recursive nature of writing processes (H2) but had not enough time to test these new strategies regarding their effectivity yet (H3). Considering that writers initially apply metacognitive strategies to focus rather on process execution than on dynamic features (Zimmerman & Risemberg, 1997, p. 117), it is reasonable that new strategies first need to be routinized before they become a part of metacognitive strategy knowledge that allows an adaptive use of strategies.

The descriptive statistics of the sample and relations among the variables showed that the older the students were, the less self-efficacious they felt regarding regulating themselves in various phases of writing and the less their knowledge about effective metacognitive writing strategies corresponded with the experts' opinions. Those findings are in line with a study showing that students taking part in writing interventions report a lower SSAW than students who do not attend those interventions (Scherer, Sennewald, Golombek, & Klingsieck, 2018). A possible explanation for the drop in confidence and strategy knowledge might be that the older students become and the more they experience as a part of their academic enculturation, the more complex they might perceive writing tasks and the more problems they might have encountered with their own academic writing. To examine this assumption, more research on the development of academic writing ability is needed.

We also need to deal with distinct limitations. A control group that engaged in all three points of measurement is missing. Thus, in accordance with the levels of evidence, the

generalizability of our findings is limited. This limitation should be seen with respect to the context in which this study was implemented. The intervention was not explicitly designed for our research. This study used an in situ approach in which no conditions were manipulated due to our research. Students' taking part in the study were in actual need of help in dealing with the demands of writing their thesis. To assign them to a control group that was not offered the help they needed did not seem reasonable. The same applied to swapping-panel designs (Shadish, Cook, & Campbell, 2001) because students would not have received the help they need at a time at which they required it. Nonetheless, we were able to compare students taking part in the intervention with those that dropped out after signing up for it. We found no significant differences between T1 and T2 in both groups which can support the assumption that no other learning process interfered with our intervention and that the pre-test did not affect the scores on the post-test. Additionally, the groups did not differ from each other on the demographic variables assessed. This might indicate that participants in the intervention were not self-selected. In sum, results of comparing data of the intervention group with available data of the no-shows provided additional support for the internal validity of the study.

However, the power of our study might have been too small to detect possible differences, so that any conclusions should be drawn with caution. At present, although there is some support for the internal validity of our research design because there were no significant influences of confounding differences (maturation, testing, and selection), clearly further research and replications are needed to support our assumptions. Evaluation studies in a realistic framework will always have to cope with these problems, and evidence can only be accumulated over different studies.

In this study, we did not assess the variables at a fourth point of measurement in terms of a follow-up. Thus, we are not able to check whether the positive effects we found are stable. To include a follow-up in future research allows gaining insight into long-term effects

of writing interventions and might as well provide support for the assumption that students' metacognitive strategy knowledge becomes more malleable after effectively routinizing the writing strategies learned in an intervention.

All in all, the results are encouraging findings for promoting writing center interventions. We were able to show that important intrapersonal factors, which predict writing performance and enable new learning opportunities, are fostered by one such intervention. All variables were based on students' self-report. Even though this report format is prone to certain biases (e.g., social desirability), we explicitly decided to use self-report instruments, as we also intended to focus on the learning level of an evaluation in order to discuss practical guidelines for evaluating writing center interventions. Thus, in the following section we will outline some suggestions for systematically evaluating interventions of writing centers.

Focusing on the learning level and implementing self-assessment instruments offers the opportunity to use economic pretest-posttest designs for evaluating writing center interventions. For evaluation purposes, the former might be considered reasonable alternatives to recommended experimental writing research designs (e.g., Graham & Harris, 2014). Especially in the context of evaluating regular writing center interventions, this is a valuable benefit because implementing RCTs is hardly realistic. When focusing on the reaction and learning levels for evaluating writing center interventions, quantitative pretest-posttest designs can be implemented in a way that takes the majority of the recommendations for solid writing intervention research as proposed by Graham and Harris (2014) into account. Such an approach allows writing centers to examine the interventions' effects on important intrapersonal factors by using valid and reliable (self-assessment) instruments in a solid pretest-posttest design. These designs can account for the real life-context of the interventions because they do not influence or bias implementation and use. In addition, thoroughly constructed self-assessment instruments hold the benefit of objective scoring and

interpretation. Furthermore, data can be gathered and analyzed anonymously. Therefore, writing centers should ensure that they offer theoretically derived interventions that are conducted in a standardized way.

As of yet, there is still a need for writing research implementing well-powered RCTs covering all four levels of an evaluation to carefully examine the effects an intervention has on each level as well as the associations between each level in the context of academic writing. This implies to control for contextual influences. From this perspective, conducting such research might not be expected from writing center intervention research because each intervention is highly contextualized (cf. Jones, 2001). Nonetheless, writing center intervention research can contribute to (re-)modellig writing theory, which is a prerequisite for evidence-based research (Scharlau & Klingsieck, 2019).

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