UNIVERSITÄT DES SAARLANDES

FAKULTÄT EMPIRISCHE HUMANWISSENSCHAFTEN UND WIRTSCHAFTSWISSENSCHAFT

FACHRICHTUNG BILDUNGSWISSENSCHAFTEN

Investigating Burnout and Self-Efficacy in the Context of Contemporary Challenges for Teachers

Dissertation

zur Erlangung des akademischen Grades eines Doktors der Philosophie

der Fakultät Empirische Humanwissenschaften und Wirtschaftswissenschaft

der Universität des Saarlandes

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Saarbrücken, 2022

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Tag der Disputation: 29.03.2022

"*There is simply no more powerful or longer lasting investment in human rights and dignity, in social inclusion and sustainable development [than to ensure quality education]*" (UNESCO, 2015, p. 4)

Acknowledgements

During the time of my doctorate, many people accompanied me, to whom I would like to express my heartfelt thanks at this point. First and foremost, I would like to thank Prof. Dr. Franziska Perels, who offered me the opportunity to write my doctoral thesis and work in her research group. From the beginning, she had confidence in my abilities, allowing me as much independence as possible and always having my back. I am very grateful to her for always supporting and motivating me along the way, always being available to me, and keeping the big picture in mind.

I would also like to express my sincere thanks to PD Dr. Antje Biermann, who took the time to read my doctoral thesis intensively and provided many helpful suggestions from a different perspective, which I really appreciated.

My deepest thanks go to Dr. Manuela Benick, who has encouraged and supported me in so many ways since my third bachelor's semester. Without her, I would not have gotten to this point at all. This thesis has benefited greatly from her feedback and our regular meetings. She is much more than a mentor to me and has become so important to me over the years. I have come to appreciate her always good advice in so many areas of life.

I would especially like to thank Dr. Laura Dörrenbächer-Ulrich, Dr. Christine Eckert, Dr. Lisa Jacob, and Angelika Schmitt for always being very helpful and supportive in all questions, always providing a good working atmosphere and many lovely (digital) experiences in the “AG” that I will always remember fondly.

Furthermore, I am incredibly grateful to the other Ph.D. students who have accompanied me on this path: Ann-Sophie Grub, Kristin Altmeyer, Lena Grüneisen, Tom Selisko, Nathalie Zetzmann, Theresa Wilkes, and Viktoria Egele. Thank you for all the support, the often-shared suffering, and mutual understanding. You have always given me the energy and strength to continue and have supported me in so many ways. I will miss you all very much.

In addition, I would like to thank all the student assistants, trainees, and (Bachelor’s and Master’s) thesis writers who contributed to my project with commitment and enthusiasm. In particular, I would like to express my

thankfulness to Laura Wilhelm, who is one of the most reliable persons I know and on whom I could always rely.

Of course, I would also like to give special thanks to the Ministry of Education in Saarland and all the teachers who participated in my surveys and thus contributed to my research. Without their great commitment, none of this research would have been possible.

Moreover, I would like to express my special thanks to my family – my parents Renate and Régis, my sister Lea, as well as my brother-in-law Dominik. They have made me what I am today, have always unconditionally encouraged me, and have never doubted me at any time. No matter what, they are always there for me and stand by me. To me, that is the most important thing in the world; I am deeply grateful for my family.

Last but not least, I would like to thank my boyfriend, Nick, who has accompanied and supported me most intensively over the years of my doctorate, not least in the months of our home office in which we shared not only our home but also our workplace. He has always and unconditionally supported and helped me where he could, critically discussing my research with me, enduring my frustrations, and celebrating even my little successes. He understands me like no other and is simply irreplaceable for me and my life.

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List of Abbreviations

A-EL	attitudes toward e-Learning
BIC	Bayesian information criterion
BLRT	bootstrap-likelihood-ratio-difference test
CFA	confirmatory factor analysis
CFI	comparative fit index
df	degrees of freedom
ICC	intraclass correlation
ICD	International Statistical Classification of Diseases and Related Health Problems
ICT	information and communication technologies
IMBP	Integrative Model of Behaviour Prediction
JD-R model	Job Demands-Resources Model of Burnout
LCRM	latent change regression model
LPA	latent profile analysis
M	mean
MANOVA	multivariate analysis of variance
MBI	Maslach Burnout Inventory
M(C)AR	missing (completely) at random
MI	multiple imputations
OTL	online teaching and learning
RMSEA	root-mean-square error of approximation
SD	standard deviation
SEN	special educational needs
SEM	structural equation modeling
SPSS	Statistical Package of the Social Sciences
SRMR	standardized root-mean-square residual
STSE	Scale for Teacher Self-Efficacy
TSE	Teacher Self-Efficacy
TSE-EL	TSE for e-Learning
TSE-DM	TSE for using digital media
UNESCO	United Nations Educational, Scientific and Cultural Organization

WHO	World Health Organization

List of Publications

This thesis is based on three empirical studies which have all been submitted to peer-reviewed journals. Two of the articles have already been published and can be accessed online. The third article is currently in revision. All articles are included in the appendix.

1. **Weißenfels, M**., Benick, M. & Perels, F. (2021). Can teacher self-efficacy act as buffer in inclusive classrooms? *International Journal of Educational Research, 109,* 101794. https://doi.org/10.1016/j.ijer.2021.101794

2. **Weißenfels M**., Klopp E. and Perels F. (2022). Changes in teacher burnout and self-efficacy during the COVID-19 pandemic: Interrelations and e-learning variables related to change. *Frontiers in Education, 6,* 736992. https://doi.org/10.3389/feduc.2021.736992

3. **Weißenfels, M**., Benick, M. & Perels, F. (accepted). Teachers' prerequisites for online teaching and learning: Individual differences and relations to well-being during COVID-19 pandemic. *Educational Psychology.*

Summary

Today's teachers are faced with ever-increasing demands in their jobs – such as inclusive education and online teaching and learning (OTL) – and are therefore prone to burnout – a syndrome characterized by emotional exhaustion and accompanied by feelings of a lack of accomplishment and depersonalization. In addition to high job demands, limited job resources play a key role in the development of burnout syndrome. A prominent personal resource that is often discussed to buffer the development of burnout in teachers is teacher self-efficacy (TSE) – a teachers' conviction of being able to successfully cope with the tasks and challenges of teaching. TSE is context-specific and can be defined for more specific contexts, such as OTL. The investigation of current challenges and the impact of teachers' resources on their burnout symptoms is still in the early stages. This thesis contributes to this area of research. The three co-authored empirical studies that form the basis of this thesis each consider teacher burnout in the context of a currently relevant job demand (inclusive education and OTL) as well as its interaction with the job resource TSE. More specifically, Study I was embedded within the context of inclusion. Here, we analyzed whether the number of students in class with special educational needs (SEN) predicted teachers' burnout symptoms and, if so, whether this effect was buffered by TSE. The same was analyzed for a particular group of SEN students with emotional needs. Our results indicate that the number of students in class with SEN, and particularly emotional needs, is a predictor of emotional exhaustion as well as depersonalization in teachers. However, we did not find a buffering effect of TSE, even if TSE consistently predicted burnout levels in a negative direction. Study II shifts from inclusion toward the challenge of OTL during the COVID-19 pandemic. Against this background, we investigated changes in burnout levels and the relation of these changes to changes in TSE from pre- to post outbreak of the pandemic. More specifically, we assessed whether these changes were related to the specific TSE for using digital media or attitudes toward e-Learning (A-EL); we considered the transition to OTL as most challenging aspect of their job for teachers during this time. First, we found a significant increase in teachers of depersonalization as well as a lack of feelings of accomplishment,

which was negatively related to increases in TSE. Second, we found little evidence for the relations between specific TSE, A-EL, and changes in teacher burnout. In Study III we modeled individual differences among teachers to gain deeper insight into the role of teachers' A-EL and self-efficacy for e-Learning. We found two quantitatively differing profiles: one profile of teachers with high TSE and favorable A-EL and another profile with A-EL being neutral to negative and TSE moderate. We then analyzed differences between those profiles and found that teachers with favorable prerequisites had higher implementation competency, perceived greater success with regards to OTL and were less stressed and exhausted than teachers without those prerequisites. In conclusion, all three studies contribute to research and practice by shedding light on questions regarding teacher burnout and as a point of departure for its prevention.

Zusammenfassung

Lehrkräfte sind heutzutage mit stetig wachsenden Anforderungen in ihrem Beruf konfrontiert (z. B. Inklusion, Online-Lehren und -Lernen) und sind daher besonders anfällig für die Entwicklung von „Burnout“ - einem Syndrom, das durch emotionale Erschöpfung gekennzeichnet ist und von einem Gefühl von Leistungsverlust und Depersonalisierung begleitet wird. Neben hohen beruflichen Anforderungen spielen auch geringe berufliche Ressourcen eine Schlüsselrolle bei der Entwicklung des „Burnout“-Syndroms. Als eine prominente persönliche Ressource, die häufig im Kontext der Entwicklung von „Burnout“ bei Lehrkräften diskutiert wird, fungiert die Lehrkräfte-selbstwirksamkeit, also die Überzeugung von Lehrkräften, Aufgaben und Herausforderungen des Berufs erfolgreich bewältigen zu können. Lehrkräfteselbstwirksamkeit ist kontextspezifisch und kann folglich für spezifischere Kontexte, wie Online-Lehren und -Lernen, formuliert werden. Die Untersuchung von „Burnout“-Symptomen und persönlichen Ressourcen von Lehrkräften im Kontext aktueller Herausforderungen steht noch am Anfang. Die vorliegende Dissertation soll einen Beitrag zu dieser Forschung leisten. Dazu wurden in den drei empirischen Studien, die dieser Dissertation zugrunde liegen, jeweils das „Burnout“ von Lehrkräften im Kontext einer aktuellen beruflichen Herausforderung (Inklusion/Online-Lehren und -Lernen) sowie deren Interaktion mit einer beruflichen Ressource, der Lehrkräfteselbstwirksamkeit, betrachtet. Die erste Studie war in den Kontext der Inklusion eingebettet. Hier untersuchten wir, ob die Anzahl der Schüler*innen mit sonderpädagogischem Förderbedarf die Burnout-Symptome der Lehrkräfte vorhersagte und ob dieser Effekt durch die Lehrkräfteselbstwirksamkeit abgepuffert werden konnte. Unsere Ergebnisse deuten darauf hin, dass die Anzahl der Schüler*innen mit sonderpädagogischem Förderbedarf und insbesondere mit "emotional-sozialem Förderschwerpunkt" prädiktiv für die emotionale Erschöpfung und Depersonalisierung bei Lehrkräften ist. Dieser Effekt konnte nicht durch die Lehrkräfteselbstwirksamkeit abgepuffert werden, obwohl diese die Burnout Symptome konsistent negativ beeinflusste. Für die zweite Studie betrachteten

wir eine andere aktuelle Herausforderung: das Online-Lehren und -Lernen während der COVID-19-Pandemie. In diesem Kontext untersuchten wir längsschnittlich Veränderungen durch die Pandemie in „Burnout“ und deren Relationen zu Veränderungen in der Lehrkräfteselbstwirksamkeit. Darüber hinaus analysierten wir genauer, ob diese Veränderungen mit der spezifischen Lehrkräfteselbstwirksamkeit für die Nutzung digitaler Medien oder mit der Einstellung gegenüber E-Learning zusammenhingen, da wir den Übergang zum Online-Lehren und -Lernen als die größte Herausforderung für Lehrkräfte während dieser Zeit ansehen. Die Ergebnisse zeigten zum einen eine signifikante Zunahme der Depersonalisierung sowie des Gefühls persönlichen Leistungsverlusts bei den Lehrkräften, was wiederum negativ mit der Zunahme der Lehrkräfteselbstwirksamkeit zusammenhing. Zum anderen fanden wir allerdings nur geringfügige Belege für die Relationen zwischen spezifischer Lehrkräfteselbstwirksamkeit, der Einstellung zum E-Learning und den Veränderungen im „Burnout“ der Lehrkräfte. In der dritten Studie haben wir individuelle Unterschiede modelliert, um einen tieferen Einblick in die Rolle der Einstellungen und der spezifischen Selbstwirksamkeit der Lehrkräfte gegenüber E-Learning zu gewinnen. Dabei fanden wir zwei quantitativ unterschiedliche Profile: ein Profil von Lehrkräften mit hoher Lehrkräfteselbstwirksamkeit und positiver Einstellung sowie ein weiteres Profil mit eher neutraler bis negativer Einstellung und moderater Lehrkräfteselbstwirksamkeit. Darüber hinaus analysierten wir weitere Unterschiede zwischen diesen Profilen und fanden heraus, dass Lehrkräfte mit eher günstigen Voraussetzungen eine höhere Umsetzungskompetenz aufwiesen sowie mehr Erfolg in Bezug auf Online Lehren und -Lernen wahrnahmen und weniger gestresst und emotional erschöpft waren. Zusammenfassend lässt sich sagen, dass alle drei Studien einen Beitrag zu Forschung und Praxis leisten, indem sie wichtige aktuelle Fragen zu „Burnout“ bei Lehrkräften beleuchten und Ansatzpunkte für dessen Prävention eröffnen.

1. Introduction

Many people, when they think of the teaching profession, might think of lots of vacation time, a good work-life balance, and many students eager to learn. However, the reality is quite different. Researchers agree that "twenty-first-century educators face more demands than teachers in any previous era" (García-Arroyo et al., 2019, p. 3) and that the teaching profession is a very stressful one (Kyriacou, 2001) from the early career stages onwards (Tynjälä & Heikkinen, 2011; Voss & Kunter, 2020). In our fast-moving world, teachers constantly have to adapt to new circumstances and tasks: they are social workers, parental advisors, managers, and educators at the same time. For Germany in particular, the ever-increasing challenges and heavy workload can be attributed primarily to two contemporary developments of recent decades: inclusive education and the implementation in the classroom of new information and communication technologies (ICTs).

The foundation for the first development – inclusive education – was laid by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1994. Since then, more and more countries have implemented inclusive education – the right of every pupil to education. In Germany, it was implemented only recently, and it is thus still a crucial challenge for teachers (UNESCO, 2017). In Germany, among the nine categories of special educational needs (SEN), students with emotional needs include about 14% of all students; these needs mostly involve interaction problems manifesting in social behavior (Ellinger & Stein, 2012).

At the same time, for general education teachers, such behavioral problems are the most stressful teaching task (Lai et al., 2016; Pang, 2012). Moreover, teachers usually do not feel well prepared for dealing with diverse needs in their classes (Lancaster & Bain, 2007), and only a minority of teachers report having positive attitudes toward implementing inclusion requirements (De Boer et al., 2011). A factor closely related to attitudes (see, e.g., Savolainen et al., 2020) and contributing positively to the implementation of inclusive practices is teacher self-efficacy (TSE; see, e.g., Woodcock et al., 2012). TSE comprises teachers' "judgement of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391) and rises with more experience with students with disabilities (see, e.g., Malinen et al., 2013).

The second contemporary development that is very challenging for teachers and also requires high levels of self-efficacy are ICTs and their implementation in class (Gil-Flores et al., 2017). In Germany, there are still many teachers who do not implement ICT in their class, and those who do, report higher levels of stress related to digitalization (Gewerkschaft für Erziehung und Wissenschaft, 2020). During the COVID-19 pandemic, teachers had to switch overnight to online teaching and learning (OTL), and thus, teaching with ICT took on entirely new relevance.

Adaptation of the Integrative Model of Behaviour Prediction (IMBP; Fishbein & Yzer, 2003) to the context of ICT use for teaching (Kreijns, Vermeulen, et al., 2013) shows that intentions for a specific behavior (such as OTL) are the best proxy for actual behavior. These intentions are influenced by several factors, and "proximal" factors account for 69% of the variance in those intentions (Van Acker et al., 2013). These proximal factors here consist of (1) perceived behavioral control; specific TSE, (2) attitudes toward the specific behavior; attitude toward e-Learning (A-EL), and (3) the perceived norm (which we suggest being very high in the context of school closures). The A-EL is here the tendency of teachers' attitudes to be, in general, more or less favorable toward OTL (e.g., Van Acker et al., 2013). Thus, especially for teachers with rather negative attitudes toward OTL and low (specific) TSE, OTL may have been particularly demanding.

In light of these various challenges, the reports are not surprising of teachers quitting their jobs or going into early retirement due to stress; teacher attrition is of major international concern (Lindqvist et al., 2014; Madigan & Kim, 2021b; Pfitzner-Eden, 2016a; Skaalvik & Skaalvik, 2011a; Wang et al., 2015).

In Germany, early retirement of teachers due to illness has reached its highest level of about 60% in 2001. Since then, the number has constantly decreased and was at 12% in 2017 (DESTATIS, 2018).[1] However, the main reasons for early retirement are still mental and psychosomatic illnesses; these are found significantly more often in teachers than in other occupational groups (Scheuch et al., 2015). Teachers also suffer more headaches, feel more exhausted and tired, and complain more often

[1] This development should also be seen against the background of a law that came into force in 2001, in which pension deductions were increased in the event of early retirement due to illness (see Schmitz & Jehle, 2013).

about high tension, without reporting more days of sick leave, than other occupational groups (Scheuch et al., 2015).

The motivation to leave the teaching profession relates to job dissatisfaction as well as emotional exhaustion (e.g., Skaalvik & Skaalvik, 2011a; Madigan & Kim, 2021b) – the core dimension of burnout syndrome (Maslach et al., 2001). Burnout is a major issue of international concern that is very frequently found in teachers. It is, therefore, the object of intense research (for a review, see, García-Carmona et al., 2019) since it has negative effects not only on teachers themselves but also on their students (see, e.g., Klusmann et al., 2016). However, still more research is needed to link burnout with different outcomes and predictors (Skaalvik & Skaalvik, 2021), for example, different job resources (as TSE) and job demands (as inclusion and OTL).

The job demands-resources model of burnout (JD-R model of burnout; Demerouti et al., 2001) aims to describe how low job resources (e.g., TSE) interact with high job demands (e.g., inclusion, OTL) to result in burnout. We know from much research in recent decades that the best resource and buffer against burnout is certainly TSE (e.g., Brouwers & Tomic, 2000).

Thus, given that burnout is a serious phenomenon, more research should be dedicated to the question of how specific *job demands* and *job resources* contribute to the development and persistence of burnout symptoms in teachers. My thesis fills this gap by investigating burnout in the context of two contemporary job demands in the educational system: inclusive education and teaching with ICT (here OTL during the COVID-19 pandemic). In doing so, the role of TSE as a job resource will also be analyzed. In pursuit of this goal, three empirical studies have been conducted.

The first study analyzed whether the number of students in class with SEN – as a job demand of inclusive education – contributes to burnout in teachers and whether this effect can be buffered by TSE (job resource) as hypothesized by the JD-R model (**Study I**).

In the second study, we investigated burnout development during the school closures following the COVID-19 outbreak, which resulted in a fast transition to OTL (job demand). Simultaneously, we analyzed the interaction of burnout development with the development of the job resource TSE. We also took the transition to OTL more specifically into consideration by analyzing whether A-EL

and the context-specific TSE had effects on general TSE and burnout over time (**Study II**).

Finally, we took a person-centered approach and investigated individual differences in prerequisites for OTL (job demand), more specifically, A-EL and TSE for e-Learning (job resources). The resulting profiles were then analyzed and compared with respect to differences in burnout symptoms (**Study III**).

In the following, I first introduce, in Chapter 2, the theoretical background that led to the research aims for the three underlying empirical studies, which are set out in Chapter 3. I then describe my methodological approaches in more depth in Chapter 4 before briefly summarizing each of the studies in Chapter 5. Finally, in Chapter 6, I discuss the findings of the studies in a broader context, consider their main limitations and draw out their implications for research and practice.

In addition to the three empirical studies underlying the present thesis, and which are embedded within the context of current challenges for teachers and their burnout and TSE levels, in Chapter 7, I briefly address three other studies I conducted during my doctorate (and which are already published or under review). In these studies, my focus shifted to students and important resources and competencies for successful learning. For example, self-efficacy also plays an important role for students and their academic careers; one study examined self-efficacy in students and investigated its mediating effect between academic buoyancy – the "capacity to overcome setbacks, challenges, and difficulties that are part of everyday academic life" (Martin, 2013, p. 488) – and achievement. More details can be found in the abstract in Section 7.3.

Two other studies emerged from the main research focus of the chair for whom I worked on self-regulated learning (SRL) and from cooperation with colleagues with whom I had the honor of working during the last several years. SRL subsumes "processes whereby learners personally activate and sustain cognitions, affects, and behaviors that are systematically oriented towards the attainment of personal goals" (Zimmerman, 2011, p. 1). While the practical relevance of SRL is beyond question, there are still many gaps in research concerning the assessment and promotion of SRL that must be closed. These topics were addressed in the two publications (discussed in Sections 7.1 and 7.2). Furthermore, I contributed to a book chapter about SRL interventions.

2. Theoretical Background

The following sections are intended to provide a deeper insight into teacher burnout and TSE as the main constructs for this thesis and its underlying empirical studies. After a detailed consideration of job burnout and its relevance in the teaching profession, I discuss TSE as a resource to resist burnout and then examine the relation between TSE and burnout in more detail. Finally, I set out the main research questions of this thesis and of the underlying empirical studies.

2.1 Burnout

The term "burnout syndrome" was first mentioned in the psychology literature by Herbert J. Freudenberger in 1974. After experiencing it himself and witnessing it in colleagues, he described it as a concept characterized by signs that were physical (e.g., exhaustion and fatigue) as well as behavioral (e.g., being quick to anger) and particularly prevalent in "the dedicated and the committed" (Freudenberger, 1974, p. 161) in the human services. Based on these and similar experiences and descriptions, numerous different definitions of burnout evolved, and its empirical study with quantitative measures started in the early 1980s, particularly focusing on its assessment and its structure. Certainly, the best-known instrument for assessing burnout is the Maslach Burnout Inventory (MBI), developed by Maslach and Jackson in 1981 and still the predominant instrument in use (see, García-Carmona et al., 2019). It has, since its first use, been adapted for numerous professions, including teaching (see, Maslach, et al., 1996; MBI-Educators Survey). However, scholars have criticized the MBI for a range of reasons (see, e.g., Schwarzer et al., 2000; Thalhammer & Paulitsch, 2014); these will be addressed in the next section.

2.1.1 Definition and Multidimensionality of the Construct

There have been many attempts at a unified definition of burnout: Burnout is defined by Schwarzer et al. (2000, p. 310), for example, "as a chronic state of exhaustion due to long-term interpersonal stress within human service professions," and by the World Health Organization as "a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed" (WHO,

2018). The WHO definition as a syndrome, which should not be understood as a medical condition, is based on the prominent multidimensional theory of burnout by Christina Maslach (1982). Maslach et al. (1996, p. 20) describe burnout as "a state of exhaustion in which one is cynical about the value of one's occupation and doubtful of one's capacity to perform." As is clear from this definition, and following the "multidimensional theory of burnout" (Maslach et al., 1982), burnout comprises three components: emotional exhaustion, depersonalization, and lack of accomplishment (Maslach et al. 2001).

Emotional exhaustion includes strong feelings of overload and refers to the individual stress response (Maslach, 2003); it is the aspect mentioned most frequently by those concerned with burnout, according to Christina Maslach (2001). Consequently, it is understood as the key component of burnout syndrome but is not seen as a sufficient criterion (Maslach et al., 2001). Additionally, burnout syndrome includes feelings of cynicism, which are a reaction to aspects of the job itself, or depersonalization, when individuals experience emotional distance in their work relationships (e.g., in relationships with students). People try to mentally distance themselves in order to cope with the overload that is an immediate reaction to emotional exhaustion.

Depersonalization and cynicism are highly correlated constructs but are empirically distinct, and more importance is attached to one or the other, depending on the profession (Larsen et al., 2017). In teachers, for example, depersonalization is clearly more relevant than cynicism, which is why depersonalization is assessed solely in the MBI-Educators Survey (Maslach et al., 1996). Lastly, the feeling of inefficacy or lack of accomplishment is a self-referential response, in terms of which people perceive themselves as incompetent or inefficient. It develops as a consequence of emotional exhaustion and depersonalization and seems to be more closely related to a lack of resources than to actual work overload (Maslach et al., 2001). Empirical studies have outlined these relations many times (for a meta-analysis see, Alarcon, 2011).

Although the MBI, with its definition of burnout as a multidimensional construct, is very popular, that does not diminish various problematic aspects of the concept. From a practical point of view, the MBI does not provide thresholds to differentiate between "burned out" and healthy persons, and its discriminant validity

with regard to comparable constructs such as depression (see Section 2.1.2) has been critically discussed (e.g., Thalhammer & Paulitsch, 2014). Moreover, some attempts to replicate the construct validity have failed (e.g., Schwarzer et al., 2000). However, a review and meta-analysis of 45 studies on the overall factorial structure of the MBI support the three-dimensionality of the instrument, under the condition that the three dimensions are not considered as independent as originally stated, but as interrelated factors (Worley et al., 2008).

Recently, many studies have tried to capture the construct by only measuring emotional exhaustion as the key component of burnout (e.g., Malinen & Savolainen, 2016; Pas et al., 2012). However, it is often emphasized that burnout measures should neither aggregate the three components nor focus on only one (Leiter & Maslach, 2016) because in doing so, "one would lose sight of the phenomenon entirely" (Maslach et al., 2001, p. 403). Early findings show low to moderate correlation between the components with emotional exhaustion and depersonalization usually having the highest correlation ($r = .56$), emotional exhaustion and lack of accomplishment the lowest ($r = -.17$), and lack of accomplishment and depersonalization a moderate correlate correlation ($r = -.32$; Byrne, 1994). Comparable results of correlations between the components of burnout are found in recent studies of teachers and underline the heterogeneity of the construct (Skaalvik & Skaalvik, 2021).

Beyond the typical correlational patterns, there are individual patterns in the continuum between burnout and engagement that also highlight the need to assess burnout in its multidimensionality. Applying a latent profile analysis (LPA), Leiter and Maslach (2016) identified five different burnout profiles: burnout (all components high), disengaged (moderate emotional exhaustion and lack of accomplishment, but high depersonalization), overextended (high emotional exhaustion, moderate to low lack of accomplishment and depersonalization), ineffective (high lack of accomplishment, emotional exhaustion and depersonalization moderate), and engagement (all components low). These profiles have been found in a sample of health care employees. Other studies have investigated burnout profiles in other professions (e.g., Maslach & Leiter, 2008). In surveys of in-service teachers, recent research is inconclusive. Salmela-Aro et al. (2019) identified two different profiles, one with fairly high burnout components but

still feeling quite engaged and the other with high levels of engagement and fewer symptoms of burnout. Martínez et al. (2020) found three different burnout profiles in teachers: one profile characterized by low emotional exhaustion and high feelings of a lack of accomplishment, one profile with high levels of emotional exhaustion and depersonalization, and a final profile characterized by low levels of depersonalization and a lack of accomplishment. More research is needed to replicate these profiles.

The analyses by components of individual differences in the experience of burnout underline the multidimensionality of the burnout construct and stress the relevance of investigating the three components together rather than alone; burnout can have many faces. This is why the empirical studies in this thesis always consider all three burnout dimensions.

2.1.2 Differentiation from Related Constructs

To describe it accurately, burnout must be distinguished from what are, at first sight, similar constructs, such as depression, which is also often found in teacher samples, especially in primary schools (for an overview, see Hindman & Bustamante, 2019). In his initial work, Freudenberger (1974, p. 161) noted that a person suffering from burnout symptoms "looks, acts and seems depressed." Depressive disorders are recognized as clinical diagnoses in the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychological Association, 2013) and comprise the main symptoms as a depressed mood and/or a loss of interest or pleasure, as well as additional symptoms like insomnia or hypersomnia, fatigue, and reduced concentration.

The main difference between the two constructs is the job-relatedness of burnout, whereas depression is said to be related to every domain of a persons' life (Maslach et al., 2001). However, in a review of 92 studies dealing with the overlap of depression and burnout, Bianchi et al. (2015) argue that depression can also be work-related in its early stages, and the consequences of burnout can also affect a person's whole life. From an empirical perspective, depression and burnout indeed have overlapping clinical symptoms (such as fatigue) and correlate moderately to highly, with emotional exhaustion usually showing the highest correlation with depression (e.g., Bianchi et al., 2013; Skaalvik & Skaalvik, 2021). However, psychometrically, factorial analyses support the assumption that the constructs are clearly distinct (e.g., Bakker et al., 2000). Moreover, considering individual differences, burnout profiles

also differ in their degree of depressive symptomatology (Martínez et al., 2020). These findings are also reflected in the *International Statistical Classification of Diseases and Related Health Problems* (ICD-11) of the WHO (2018), where "burnout syndrome" will be listed independently as an occupational phenomenon from 2022 on.

The job-relatedness aspect of burnout should also be differentiated from job satisfaction which, in the teaching profession, can be defined as "teachers' affective reactions to their work or to their teaching role" (Skaalvik & Skaalvik, 2011a, p. 1030). The constructs are clearly linked (e.g., Skaalvik & Skaalvik, 2011a; $r = -.53$), and it remains unclear whether job dissatisfaction is a predictor or a consequence of job burnout.

2.1.3 Correlates and Consequences of Burnout

Several individual characteristics of teachers are related to increased symptoms of burnout: depersonalization is often higher in men (Lau et al., 2005; Saloviita & Pakarinen, 2021), whereas women are more emotionally exhausted and feel a lack of accomplishment more frequently (Fernet et al., 2012; Grayson & Alvarez, 2008; Lau et al., 2005). However, other studies find no such gender effects in teacher burnout (see, e.g., Yorulmaz & Altınkurt, 2018). There is meta-analytical evidence from studies in 36 countries that gender egalitarianism in society is negatively related to burnout; thus, the more balance in gender roles, the fewer burnout symptoms are seen (García-Arroyo et al., 2019). Moreover, although it is assumed that burnout develops through long-term stress (Maslach et al., 2001), it is often significantly related to age, with younger teachers reporting higher levels of burnout (Antoniou et al., 2006; Lau et al., 2005; Saloviita & Pakarinen, 2021). Personality factors, such as emotional stability, extraversion, and conscientiousness, are negatively related to burnout (for meta-analysis, see Kim et al., 2019) and were found to be risk factors for vulnerability to burnout in first-year student teachers (Reichl et al., 2014).

Burnout itself means substantial stress for the individual, but additionally, it has been linked to many other alarming symptoms. In their review, García-Carmona et al. (2019) report that consequences and correlates of burnout (in teachers) can be subsumed into three categories: physical, psychological, and behavioral.

Researchers have found positive associations between the extent of burnout symptoms and physical illness as well as subjective health (Hakanen et al., 2006). For example, burnout is highly related to cardiovascular diseases in men as well as musculoskeletal disorders in women (Honkonen et al., 2006), controlled for several sociodemographic variables and health behavior (e.g., smoking and Body Mass Index). Moreover, burnout has been linked to a high risk for Type 2 diabetes (Melamed et al., 2006) and a higher incidence of infections (gastroenteritis, flu, and cold). Emotional exhaustion is the best predictor among the burnout components (Mohren et al., 2003) and is generally linked to more symptoms of illness (Wang et al., 2015), especially in teacher samples (Scheuch et al., 2015).

On the behavioral level, burnout, and emotional exhaustion, in particular, is related to less physical activity, a higher likelihood of obesity, and problems with alcohol use (Ahola et al., 2012). Considering problematic behavior in the classroom, teachers suffering from burnout show more autonomy-suppressing behavior (Shen et al., 2015) and offer fewer options to their students (Pogere et al., 2019). They also show behavioral changes that affect their students in the long run; students exhibit significant setbacks in their academic outcomes as a result of teacher burnout (Klusmann et al., 2006). The negative effect on student achievement has been confirmed in a recent meta-analysis of 29 studies (Madigan & Curran, 2020). The effects of burnout on motivation and student well-being are often discussed, and there is some evidence for the negative effects just mentioned (Madigan & Kim, 2021a; for a general review). Moreover, teachers suffering from burnout are much more likely to quit their jobs (Skaalvik & Skaalvik, 2011a; Wang et al., 2015).

Finally, psychological correlates of burnout in teachers are, for example, less optimism and hardiness (Otero López et al., 2010), less satisfaction with the job (Skaalvik & Skaalvik, 2011b; Skaalvik & Skaalvik, 2017), less work engagement (Hakanen et al., 2006), and less emotional intelligence (Mérida-López & Extremera, 2017). Moreover, high levels of burnout are very closely related to lower teacher self-efficacy and vice versa (Brouwers & Tomic, 2000).

As is evident, burnout is not only a problem per se but has far-reaching and serious consequences, which makes it an important global concern. To better understand the nature of the phenomenon, it is crucial to know how, why, and under

what circumstances burnout develops, who is particularly prone to the condition, and how it can be prevented.

2.1.4 Burnout Development – the Job Demands-Resources Model

Since the beginning of research on burnout syndrome, many theories, models, and approaches have been developed to explain its development, and this issue is still being widely discussed today (Mäkikangas & Kinnunen, 2016). In one of the first attempts to shed light on burnout development, Leiter & Maslach (1988) assumed that, in response to high demands in the job, people develop symptoms of exhaustion and fatigue. Consequently, they lack the ability to be emotionally involved and develop feelings of cynicism or depersonalization concerning their job. As a logical result, they will develop feelings of inefficacy – a lack of accomplishment. Golembiewski et al. (1986) stated that the origin of burnout syndrome is not emotional exhaustion but rather a feeling of cynicism and that lack of accomplishment and, in a final stage, emotional exhaustion develops as a result of that cynicism and related decreasing performance. Their model thus suggests exactly the opposite sequence to that of Leiter and Maslach (1988). An attempt has been made to integrate both models (Lee & Ashforth, 1993). Empirically, none of these models was completely validated in longitudinal studies (see, e.g., Taris et al., 2005), but Leiter and Maslach's (1988) model seems the most appropriate, particularly in respect of their assumption that emotional exhaustion is the first component of burnout to show up (Brouwers & Tomic, 2014).

Today, there is a consensus of sorts that burnout follows a very individual process and is closely associated with high job demands and low job resources: a recent longitudinal person-centered study found two different profiles of burnout development over the eight years of the study that, in sum, support the job demands-resources model (JD-R model) of burnout (Mäkikangas et al. 2020).

The JD-R model of burnout assumes that burnout develops in response to high job demands and limited job resources in terms of exhaustion and consequently declining motivation (Demerouti et al., 2001). In their model, the authors apply Maslachs' multidimensionality but argue that the component lack of accomplishment is only "loosely related" (p. 500) to the other dimensions and rather reflects a personal characteristic closely related to self-efficacy. Thus, the model is based on emotional exhaustion in terms of a stress reaction and depersonalization in terms of

distancing from relationships in the job (Demerouti et al., 2001) and their direct relations to job demands and job resources. The authors argue that emotional exhaustion has often been related to work overload and time pressure – the job demands (see Lee & Ashforth, 1996; for a review) – and depersonalization to low job resources such as a lack of support (e.g., Leiter & Maslach, 1988).

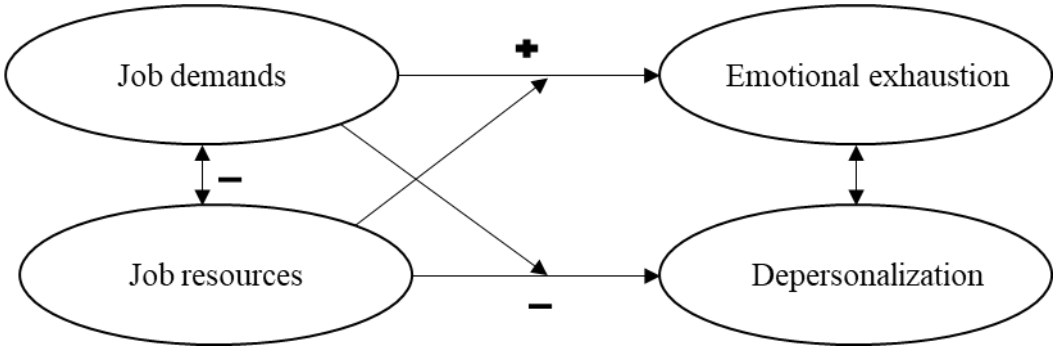
According to Demerouti et al. (2001), job demands comprise the "physical, social, or organizational aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs" (e.g., exhaustion) (p. 501). In other words, the stressors of the job require sympathetic activation in order to maintain performance, and the higher this activation, the worse the physiological and psychological consequences, which leads to emotional exhaustion.

In contrast, job resources are those "physical, psychological, social, or organizational aspects of the job that may do any of the following: (a) be functional in achieving work goals, (b) reduce job demands at the associated physiological and psychological costs; (c) stimulate personal growth and development" (p. 501). Moreover, job resources can be divided into internal and external resources, whereas the former refers to physical or psychological resources (e.g., self-efficacy) and the latter to organizational or social resources (e.g., school climate).

Following the JD-R model, the development of burnout takes place in two consecutive processes: first, high job demands lead to energy depletion and emotional exhaustion. Second, this circumstance is complicated by a lack of resources to cope with the high demands. The interaction of low job resources and high job demands is particularly important in the development of burnout (see Bakker & Demerouti, 2007; depicted in Figure 1 below). Moreover, across age levels, burnout is said to follow a curvilinear trend (see Schwarzer et al., 2000).

Figure 1

The JD-R model adapted from Bakker & Demerouti, 2007



Although there has been much discussion on burnout development, the JD-R model is still widely used today, for example, in investigating burnout in teachers (Skaalvik & Skaalvik, 2021). The assumptions of the JD-R model of burnout are empirically well proven; several job demands have been related to the development of emotional exhaustion and several job resources to feelings of depersonalization and a lack of accomplishment (e.g., Hakanen et al., 2006; Hakanen et al., 2008; Bakker et al., 2007)). The hypothesis of the interaction of high job demands and low job resources resulting in burnout has also been confirmed in empirical studies (Bakker et al., 2007; Xanthopoulou et al., 2007). Simultaneously testing all direct, indirect, and interaction assumptions of the JD-R model in a sample of new teachers, Dicke et al. (2018) found strong empirical support for the overall model. However, the process for the individual person does not strictly occur as described by the JD-R model; rather, there are individual developmental trajectories (Mäkikangas et al., 2020).

2.1.5 Teacher Burnout and Job Demands

Research on burnout in teachers is of international relevance and has been conducted in diverse countries, amongst others Norway (e.g., Skaalvik & Skaalvik, 2009; Skaalvik & Skaalvik, 2021), Spain (García-Carmona et al., 2019; Martínez et al., 2020); Canada (Lee & Ashforth, 1990), the United States (Maslach & Leiter, 2008), Japan (Reeves et al., 2017) as well as Germany (Dicke et al., 2015b). To do so, researchers have translated and psychometrically tested the original MBI in many languages so that, despite the MBI's weaknesses (see Section 2.1.1) the global results

are comparable (Maslach et al., 2001). Although teacher burnout seems to be a relevant issue globally, a recent meta-analytical review highlighted the significant differences in teacher burnout between countries and drew attention to country specificities in teacher education and school systems (García-Arroyo et al., 2019). However, the daily practice and related challenges facing teachers around the world are comparable and teachers in many countries have to face the new demands of inclusion (particularly in Germany where the policy was only implemented in 2017) as well as of OTL because of COVID-19-related school closures. Taking account of the JD-R model I now focus more precisely on how these job demands are particularly onerous for teachers and this then leads to discussion of a job resource I consider crucial in the context of teaching – TSE.

Job demands in Teacher Occupation. The stress teachers experience and the stressors by which they are affected differ individually, and personality characteristics certainly play a role (Kyriacou, 2001; see Section 2.1.3). Nevertheless, two job demands are very consistently linked to teachers experiencing stress and burnout symptoms: work overload and student behavior.

According to Byrne (1994), it is important to distinguish between quantitative work overload (e.g., many new demands, time pressure) and qualitative work overload (e.g., being overwhelmed due to the complexity of demands). In empirical studies, work overload is often conceptualized in terms of time pressure and is particularly strongly linked to emotional exhaustion (Fernet et al., 2012a; Pogere et al., 2019; Skaalvik & Skaalvik, 2010; Skaalvik & Skaalvik, 2011a; Skaalvik & Skaalvik, 2017), even on a daily level (Schmidt et al., 2017). The findings fit the assumption of the JD-R model that demands especially affect emotional exhaustion (Demerouti et al., 2001).

Furthermore, student behavior is often found to be a predictor of burnout in teachers. In particular, the disruptive behavior of students has been consistently linked to more burnout symptoms (Fernet et al., 2012a; Skaalvik & Skaalvik, 2010). Analyzing 21 studies, a meta-analysis on student misbehavior revealed that its largest effect is on emotional exhaustion but that all components of burnout are affected significantly (Aloe et al., 2014).

Taking a broader perspective, it is obvious that both work overload and student behavior play a crucial role in the implementation of educational inclusion

policy. The demands that come with inclusive teaching implicate work overload in a quantitative and qualitative manner and, at the same time, involve dealing with the behavioral problems of students, for example, those with emotional SEN. For special education teachers, it has already been shown that the number of students with "emotional or behavioral needs" predicts their burnout symptoms (Nichols & Sosnowsky, 2002; Coman et al., 2013).

A study by Talmor et al. (2005) found correlations between the number of students with SEN in class and the burnout rates of special education teachers. However, no studies have investigated burnout symptoms in general education teachers or focused on the additional burden of meeting diverse needs recently. In general education teachers, studies have rather considered the disruptive behavior of students, which also significantly contributes to burnout (Aloe et al., 2014). One aim of the first study of this thesis is, therefore, to investigate the effect of inclusive teaching (number of students with SEN and particularly emotional needs) on burnout symptoms in general education teachers (**Study I**).

In the course of digitization, another current challenge for teachers that has likely led to quantitative and qualitative work overload is OTL. The sudden switch to digital learning materials with the outbreak of the COVID-19 pandemic may have had a considerable effect on teacher burnout – depending on their preparedness to teach in digital-learning environments. The work routines of teachers changed very suddenly from one day to another, and especially for those with little experience in the implementation of digital learning, it could have felt very stressful and exhausting. Moreover, teachers had a high emotional workload supporting their students at a distance that could have intensified the development of burnout (especially depersonalization). Some researchers have investigated the pandemic's consequences for teachers' well-being (including the impact of burnout), but the role of OTL has been neglected so far (see, e.g., Sokal et al., 2020a).

For the second study of this thesis, therefore, my co-authors and I analyzed changes in teachers' burnout and TSE from pre- to post-outbreak period of COVID-19 and the relation of these changes to OTL-related variables (**Study II**). In order to investigate the role of OTL more thoroughly, we furthermore analyzed individual differences in the prerequisites for OTL and their relation to teachers' well-being in terms of burnout (**Study III**).

Certainly, in the context of job demands, the question arises why some teachers handle these demands better than others. Coping strategies are often mentioned as important, and overloaded teachers tend to use emotion-focused strategies more than other types (Pogere et al., 2019); however, coping strategies are only needed when there are insufficient job resources. This then links back to the JD-R model of burnout. Job Resources in the JD-R model refer to the "physical, psychological, social, or organizational aspects of the job" (Demerouti et al., 2001, p. 501), but researchers mostly neglect job resources such as personal motivational characteristics as already correctly outlined by Fernet et al. (2012a). I argue that TSE, which is proven to be a crucial resource against burnout (e.g., Brouwers & Tomic, 2000), should be investigated in terms of a job resource in the JD-R model of burnout. My co-authors and I, therefore, investigated TSE in all studies for this thesis, investigating its interaction effect with high job demands on burnout (**Study I**), its changes in relation to burnout (**Study II**), as well as its role in OTL and related differences in teacher burnout (**Study III**).

2.2 Self-Efficacy

As outlined previously, TSE plays a prominent role as personal resource in the JD-R model of burnout and will, therefore, be introduced here in a theoretical sense before considering its interplay with teacher burnout and setting out the research aims of the thesis.

The origin of research on TSE can be traced along two strands: The RAND studies based on Rotter's social learning theory (e.g., Armor et al., 1976) and studies based on Bandura's (2001) social cognitive theory of human behavior; the latter has meanwhile become established and is the basis of today's research on TSE.

2.2.1 Definition and Social Cognitive Theory

Social cognitive theory describes humans as proactive, self-regulated, self-organized, and self-reflective agents who "influence intentionally [their] functioning and life circumstances" (Bandura, 2006b, p. 164). The core of the theory lies in the interactive triadic reciprocity between personal factors, the environment, and the executed actions (Bandura, 1989). Among the personal factors, Bandura assumes that "people's beliefs about their capabilities to exercise control over events that affect

their lives" (Bandura, 1989, p. 1175) are central, naming those beliefs "perceived self-efficacy."

For Bandura (1977), self-efficacy beliefs determine behavior directly as well as indirectly through motivational (e.g., effort), affective (e.g., stress), cognitive (e.g., goal setting), and selective (e.g., environment) processes. People with firm self-efficacy beliefs will set more challenging goals, persevere longer in difficult tasks, and be more resilient (Bandura, 2006b).

Bandura (1977) identifies three dimensions of variation in self-efficacy beliefs: (a) magnitude, (b) generality, and (c) strength. Variations in *magnitude* mean that self-efficacy beliefs for a specific task can vary depending on the complexity or difficulty of the task; variation in *generality* is the degree to which a particular success can be transferred or generalized to other situations. Finally, efficacy beliefs are not an all-or-none-phenomenon but vary from very low to very high; that is, they vary in *strength*.

Most importantly, it should be pointed out that self-efficacy beliefs are not stable across diverse situations. Instead, self-efficacy is very specific for every imaginable context or situation (Bandura, 2006a). For example, a math scientist who is convinced to do good research does not have to be convinced to be good at mental arithmetic nor to be a good teacher. The latter, thus the self-efficacy beliefs related to being a good teacher, for example, refer to the specific form of TSE, which has been the object of educational research for at least 40 years (see Tschannen-Moran et al., 1998), and is the form of self-efficacy in which I was particularly interested when planning the studies for this thesis.

2.2.2 Differentiation from Related Constructs

When defining self-efficacy beliefs, it is important to distinguish these from certain related constructs such as outcome expectancies (e.g., Heckhausen & Heckhausen, 2006), locus of control (Rotter, 1954), and self-concept (e.g., Shavelson et al., 1976).

Outcome expectancies describe the conditional relationship between a behavior and its outcome. Self-efficacy, on the other hand, is more concerned with the belief that must be present in the first place for a person to perform a behavior successfully that would then lead to a specific outcome (Bandura, 1977). In other words, outcome expectancies are general judgments about whether a certain behavior

will usually lead to a specific outcome. Self-efficacy beliefs, by contrast, concern the judgment of a specific person that they are able to perform the specific behavior that will lead to the specific outcome. For example, if a teacher is convinced that inclusive education is beneficial for students with special needs (outcome expectancy), this does not say anything about whether they see themselves as capable of designing inclusive education (self-efficacy).

Furthermore, locus of control should be distinguished from self-efficacy beliefs. The former comprises beliefs about the control a person has about certain situations: someone can think that they have high control about their life or specific events, but others might rather think that they have little influence on happening events and that other factors (e.g., luck) are much more important (Rotter, 1954; Bandura, 2006a). Thus, a high locus of control does not (always) imply high levels of self-efficacy: A teacher can think that the behavior of students is determined entirely by their classroom management (locus of control) but do not feel effective in their classroom management (self-efficacy).

Self-concept is often defined as all feelings and thoughts in relation to oneself or, in broader terms, how someone perceives themselves (Shavelson et al., 1976). According to Bandura, self-efficacy and self-concept "are entirely different phenomena" (Bandura, 2006a, p. 309). However, it cannot be denied that both concepts have certain similarities: experience and verbal persuasion play a role in their development, and both are said to predict behavior or outcomes, for example, academic achievement (Bong & Skaalvik, 2003). Despite many similarities, self-efficacy is less influenced by social comparisons and not at all by internal comparisons, as is the case for self-concept (internal/external frame of reference model; see, Marsh, 1986). Self-concept, in contrast to self-efficacy, is more domain-specific (e.g., math) than context-specific (e.g., solving a specific problem) and is more of an evaluation of competence than of confidence. It is based on previous experience rather than expectations of the future (for a review of differences and similarities, see Bong & Skaalvik, 2003).

2.2.3 Correlates and Consequences of Self-Efficacy

According to Bandura, self-efficacy beliefs "determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences" (Bandura, 1977, p. 194). Empirically, self-efficacy beliefs

have been linked to, amongst other factors, job satisfaction (e.g., De Simone et al., 2018; Law & Guo, 2016), work engagement (e.g., De Simone et al., 2018), and job performance (Randhawa, 2007) in different professions.

There are many empirical studies linking TSE with diverse outcomes. Teachers with higher TSE report higher job satisfaction (e.g., Klassen & Chiu, 2010; Toropova et al., 2021) and are more enthusiastic about teaching (Allinder, 1994; Lazarides et al., 2021). Moreover, their instructional quality is higher (Holzberger et al., 2013), with longitudinal studies confirming this impact of TSE on the quality of instruction (Künsting et al., 2016). A meta-analysis supports the association between TSE and teaching effectiveness (r =.12) (Klassen & Tze, 2014), and this is confirmed by the positive impact of higher TSE on students' academic achievement (Caprara et al., 2006).

Furthermore, teachers with high TSE have fewer conflicts with students and report feeling closer to them (Hajovsky et al., 2020). This finding is confirmed by studies in which students have reported better relationships with teachers (Summers et al., 2017) and being more motivated (Mojavezi & Tamiz, 2012) as a result of teachers having high TSE. Teachers with high TSE rates also report better mental health (von Muenchhausen et al., 2021), resilience (Yada et al., 2021), and more positive emotions (Burić et al., 2020). Most importantly, TSE is linked to lower burnout rates; this link will be considered in greater depth in Section 2.3.

TSE is thus crucial for many important aspects of teachers' lives and careers and can also have a significant effect on students, which make it an interesting research topic. In the next section, I discuss more precisely how teachers can develop self-efficacy.

2.2.4 Development of Self-Efficacy

Bandura (1977) argued that self-efficacy beliefs could be acquired in various ways and distinguished four sources. First, so-called *performance accomplishments* are the most effective way to develop strong self-efficacy beliefs formed through mastery experiences. Thus, if a person successfully copes with a situation, this increases their self-efficacy expectation in a similar situation in the future when the success has been attributed internal and stable. For example, a teacher who has successfully disciplined a disruptive student will increase their self-efficacy in

classroom management. Moreover, self-efficacy expectations that are well-established also transfer to other similar situations.

The second strongest source of self-efficacy beliefs is *vicarious experience* or observation of others performing a specific task. The more similar the person observed is to the person observing, the more likely it is that they will draw conclusions about their own efficacy. For example, a pre-service teacher is more likely to compare themselves with other pre-service teachers than with experienced ones. The third source of self-efficacy beliefs is *verbal persuasion*. If others (e.g., friends, parents) believe in a person and their competencies, they will also be more likely to believe that they can perform an action successfully or be a good teacher. Lastly, the perception of one's own physical states of arousal (*emotional arousal*) allows the drawing of conclusions. For example, an increased pulse rate in a teacher before entering class can reveal, for someone with rather low self-efficacy, that the nervousness conveyed indicates insufficient competence. A well-developed self-efficacy, on the other hand, is more likely to allow an interpretation of an elevated pulse as normal "stage fright."

In the context of teaching, the sources identified by Banduras have been investigated and empirically validated in students (e.g., Joët et al., 2011) as well as in teachers (e.g., Usher & Pajares, 2009). It has essentially been confirmed that mastery experiences play a major role in the formation of self-efficacy beliefs (Pfitzner-Eden, 2016b; Tschannen-Moran & Mcmaster, 2009). Once established, Bandura (1977) assumes that self-efficacy beliefs for a specific context should be relatively stable; this has been empirically validated for TSE by several studies (e.g., Künsting et al., 2016; Praetorius et al., 2017). However, this would imply that self-efficacy mostly increases in the first years of teaching (with mastery experience) and then stabilizes at a specific point for an individual teacher. However, empirical studies on the relation between teaching experience and self-efficacy have yielded inconclusive results (e.g. (Klassen & Durksen, 2014; Woolfolk Hoy & Burke Spero, 2005; Fives et al., 2007; Klassen and Durksen, 2014; Lin and Gorrell, 2001; Pendergast et al., 2011; Garvis et al., 2012). Klassen & Chiu (2010) used a structural equation model with a sample of 1,430 in-service teachers and found an inverted u-shaped relationship; TSE rises for the first 25 years of teaching and then declines until

retirement. This could be due, for example, to new demands and related motivation deficits to engage in new methods and teaching practices (Klassen & Chiu, 2010).

This is in line with the hypothesis of some scholars that the formation of TSE beliefs is of a "cyclical nature" (Tschannen-Moran et al., 1998, p. 233). Positive mastery experiences positively influence efficacy beliefs, which in turn will lead to better performance and again higher levels of self-efficacy. By contrast, lower efficacy beliefs imply less persistence in challenging situations, which then leads to unsatisfying performance and, finally, even lower levels of self-efficacy (Tschannen-Moran et al., 1998). Once TSE for a specific situation or teaching task is established, it should be relatively stable. However, new challenges, together with new teaching tasks (job demands), always lead to a new evaluation of TSE (Tschannen-Moran et al., 1998).

Thus, TSE also depends on the perception of new job demands as threatening obstacles or as enjoyable challenges. Also, according to Bandura (2012, p. 13), "resilient self-efficacy requires experience in overcoming obstacles through perseverant effort." These findings, taken together, show that *job demands* also play an important role in the development of self-efficacy (see, e.g., Skaalvik & Skaalvik, 2019).

2.2.5 Teacher Self-Efficacy

As mentioned above, Bandura (2006a) also noted that self-efficacy is not a global but rather a context-specific construct that can vary inter- as well as intra-individually, depending on the context. For example, a teacher can feel very efficacious in teaching but not in raising their own children. Based on Banduras' social cognitive theory, TSE can be defined as "the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Tschannen-Moran et al., 1998, p. 233). TSE is the efficacy belief in the specific contexts of teaching (and not all efficacy beliefs of a teacher; Pfitzner-Eden et al., 2014). There is increasing interest in research on TSE (for a review, see Kleinsasser, 2014), and studies have been conducted all around the world, for example, in the United States (e.g., Tschannen-Moran & Woolfolk Hoy, 2007), Canada (e.g., Wang et al., 2015), China (e.g., Lai et al., 2016), and Europe (e.g., Schwarzer & Hallum, 2008).

Within the context of teaching, there is now consensus that three dimensions of TSE can be distinguished that are, to a certain degree, independent: efficacy for *classroom management*, efficacy for *student engagement*, and efficacy for *instructional strategies* (Tschannen-Moran & Woolfolk Hoy, 2001). Efficacy for *classroom management* refers to controlling disruptive student behavior to allow for the smooth running of the classroom. Efficacy for *student engagement* refers to the promotion and motivation of students, and efficacy for *instructional strategies* involves flexibility in adapting the level of teaching to different students, for example, in the context of inclusive education (Pfitzner-Eden et al., 2014; Tschannen-Moran & Woolfolk Hoy, 2001).

Through exploratory factor analysis, the three dimensions have evolved over many years, during which TSE came to be known as an "elusive construct" (Tschannen-Moran & Woolfolk Hoy, 2001, p. 801). The Ohio State Teacher Efficacy Scale (OSTES) was the first psychometrically valid and reliable instrument developed for the assessment of TSE (Tschannen-Moran & Woolfolk Hoy, 2001). However, researchers criticized the scale as not following the guidance in Bandura's (2006a) "Guide for constructing self-efficacy scales." Consequently, German researchers further developed the scale, especially with regard to item phrasing; items now refer more clearly to a teachers' confidence in executing a specific behavior by asking, "How certain are you that you can…?" (Pfitzner-Eden et al., 2014). This new scale, the Scale for Teacher Self-Efficacy (STSE), confirmed the three-factor structure of TSE.

Another recommendation by Bandura relates to the context-specific assessment of TSE. Teachers can feel very confident regarding classroom management and providing instructional strategies but less confident with regard to the needs of students with SEN, for example. Accordingly, a relatively new strand of research has developed specific TSE measures, for example, for the implementation of inclusion policy (Sharma et al., 2012) or SRL (De Smul et al., 2018). In the present thesis, I mainly investigated (general) TSE as a job resource but also attempted to gain insights into specific TSE such as TSE-EL. In all three empirical studies, TSE was regarded as a personal job resource in the context of current job demands and burnout.

In **Study I**, we analyzed a possible moderating effect of TSE as a job resource in the relationship between the number of students with SEN (job demand) and their teachers' burnout rates. TSE predicts lower concern for inclusive education (Savolainen et al., 2020), and has been shown to be negatively related to burnout in inclusive-education contexts (e.g., Sariçam & Sakiz, 2014). In light of the JD-R model of burnout, we, therefore, hypothesized that TSE could reduce the effect of the number of students with SEN on the development of burnout symptoms.

In **Study II**, we investigated TSE as a job resource during the COVID-19 pandemic, assuming that challenge of the pandemic context would have led to a reevaluation of TSE together with a significant increase in the experience of burnout. More precisely, we analyzed the interplay of the development of TSE and burnout from the pre- to post-outbreak period of the COVID-19 pandemic. The outbreak of the pandemic, related school closures, and further measures taken in response were unexpected and thus challenging (a job demand), and we were thus interested in their effects on changes in TSE (and burnout). Additionally, we introduced the specific TSE for using digital learning material as a more context-specific measure of TSE and examined its effect on the change of burnout and TSE as the intention to implement digital learning material in class has been shown to be related to its digital-learning self-efficacy (Van Acker et al., 2013). We assumed that this specific TSE had a significant impact during the pandemic because teachers feeling more confident with the use of digital learning material would have felt less stressed by the sudden implementation of OTL.

In **Study III**, we then analyzed individual differences in the specific TSE for e-Learning and A-EL in terms of prerequisites for OTL, according to the adaptation of the IMBP (Kreijns et al., 2013).

2.3 Interplay of Self-Efficacy and Burnout in Teachers

According to Llorens-Gumbau and Salanova-Soria (2014, p. 4), "one of the pivotal personal resources in stress and health processes is self-efficacy." As already mentioned in this thesis, burnout and self-efficacy are closely related (see Section 2.1.3 and 2.2.3). I will now take a closer look at their interplay and relevance for the present thesis.

Most studies that have investigated the relationship between self-efficacy and burnout have considered self-efficacy on a global level and analyzed its relationship

to the different components of burnout. A systematic meta-analysis by Shoji et al. (2016) found a mean association of $r = -.33$ between self-efficacy and burnout across different occupational groups whereby the type of occupation moderated the relationship; in teachers, the mean correlation was found to be $r = -.38$. Zee and Koomen (2016) reviewed TSE and its relationship to well-being in teachers and found a range of $r = -.17$ to $r = -.63$ for the relationship between TSE and burnout.

Research on the association between burnout and TSE has mainly focused on two methodological approaches: cross-sectional and longitudinal designs (such as cross-lagged panel designs). Cross-sectional studies have investigated the relations between TSE and burnout at the same point in time and have consistently found a negative relationship. Examples of these studies include Skaalvik & Skaalvik (2010), in which the authors found a correlation of $r = -.29$ between TSE and *emotional exhaustion* and a correlation of $r = -.41$ with *depersonalization* and Capone and Petrillo (2020), where the authors reported comparable results ($r = -.23$ for the correlation with *emotional exhaustion* and $r = -.35$ for the correlation with *depersonalization*). Additionally, Betoret (2009) reported a correlation of $r = -.64$ between TSE and *lack of accomplishment*. However, Schwarzer and Hallum (2008) found higher correlations: $r = -.48$ for *emotional exhaustion* and TSE, $r = -.56$ for *depersonalization*, and $r = -.75$ for *lack of accomplishment*.

The only study to date that has explored the relations of all dimensions of TSE together with all dimensions of burnout is Wang et al. (2015), in which the authors reported correlations ranging from $r = -.13$ to $r = -.43$; the highest correlation was between *lack of accomplishment* and TSE in relation to *student engagement* and the lowest between *emotional exhaustion* and TSE in relation to *instructional strategies.*

Cross-sectional studies shed light on the relations between specific components of TSE and burnout at one point in time, and these have consistently found a negative association, although the extent of this has varied slightly due to methodological issues like the instruments used for the assessment of TSE. However, they fail to answer the question of causality: Is TSE the antecedent of burnout, or is it the other way around?

This is where longitudinal designs come into play. Longitudinal studies try to capture the nature of the directionality between both constructs. One of the first

longitudinal studies in this area found an effect on the sense of depersonalization of self-efficacy for classroom management after five months (Brouwers & Tomic, 2000). Moreover, the level of self-efficacy predicted accomplishment at the same time point (synchronous effect). However, the relationship between emotional exhaustion and TSE for classroom management was reversed; the former predicted the latter (synchronous). No longitudinal relations were found between accomplishment and emotional exhaustion and TSE for classroom management (Brouwers & Tomic, 2000).

However, applying a cross-lagged panel design with latent variables, Schwarzer & Hallum (2008) found support for TSE as an antecedent of burnout in teachers (−.26) and no support for the relationship in the other direction (.00). Moreover, in this study, job stressors mediated the link between self-efficacy and burnout. In a cross-lagged panel design with a sample of 274 secondary school teachers, Llorens-Gumbau and Salanova-Soria (2014) found a "gain cycle" in which self-efficacy was central: teachers who were self-efficacious at T1 reported more "organizational facilitators" (the opposite of obstacles; e.g., easy access to necessary materials) at T2. Moreover, these facilitators were related to greater engagement (as the opponent of burnout) and again higher TSE at T2. The study by Malinen and Savolainen (2016) supports these findings: self-efficacy for managing student behavior significantly predicted emotional exhaustion three months later.

A study by Kim and Burić (2020) again supports the assumption of burnout as the antecedent of TSE: in an autoregressive cross-lagged panel design with three points in time, exhaustion and depersonalization consistently predicted TSE but not vice versa. Additionally, these relations were not moderated by gender or stage of career. These findings are in line with a study by (Dicke et al., 2015b) where a latent change model was applied with a sample of 1,740 student teachers. Here, earlier TSE did not predict changes in emotional exhaustion, but the opposite relationship was evident: earlier emotional exhaustion predicted changes in TSE.

Obviously, the findings of longitudinal studies that aim to capture the directionality of the relation between TSE and burnout are mixed, and it seems as if the results differ in particular between the constructs' dimensions. Moreover, the studies assuming that TSE is not an antecedent of burnout are hard to interpret; Dicke et al. (2015) only investigated emotional exhaustion, and Kim and Burić

(2020) implemented a measure other than the MBI for burnout. However, based on the sources of TSE identified by Banduras (1977; see Section 2.2.4), it is also evident that feelings of emotional exhaustion (as a physiological state) can lead to a decrease in self-efficacy. To date, it cannot be clearly determined whether high TSE is the antecedent of low burnout or the other way around. It is likely that the nature of this interaction is too complex to measure and varies greatly between teachers (e.g., depending on such factors as their career stage; see Fives et al., 2007; Dicke et al., 2015b). Thus, we should speak of a reciprocal relationship between TSE and burnout.

The present thesis, therefore, investigates TSE, burnout, and their interplay for two current challenges faced by teachers. First, we analyzed whether TSE could serve as a buffer against burnout in the context of inclusive education (**Study I**)**.** Second, we used the context of the outbreak of COVID-19 as a time frame to investigate changes in TSE and burnout, as well as the interaction of these changes during a challenging time (**Study II**). Finally, a person-centered approach was applied to investigate whether profiles in A-EL and TSE-EL could explain differences in burnout symptoms during the pandemic **(Study III).**

3. Research Aims

In light of the theoretical background provided in the previous sections, the overall aim of this thesis is to investigate teacher burnout and TSE as well as their interrelation in the context of two main current demands – inclusion and OTL. Research gaps were identified in the literature review and addressed in three empirical studies. The first study was embedded within the context of inclusion and the others within the current challenge of OTL during the COVID-19 pandemic. The concrete research aims for Study I–Study III are set out in the following.

3.1 Study I

The implementation of inclusive education can be very challenging for general education teachers. They have to deal with many individual and special needs in class, learn new methods to do so, and in general, do not feel well prepared. However, to the best of my knowledge, research has focused on the effects of students with SEN on burnout in special education teachers but not, so far, in general, education teachers. Therefore, in the first empirical study of this thesis, the

effect of the number of students with SEN (*job demand*) on burnout symptoms in teachers was investigated. As students with emotional needs are one of the greatest challenges in daily inclusive teaching, these were included in the investigation. Further, as previous findings suggest that TSE is a buffer against burnout, the study analyzes whether TSE (*job resource*) could buffer the effects of students with SEN and emotional needs on burnout symptoms in general education teachers. This interaction hypothesis was derived in line with the JD-R model of burnout.

3.2 Study II

Another current challenge, and the objective of Study II, is teaching with digital materials, specifically OTL, during the COVID-19 pandemic. In light of the challenging circumstances of the pandemic, which led to school closures and thereafter OTL, we were particularly interested in individual changes in teachers' well-being in terms of burnout and TSE during this time. The sudden school closures were completely unexpected, which made their impact particularly interesting to research. While other studies have investigated teachers' well-being (e.g., burnout) during the pandemic, to the best of our knowledge, no other study has modeled changes in burnout and TSE and their interrelations during such a major educational rupture. Moreover, the role of OTL has been neglected so far. Since we assumed that OTL was one of the major stressors during this time, we further investigated the role of A-EL as well as specific TSE for the use of digital media in changes in levels of burnout and general TSE.

3.3 Study III

In the third empirical study, we took a closer look at attitudes toward e-Learning and TSE for e-Learning. In light of the IMBP that has been adopted for teaching with ICT, we considered A-EL and TSE for e-Learning as relevant prerequisites for OTL during the pandemic. Accordingly, we investigated individual differences in these prerequisites in order to identify different teacher profiles (see Sections 4.3.3 and 5.3 for more information). We were further interested in whether we could find differences between those profiles in relation to other variables. In that respect, we were particularly interested in differences in teachers' burnout and subjective experience of stress but also in their OTL implementation competency.

Other studies have analyzed individual differences in prerequisites for OTL, but we assume that the IMBP is the most appropriate basis for doing so.

4. Methods

This chapter details the data collection procedure for the entire thesis, since the empirical studies share a common database. An overview of the instruments used is also presented. The methodical approaches for the three empirical studies are presented in more depth before the studies are briefly summarized in Chapter 5.

4.1 Procedure

The three empirical studies that form the basis of the present thesis were all part of the project “BeHSaar” (Besondere Herausforderungen Saarländischer Grund- und Gemeischaftsschulen [Special Challenges of Elementary and Community Schools in the German federal state Saarland]) financed by the Ministry of Education in Saarland. In this project, we collected data at an interval of approximately six months from, amongst others, teachers. The first data collection began in October 2019 and ended in December 2019, and the second data collection started in May 2020 and was completed at the end of June 2020. For both collections, we used online questionnaires that were created with Questback Unipark. Teacher participation was voluntary. We sent the links for the survey questionnaires via mail to the school principals, requesting that they distribute the link amongst their colleagues. All data were handled according to the ethical standards of the Ethics Committee of the Faculty for Empirical Human Sciences and Economical Sciences (Saarland University) as well as the data protection committee of the Ministry of Education in Saarland.

For the regression models in Study I, data from the first measurement period were used (N = 319). The LPA in Study III was based on data from the second measurement period (N = 169), and the data collected from teachers that participated in both measurement periods (N = 92) were the basis of the latent change regression model in Study II. Table 1 provides an overview for each measurement period and sample, and the constructs that were covered. The instruments used are depicted in Section 4.2.

Table 1

Overview of Time of Measurement, N, and Constructs

Time	**Main Constructs/Variables**	
Measurement Period 1 (October 2019 - December 2019) *N* = 319 teachers	Age	*M* = 39.43; *SD* = 9.90
	Gender	74.3% women
	Teaching experience	*M* = 10.66; *SD* = 8.63
	School level	44.8% secondary school teachers
	Burnout	
	TSE	
Measurement Period 2 (May 2020 – June 2020) *N* = 169 teachers	Age	*M* = 41.69; *SD* = 10.47
	Gender	76.6% women
	Teaching experience	*M* = 9.55; *SD* = 9.85
	School level	55.3% secondary school teachers
	Burnout	
	TSE	
	TSE for using digital media	
	Attitudes towards e-Learning	
	Implementation competency	
	Perceived success with OTL	
	Stress related to the COVID-19 situation	

Note: *N* refers to the adjusted sample sizes.

4.2 Questionnaires

In this section, I have included all questionnaires used in the first and second data collections. Questionnaires were administered online and were all ranked using a 6-point Likert scale (ranging from 1 = “agree entirely” to 6 = “don’t agree at all”). For ease of interpretation, we recoded all items in a reordered scale (from 1 = “don’t agree at all” to 6 = “agree entirely”). Internal consistency was assessed using Cronbach’s alpha for all measurement points. Instruments together with exemplary items and alpha value for each study sample are set out in Table 2.

The COVID-19 pandemic (and thus the associated relevance of OTL) occurred after the first data collection. Therefore, we used additional instruments in the second data collection (for Study II and III) to capture the specificities of the new context. While most of the scales used were already in use and well-known, we had to adapt and develop three new scales.

Specific TSE scales for OTL during the pandemic had obviously not yet been developed, which is why we had to look for scales in the general context of ICT. To the best of our knowledge, there are no psychometrically tested instruments for specific TSE in such a context. Most often, scholars have utilized three items referring to the use of digital media (Van Acker et al., 2013; Kreijns et al., 2014), which we translated and implemented in our study as well. The resulting scale, to which we added one content-wise inversed item (“Using digital media for teaching is very difficult for me”), was named “TSE for using digital media”.

However, this context (using digital media) was rather narrowly defined, and we were afraid that it would not be fully applicable to the context of OTL. We thus wanted to implement another broader measure of TSE for e-Learning. Doing so, we adapted a valid German TSE measure (Schwarzer & Schmitz, 2000) and reframed for the context at the beginning of the items (“*When it comes to e-Learning*, I know that I can get the relevant material across to even the most problematic students”).

Finally, we developed four items asking about stress experienced due to the pandemic (“I do not feel burdened by the school situation because of Covid-19”).

Table 2

Overview of the Instruments for Each Study

Construct	Instrument	Subscales	Item example (*n*)	Cronbach's α		
				Study I	Study II	Study III
Teacher Self-Efficacy	STSE (Pfitzner-Eden et al., 2014)	Classroom Management	"I manage to control disruptive behavior in class" (4)	.87	T_1 =.88 T_2 =.86	/
		Student Engagement	"I can motivate students who have little interest in education" (4)	.81	T_1 =.83 T_2 =.77	/
		Instructional Strategies	"I am able to provide an alternative explanation or another example when students are confused" (4)	.74	T_1 =.65 T_2 =.66	/
TSE for e-Learning	Modification of items by Schwarzer & Jerusalem (1999)	/	"When it comes to e-Learning, I know that I can get the relevant material across to even the most problematic students." (8)	/	/	.84

Construct	Instrument	Subscales	Item example (*n*)	Cronbach's α		
				Study I	Study II	Study III
TSE for digital media	Adapted according to Van Acker et al. (2013)	/	"I know that I can easily create digital learning environments" (4)	/	.87	/
Attitudes toward e-Learning	(Mishra & Panda, 2007)	/	"e-Learning can solve many of our educational problems." (11)	/	/	.93
Teacher Burnout	MBI-ES (Enzmann & Kleiber, 1989)	Emotional Exhaustion	"My work frustrates me" (9)	.87	T_1 =.86 T_2 =.88	.88
		Depersonalization	"I think I treat some students to some extent impersonally" (5)	.71	T_1 =.73 T_2 =.68	.71
		Lack of Accomplishment	"I succeed well in putting myself in the position of my students" (8)	.79	T_1 =.83 T_2 =.73	.75
Stress	Self-generated	/	"I do not feel burdened by the school situation because of Covid-19" (4)	/	/	.72
TPACK	TPACK-DEEP (Yurdakul et al., 2012)	Exertion	"I can apply instructional approaches and methods appropriate to individual differences with the help of technology" (12)	/	/	.91
Success with OTL	ZfA (2020)	/	"I can observe learning success in the students." (11)	/	/	.89

4.3 Data Analysis

The following section briefly addresses specific methodological aspects of the empirical studies and, with reference to the hypotheses, the statistical analyses of these studies is then presented.

4.3.1 Study I

For the purpose of the first study, we first analyzed if our missing data (7.28%) were missing systematically, at random (MAR), or completely at random (MCAR). Data that is MAR means that missingness (or not) is possibly related to other variables in the dataset but not to unobserved ones. MCAR is a specific form of MAR in which missingness does not systematically depend on variables that are observed. Data that is, instead, missing not at random (MNAR) is called "nonignorable" because missingness here depends on unobserved data (Graham, 2009). Little's (1988) MCAR test for our data yielded a significant result ($\chi 2$ = 10822.35, df = 10413, p <.01), implying that our missing values were not MCAR but rather MAR, thus missingness was possibly related to observed data. In order to maintain power, we decided on multiple imputations (MI). In MI procedures, missing values are replaced by m (number of imputations) plausible values, each time creating a complete data set. Parameters are then estimated for each different dataset and for all datasets together (Schafer & Graham, 2002). For our data, we imputed m = 5 alternative datasets with 500 iterations using SPSS and interpreted the pooled results for all datasets when analyzing the general linear regression models.

Second, before computing statistical analyses to answer the research questions, we verified the factorial structure of the STSE for our sample of in-service teachers; the STSE has primarily been validated in samples of pre-service teachers (Pfitzner-Eden et al., 2014). Confirmatory factor analysis (CFA) is commonly used for this purpose. CFA is a form of structural equation modeling (SEM) and investigates the validity of a theoretically derived measurement model (e.g., instruments) between manifest (observed) variables and higher-level latent (unobserved) factors. In latent variable modeling, any shared variance between manifest variables is completely attributable to the latent factors, which results in more economical measurement models (Brown & Moore, 2012).

In order to analyze if the measurement model fits the empirical model, covariance matrices of the models were estimated and compared. The model fit finally "determines the degree to which the structural equation model fits the sample data" (Schermelleh-Engel et al., 2003, p. 23f). However, there is no single indicator for the goodness of a model's fit, but many different that can be taken into account when interpreting the results of a CFA. A common indicator is a chi-square ($\chi 2$) test, which determines if the covariance matrix of the populations is identical to that of the measurement model (null hypothesis). A significant result then indicates that the covariance matrices clearly differ. However, to account for problems of the chi-square distribution related to sample size, the number of parameters, and the assumption of multivariate normality, scholars have recommended considering the chi-square value in dependence on the degrees of freedom (Schermelleh-Engel et al., 2003).

Other goodness-of-fit indices have been developed that provide other important information about the model fit, the root-mean-square error (RMSEA), the comparative fit index (CFI), the standardized root-mean-square residual (SRMR), to name a few common ones (Brown & Moore, 2012). A good model fit is said to be indicated by a $\chi 2/df$-ratio below 2, RMSEA below .05 (acceptable below .08), SRMR below .05 (acceptable below .10), and a CFI greater than .97 or at least .95 (Schermelleh-Engel et al., 2003; Brown & Moore, 2012).

For the STSE, we conducted the CFA in MPlus7 (Muthén & Muthén, 2012) using maximum likelihood parameter estimation. Our hypothetical model assumed that the 12 manifest variables have three latent first-order factors (instructional quality, classroom management, and student engagement) and an overall latent second-order factor. The measurement model yielded a good fit to the empirical data ($\chi 2/df$-ratio = 1.76, RMSEA =.05, SRMR =.04, CFI =.95).

Third, we conducted a statistical analysis that fitted our hypotheses concerning the interaction of TSE and the number of students with SEN/emotional needs on burnout in teachers. We wanted to account for our nested data structure (Level 1: n = 319 teachers; Level 2: n = 23 schools) and thus planned on conducting multilevel linear models, otherwise called Hierarchical Linear Models or Mixed Models.

A stepwise procedure is recommended when using multilevel models. This should proceed from a simple model to increasingly complex models, mainly differing with regard to fixed or random intercepts and slopes (Raudenbush & Bryk, 2002). In a general linear model, it is assumed that intercepts, as well as slopes, are fixed, which means that the same regression equation is valid for the whole sample. Where intercepts and slopes are random, their values can vary between different groups within the sample (e.g., across schools). Accordingly, multilevel models can have random intercepts with fixed slopes, fixed intercepts with random slopes, or random intercepts and slopes. A basic equation for a multilevel regression model with random intercepts and slopes would be: $Yij = (b0 + u0j) + (b1 + u1j)Xij + \varepsilon ij$ (Field et al., 2012).

However, based on simulation studies, some authors recommend that multilevel analyses should not be conducted with fewer than 50 groups on Level 2 because it leads to estimation biases (Maas & Hox, 2005). Furthermore, there is no advantage to using multilevel models when there is little variation between the groups on Level 2 (Field et al., 2012). Other researchers have argued that "for testing the effect of a level-one variable, the level-one sample size is of main importance" (Snijders, 2005; p. 2). General linear regression would also be biased because it cannot account for the hierarchical structure of our data and the variability that is attributable to teachers being in different schools.

Due to ambiguous indicators, we decided to conduct general linear as well as multilevel models and compare the results. Consequently, we worked up the models from a simple baseline model (fixed intercepts and slopes) to more complex models (random intercepts and/or slopes) using the lme4 package (Bates et al., 2015) in R (R Core Team, 2019). As recommended, we had previously centered the Level-1 predictors (number of students with SEN/emotional needs and TSE) at the group-mean to remove between-subject variance (Enders & Tofighi, 2007). The models were set up for each dimension of the MBI separately. In the baseline models, we calculated the intraclass correlation (ICC) as an indicator of the need for a multilevel model. The ICC for the baseline models were rather small, which means that only a small part of the variance in the burnout dimensions could be attributed to the differences in schools (depersonalization = 2%, lack of accomplishment = 1%, emotional exhaustion = 3%) (Arend & Schäfer,

2019; Field et al., 2012). Nevertheless, we continued with the models with random intercepts and fixed slopes, fixed intercepts and random slopes, and lastly, random intercepts and slopes using maximum likelihood estimation. These models were compared using likelihood ratio tests (Field et al., 2012), resulting in the best fits for random intercepts and slopes for all three dimensions. We then tested our hypotheses using these models.

4.3.2 Study II

In the second study, in which we were interested in individual changes during the COVID-19 pandemic, we followed a longitudinal approach and decided to implement a Latent Change Regression Model (LCRM; McArdle, 2009). LCRMs are dynamic structural equation models and strongly recommended for the assessment of change, particularly in complex theories in which several ongoing processes are hypothesized to be interrelated (Ferrer & McArdle, 2010).

LCRMs are mainly based on latent change score or latent difference score models (McArdle & Nesselroade, 1994), where change is specified as a latent difference between at least two time points. However, and what is special about LCRM, is the latent difference score is then regressed on the first timepoint to allow a base-free measurement of change. This procedure is particularly recommended when the change that is measured had not started before the first measurement (as is the case with changes prompted by the pandemic, which cannot have influenced our first measurement in late 2019). The main advantage of latent change score or latent regression score models is that they capture dynamic processes: the change in different constructs can be assessed at the same time as the interrelations of change. Moreover, predictors or correlates of change can be implemented in the models.

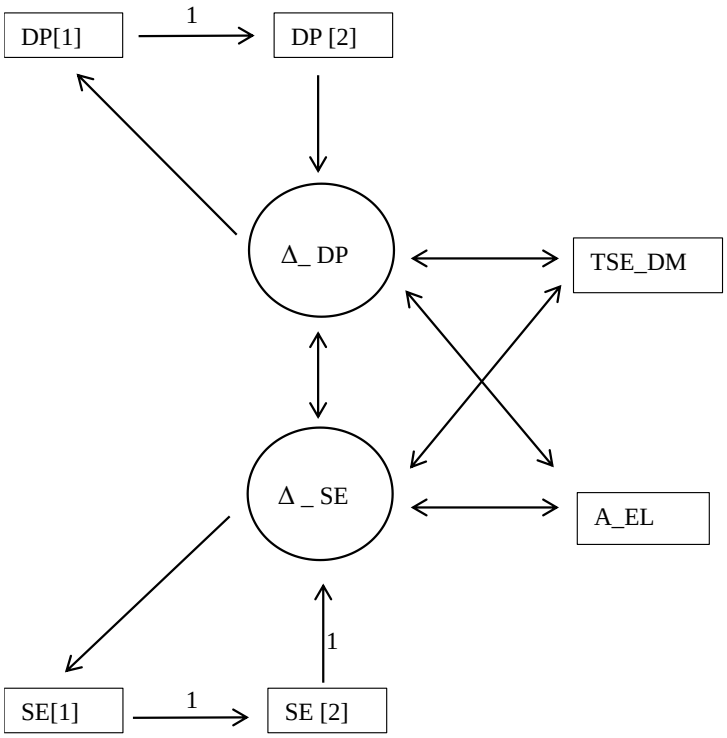
Accordingly, we investigated a model in which changes in burnout (*emotional exhaustion, lack of accomplishment, depersonalization*) and TSE (*classroom management, student engagement, instructional quality*) were measured from pre- to post-outbreak period. Interrelations of change in these variables (subscales) were analyzed as well as possible correlates of change (TSE for e-Learning and A-EL). Correlations between subscales and difference scores were consistently allowed, which resulted in a saturated model (*df* = O). Figure 2

depicts an exemplary part of the LCRM, where interrelations between constructs and interrelations between latent change scores and constructs are apparent.

Power was assessed using the results of the LCRM in a Monte Carlo Study with 10,000 replications (Zhang & Liu, 2019). Here, the power is defined as the number of repetitions where α is smaller than .05. Values of .8 are considered optimal, and a power of .5 is sufficient (see Kyriazos, 2018). The results of the power analysis are presented in detail in Section 5.2.3.

Figure 2

Exemplary Representation for the LCRM with Depersonalization and Student Engagement



Note. DP = depersonalization (burnout), TSE_DM = TSE for using digital media, A_EL = attitudes towards e-Learning, SE = student engagement (TSE), Δ = latent change score.

4.3.3 Study III

In the third study, the main methodological approach was a LPA in which we modeled individual differences in prerequisites for OTL. In the classic variable-centered approaches (e.g., regression and correlation), variance in variables is explained for a whole sample which is assumed to be homogeneous. In variable-centered approaches such as LPA, the systematic relations of variables within individuals are investigated (Meyer et al., 2013). However, both approaches can be combined within one study to gain even more insight.

In LPA, class membership is modeled as a latent variable to which every variable in the model contributes. Individuals with comparable response patterns are then clustered into the same latent classes. Comparable to cluster analysis, the aim of an LPA is to generate a minimum of clusters or profiles with different response patterns and thereby reduce data complexity. As already mentioned, this approach can also be combined with a variable-centered approach in a further step. For example, latent classes can be analyzed regarding differences in other variables.

In our study, we conducted an exploratory LPA in the MPlus7 software (Muthén & Muthén, 2012) using maximum likelihood parameter estimation. In our exploratory LPA, we estimated models with two to seven classes because we had no specific hypothesis to confirm. Starting values were first set to 500 and then to 50 to avoid local maxima. The number of iterations was set to a maximum of 50. The models with two to seven classes were then compared with regard to relative model fit; thus, we compared models with *k* classes to the subsequent model of *k-1* classes. Following Nylund et al. (2007), we used the bootstrap-likelihood-ratio-difference test (BLRT) to define the model that best fits our data. Applying a bootstrapping method, the BLRT examines *p-values* for the difference of likelihood ratios for models with *k* classes vs. models with *k-1* classes. Accordingly, the test is significant when the model with *k* classes has a better model fit than the model with *k-1* classes. We then used the Bayesian Information Criterion (BIC; lower values indicate better model fit) as another statistical criterion (see Section 4.3.1). Finally, entropy is a measure of the quality of the classification and can take values between 0 and 1, whereby higher values indicate

a better classification. However, decisions on the number of classes should also consider meaningfulness in terms of content as well as ecological considerations. Additionally, we implemented a variable-centered approach and conducted MANOVAs with the latent class membership as a group variable and investigated differences with regard to burnout, stress, success with OTL, and TPACK.

5. Empirical Studies

In light of the overall aim of this thesis – investigating teacher burnout and TSE as well as their interrelations in the context of two major current demands – three empirical studies were conducted that will be briefly summarized here. In each study, I was the first author.

5.1 Study I

Weißenfels, M., Benick, M. & Perels, F. (2021). Can teacher self-efficacy act as buffer in inclusive classrooms? *International Journal of Educational Research, 109*, 101794. https://doi.org/10.1016/j.ijer.2021.101794

Abstract

The main aim of this study was to analyze if the relationship between students with special educational needs (SEN), especially students with 'emotional needs', and the high burnout rates of teachers is moderated by teacher self-efficacy (TSE). The moderated regression analyses did not reveal significant interaction effects, but we found, for instance, a strong relationship between depersonalization and number of students with SEN and replicated the negative relationship between self-efficacy and burnout in todays' inclusive classrooms. Findings illustrate once more the relevance of TSE for teachers' health as well as for the successful implementation of inclusion. Given the stresses of today's classrooms, more research should be dedicated to the question of how to prevent teacher burnout.

5.1.1 Context and Aims

The UNESCO resolution for the systematic implementation of inclusive education was adopted in Germany in 2017. It guarantees the right of every child to be educated and develop their potential – regardless of special learning needs,

gender, or social and economic conditions – while reducing exclusion (UNESCO, 2014). Teachers are certainly of incomparable significance for the realization of inclusion (Malinen et al., 2012) and have to be able to respond to diverse needs. There are nine categories of SEN; the special needs related to "emotional and behavioral development" is, with 14.3%, one of the broadest categories and is characterized by problems in social behavior and emotionality (Ellinger & Stein, 2012).

The inclusion of students with special needs is a challenge (job demand) in everyday classrooms for today's teachers (Lai et al., 2016). They feel badly prepared for dealing with diverse needs (Lancaster & Bain, 2007) and have neutral to negative attitudes towards inclusion (De Boer et al., 2011), which, in turn, go hand in hand with low self-efficacy beliefs (Malinen et al., 2012). Thus, the implementation of inclusion implicates many additional tasks that can lead to overload and burnout symptoms in teachers (Brunsting et al., 2014). Regarding special education teachers, there is evidence that the number of students with SEN in class predicts teachers' burnout rates (e.g., Coman et al., 2013; Talmor et al., 2005).

TSE as a *job resource* is a longitudinal predictor of positive attitudes and lower levels of concern about inclusive practices (Savolainen et al., 2020). TSE is also closely related to the successful implementation of inclusive practices; teachers with high TSE respond more adequately to the needs of their students (e.g., Kiel et al., 2019; Almog & Shechtman, 2007; Woodcock et al., 2019). There is also evidence for the negative relation of TSE and burnout in inclusive contexts (Sariçam & Sakiz, 2014; Ruble et al., 2011; Boujut et al., 2017).

These findings, taken together, suggest that TSE is a relevant antecedent, and burnout a crucial consequence, in the context of inclusion. Moreover, there is evidence for TSE's buffering effect on burnout in general, as well as in the context of inclusion. However, up to now, no study has investigated the effects of the demands on general education teachers that come with inclusion. Considering the JD-R model of burnout (Demerouti et al., 2001), the additional demands of meeting diverse needs (job demands) could lead to severe emotional exhaustion for general education teachers, especially because they are ill-prepared for these tasks. At the same time, high self-efficacy could act as a job resource in coming

up with these tasks and could thus buffer the effects of the additional demands. Thus, teachers simultaneously experiencing high demands with low self-efficacy, would very likely develop symptoms of burnout. Consequently, the aim of our study is to analyze the effect on burnout in teachers of the interaction of the number of pupils with SEN (*job demand*) and TSE (*job resource*). We assume that the number of students with SEN predicts burnout in teachers (**Hypothesis 1a)** and that this effect can be buffered by TSE (**1b**). Moreover, we assume the same for a special group of SEN: students with emotional needs (**Hypothesis 2a + b**) against the background of behavioral problems being the most challenging teaching task (Lai et al., 2016).

5.1.2 Methods

Our study included n = 319 voluntarily participating teachers – 74.3% women, ranging in age from 25 to 65 years (M_{age} = 39.43, SD_{age} = 9.90) – from 23 schools (44.8% secondary schools) who filled out an online questionnaire. They had to state how many students with SEN (M = 4.70; SD = 4.60) and, in particular, emotional needs (M = 1.91; SD = 2.43) they had taught in the preceding year. Teachers then filled out the three scales of the Maslach Burnout Inventory (MBI; Maslach et al., 1996) as well as the STSE by Pfitzner-Eden et al. (2014). Internal consistency, as specified by Cronbach's alpha, was satisfied for all scales (see Table 2).

School level (primary vs. secondary school) was entered as a covariate because primary school teachers were significantly younger (t = − 3.13, p <.01), experienced less burnout (t = - 2.23, p <.05) and more TSE (t = 2.70, p <.01). Because of a significant MCAR test (Little, 1988), which indicated our missing data to be MAR we conducted five imputations with 500 iterations each.

Further, we conducted multilevel analyses with R (R Core Team, 2019) using the lme4 package (Bates et al., 2015). The general linear regression models were set up in SPSS due to easier application.

5.1.3 Results

Using a CFA, we investigated if the factorial structure of the STSE was valid in a sample of in-service teachers. The model yielded satisfactory results and

confirmed the structure for our sample (χ^2/df-ratio = 1.76; RMSEA = .05, SRMR = .04, CFI = .95).

Manifest interrelations of all variables indicated positive relations within subscales of burnout (r >.46, p <.01), and negative relations between subscales of burnout and TSE (r > -.32, p <.01). The number of students with SEN was positively related to emotional exhaustion (r =.14, p <.05) and depersonalization (r = .18, p < .01). The number of students with emotional needs, was positively related to emotional exhaustion (r = .21, p <.01), depersonalization (r = .17, p <.01), and lack of accomplishment (r = .15, p <.05) as well as negatively to TSE (r = − .14, p <.05).

For all analyses, we estimated multilevel and general linear models which provided comparable results (for detailed results see Appendix 9.1). We found no significant interaction between the number of students with SEN and TSE in predicting the burnout subscales (**Hypothesis 1**) - neither in the multilevel nor in the general linear models. The same applies to the number of students with emotional needs (**Hypothesis 2**).

However, TSE consistently predicted burnout subscales (p <.001). Moreover, we found that the number of students with SEN significantly predicted emotional exhaustion in the multilevel model (b = .03, p <.05) and depersonalization in the general linear model (β = .19, p <.05) as well as the multilevel model (b = .03, p <.05). The number of students with emotional needs significantly predicted emotional exhaustion in the general linear model (β = .29, p <.05) as well as in the multilevel model (b = .08, p <.05). Depersonalization was only significantly predicted by the number of students with emotional needs in the general linear model (b = .14, p <.05). Lack of accomplishment was not significantly predicted in any analysis.

5.1.4 Discussion

This study aimed to investigate the effect of inclusive classrooms in terms of the number of students with SEN and emotional needs on burnout in general education teachers and the potential buffering effect of TSE.

Our results indicate that the number of students with SEN and emotional needs particularly affect depersonalization in teachers, which is in line with previous research in special education teachers (Talmor et al., 2005) and with

meta-analytical findings considering students' disruptive behavior (Aloe et al., 2014). Rather, emotional exhaustion seems to be impacted by students with emotional needs, which implies that it is also the quality of a students' need, and not only the quantity of those students in class that affects burnout. Lack of accomplishment seems not to be affected in our sample, which is in line with high TSE rates that are consistently negatively related to the burnout dimensions. This finding fits the assumptions of the JD-R model of burnout in which it is stated that lack of accomplishment develops due to a lack of resources, whereas the other dimensions are linked with high job demands (Demerouti et al., 2001).

An important limitation of this study that must be considered when interpreting the findings is the assessment of the number of pupils with SEN and emotional needs. We asked teachers to estimate these numbers subjectively to gain insight into their subjectively experienced stress and related burnout. Therefore, it is possible that especially stressed teachers overrated this number. Moreover, the number referred to the preceding school year; burnout develops through long-term stressors and not from one week to the next (Maslach et al., 2001).

Future research should address whether teachers with burnout symptoms overestimate the number of students with SEN in their class to determine if it is, in fact, the *number* of students that leads to depersonalization and emotional exhaustion in teachers or, if exhausted teachers tend to feel more rapidly stressed, overestimate their teaching load in terms of students with special needs and consequently respond badly to the needs of their students. This is crucial to differentiate because teachers already feeling exhausted and overestimating their demands in daily teaching are caught in a vicious circle of high demands and exhaustion. One way to cope would be to analyze the triggers in daily teaching and to learn how to regulate the emotions that arise (Chang, 2009). Moreover, we know that the behavior towards students changes in burned-out teachers, which can have significant impact on a students' career (Klusmann et al., 2016).

With this study, we underlined the relevance of TSE in the context of inclusion even if the results did not support our hypothesis of an interaction. TSE as a job resource was highly related with a lack of accomplishment, which was, however, not associated with the demands of inclusive teaching. This finding

shows that we always have to consider the demands and resources of teachers simultaneously and both have to be addressed to prevent and address burnout symptoms. As already pointed out by Bakker et al. (2007) job resources seem to be especially relevant in contexts where job demands are high.

5.2 Study II

Weißenfels M., Klopp E. and Perels F. (2022). Changes in teacher burnout and self-efficacy during the COVID-19 pandemic: Interrelations and e-learning variables related to change. *Frontiers in Education, 6*, 736992. https://doi.org/10.3389/feduc.2021.736992

Abstract

Although the reciprocal relationship of teacher burnout and teacher self-efficacy (TSE) is well documented, the literature still lacks studies investigating their (latent) changes and interrelations of change over time. By applying a latent change regression model in our study, we aimed to contribute to this research gap by examining changes in burnout and their relations to changes in TSE during the COVID-19 pandemic—a very challenging time for teachers. As the implementation of digital learning material played a major role during the pandemic, we were also interested if attitudes and self-efficacy toward e-Learning were related to changes in burnout and TSE. Our sample consisted of 92 German inservice teachers who completed a questionnaire twice during the 2019–2020 school year. Our main findings are that the burnout components depersonalization and lack of accomplishment significantly increased from the pre- to post-COVID-19 outbreak, whereas emotional exhaustion did not. Changes in burnout were negatively correlated to changes in TSE, but we found little evidence for relations of change in burnout and TSE with variables concerning e-Learning. Our findings indicate that the challenge was not the work overload but rather a lack of resources. Implications for research and practice are discussed.

5.2.1 Context and Aims

The COVID-19 pandemic has been described as one of the greatest challenges of our time (Saha & Dutta, 2020). However, there are as yet few

empirical studies that have investigated the psychological consequences of the pandemic for teachers (e.g., Allen et al., 2020; Hansen et al., 2020; Kim et al., 2021; Sokal et al., 2020a; Sokal et al., 2020b). Teachers were among those most affected by pandemic measures: schools were closed in 194 countries worldwide (UNESCO, 2020), and accordingly, teachers had to switch very quickly to OTL and support their pupils from a distance. The latter, in particular, could have led to increased emotional workload (Müller & Goldenberg, 2020) and very likely resulted in feelings of depersonalization.

Considering the JD-R model of burnout (Demerouti et al., 2001), the demands of the implementation of OTL could have led to emotional exhaustion in teachers and consequently intensified the effects of depersonalization and lack of accomplishment, especially if resources such as TSE were low. The pandemic offered an opportunity to analyze the development of burnout as well as its interaction with TSE in unique circumstances. Other studies that have investigated the well-being of teachers during the pandemic have neglected the role of OTL (e.g., Sokal et al., 2020b).

Following the adapted IMBP, Kreijns et al. (2013) assume that context-specific TSE together with corresponding attitudes and a perceived norm (e.g., social pressure) are the main determinants of the intention to use ICT. These are thus also the determinants for the use of OTL, which is why we consider both constructs as relevant influential variables.

The aim of this study was, on the one hand, to investigate changes in burnout components during the pandemic and their relation to changes in TSE and, on the other hand, to analyze whether changes in TSE and burnout, thus the degree in which they in-/ or decreased were related to teachers' A-EL as well as their specific TSE for using digital media.

5.2.2 Methods

This study comprised a sample of n = 92 teachers who participated in the online questionnaire at both measurement time periods: before the outbreak of the pandemic in December 2019 and in May 2020, when schools in Germany reopened in stages. Teachers ranged in age from 26 to 64 years (M = 40.19; SD = 9.63), had 10 years of teaching experience (M = 10.78; SD = 8.25) and 82% were women. Due to inconclusive findings regarding differences in burnout with

respect to gender (e.g., Fernet et al., 2012; Lau et al., 2005) and years of teaching experience (e.g., Klusmann et al., 2008; Lau et al., 2005), we included gender and teaching experience as covariates for our analyses.

The subscales of the MBI (Enzmann & Kleiber, 1989) and STSE (Pfitzner-Eden et al., 2014) had satisfactory internal consistency at both time periods (see Table 2). Moreover, we implemented a self-generated 4-item measure for the context-specific TSE and a scale for the assessment of teachers' A-EL by Mishra & Panda (2007) at the second time period.

In order to investigate our research questions, we applied an LCRM (see Section 4.3.2; McArdle, 2009) and 1) analyzed the latent-change scores of the MBI and TSE subscales and 2) their relations to A-EL and the specific TSE. A post hoc power analysis was performed on the basis of the LCRM results by means of a Monte Carlo Study (10,000 replications; see Zhang & Liu, 2019).

5.2.3 Results

As expected, the means of the latent difference scores in the subscales lack of accomplishment (M = .53, SE = .16, p <.001, power = .97) and depersonalization (M = .94, SE = .26, p <.001, power = .99) were significant and positive, which implies a significant increase. However, an increase in emotional exhaustion was not found (M = −.24, SE = .26, p = .357, power = .11). Moreover, the latent change scores of the burnout subscales were consistently negatively related to the latent change scores of the TSE subscales (see Table 3). Since the latent change scores for TSE also indicate an increase from the pre- to post-outbreak period of the COVID-19 pandemic (Δ _CM: M = 2.49, SE = .41, p <.001, power = .99; Δ _SE: M = 2.31, SE = .49, p <.001, power = .98; Δ _IS: M = 2.04, SE =.36, p <.001, power = .99), we can conclude that higher increases in burnout subscales are related to less of an increase in TSE subscales during the pandemic.

Table 3

Correlation of Latent Difference Scores for MBI and TSE Subscales

	Δ_CM	Δ_SE	Δ_IS
Δ_EE	−.40***	−.21†	−.40***
power	.88	.33	.99
Δ_LA	−.42***	−.31**	−.40***
power	.65	.25	.92
Δ_DP	−.17	−.17	−.26*
power	.07	.29	.50

Note. Δ = latent difference score, EE = emotional exhaustion, LA = lack of accomplishment, DP = depersonalization, CM = classroom management, SE = student engagement, IS = instructional strategies.

Furthermore, we analyzed the relations of the latent difference scores to teachers' A-EL, their specific TSE as well as the covariates gender and teaching experience. Regarding the latter, we found only one significant relationship, between teaching experience and lack of accomplishment (r =.23, p <.01, power =.97), which indicates that more experienced teachers felt a decrease in accomplishment more than their less experienced colleagues. In relation to A-EL, we found no significant relationships, and the specific TSE was positively related to the increases in TSE for classroom management (r =.28, p <.05, power =.72).

5.2.4 Discussion

The findings of this study add to our knowledge of teacher burnout and TSE during the unique context of the COVID-19 pandemic. In line with other research, we found that the feelings of lack of accomplishment and depersonalization in teachers increased from the pre- to post-outbreak period (Sokal et al., 2020b). However, emotional exhaustion did not increase, which indicates that the emotional workload and lack of resources during the pandemic were more relevant than the quantitative workload (see also Kim & Asbury,

2020). This also fits with the finding for our sample that increases in TSE were significantly related to less of an increase in burnout.

Contrary to our assumptions, we found no evidence of a relationship between A-EL and changes in TSE or burnout; this is despite the findings of other studies that the perception of distance learning mediated the negative relationship between emotional exhaustion and TSE during the pandemic (Soncini et al., 2021). Further, we found that higher specific TSE for using digital media was significantly positively related to increases in TSE for classroom management. In addition, higher increases in feelings of a lack of accomplishment were related to having more teaching experience, which is explained by the fact that older teachers usually feel less confident regarding digital media (e.g., Tondeur et al., 2018).

The main limitations of this study are the partially low power and the lack of knowledge about what exactly teachers did between the first and second measurement periods. Moreover, another measurement point could have shed more light on the stability of the effects, and larger samples would have enhanced the generalizability of the findings.

Despite its limitations, this study contributed significantly to knowledge about teachers' well-being during school closures due to the COVID-19 pandemic. Even though it was a unique context, our findings on the role of short-term high job demands together with low job resources in the development of burnout are relevant in other contexts where daily routines change from one day to another. The investigation of specific job demands seems to be a promising avenue for future research into the development of burnout and its interaction with job resources like TSE using the JD-R model of burnout.

5.3 Study III

Weißenfels, M., Benick, M. & Perels, F. (accepted). Teachers' prerequisites for online teaching and learning: Individual differences and relations to well-being during COVID-19 pandemic. *Educational Psychology.*

Abstract

Teacher self-efficacy for e-Learning (TSE-EL) as well as attitudes toward e-Learning (A-EL) are highly relevant prerequisites for online teaching and learning (OTL). This study therefore analyzed individual differences in A-EL

and TSE-EL. Conducting latent profile analyses with n = 169 German in-service teachers, we found one group with positive A-EL as well as high TSE-EL and another with more negative A-EL and lower TSE-EL. We further analyzed the differences between these groups during the COVID-19 pandemic: Teachers belonging to the group with more beneficial prerequisites were less emotionally exhausted, felt less stressed about the pandemic, perceived more success with OTL, and had higher implementation competency for OTL. These results highlight the pandemic's psycho-educational impact on teachers and provide a starting point for the development of training based on individual prerequisites.

5.3.1 Context and Aims

The negative impact of COVID-19 on the well-being of teachers has been well studied (e.g., Study II of this thesis; Allen et al., 2020; Hansen et al., 2020; Kim & Asbury, 2020). However, researchers have thus far mainly implemented variable-centered approaches to investigate whether there are significant changes from one point in time to another. In Study II, we found few indications that A-EL or specific TSE were related to changes in teachers' well-being during the pandemic. This could have resulted from methodological issues (that will be outlined in greater depth in the discussion). We nevertheless argue that the abrupt overnight transition to OTL and the related sudden change in daily routines is a crucial part of determining whether teachers' well-being suffered during the pandemic.

The question thus arises whether there are differences between types of teachers with regard to preparedness for OTL and whether those were differently stressed by the pandemics' consequences. This study, therefore, aimed to analyze two important prerequisites for teachers' use of OTL: namely TSE for e-Learning (TSE-EL) and A-EL based on the adaptation of the IMBP (Fishbein & Yzer, 2003) to the context of ICT for teaching (Kreijns, Vermeulen, et al., 2013). According to this model, intentions for a specific behavior (e.g., OTL) are the best proxy for actual behavior. These intentions are mainly influenced by perceived behavioral control (TSE-EL), attitude toward the behavior (A-EL) as well as the perceived norm (which we suggest is very high in the context of school closures). Previous studies have shown that specific TSE and A-EL not only predict

teachers' intentions to use digital learning material (e.g., Van Acker et al., 2013) but are also significantly positively related to teachers' "technological, pedagogical, and content knowledge" (TPACK), thus their actual competency (Abbitt, 2011; Scherer et al., 2018).

This study's first aim was to analyze individual differences in TSE-EL and A-EL in a sample of in-service teachers during the COVID-19 pandemic applying a person-centered approach (**Hypothesis 1**). Different patterns in A-EL or TSE-EL have rarely been investigated (see, e.g., Eickelmann & Vennemann, 2017). In the context of the pandemic, other studies have attempted to model individual differences in prerequisites of teachers but used other variables to do so (Scherer et al., 2021). However, we assume that the adaptation of the IMBP is a good basis to analyze individual differences in teachers with respect to OTL during the pandemic.

The second aim was to analyze if the profiles differed regarding other outcome variables. These outcome variables were stress-related variables (e.g., burnout) because we assumed that teachers with fewer favorable prerequisites for OTL would have greater difficulty in its implementation and would, for example, feel more stressed and exhausted as a result (**Hypothesis 2**). We also analyzed group-differences with regard to competency-related variables (e.g., implementation competency) because prior research found both A-EL and TSE-EL were positively related to teachers' competency (Scherer et al., 2018). For this reason, we assumed that teachers with beneficial prerequisites would also be more likely to be more competent in OTL implementation (**Hypothesis 3**).

5.3.2 Methods

The final sample consisted of n = 169 teachers of whom 44.7% were primary school teachers (and the rest secondary school teachers). Teachers' ages ranged from 26 to 64 years (M = 41.69; SD = 10.47) and most were women (76.6%). The respondents filled out online questionnaires from May 2020 onward –when schools were engaged in step-by-step reopening in Germany. TSE-EL was assessed with a modification to the context of e-Learning of Schwarzer and Jerusalems' (1999) instrument. For A-EL, the items by Mishra & Panda (2007) were implemented. We also assessed implementation competency using the 12-item "exertion" scale of Yurdakul et al. (2012). We assessed perceived success

with OTL (ZfA, 2020), acute stress related to COVID-19, and lastly burnout, using the MBI (Enzmann & Kleiber, 1989).

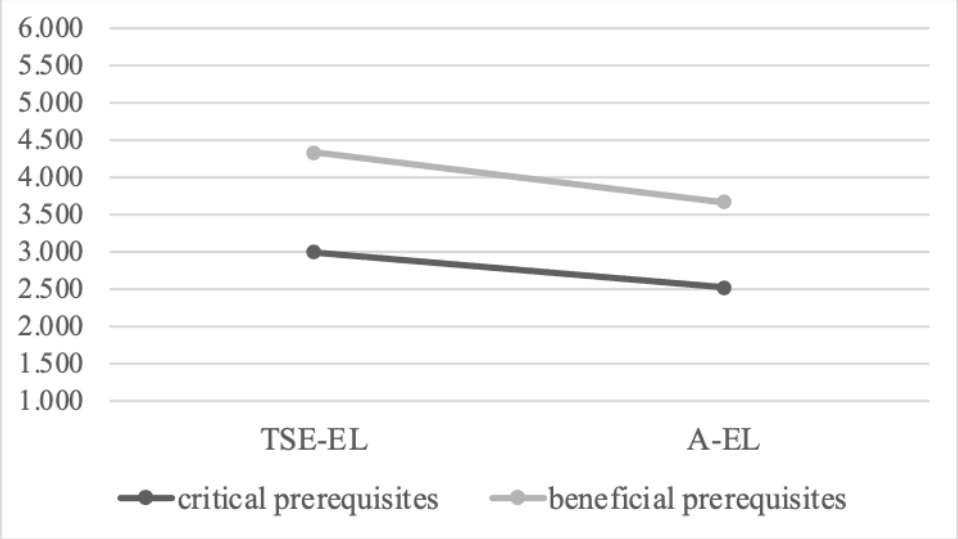
For the purposes of this study, we first conducted an LPA in MPlus7 (Muthén & Muthén, 2012) with A-EL and TSE-EL to identify individual patterns of prerequisites in teachers (**Hypothesis 1**). Second, we implemented profile membership as a group variable in two MANOVAs: within the first MANOVA we analyzed differences in competency variables (**Hypothesis 2**; implementation competency and perceived success with OTL) and in another MANOVA we analyzed differences regarding stress variables (**Hypothesis 3**; acute stress due to COVID-19 and burnout).

5.3.3 Results

Applying an LPA we identified the best fit criteria for a model with two quantitatively differing profiles (BIC: 908.77; Entropy: 0.67; BLRT $p < .001$): one profile with rather moderate TSE-EL and neutral to unfavorable A-EL (Profile 1; critical prerequisites), which comprises 25.72% of the teachers in our sample; and one profile with rather high TSE-EL and favorable A-EL (Profile 2; beneficial prerequisites) which comprises 75.28% of the teachers in our sample. Teachers with different profile memberships did not differ in respect of gender (χ^2 (2) = 5.73, p =.057), age (F (1,166) =.06, p =.802), or teaching experience (F (1,22) =.37, p =.552). The two profiles are represented in Figure 3.

Figure 3

TSE-EL and A-EL in Both Profiles



For the investigation of Hypotheses 2 and 3, we conducted two MANOVAs with profile membership being the independent variable. In the first MANOVA (**Hypothesis 2**) we found that teachers with different profile membership also differed with regard to their implementation competency (F (1, 149) = 28.61; $p < .001$; $\eta^2_p = .184$) as well as concerning their perceived success with OTL (F (1, 149) = 18.15; $p < .001$; $\eta^2_p = .136$). The second MANOVA (**Hypothesis 3**) showed significant differences between the profiles with regard to emotional exhaustion (F (1, 163) = 5.66; $p = .019$; $\eta^2_p = .034$) and acute stress due to COVID-19 (F (1, 163) = 8.17; $p = .005$; $\eta^2_p = .048$). All differences were in the expected direction: teachers in the beneficial profile were, on average, less stressed and less exhausted and had higher implementation competency as well as higher perceived success with OTL.

5.3.4 Discussion

We were, for the most part, able to confirm our hypotheses. We found that teachers indeed differed individually with regard to their prerequisites for OTL based on the adopted IMBP (Kreijns, Vermeulen, et al., 2013). These differences were quantitative in nature: one profile had high prerequisites and another had moderate to low prerequisites. This underlines empirical findings that A-EL and TSE-EL always go hand in hand and are correlated positively (e.g., Scherer et al., 2018). Differences between the profiles indicated that teachers with beneficial prerequisites actually had more implementation competency and perceived more success with OTL (accompanied by moderate effect sizes), which is in line with research on TPACK and its positive relation to A-EL and TSE-EL (e.g., Scherer et al., 2018). Moreover, teachers with detrimental prerequisites were more stressed due to COVID-19 and emotionally more exhausted. This finding is groundbreaking as these relationships had not been studied up to now. The findings indicates that the interplay of A-EL and TSE-EL in teachers can actually have a large impact on teachers' well-being.

Modeling individual differences in prerequisites for OTL based on the IMBP seems promising. However, more research is needed to validate our findings in other samples. Distal and ultimate variables of the model should be implemented to get a better understanding on how TSE-EL and A-EL are affected. Profiles of different prerequisites could then serve as a starting point for

individual trainings; we have seen how important the training of A-EL and TSE-EL is with regard to teachers' well-being.

The factors limiting the interpretability and generalization of this study's findings are the timing of measurement and the administration of the online questionnaire. The latter is problematic because this could have resulted in an overestimation of the beneficial profile; unfortunately, we cannot assume that the number of teachers belonging to this profile (about 75%) is representative. Moreover, the study was conducted in May 2020 when schools were gradually reopening, thus when the largest part of OTL was over. The period of OTL could thus already have affected teachers' A-EL and TSE-EL and it is consequently critical to speak about teachers' prerequisites.

However, we can conclude that teaches with individual differences in A-EL and TSE-EL differed significantly regarding their competence and well-being during the pandemic. Regarding the possibility of future pandemics or similar situations at schools, it is crucial to further investigate the challenges faced by teachers during and after OTL.

6. General Discussion

Within this chapter, I review the main findings of the empirical studies, draw conclusions about the overall research aim of this doctoral thesis, and consider its limitations. I then put the results into the context of previous findings and conclusions and suggest new directions for research and practice. First, I briefly summarize the main findings of the three empirical studies in light of the overall aims of the thesis.

6.1 Summary of the Findings

Overall, the aim of this thesis was to investigate teacher burnout and TSE and their interrelations in the context of two main current demands – equal inclusion in education and OTL. I was the primary author for three empirical studies based on data collected in two periods from teachers in 23 primary and secondary schools in Saarland.

The first data collection took place in the beginning of the 2019/20 school year and formed the basis for the first study in which we analyzed the impact on burnout in teachers of the number of students with SEN as well as the potential

buffering role of TSE in this context. To do so, we asked teachers to provide their subjective estimate of the number of students with SEN they had taught in the preceding school year; we assumed that this number would most likely have an effect on burnout symptoms experienced (Talmor et al., 2005). They were asked to provide a similar estimate in respect of the number of students taught with emotional needs – one of the main categories of SEN and that which is likely to be the most challenging for teachers (Lai et al., 2016).

Due to our nested data structure, we decided to conduct general linear as well as multilevel regression models. We found partial evidence for the number of students with SEN predicting emotional exhaustion as well as depersonalization in teachers, though not their lack of accomplishment. The same finding applies to the question of the impact of the number of students with emotional needs. Furthermore, contrary to our assumptions, these effects were not buffered by TSE, even though burnout levels were always predicted by TSE. With regard to the main aim of this thesis we can assume that the inclusion of students with SEN and, in particular, of those with emotional needs, is in fact very demanding for teachers; this is also in line with previous research (Talmor et al., 2005; Saloviita & Pakarinen, 2021). The quantity and their "quality" (the number with emotional rather than other needs) of students with SEN are most likely job demands for teachers that can lead to emotional exhaustion as well as mental distancing (depersonalization) from their students.

To implement the right of every child to receive high-quality education, teachers need to be better prepared; overloaded teachers can surely not provide the best education (UNESCO, 2017). Moreover, TSE, even if not buffering the effect on burnout in our study, was consistently negatively related with the number of students with SEN as well as with the rate of burnout in teachers. This finding underlines those of previous studies on the relationship between burnout and TSE (e.g., Brouwers & Tomic, 2000) and emphasizes the role of TSE as a promising starting point for burnout prevention – even if in a specific context.

The second job demand I aimed to investigate more thoroughly was OTL during the COVID-19 pandemic as a consequence of school closures and the sudden need for distance teaching. Against this background, our study hypothesized that teachers' well-being in terms of burnout levels would very

likely have suffered as a result of the new demand in the form of OTL (see also, e.g., Sokal et al., 2020a). These changes would also have been negatively related to the changes in teachers' TSE levels (Study II). For this purpose, we analyzed longitudinal data of 92 teachers who participated during the first data collection in 2019 and the second beginning in May 2020.

We considered OTL to be one of the main challenges for teachers during this time and thus analyzed whether changes in burnout and TSE had been associated with TSE for digital media as well as A-EL. Applying an LCRM, we found that two of the burnout dimensions – namely depersonalization and lack of accomplishment – indeed significantly increased from the first to the second measurement. As expected, changes in burnout were related to changes in TSE, but we found little evidence for relations with A-EL or TSE for digital media. The changes in feelings of depersonalization and lack of accomplishment tell us that it was not the work overload per se that affected teachers' mental health (overload would have led to changes in levels of emotional exhaustion); rather, emotional overload and a lack of adequate resources had this effect. These results highlight the psychological impact on teachers during the COVID-19 pandemic.

With regard to the main aim of this thesis, we can conclude that general TSE can indeed act as a resource during a crisis and buffer negative changes in burnout (an increased experience of burnout symptoms). However, we found little evidence that changes in teachers' well-being were related to TSE for digital media or A-EL, respectively. Nevertheless, we assume that the evaluation of whether OTL is a challenge for teachers affected their specific TSE and A-EL. We, therefore, analyzed these more thoroughly in Study III using another methodological approach.

In Study III, we investigated whether teachers differed with regard to their readiness for OTL in terms of A-EL and TSE-EL in order to then analyze whether these differences also showed up in their well-being (as well as their competency). For this study, we analyzed the data of 169 teachers who participated during the second measurement period using a combination of a person-centered (LPA) and a variable-centered (MANOVA) approach. In doing so, we found two quantitatively differing profiles: a profile with beneficial prerequisites (high TSE, favorable attitudes) and one with, by comparison,

detrimental prerequisites (moderate TSE, unfavorable attitudes). Teachers of different profiles also showed significant differences with regard to other outcome measures, namely their implementation competency, their perceived success with OTL, the stress they experienced due to COVID-19, and their emotional exhaustion. Teachers with beneficial prerequisites consistently had the more desirable outcomes. This study (applying an alternative approach to that in Study II) allowed us to conclude that OTL was, in fact, a considerable demand for teachers during the pandemic, taking into consideration that their satisfying the prerequisites for the implementation of OTL significantly contributed to their well-being.

This study took an alternative approach and perspective that showed us that context-specific TSE-EL can help address the challenges of OTL (as a prerequisite) and this can minimize the effects on burnout in teachers. All three studies contributed to this thesis' aim in a very individual but significant ways. They explored two of the main challenges currently facing teachers (inclusion and OTL) by investigating their role in the presence and development of burnout and TSE as an important resource. The findings contributed to current knowledge of the teaching profession, its challenges and its potential to address these challenges. Before outlining the implications for research and practice of this thesis and its underlying empirical studies, I examine some of the limitations of the studies that must be kept in mind.

6.2 Limitations

As is usual for empirical field research, findings may be of limited generalizability due to properties of the specific design, sample, or instruments. This holds true for this doctoral thesis and its underlying studies. The main limitations will be critically examined below.

6.2.1 Sample

One major limitation of this thesis relates to the sample of teachers in the empirical studies. Teachers who participated in the study were all working in the same 23 schools in the federal state of Saarland and were recruited for the project "BeHSaar." Thus, the sample was selective and local, limiting the generalizability of the results. Furthermore, our sample exclusively consisted of primary schools

or community schools, so-called *Gemeinschaftsschulen*, which represent one of two specific forms of secondary schools in Saarland where three different forms of graduation can be made after 9, 10, or 13 years. The highest academic qualification, *Abitur*, is typically conferred at *Gymnasium* after 12 years, but it can also be made after 13 years at *Gemeinschaftsschule*. Consequently, classes at primary schools and *Gemeinschaftsschulen* are more diverse than at *Gymnasium* (e.g., Sälzer et al., 2016), which could make daily teaching more challenging and put teachers at higher risk for the development of burnout symptoms (Timms et al., 2006). However, my particular interest in this thesis was to consider the main challenges (e.g., diverse classrooms), and this made the samples appropriate for the empirical studies. Nevertheless, future studies should also investigate daily challenges for teachers in other types of schools and could even compare the different samples.

Another point of criticism concerning the sample relates to its gender ratio. For both time points, the sample mainly consisted of female teachers (about 75%), which could have had an impact on the results. However, the role of gender in the development of burnout (in teachers) is still unclear, and findings are inconclusive (e.g., Ju et al., 2015; Purvanova & Muros, 2010; Timms et al., 2006). Studies indicate that the effects depend on the component of burnout considered and are not homogeneous for the overall burnout phenomenon (Fernet et al., 2012; Grayson & Alvarez, 2008; Lau et al., 2005). However, regarding OTL, which was of primary importance for Study II and Study III, male teachers seem to have higher prerequisites for teaching with ICT (e.g., Gebhardt et al., 2019). Thus, our unbalanced gender ratio could have influenced the results, and future research should more thoroughly consider gender differences in burnout (under different circumstances). In this regard, investigation of the moderating role of gender egalitarianism in societies seems to be promising (García-Arroyo et al., 2019).

Even if participation at both measurement points was voluntary, the question remains whether we had a selective sample. All questionnaires were administered online; consequently, teachers with little experience with online tools, like teachers with negative attitudes, were very unlikely to respond (e.g., Teo, 2011). This is a limitation for Study II and III in particular. However, the

online assessment of the questionnaires was also beneficial. First, teachers could take their time to fill in the questionnaires from home or another place with sufficient privacy to honestly answer the questionnaire items. Second, an online assessment allowed the respondent's anonymity to be preserved. Teachers could feel comfortable in answering the items without worrying about the potential consequences of someone knowing their true feelings regarding their job. Privacy and anonymity are both explicitly required for the administration of the MBI (Maslach et al., 1986).

Furthermore, the question arises whether teachers greatly suffering from burnout were interested in participating in the study at all. It is most likely that the distribution of symptoms of emotional exhaustion, depersonalization, and lack of accomplishment is not representative because teachers who were really overwhelmed most likely did not participate or are no longer teaching. This effect, known as the "healthy worker effect," is a common issue in burnout research (see, e.g., Schaufeli & Van Dierendonck, 1995). However, the scale scores were comparable to previous studies with rather moderate means and the highest values for emotional exhaustion (for review, see García-Carmona et al., 2019).

Finally, even if the sample sizes were mostly sufficient for the analyses in the three studies (particularly multilevel modeling and SEM), they were nevertheless relatively small. For the first measurement time point, the sample size was still relatively large, with 352 teachers included (Study I). However, few of those included in this sample also participated in the second measurement, probably due to the pandemic and lack of time. Only 92 teachers participated in both data collections and were included in the analyses for Study II: the latent change regression model. This SEM would have benefited from a larger sample and would have had greater power to detect potential effects. However, at the second measurement time, teachers who did not participate in the first questionnaire joined, yielding a sample of 169 teachers for the LPA in Study III. As LPA is relatively complex with many different indicators that can be applied to detect the correct number of latent classes, it is difficult to calculate *the* correct sample size, and the power analysis is, in most cases, not conducted due to its complexity (Spurk et al., 2020). However, we considered the sample size in this

case as negligible since simulation studies have shown that sample size has a relatively small effect on the power in LPA (Tein et al., 2013).

6.2.2 Questionnaires

Another main aspect that limits the findings relates to the questionnaires used. The MBI was developed in 1981 and can still be considered state of the art in the assessment of burnout. However, since its first establishment, there have been concerns, and revisions have been recommended (e.g., Schwarzer et al., 2000). The main problem is that there are no up-to-date norms that we could use for comparison in our sample to identify critical cut-offs in the three dimensions. Lacking other valid instruments for the assessment of three burnout dimensions, we decided to proceed with the MBI.

Another limitation in the questionnaires relates to TSE. For the assessment of overall TSE, we implemented the STSE by Pfitzner-Eden et al. (2014) because it provides a German instrument that precisely considered Bandura's (2006a) recommendations during development. However, the instrument and its three subscales have only been validated in a sample of pre-service teachers. Therefore, we implemented a CFA in the first study to verify the structure in our sample. From the good model fit, we concluded that the STSE could also be applied to in-service teachers. Even if the STSE divides three dimensions to specifically capture different tasks or contexts (e.g., classroom management), it has its limits in relation to context specificity. According to Bandura (2006a), self-efficacy should always be assessed as specifically as possible. For example, TSE could be specifically framed in the context of inclusion or e-Learning. For Study I, we could, for example, have implemented a specific measure of TSE for inclusive practices (e.g., Sharma et al., 2012), but there is no existing valid German measure. The development of such an instrument would have clearly gone beyond the aim of the present dissertation. However, for the context of OTL, we made an attempt to capture specific TSE (in addition to capturing an overall TSE). We translated items from existing studies (Van Acker et al., 2013) (Study II) and tailored existing items to the context of e-Learning (Study III). We also made an attempt to assess TSE for e-Learning and, more specifically, the use of digital media. However, even if first attempts have been made here, the need to psychometrically test and validate an instrument is urgent.

Another limitation of the studies with respect to the questionnaires is that all assessments are self-reported measures. However, there are very few valid and reliable alternatives for the assessment of burnout or TSE because very personal feelings and attitudes have to be measured. Attempts to validate burnout ratings with more objective criteria like absenteeism or behavioral indicators have mostly failed (e.g., Lawson & O'Brien, 1994). However, future studies could consider including student ratings of teachers' behavior to get a better sense of the behavioral consequences evident in a teacher with certain self-reported symptoms. As teacher burnout has a big impact on student outcomes (Madigan & Curran, 2020), such ratings could shed more light on ongoing processes in the classroom.

6.3.3 Design and Methods

In each of the three studies, there are issues concerning the design and methods implemented. In Study I, we analyzed a regression model to predict burnout levels, although we had only one time point. Instead of allowing teachers to estimate the number of students with SEN in the preceding school year, it would have been preferable to ask for this number a few months earlier to obtain a more reliable measure that does not mask underlying retention deficits. It would be most promising to implement a longitudinal design with at least three or more time points and assess all variables (TSE, burnout, and number of students with SEN) at every time point. This would allow the calculation of a cross-lagged panel design that could clarify longitudinal relations and shed more light on the question of the causality of these associations (Selig & Little, 2012).

In the second study, we followed a longitudinal approach and investigated a latent change score model with two points in time. Latent change score or latent growth curve models should be implemented more often as they have many advantages over classical longitudinal approaches that only look at the difference between group means (McArdle, 2009). Making use of this dynamic approach, we investigated the relationship between changes in burnout and TSE with variables that we measured at the second point in time. These variables were TSE-EL and A-EL, and it is critical to note that the variables could, at this point, already have changed due to OTL (which could be a reason why we found almost no significant relation). Moreover, including the second point in time, we only captured short-term effects on burnout. However, it would have been very

interesting to follow up with the teachers a few months later to see if the effects had remained stable or declined.

The assessment of A-EL and TSE-EL at the second point in time is also a limitation of Study III. Here, we aimed to investigate prerequisites for OTL but assessed these in May 2020, when teachers were already in the middle of OTL. Thus, it is likely that their A-EL, as well as their TSE-EL, could already have changed as a result of their experiences with OTL.

6.3 Scientific Implications and Future Directions

Several implications and further suggestions for research and practice were already discussed in Section 5 within the description of the empirical studies underlying this thesis. The present section will not serve as a repetition of these considerations but will both take a wider perspective and discuss possibilities for future research more deeply. In doing so, I address four main points: questions regarding the assessment of TSE and burnout, methodology, future considerations for the JD-R model and its assumptions, and the nature of the relationship between TSE and burnout. The section begins with questions related to TSE assessment and burnout. Subsequently, I address various practical implications of the research.

6.3.1 The assessment of TSE and Burnout

The foundation of every study and its interpretability lies in the operationalization of the constructs of interest, and thus, the instruments that are used to assess those constructs are of particular interest. As I have outlined in the present thesis, TSE is a context-specific construct that needs to be assessed very specifically in relation to the specific context or task (Bandura, 2006a). Thus, to enable comparisons, it is urgent that future research must develop and validate specific TSE instruments that can be translated and used by researchers from different countries.

Inclusive practices, for example, are very complex, and any instrument to assess TSE for inclusive practices should consider its many challenges (e.g., diverse classrooms, special needs, administrative and organizational tasks). In the context of inclusive education, an instrument to assess teacher efficacy in implementing inclusive practices was developed and validated by Sharma et al.

(2012). Researchers in Hong Kong have also translated and implemented this scale (Malinen et al., 2012); this scale seems to be very promising but should be examined in greater detail to determine whether it fits the recommendations of Bandura (2006a) for the development of TSE scales (this is not clearly indicated by the authors) and, if necessary, revised. The next step would be for the scale to be translated, implemented, and validated across different countries and teacher samples. Having an instrument that can be implemented in different countries would clearly have a crucial benefit for international research and the comparability of results.

The same holds true in the context of digitalization. Here, it is especially important to further distinguish TSE for the implementation of ICT/digital media for teaching in the classroom from TSE for e-Learning in general or for OTL at a distance. For our studies, we implemented one scale for the use of digital media following Van Acker et al. (2013) and a further general TSE scale with the beginning of each item reframed to refer to e-Learning. When implementing these questionnaires, we explicitly referred to "all forms of learning where digital media are employed." However, it is possible that teachers who felt very confident teaching with smartboards, for example, also struggled were not convinced they could implement OTL effectively. Thus, instruments should be more specifically tailored and implemented. Also, differences between the various instruments could tell us something about what the real problem is: is it ICT in general that is challenging, or was it rather the circumstances in which OTL was enacted that left so many teachers struggling? The same question arises in respect of the attitudes of teachers, as those can also differ greatly between OTL and ICT in general.

Besides assessing more and more specific TSE, one further research focus should be to analyze how specific TSE affects general TSE in teachers. It would be interesting to know, how much variance in general TSE is explained by TSE for inclusive practices, TSE for e-Learning, TSE for SRL and others. Moreover, teachers probably differ individually with regard to the single specific scales and resulting general TSE, which makes person-centered approaches like LPA interesting for this purpose.

In addition to assessing additional and more specific TSEs, further research should also explore how specific TSE affects general TSE in teachers. It

would be interesting to know, for example, how much variance in general TSE is explained by TSE for inclusive practices, e-Learning, SRL, and others. Moreover, teachers probably differ individually with regard to the single specific scales and resulting general TSE, which makes person-centered approaches like LPA interesting for this purpose.

Another implication of my findings concerns the multidimensionality of the construct of burnout. Some authors have argued that emotional exhaustion, as the key component of burnout syndrome, could be assessed alone (e.g., Malinen & Savolainen, 2016; Pas et al., 2012). However, all three empirical studies here indicate that results differ greatly depending on the burnout dimension assessed, even if those dimensions are always moderately correlated. In Study I, we found that the number of students with SEN predicted emotional exhaustion and feelings of depersonalization in teachers, but not their lack of accomplishment. In Study II, emotional exhaustion was the only dimension of burnout that did not show a significant increase between the two points in time. Finally, in Study III, the profiles of prerequisites in OTL differed with regard to teachers' emotional exhaustion but not with regard to the other dimensions.

These results tell us that the elements of burnout should be differentiated and investigated and burnout thus assessed in its multidimensionality; the development of burnout and its relation to other constructs seems to be very different between its various dimensions, and an investigation of the nature of these could advance our understanding and help prevent burnout (see also Kim & Burić, 2020). Nevertheless, we should not forget that the MBI has been criticized for, among other issues, the validity of its construct to countries other than the US (e.g., Thalhammer & Paulitsch, 2014; Schwarzer et al., 2000); close psychometric examination and, if necessary, adaptation for individual countries should be considered.

6.3.2 Research Methods

The multidimensionality addressed above points to the need for person-centered approaches in research on burnout. Some studies for other samples have already shown that there exist different individual patterns in burnout (e.g., Leiter & Maslach, 2016), and only recently the first attempts have been made to find different profiles of burnout in teachers (e.g., Martínez et al., 2020). The

advantage of person-centered approaches is that individual and heterogeneous subgroups are considered rather than a homogeneous mass. Results of variable-centered approaches always refer to the mean of a sample and cannot be interpreted for one single person. Person-centered approaches seem to be especially promising regarding the development of burnout (Mäkikangas et al., 2020). The development of burnout should be investigated further by analyzing critical time points in a teacher's career (for review on challenges in the transition from pre-service teaching to in-service teaching see, e.g., Tynjälä & Heikkinen, 2011). Specific job demands could have a significant impact on the development of different profiles.

In relation to methodological approaches, it is urgent that more longitudinal study designs are applied in the investigation of burnout and TSE, and especially in investigations of their relationship. In Study II, we implemented a promising approach, namely a latent change model (McArdle, 2009). This allowed us to see how TSE and burnout develop together and how a change in one construct relates to a change in the other – when only considering the means at each time point, we would not have found anything because they did not show a significant difference. Thus, latent change models can reveal changes in variables *within* individuals across time, as well as differences *between* individuals (Steyer et al., 2000). Moreover, due to their dynamic nature, it is possible to analyze changes through the interrelation of other variables or covariates or even to investigate which variables can predict change. Particularly for longitudinal data, SEM, such as a latent change score model, is said to be the most useful way to analyze data and could significantly contribute to answering future research questions (McArdle, 2009; Ferrer & McArdle, 2010).

Moreover, future studies could account for the nested data structure we typically have when investigating teachers within schools and collect data in a way that supports such models (enough teachers per school for Level 2 as well as sufficient schools for Level 1; see, e.g., Field et al., 2012). We saw, in Study I, that the results of a general linear and a multilevel approach differ with even a small ICC, which emphasizes the need to conduct the most appropriate analysis. Analyzing multilevel models also allows differentiation between the variance explained at different levels, and this could extend our knowledge significantly.

However, a large sample with adequate group sizes is required for this (e.g., Snijders & Bosker, 2012), and we did not have this for Studies II and III.

In conclusion, with regard to methodological approaches, great attention should be paid to the selection of the most suitable methods for answering future research questions, whether that is a latent change score model or a multilevel approach.

6.3.3 Job demands and Job Resources (JD-R Model)

The core of this thesis was the use of the JD-R model of burnout and its explanation of how burnout develops as an interaction of high job demands and low job resources. Within the empirical studies, two potential high job demands (Study I: inclusion, Studies II and III: OTL) and one primary personal resource (TSE) were investigated. In sum, we can say that educational inclusion and OTL seem to be very demanding and can even cause symptoms of burnout.

Clearly, more studies are needed to support this direction of research. It is crucial to determine job demands in daily teaching because by identifying them it becomes possible to develop strategies to support teachers. For example, many studies have investigated job demands like time pressure or general workload, and here, findings are relatively conclusive; time pressure is the "best" predictor for the development of emotional exhaustion (e.g., Skaalvik & Skaalvik, 2011a). The focus of research should, therefore, switch to more specific demands like dealing with inclusion or with the implementation of ICT in class since these are potential challenges that significantly affect teachers' well-being.

For inclusive education, researchers usually consider what is *needed* to teach effectively in inclusive classes rather than what is most *challengin*g. Three core areas are usually distinguished: dealing with students' behavioral problems, pedagogical knowledge, and collaboration with parents and multi-professional teams (Sharma et al., 2012; Lai et al., 2016). As important as this approach certainly is, we lack studies that examine what is difficult for teachers who are teaching inclusively and what overwhelms them and likely affects their health. For example, it is possible that collaboration with parents is not a big problem because teachers are used to this, but that managing student behavior, especially of students with emotional needs, is more challenging (see, e.g., Lai et al., 2016). Study I of this thesis thus investigated the number of students with SEN and its

effect on burnout symptoms in teachers. However, this was only a first step, and future research should investigate more thoroughly the specific effects of different student needs and the interaction of quantity and quality of those needs (for example, the total number in class vs. those with a specific need).

It would also be interesting to investigate possible moderation of effects through personality factors or teacher resources because whether a job demand is challenging or not certainly differs individually. In doing so, it is crucial to examine the causality of perceived burnout symptoms in teachers and perceived quantity and quality of students' needs to differentiate two aspects properly: the *real* effect of inclusive education on teachers' burnout symptoms and, that overwhelmed teachers may tend to overestimate the challenges of inclusive education. Therefore, longitudinal studies that start at the beginning of a teachers' career are very important. Overwhelmed teachers in particular need to be relieved. This prevents a vicious cycle in which they are not responsive to the needs of all children, which has a negative impact on the students and leaves them once again perceiving things as more challenging. At this point, the fact that general education teachers have not undergone a specific training for students with SEN – maybe even due to personal reasons – should not be neglected. Studies comparing general education teachers in inclusive schools with special education teachers show that the former suffer significantly more from burnout (Candeias et al., 2021).

As regards inclusive practices, future research should also investigate more thoroughly the challenges of teaching with ICT and why teachers still rarely implement it in daily teaching or find it stressful to do so (GEW, 2020). Our studies suggest that, especially in respect of OTL, it was largely a lack of adequate resources and the additional emotional burden teachers had to deal with that made OTL so challenging.

Further, the direction of research should focus on internal as well as organizational or external resources for teachers to effectively teach with ICT and OTL. We have seen that the adapted IMBP can be used to investigate teachers' prerequisites. We analyzed two of the three proximal variables, which were both internal or personal resources, namely self-efficacy and attitudes. Many other studies have pointed to the importance of self-efficacy and teacher attitudes for

the implementation of ICT (for a meta analysis, see Scherer & Teo, 2019); this research area is promising because personal resources can be an excellent starting point for trainings to foster teachers' ICT-implementation competency. However, such studies have so far (1) mainly considered attitudes and how these can be fostered and (2) focused on pre-service teachers (e.g., Tondeur et al., 2012; Tondeur et al., 2018; Tondeur et al., 2021). There is, on the one hand, a need to consider the context-specific TSE and how Bandura's sources could be implemented in trainings or in teacher preparation programs – the approach when fostering attitudes or self-efficacy differs significantly and can be mutually reinforcing (Fishbein, 2000). On the other hand, even if it is of great importance to prepare the future generation of teachers, it is also important to investigate how best to support in-service teachers and foster their ICT skills and the intention to use them in class or when teaching at a distance. Moreover, regarding the "dista" and "ultimate" variables of the IMBP, it is also crucial to prepare a working environment at schools that makes it easy and feasible for teachers to implement ICT when they have the personal prerequisites for doing so.

Regarding the specific context of the pandemic, there have already been attempts to investigate job resources and job demands that were particularly important for the well-being of teachers with uncertainty and anxiety found to be most important here (Kim et al., 2021; Pressley, 2021). It is crucial to further investigate the specific demands of this special situation since it cannot be ruled out that a pandemic like this (with responses that include school closures) may happen again in the future. Thus, one potential avenue of future research could be to investigate in greater depth what is particularly challenging in teaching today (such as challenges in educational inclusion, in teaching with ICT, or in the context of crises) that significantly affects the development of burnout symptoms.

In addition to job demands, the other main category in the JD-R model is job resources – these can buffer the effect of high job demands and thus prevent the development of burnout (Demerouti et al., 2001). In this study, we have mainly analyzed one personal, internal resource – TSE – which is definitely one of the most important resources and should be investigated further (see Section 6.3.3). However, there are other resources, namely external or organizational resources, that could be more thoroughly analyzed.

TSE, for example, has a counterpart at the organizational level in the group-level attribute known as collective efficacy; thus, "the perceptions of teachers in a school that the efforts of the faculty as a whole will have a positive effect on students" (Goddard, Hoy, & Hoy, 2000, p. 480). Collective efficacy is "more than the sum of the individual attributes" (Goddard et al., 2000, p. 482) and refers to the efficacy beliefs of teachers within a school. Correlations with individual self-efficacy are usually reported between r = .35 and r = .55 (see Skaalvik & Skaalvik, 2019). Collective teacher efficacy has already been shown to be related to lower levels of teacher burnout (Lim & Eo, 2014; Skaalvik & Skaalvik, 2007) but, most interestingly, is also strongly positively related to a better school climate (Malinen & Savolainen, 2016; Veiskarami et al., 2017). We claim that collective teacher efficacy could become more important in the future because teaching will hopefully increasingly shift from the case of an individual standing in front of a class to a team of teachers (and other professionals) who teach and support the students together. School climate is also related to the stress and burnout levels experienced by teachers (e.g., Lim & Eo, 2014) and could also become more important as a job resource. Moreover, it is associated with the academic success of pupils (MacNeil et al., 2009; Ruus et al., 2007) and their psychological and physiological well-being (Ruus et al., 2007; Virtanen et al., 2009).

In conclusion, the JD-R model of burnout is a good foundation for the investigation of the development of burnout. By investigating potential job demands as well as job resources that can buffer the demands' effects, a more concise picture of the prevention of burnout development can be built. A possible next step could be to investigate the role of job resources for these job demands in particular, as well as their interaction with the job demands on burnout.

6.3.4 TSE as a Resource Against Burnout

To me, one of the most important questions to be further elaborated concerns the nature of the relationship between TSE and burnout: How do they exactly influence each other (over time)? There is considerable research that tries to capture this relationship; nevertheless, the findings are still inconclusive (see Section 2.3). Theoretically, it seems to be assumed, and there is empirical evidence, that TSE is the antecedent of burnout. However, recent research

suggests that TSE is, in fact, not an antecedent of burnout – as often assumed – but that the opposite holds true (Kim & Burić, 2020). There are two problems in the research on TSE and burnout that could inhibit a clearer understanding.

Research is too often conducted cross-sectionally instead of longitudinally, and the latter is crucial for a better understanding of the interactions (see also Section 6.3.2). In addition, a "simple" relation – that one construct (with all its dimensions) predicts the other (with all its dimensions) – is usually assumed. I claim that a more differentiated approach is more promising and should thus be followed more often: studies that look at the different dimensions specifically do not find that all dimensions of one construct (e.g., TSE) predict all dimensions of the other (e.g., burnout) but that the dimensions are interrelated in a more complex way (e.g., Brouwers & Tomic, 2000; Llorens-Gumbau & Salanova-Soria, 2014).

Another problem of existing studies lies in the object of assessment; many studies only investigate emotional exhaustion (e.g., Dicke et al., 2015b) or classroom management (e.g., Brouwers & Tomic, 2000) but rarely all dimensions together. In the second study of this thesis, we investigated how changes in one dimension are related to changes in the other, but we did not analyze whether the initial level in one construct led to changes in the other or vice versa. Thus, a longitudinal design covering all dimensions from the beginning of their career and tracking teachers over several years would be most promising and allow for more complex and deeper analyses. Moreover, moderator variables of change could be integrated (as in Kim & Burić, 2020), such as gender, teaching experience, age, and school level, as well as specific job demands or aspects of teachers' professional competence, such as their general pedagogical knowledge (see, e.g., Lauermann & König, 2016) or classroom management skills (Dicke et al., 2015a).

I claim that TSE is a crucial resource for teachers, and it is undoubtedly an important aspect of teachers' professional competence (Kunter & Baumert, 2013). Accordingly, it is beyond question that effective interventions to foster TSE in teachers should be further developed and evaluated. There already are a number of studies that show these interventions have a positive impact on TSE through professional development strategies (e.g., Huber et al., 2016), resource-oriented approaches (Winkelmann, 2011), or classroom management training (Dicke et al.,

2015a). However, the application of these in schools or teacher education programs is still missing. Moreover, research focus should shift to specific interventions to promote TSE for inclusive practices (for example, educative approaches; see, e.g., Sharma & Nuttal, 2016) or for dealing with digital media. For these specific contexts, adaptive approaches that depend on teachers' individual prerequisites seem to be very promising (e.g., as in Tondeur et al., 2021).

Regarding burnout intervention studies in general, a recent meta-analysis comes to the conclusion that overall (including different approaches other than TSE), the effects are very small, particularly for depersonalization. For different components, these studies found various approaches to be promising (e.g., cognitive behavioral therapy for emotional exhaustion and mindfulness-based approaches for lack of accomplishment; Iancu et al., 2018). To me, this points, on the one hand, to the need for more individualized approaches, integrating different kinds of strategies depending on the teacher, and on the other hand, to more focus on burnout prevention.

Last but not least, recent research suggests that emotional exhaustion has a "state" as well as a "trait" component and that interventions should take this into consideration as well (Dicke et al., 2021).

6.4 Practical Implications

Taking a wider view of the thesis results and its theoretical implications outlined in the last sections, I would also like to briefly address practical implications for teacher training and further education, especially with regard to teacher burnout and its prevention.

The JD-R model of burnout offers a good starting point for burnout prevention. According to this model, there are two approaches that can help in reducing burnout experiences in teachers: a reduction of job demands and a promotion of job resources.

Job demands, in particular, have a great impact on emotional exhaustion in teachers. Studies have analyzed factors such as time pressure (e.g., Maas et al., 2021) or high quantitative workload (e.g., Hakanen et al., 2006), which could be relatively easily reduced by political decision makers. For example, smaller class sizes can reduce workload and time pressure: empirical findings show that

reduced class size is related to fewer burnout symptoms in teachers (French, 1993; Saloviita & Pakarinen, 2021). Moreover, in Study II, we provided evidence for the number of students with SEN in class being related to increased burnout symptoms, particularly depersonalization, in teachers – a finding confirmed by others (Talmor et al., 2005; Saloviita & Pakarinen, 2021). In this context, the study by Saloviita and Pakarinen (2021) also found that in classes with additional help available (e.g., special education teachers), burnout rates in teachers are lower. Thus, they make a recommendation of no more than two students with SEN in class when there is no additional help from a special education teacher.

Regarding the number of students with SEN and the implementation of inclusion, another important approach would be to work on teachers' *perception* of inclusion as a challenge or high job demand and enable more mastery experiences that develop TSE as a job resource (Bandura, 1997); teachers with more lived experience of students with SEN show higher TSE (Malinen et al., 2013). Thus, this approach is particularly promising in the early phases of a teachers' career, for example, through practical trainings during teaching studies. The same holds true for other demands in the teaching profession, such as OTL. Giving young teachers *the* best possibility to have experiences that result in the development of general TSE as well as specific TSE (for OTL, inclusion, and so on) is a crucial starting point in burnout prevention and "will pay lasting dividends" (Tschannen-Moran et al., 1998, p.234).

Besides the formation of strong TSE beliefs, we should also take greater account of attitudes. Study III has shown, in light of the adapted IMBP (Kreijns et al., 2013), that the interplay of specific TSE together with attitudes toward a certain behavior is crucial for the formation of intentions for that behavior. The important role of teachers' attitudes has also been proven in the context of inclusion (De Boer et al., 2011), and interventions in both contexts (inclusion and OTL) seem promising (for OTL see, e.g., Tondeur et al., 2021; for inclusion see, e.g., Chao et al., 2017).

Going a little further, student-teacher self-assessments of suitability for the teaching profession should be available at every university. In addition to relevant motivational factors for the job, such as individual differences in intrinsic or extrinsic career-choice motivations (see, e.g., Biermann et al., 2019), further

predictors for burnout development (e.g., personality factors; Kim et al., 2019) could help students be aware of their risk factors before entering the job and support their self-reflection from early on. Moreover, as emotional exhaustion has both trait and state components (Dicke et al., 2021), the assessment of both could help detect potential warning signs before entering the job and in regular screenings over the course of a teachers' career, allowing intervention before burnout becomes chronic (Brouwers & Tomic, 2014).

6.5 Conclusion

This thesis has underlined the importance of current job demands, such as inclusion and OTL, in the development and persistence of burnout symptoms as well as in its interaction with TSE – the most important resource when it comes to burnout. The three empirical studies provide new insights into how the current challenges of our century affect teachers' well-being in terms of their burnout symptoms and TSE. Various important implications for research and practice have been drawn out that will broaden our understanding further.

It remains to emphasize that burnout in teachers is a significant problem that should not be underestimated due to its consequences at three different levels: first, burnout in teachers can lead to negative psychological as well as physical consequences in teachers themselves (see Section 2.1.3). Second, the experience of burnout in teachers has severe effects at the student level (see Section 2.1.3). Finally, burnout has high costs as it is the most important predictor of teacher attrition (for meta-analysis see (Madigan & Kim, 2021b).

However, many approaches that seem to be promising are not transferred into school practice. One of the biggest problems in European countries is that education is rarely a priority in financial questions and, rather, is under-financed (UNESCO, 2015). Lastly, I would therefore like to emphasize that it is crucial to invest in education and particularly teacher education to enable the best possible education for our children and future society because "there is simply no more powerful or longer-lasting investment in human rights and dignity, in social inclusion and sustainable development [than to ensure quality education]" (UNESCO, 2015, p. 4).

7. Excursus: Research Beyond Teacher Burnout and Teacher Self-Efficacy

The investigation of burnout and TSE in the context of contemporary challenges for teachers was the main aim of my doctorate and therefore described and discussed thoroughly within this thesis. However, I also contributed to other research collaborations within the last several years that I do not like to leave unmentioned. I originally came to my working group while writing my Bachelor's thesis (and later Master's thesis) about SRL in students. Since then, SRL has become a highly relevant and interesting topic for me, which is why I was happy to further contribute to the research of my colleagues. Two peer-reviewed articles as well as a book chapter have since evolved from this. The original abstracts of the published manuscripts are presented in Sections 7.1, 7.2. and 7.3. The first dealt with the assessment of SRL and the question of whether different components of SRL should be assessed with different instruments, and the second study investigated a SRL training with primary school students and the question whether an additional teacher training would enhance the intervention's effects. The book chapter deals with interventions to foster SRL.

Finally, in Section 7.4 I present a third manuscript in which we investigated the role of self-efficacy not for teachers but for students as it is also a relevant resource in the context of their daily challenges and setbacks.

7.1 Multimethod assessment of self-regulated learning in college students: Different methods for different components?

Dörrenbächer-Ulrich, L., **Weißenfels, M.**, Russer, L., & Perels, F. (2021). Multimethod assessment of self-regulated learning in college students: Different methods for different components? *Instructional Science, 49*(1), 137-163. https://doi.org/10. 1007/s11251-020-09533-2

Abstract

Although self-regulated learning (SRL) is seen as highly relevant for successful college learning, college students oftentimes show a lack in SRL abilities.

Therefore, it seems necessary to foster SRL in this group of learners. In order to evaluate such training and to foster SRL in an optimal way, a valid assessment of this competence and its development is necessary. As different methods for the assessment of SRL show benefits and points of criticism, the present study used a multimethod approach to investigate convergence between and across different measures as well as their predictive validity for achievement. SRL was conceptualized of cognitive, metacognitive, and motivational components. Seventy college students were assessed with two broad SRL-measures (questionnaire, strategy knowledge test) and two task-specific SRL measures (microanalyses, trace data) within a standardized laboratory setting. Moreover, GPA of college entrance diploma was gathered as an indicator of general achievement level. Results indicate moderate to high relations between the different components of SRL (cognition, metacognition, and motivation) within one

assessment level and no relations between the different assessment methods within one component. With regard to achievement, we found that every component is predictive for achievement but only if measured with different assessment methods. The results are discussed with regard to their implications for future research and the use of different assessment methods for SRL.

7.2 Fostering SRL in Primary School Students: Can Additional Teacher Training Enhance the Intervention Effects?

Benick, M., Dörrenbächer-Ulrich, L., **Weißenfels, M.** & Perels, F. (2021). Fostering SRL in primary school students: Can additional teacher training enhance the intervention effects? *Psychology Teaching & Learning*. https://doi.org/10.1177/1475725721101 3638

Abstract

Teachers play a key role in the development of self-regulated learning (SRL), especially in primary education. However, current results indicate that teachers are either inadequately or only moderately fulfilling this key function, as they spend little time in the instruction of SRL strategies. The objective of the

current study was, therefore, to develop an intervention that guides teachers to provide students with SRL strategies and investigate if additional teacher training (ATT) can enhance the intervention effects. Data of 607 fourth-graders were used to analyze their SRL within a pretest/posttest control-group design using a questionnaire and a learning diary. Contrasting the data of the groups actively participating in the intervention (simple intervention group and trained-teachers intervention group) with the data of a passive control group revealed positive effects of the intervention in terms of an increase in their reported use of SRL strategies (questionnaire and diary data). However, we found no transfer effects on achievement, as well as that the ATT had no beneficial effect on results at the student level. For fourth-graders, the developed intervention seems appropriate to impart SRL strategies to them. For teachers, it represents a potential opportunity to instruct SRL strategies to their students in their classes.

7.3 Interventionen zur Förderung von SRL [Interventions to foster SRL]

Benick, M., Dignath-van Ewijk, C., **Weißenfels, M.**, Bellhäuser, H. & Perels, F. (2019). Interventionen zur Förderung selbstregulierten Lernens. In H. Gaspard, U. Trautwein & M. Hasselhorn (Hrsg.), *Diagnostik und Förderung von Motivation und Volition* (S. 177-192). Hogrefe.

Zusammenfassung

Das Konzept der Selbstregulation wurde bereits in den achtziger Jahren von Bandura (1986) als Teil seiner sozial-kognitiven Lerntheorie entwickelt und im Hinblick auf die reziproke Interaktion zwischen Person, Verhalten und Umwelt beschrieben. Die Übertragung dieses Konzepts auf den schulischen Kontext führte gegen Ende der achtziger Jahre dazu, dass der Begriff des selbstregulierten Lernens (SRL) Einzug in die Wissenschaft hielt. Mit dem vorliegenden Beitrag sollen ausgehend von einer kurzen Darstellung theoretischer Grundlagen die Themenbereiche Diagnostik und Förderung selbstregulierten Lernens aufgegriffen und diesbezüglich zentrale Befunde vorgestellt werden. Eine inhaltliche Schwerpunktsetzung liegt hierbei auf den aktuellen Verfahren zur Diagnostik selbstregulierten Lernens sowie auf

allgemeinen Befunden von Interventionsstudien. Diesbezüglich werden Beispielstudien aus dem (vor)schulischen und universitären Kontext beschrieben. Das Kapitel endet mit einer Darstellung zentraler Befunde von Interventionsstudien in Bezug auf zentrale Leistungsmaße sowie differentielle Effekte.

7.4 Linking Academic Buoyancy and Math Achievement in Secondary School Students: Does Academic Self-Efficacy Play a Role?

Weißenfels, M., Hoffmann, D., Dörrenbächer-Ulrich, L. & Perels, F. (in revision). Linking academic buoyancy and math achievement in secondary school students: Does academic self-efficacy play a role? *Current Psychology*

Abstract

Academic buoyancy describes the ability to successfully overcome and recover from setbacks in an academic context (e.g., a poor grade, motivational dips, stress due to upcoming performance exams). This day-to-day form of academic resilience has recently been defined in the context of positive psychology. The present study aimed to gain insights into the mechanisms of academic buoyancy by predicting math achievement. Since there is already evidence that this relationship is rather indirect than direct, we were particularly interested in investigating a potential actor of an indirect effect, academic self-efficacy. For this purpose, n = 974 students at eleven secondary schools in southwestern Germany were surveyed through a questionnaire. The data were analyzed using a latent variable approach. The results of the study show that academic buoyancy is a significant predictor of math achievement and that this relation is explained through academic self-efficacy, even when controlling for gender. Implications for practice and further research are also discussed.

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9. Appendix

Publication I

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