Uncovering the situational impact in educational settings: Studies on motivational and emotional experiences

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1. Introduction: Aims of the Special Issue

The common goal of the studies combined within this Special Issue was to uncover the situational impact in educational settings above and beyond the impact of individual learners' characteristics. The articles presented refer to motivational and/or emotional experiences in educational settings. Most well-established theoretical models targeting the role of learners' motivational and emotional experiences in academic contexts such as schools or universities describe intraindividual processes that vary over time and depend on the learning situation rather than solely on individual learners' characteristics. Prominent examples include expectancy-value theory (Eccles & Wigfield, 2002) and control-value theory (Pekrun, 2006) of achievement emotions. The models described in these theories assume that situational and individual characteristics as well as their interaction have an impact on the motivational and emotional experiences of learners.

Although most theories in the field of education postulate intraindividual processes, educational research has primarily focused on interindividual differences while neglecting intraindividual processes and the temporal dynamics of centrally important constructs like emotions and motivation as well as their antecedents and correlates (Murayama et al., 2017). Importantly, interindividual findings do not necessarily provide insights into the processes that evolve within persons over time (Dietrich, Schmiedek, & Moeller, 2022; Molenaar, 2004; Schmitz, 2006). For instance, students who report more effort on average might also report more enjoyment towards learning on average (i.e., effort and enjoyment might be positively associated between students), yet students' effort and enjoyment might be negatively related within students at different occasions, as putting effort into a learning task is exhausting and less enjoyable. Learners' emotions, motivation as well as their antecedents and correlates show impressive dynamics over time as demonstrated by recent studies with learners, children, and adults in daily life (e.g., Goetz, Sticca, Pekrun, Murayama, & Elliot, 2016; Martin, Mansour, & Malmberg, 2019; Neubauer, Dirk, & Schmiedek, 2019; Rottweiler & Nett, 2021). However, traditional educational research still tends to focus on trait assessments and thus largely neglects these temporal dynamics. This may result in inadequate portrayals of motivation and emotions and their relations with antecedents and correlates in educational settings. Thus, the contributions in this Special Issue aimed to demonstrate that taking the situational impact in learners' motivational and emotional experiences into account is indispensable. However, this results in two main challenges: First, it requires different approaches for study designs, and second, the data assessed is complex in nature and requires advanced statistical methods.

Considering the measurement of the impact of educational settings, the characteristics of these settings need to be taken into account within different study designs. This includes the consideration of the domain (e. g., school subject) and the context (e.g., classroom versus homework) of

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the educational setting. The present Special Issue presents studies investigating students' motivational and affective within-person processes as well as antecedents (e.g., instructional quality, lack of challenge, task perception) and correlates (e.g., success and failure experiences, career aspirations) by applying the experience sampling method which provides the opportunity to assess students' experiences in situ. Experience sampling studies go beyond traditional cross-sectional research by simultaneously analyzing interindividual and intraindividual relations and thereby addressing the situational as well as the person-specific impact and resulting intraindividual dynamics (Bolger & Laurenceau, 2013).

Besides technological developments that have eased application of the experience sampling method and the collection of intensive longitudinal data from many participants, there has also been immense progress regarding statistical methods to model multilevel and dynamic patterns, which is the second challenge in taking the situational impact into account when studying learning. The contributions in this Special Issue faced these challenges and demonstrated that it is high time to take within-person processes into the focus of educational research (Murayama et al., 2017). This post-script takes a critical look at these efforts and aspirations and summarizes lessons for future research.

2. Overview: Different situational and dynamic perspectives

Taking a valuable situational and dynamic perspective on motivational and emotional processes was the goal of the contributions in this Special Issue. Focusing on the situational perspective first, we considered the degree to which the authors sampled different learning situations. All contributions applied an experience sampling approach and thus assessed motivational and emotional variables and their correlates repeatedly in different situations. When we take the range of repeated measurement occasions as a proxy for different learning situations, the studies included on average between 4.4 and 149 repeated situational measurements per person. This demonstrates that all studies considered situational influences on learning processes, but the degree to which situational influences on motivation and emotion were explicitly assessed varied largely between the studies. Nonetheless, all studies revealed that emotional and motivational variables show substantial intraindividual variability over different learning situations. Considering the intra-class correlation as a measure of variance decomposition between persons (i.e., interindividual variability) and within persons (i.e., intraindividual variability) across repeated measurements, the studies demonstrated that between 39% and 71% of the total variance in the variables assessed across the different contributions could be attributed to stable between-person differences. Consequently, the studies demonstrated that there is meaningful intraindividual variability in emotions, motivation, and their correlates. Moreover, as demonstrated by several contributions of this issue through multilevel confirmatory factor analyses and assessing reliability of the obtained factors at the within-person level (Neubauer, Schmidt, Schmiedek, & Dirk, 2022; Talic et al., 2022; Wieland, Hoppe, Wolgast, & Ebner-Priemer, 2022), this intraindividual variability contains true score variance and is therefore more than just noise. In conclusion, the contributions of this Special Issue demonstrated that the repeated assessment of students' emotions, goals, expectancies, and other motivational variables as well as their correlates allows for the reliable assessment of intraindividual variation and forms the basis for understanding learning processes as they evolve in the situation.

Further, the studies of this issue also represent a wide range of the different situational characteristics. For instance, while Krannich et al. (2022) focused on math classes, Talic et al. (2022) also focused on learning at school but considered four main subjects. Moeller, Viljaranta, Tolvanen, Kracke, and Dietrich (2022) and Bieg, Dresel, Goetz, and Nett (2022) evaluated students' experiences of one specific university course. Neubauer et al. (2022) and Tamura et al. (2022) assessed learners' reflections of one day whereas Wieland et al. (2022) assessed

students' actual experience in the moment. This resulted not only in the consideration of different situational characteristics, but also different types of intraindividual variability. This intraindividual variability ranged from moment-to-moment variation in perceived teacher emotions and behavior (Bieg et al., 2022; Talic et al., 2022), students' situated expectancies of success within one university lecture (Moeller et al., 2022), and within-day variation in perceived task ambiguity during exam preparation (Wieland et al., this issue), to day-to-day variation in perceived academic success and failure (Neubauer et al., 2022). Thus, these different characteristics reach from current states assessed in a situation (e.g., "At the moment I am experiencing enjoyment", Bieg et al., 2022) to retrospective judgements of a day (e.g., "Today, at school, I didn't feel too smart", Neubauer et al., 2022). Importantly, the latter differ conceptually from momentary assessments within a day, and both provide unique information (Neubauer, Scott, Sliwinski, & Smyth, 2020). Thus, different sampling procedures complement each other and are needed to gain a comprehensive understanding of emotional and motivational processes in educational settings. In sum, the contributions show that the choice of the timescale at which learning experiences are sampled in learners' everyday contexts is of central importance for the understanding of the situational impact on learning processes. Theoretical models and empirical replications of the findings in this issue are needed to specify how emotions, motivation, and other aspects of the learning process relate to each other in complex and dynamic ways (see Dietrich et al., 2022).

Secondly, concerning the dynamic perspective, we evaluated the degree to which the authors considered concurrent synchronous and time-lagged relationships between variables. The latter is what we define as dynamic relationships (Hamaker, Asparouhov, Brose, Schmiedek, & Muthén, 2018). These dynamic relationships might be the closest to what we can assess from intensive longitudinal data to make inferences about lead-lag relationships and generate hypotheses about which emotional and motivational processes drive each other. We acknowledge, however, that all contributions in this Special Issue despite studying dynamic relations do not allow for causal inferences (see Dietrich et al., 2022). Nevertheless, the majority of the contributions aimed to uncover causal dynamics among sets of variables by disentangling reciprocal relationships (Bieg et al., 2022; Moeller et al., 2022; and Neubauer et al., 2022), identifying mediation effects (Krannich et al., 2022), and analyzing networks of complex potentially causal relationship between a large set of motivational variables (Tamura et al., 2022). These findings are promising and highlight the potential of experience sampling studies with intensive longitudinal data to build hypotheses and learn about potential causal dynamics in real-life learning situations.

3. Another piece of the story: Different analytical approaches to model situations and dynamics

In the introduction of this Special Issue, Dietrich et al. (2022) postulated that novel analytical approaches are required to analyze complex situation-specific data and meet the requirements of answering research questions that address intra- and interindivdual processes simultaneously. The research presented in this Special Issue provides a first summary of some of the analytical approaches that fit the requirements of such data and research questions. Talic et al. (2022), Wieland et al. (2022), and Krannich et al. (2022) applied multilevel structural equation modelling that identifies intra- and interindividual relationships between different constructs of interest. This method especially assesses structural differences of intraindividual and interindividual relations, which is highly important when it comes to disentangling the situational impact. Moeller et al. (2022) also applied multilevel SEM by modelling time-lagged relations between the three measurements within one lesson taking the measurement of multiple lessons on level 2 into account.

Neubauer et al. (2022) applied dynamic structural equation

modelling (DSEM; Hamaker et al., 2018), an approach that integrates multilevel SEM with time series analysis and investigates time-lagged relations of multiple assessed constructs. This approach enabled the authors to model and analyze dynamic relations over time. Bieg et al. (2022) answered their research question by applying (Bivariate) STARTS models (Kenny & Zautra, 1995; Kenny & Zautra, 2001) that are a specific version of latent state latent trait structural equation models that also include autoregressive relations. This approach also accounts for time-lagged relations and thus allows for the examination of dynamic processes. In contrast to multilevel approaches, in these models, every measurement occasion is modelled individually. Thus, this approach allows for more individual modelling of specific situations and relations. However, the number of measurement occasions that can be considered is limited compared to the DSEM-approach. Tamura et al. (2022) applied network analysis, an approach used to identify patterns of relationships among a large number of variables, in order to analyze bidirectional relationships between a large number of variables that form a network of motivational and emotional processes that take place during learning.

Taken together, there are numerous methodological approaches that might be similar in their aims, such as taking the multilevel structure of the data into account, but differ in specific details to address study-specific characteristics such as the number of participants, occasions, and variables. Despite or precisely because of these differences, all studies successfully addressed the structure of intraindividual variability and synchronous and dynamic time-lagged intraindividual relations.

4. Coda

As recent technological developments have made the collection of intensive longitudinal data from many participants easier, and statistical methods to model dynamic patterns have been developed and refined, within-person processes need to be studied intensively in educational research (Murayama et al., 2017). The contributions in this issue demonstrate that studying within-person processes elucidates the situational impact in learning situations. However, we have also learned that the timeframe and sampling of repeated measurements should be chosen carefully. Moreover, the degree to which momentary assessments involve state-like and trait-like aspects of motivation and emotion likely differs depending on the timescale of measurements (Neubauer et al., 2020).

Different analytical approaches were presented in this issue that serve as a perfect starting point for hypotheses centered around within-person motivational and emotional processes and lead-lag-relationships between variables. However, future studies are needed that combine experimental manipulation with assessments of learning in real-life contexts (e.g., Schmiedek & Neubauer, 2020) to better allow for causal inferences in within-person dynamics.

We wish for an even larger variety of different analytical approaches to study intraindividual and interindividual variation in educational settings, although this makes comparisons between empirical findings and generalizations difficult. The potential of different analytical approaches that uncover the situational impact in learning situations needs to be evaluated empirically.

We hope that this Special Issue serves as a catalyst to inspire more researchers to study situational and individual characteristics as well as their interaction as they take place in educational settings.

Acknowledgements

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