

Social-Distance Education: Struggling with Cognition, Emotion or Motivation during SRL?

Lenka SCHNAUBERT* & Ben HEROLD

University of Duisburg-Essen, Germany

*lenka.schnaubert@uni-due.de

Abstract: The covid-19 pandemic dramatically changed the educational landscape as emergency remote teaching strategies had to be implemented almost worldwide changing educational practices and reducing student-teacher contact. This comes with many challenges for students, who had to rely on their self-regulatory skills more than ever. To get an overview over challenges connected to social-distance education, we conducted a survey study ($N = 119$) to find out more about self-regulatory challenges students face during this digital semester. The results show that students seem to rate motivational and emotional challenges most severe and to have less issues with cognitive and metacognitive challenges. This has implications on what should be focused on in upcoming (socially distanced) semesters as providing highly structured learning material to foster students' understanding of the content material may not entirely solve the most pressing challenges for students.

Keywords: Social-Distance Education, Self-Regulated Learning, Higher Education

1. Introduction

The severe impact of the covid-19 pandemic on higher education (HE) and educational practices forced universities worldwide to adapt to the situation by shifting to emergency remote teaching (ERT) under conditions varying severely between and even within states and national boundaries (as pointed out by Reynolds & Chu, 2020a). Recent surveys show teachers and students struggling with technological infrastructure, technology usage and the logistics of the new situation (e.g., Marinoni, van't Land, & Jensen, 2020). During ERT, teachers provided a wide range of different educational resources and courses often minimising synchronous teaching and relying heavily on asynchronous activities. This not only puts a strain on teachers and technological infrastructures, but it also requires students to conduct their coursework largely at home, often with minimal (or reduced) teacher interference and guidance, making it more pertinent for them than ever to successfully and independently regulate their learning processes.

1.1 Challenges Related to Self-Regulated Learning

Self-regulated learning (SRL) can be described as actively regulating cognitive, behavioural, motivational and affective aspects of learning (Panadero, 2017; Pintrich, 2000) by metacognitively monitoring internal and external conditions and adapting one's own learning-related activities (Winne & Hadwin, 1998; Winne & Nesbit, 2009). During SRL, learners not only regulate their cognitions and learning activities, but also need to regulate their motivation (Winne & Hadwin, 2012; Zimmermann, 1989). Additionally, affect is more and more regarded as an important factor during SRL (e.g., Efklides, 2011; Efklides, Schwartz, & Brown, 2018). Thus, when studying challenges during SRL, cognitive, metacognitive, motivational, and emotional aspects should be considered. While self-regulated learning processes occur within any given learning situation, challenges learners face vastly depend on instructional support, which may be provided by teachers, peers, or digital learning environments and thus may vary severely across different learning situations. Some situations are particularly challenging with regard to SRL for example when the content is complex and digital learning environments do not offer self-regulatory support (e.g., Azevedo & Cromley, 2004; Azevedo, Moos, Greene, Winters, & Cromley, 2008). Thus, it can be assumed that changes affecting the individual support structures and

the nature of student-teacher interaction during ERT may severely affect the challenges learners perceive with regard to SRL. Cognitive and metacognitive challenges are amongst the most discussed within SRL research as metacognition and SRL are inherently linked and the terms are even sometimes used interchangeably (Dinsmore, Alexander, & Loughlin, 2008). Cognitive challenges may be related to prior knowledge or the availability of cognitive strategies while metacognitive challenges relate directly to regulating cognition and learning. However, empirical research has found that especially motivational challenges are among the most prevalent in HE (Koivuniemi, Panadero, Malmberg, & Järvelä, 2017). For example procrastination, which can be conceptualised as a failure to regulate motivation, may severely affect academic achievement and is related to students' drop-out intentions (Bäulke, Eckerlein, & Dresel, 2018). But also emotions can play a major role in SRL (Webster & Hadwin, 2015) and especially negative emotions can be a hindrance to academic success on school level (Pekrun, Lichtenfeld, Marsh, Murayama, & Goetz, 2017). Thus, regulating motivation and emotion can be seen as equally important as regulating cognitions and learning activities.

1.2 Research Question

While the current pandemic-related situation poses a lot of questions regarding not only practical issues of ERT (see for example the current special issue on evidence-based and pragmatic online teaching and learning approaches, Reynolds & Chu, 2020b), but also theoretical questions on the nature of HE learning and teaching processes during social-distance education, the question of what learners struggle with during ERT is one of the central questions to answer. Thus, this research aims at identifying rather broadly and explorative what self-regulated-learning related issues university students struggled with most during the "social-distance semester". While we acknowledge that this depends severely on the structure of courses attended and the personal situation of the students, we hope to identify what issues are most pressing and need to be addressed explicitly in upcoming (socially distanced) semesters.

2. Method

2.1 Design of Questionnaire

In order to answer those questions, we designed a questionnaire relating to challenges of SRL during learning. Building on the issues identified by Koivuniemi and colleagues (2017) and results of the analysis of a small pre-study in a psychology lecture ($N = 6$), we developed a questionnaire containing 32 items covering a broad selection of items to explorative assess students' perceived challenges. The items covered topics like cognitive and metacognitive challenges, e.g., regarding comprehension of content, goal setting and planning, or monitoring knowledge and progress, learning tactics and strategies, but also emotional challenges like fears and frustration, and motivational challenges like interest, regulation of concentration, effort and motivation, procrastination, and last but not least, social aspects like teacher-student and peer contact. All items were phrased as statements and answers were to be given using an equal-distant response format ranging from 1 (not at all true) to 6 (completely true). Items were mainly coded as challenges with higher values indicating higher challenges. Seven items were positively coded (higher values indicating less challenging aspects) and therefore recoded for analyses so that high values uniformly indicate challenges being perceived as more severe.

2.2 Sample

The study's data sample consisted of answers of $N = 119$ university students studying in Germany who answered the questionnaire online (the original sample consisted of 122 students of which 3 had to be excluded due to incomplete or highly improbable answer patterns). Students were mainly in their 20s with a mean age of 24.6 ($SD = 4.6$) coming from study courses covering a broad range of subjects with the most frequent being psychology (37, including business psychology), economics or related subjects (32), and cognitive and media sciences (17). 70 (59%) were female, 31 (26%) male and 18 (15%)

preferred not to respond to this question. Participants were recruited via the university’s student forums, social media pages, and advertisement in lectures. They received no compensation for participation.

2.3 Study

The study (ID: psychmeth_2020_VLSRL_07B) was conducted online in June 2020 and approved by the local ethics committee. After an introduction into the aims of the study, participants gave their informed consent and were given the questionnaire to answer. They were informed that there were no right or wrong answers and that they should answer as truthfully as possible. They were not asked to respond to ERT explicitly, but only asked to assess their perceived challenges within the digital learning context of the semester. After completing the SRL-challenges questionnaire, they were asked to provide demographical information, thanked and provided with contact information of the researchers.

3. Results

3.1 Description of Data: Biggest and Smallest Singular Challenges

In a first step, we evaluated each item separately to identify areas with biggest and smallest challenges. Items in general had means between 2.15 and 5.26 (see Table 1). We classified challenges whose 95% CI (3000 percentile bootstrapping) was entirely below 3 as small and, in contrast, challenges whose 95% CI was entirely above 4 as big. The results can be seen in Table 1 (we included borderline items whose 95% CI was equal/below 3.1 or equal/above 3.9). The most severe challenge seems to be missing contact with peers while the least severe seems to be the fit between new content and prior knowledge.

Table 1. *Biggest and smallest singular challenges*

| | <i>M</i> | <i>SD</i> | 95% CI (Mean) | |
|--|----------|-----------|---------------|-------|
| | | | lower | upper |
| <i>least challenging (95% CI < 3.00 [< 3.10])</i> | | | | |
| The new content does not fit to my prior knowledge | 2.15 | 1.10 | 1.96 | 2.36 |
| I don't know why I have to learn these things | 2.29 | 1.16 | 2.08 | 2.49 |
| I lack the prior knowledge to understand the material | 2.44 | 1.11 | 2.24 | 2.64 |
| The topics to be learned are not important to me | 2.55 | 1.20 | 2.35 | 2.76 |
| Handling the technology is frustrating for me | 2.53 | 1.43 | 2.29 | 2.79 |
| I don't know how to apply my knowledge to solve the tasks | 2.73 | 1.32 | 2.50 | 2.98 |
| [I have trouble understanding the to be learned content] | 2.84 | 1.16 | 2.64 | 3.04 |
| ... | | | | |
| <i>most challenging (95% CI > 4.00 [> 3.90])</i> | | | | |
| [I am worried, because I have so much to do] | 4.17 | 1.45 | 3.91 | 4.43 |
| [I have trouble starting with learning] | 4.19 | 1.35 | 3.95 | 4.42 |
| I have trouble concentrating | 4.27 | 1.33 | 4.03 | 4.50 |
| I have trouble keeping up my motivation | 4.31 | 1.36 | 4.06 | 4.55 |
| I miss the personal contact to my student peers | 5.26 | 1.05 | 5.07 | 5.44 |

Note: 95% CI are based on 3000 percentile bootstrapping; $N = 119$; values range from 1 (not true at all → not challenging) to 6 (completely true → challenging); all items are translated from German

3.2 Extracting Factors (Exploratory Factor Analysis)

In a second step, we conducted an exploratory factor analysis with varimax rotation. This analysis was chosen because the item development was partially based on a bottom-up approach covering a broad range of items without a definitive, pre-defined factor structure. The analysis came up with 8 factors with Eigenvalues larger than 1, explaining 69.7 % of the variance. While the amount of factors was no

surprise due to the broad nature of the items, it seemed that (meta-)cognitive issues formed one factor (8 items including challenges related to comprehending the learning content and challenges relating to metacognitively monitoring learning, setting goals or regulating the learning process itself), motivational issues formed a second factor (6 Items including issues related to procrastination and the regulation of concentration, effort and motivation), and emotional issues a third one (4 Items including fear of failure, worries due to the amount of work and frustration with progress). A fourth factor was related to broader organisational issues of structuring learning (4 items relating to issues of general time management and scheduling, keeping an overview over courses and using one’s known learning techniques during the online semester). The other factors were not readily interpretable and their internal consistency was poor (Cronbachs $\alpha < .6$), so we did not pursue them further.

3.3 Forming Scales

Taking the content of the items into account as well as scale reliability, we formed scales based on this analysis. We came up with 5 scales. Since the first factor included items relating to two content-wise very different aspects, we separated these two and formed two cognitive sub-scales with five items each (largely based on factor 1 but including two additional items with high factor loadings on this scale): one relating directly to comprehension and understanding of the content (*cogn*) and one relating to the learning process and its (metacognitive) regulation (*metacogn*). A third scale consisted of the items of the second factor and formed a motivational scale (*motiva*) with six items. The fourth scale consisted of the emotion-related items of factor 3, however, we excluded one item that did not fit content-wise and loaded high on various factors. The resulting scale had three items (*emotion*). The last scale consisted of three items from factor 4, but we excluded one item that loaded equally high on the first factor and related to monitoring learning and was thus included in *metacogn*. It can be interpreted as managing the coursework (*manage*). Altogether, we formed five scales whose descriptive statistics can be viewed in Table 2. It should be noted that some items loaded on various factors and were highly interrelated.

Table 2. Descriptive statistics of the extracted scales

| Scale | No. of Items | N | M | SD | 95% CI (Mean) | | Cronbach’s α |
|----------|--------------|-----|------|------|---------------|-------|---------------------|
| | | | | | lower | upper | |
| cogn | 5 | 119 | 2.81 | 0.87 | 2.68 | 2.96 | .772 |
| metacogn | 5 | 119 | 3.20 | 1.07 | 3.01 | 3.39 | .865 |
| motiva | 6 | 119 | 3.78 | 1.04 | 3.59 | 3.95 | .856 |
| emotion | 3 | 119 | 3.90 | 1.27 | 3.68 | 4.13 | .790 |
| manage | 3 | 119 | 3.51 | 1.33 | 3.27 | 3.75 | .784 |

Note: 95% CI are based on 3000 percentile bootstrapping

Table 3. Pairwise comparisons between the scales

| comparison (rank 1 vs. rank 2) | rank 1 | rank 2 | z | p (bonferroni corrected) |
|--------------------------------|--------|--------|--------|--------------------------|
| cogn vs. metacogn | 1.91 | 2.71 | -3.915 | .001 |
| cogn vs. manage | 1.91 | 3.15 | 6.047 | < .001 |
| cogn vs. motiva | 1.91 | 3.47 | 7.646 | < .001 |
| cogn vs. emotion | 1.91 | 3.76 | 9.040 | < .001 |
| metacogn vs. manage | 2.71 | 3.15 | 2.132 | .330 |
| metacogn vs. motiva | 2.71 | 3.47 | 3.731 | .002 |
| metacogn vs. emotion | 2.71 | 3.76 | 5.125 | < .001 |
| manage vs. motiva | 3.15 | 3.47 | 1.599 | > .999 |
| manage vs. emotion | 3.15 | 3.76 | 2.993 | .028 |
| motiva vs. emotion | 3.47 | 3.76 | -1.394 | > .999 |

3.4 Comparisons

To get a better picture of the most pressing issues, we conducted non-parametric comparisons (Friedman's Rank Test with paired samples), identifying differences between the challenges on the scales ($\chi^2(4) = 103.76, p < .001$). Pairwise comparisons between the 5 previously formed scales (see Table 3; bonferroni-corrected p -values) found motivational and emotional issues being (significantly) more severe than any other categories with emotional issues additionally outweighing motivational issues. Cognitive and metacognitive issues on the other hand were significantly less of an issue than the other categories and cognitive issues were less relevant than metacognitive issues or managing one's learning. However, there was no significant differences between the latter. We can thus conclude especially emotional aspects to be perceived as most challenging amongst students followed by motivational issues. Managing and metacognitively regulating the learning process were perceived as less severe but still more relevant than cognitive aspects directly related to understanding the learning content, which seems quite clearly to be perceived as least challenging by the students. The statistics for all comparisons can be viewed in Table 3.

4. Discussion

This exploratory survey study analysed the challenges HE students perceive with regard to regulating their learning during the covid-19-induced social-distance-education semester. Results indicate that students severely missed their peers and struggled to keep up their motivation and although they seemed to do quite fine cognitively, they are worried due to having so much on their hands. Thus, the most severely perceived issues related to emotional and motivational challenges while actually understanding the content with less teacher guidance and even structuring the learning process seemed to be rather less of an issue. This is in line with previous research identifying emotional and motivational challenges (e.g., Koivuniemi et al., 2017; Webster & Hadwin, 2015). While it remains unclear how exactly the pandemic-induced semester had an impact on these results and if the results are inherently due to different challenges arising from ERT or to teachers being more skilled in supporting cognition than motivation or emotion during the crises, it at least gives indications that the focus of providing students with support during this crisis should not be limited to improving the learning material to make it easier to understand the content, but that it seems important to provide support on other levels as well. Clear structures and chunking tasks may help learners to initiate their learning process and keep up their motivation while regular feedback and support and even individualised and more flexible learning arrangements may reduce stress levels. Finally, it is important to notice that altogether, students seem to be doing quite well, but seem to have trouble keeping up their concentration and motivation and especially miss their peers. The social role of the university should not be underestimated as it is not only a place to study, but a place to connect, and social support can be an important factor for academic retention and success (e.g., Wilcox, Winn, & Fyvie-Gauld, 2005).

Clearly, this initial research has some limitations that need to be discussed especially relating to the questionnaire and sample. First off, the questionnaire, while building on previously found challenges and a small pre-study, was still not validated and covered a broad range of issues. This became very clear during factor analyses which led us to discard quite a few items and the resulting scales and items still have some overlap in places. Thus, it is vital to keep in mind that this study was meant to give first indications rather than final proof. Research needs to build on this and study in more detail what learners struggle with. Additionally, the study was conducted (shortly) before students' exams and thus the chance to compare own understanding to academic demands. Thus, perceived challenges related to understanding the coursework may be underestimating true difficulties due to a tendency of students to show overconfidence in their abilities (e.g., Ehrlinger, Mitchum, & Dweck, 2016) especially when learning is based on video lectures without opportunities for self-testing (Szpunar, Jing, & Schacter, 2014). The other aspect that needs to be discussed is the sample. The sample consisted of German university students with various majors from different universities. Thus, this sample does not reflect a homogeneous population and students may have been exposed to a large range of different courses, course structures and materials and may also have been exposed to a vast number of personal challenges during this crisis. On the other hand, the sample is still limited to German

students and may not be readily generalised towards other educational systems and / or countries in which the pandemic had a more severe impact or was met with more severe social restrictions.

It is per definition that the impact of a pandemic may affect different educational structures very differently. It is thus up to (learning) scientists to pool their data and find out more about generic but also specific educational aspects of the crisis to gain knowledge about how learners regulate their learning during this time and what we can learn from this to provide guidance or give students (and teachers) the tools to handle the situation. Thus, follow-up research needs to match the challenges learners experience to specific aspects of their educational context like course design to draw more definitive conclusions and to best support students. However, it seems clear that providing better learning material and explaining content in easy to understand terms may, while still important, not be answering to the most pressing issues which are providing means of contact between students and helping them to keep up motivation and emotional well-being.

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