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Revisiting Textbook Adaption Through Open Educational Resources: An Inquiry into Students' Emotions

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Abstract

This qualitative study explored the emotional trajectories students experienced when faced with open educational resources (OER) that expanded the learning available from a required textbook. Data included students' reflections, group discussions, and interviews, along with field notes which were collected in a classroom at a Chinese university in one semester. The study showed that students' initial positive emotions arose from their understanding of their own learning needs. Their positive emotions toward the conjugated use of OER and a textbook fluctuated over the semester but were gradually enhanced through their involvement in classroom practices (e.g., knowledge building and teacher mediation). Through the process, students' positive and negative emotions respectively facilitated and hampered their learning practices; however, negative emotions were not always detrimental—they also facilitated students' learning. Students' emotions gradually stabilized in the direction of being positive, especially in tandem with (a) achievement of sufficient knowledge gained through OER-based textbook use and teacher-mediated learning, and (b) their augmented confidence in proficiently using the new knowledge to navigate their practices.

Keywords: textbook, OER, student emotion, knowledge building, material use

Introduction

Textbooks are crucial components of educational settings in that teachers rely on them to impart knowledge and fulfill instructional goals (Hilton, 2016; Tomlinson, 2003). Nevertheless, no textbook contains everything needed for students in a given classroom and, as a result, educators also use open educational resources (OER) to complement their teaching (Stockwell et al., 2015; Vo, Zhu, & Diep, 2017). Indeed, the wide scope of OER (e.g., free Web-based texts or audio-visual resources), along with their convenient accessibility, offers instructors optimal choices for supplementing students' knowledge with content missing from the chosen textbook (Hess, Nann, & Riddle, 2016). As such, a conjugated use of textbooks and OER has emerged as a popular and valuable assemblage, meeting both institutional demands and students' learning needs (Zhang, 2018). Researchers have found a positive effect on students' mobilization of complementary knowledge when they combine traditional textbook usage with OER (Hilton, 2016).

However, research into Web-enhanced teaching has ignored the aspect of emotion, especially in situations involving materials use (i.e., a textbook and OER) (Henritius, Löfström, & Hannula, 2019). This component merits our attention because it affects students' motivation for learning, as revealed in the field of general education (Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011). For example, studies have shown that emotions are contextually shaped (e.g., relating to the difficulty of learning content or a change of instructional style) (Mainhard, Oudman, Hornstra, Bosker, & Goetz, 2018) and that positive emotions facilitate students' learning, while negative emotions impede learning (Rienties & Rivers, 2014). In cases where students are exposed to a combination of textbook and OER use, textbook content may be adapted, rearranged, or even deleted, and OER used as a supplement, offering additional or alternative content (Hess, Nann, & Riddle, 2016). This means that students may experience a change of curriculum or instructional practices, which can cause emotional turmoil and, in turn, affect students' learning (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Caring for students in the context of Web-enhanced learning, especially in relation to textbook adaption and OER use, is necessary and important (Stockwell et al., 2015). However, this line of research clusters around students' learning outcomes (Hilton, 2016) or focuses on their emotions in a static manner, such as how they feel after completing a course (Parlangeli, Marchigiani, Guidi, & Mesh, 2012); fluctuation of students' emotions within specific contexts has not yet been adequately explored. As stated above, a qualitative exploration of students' emotions in relation to Web-enhanced learning is needed, especially as it concerns the combined use of OER and textbooks and the complexity of the emotions they elicit (Henritius, Löfström, & Hannula, 2019), in order to best meet students' needs. As such, this qualitative study aims to explore the trajectory of student emotions in the context of a blended use of textbooks and OER. It is hoped that the study can help instructors channel some attention to the complexity of students' emotions when offering them the pedagogical affordances of textbook adaption through Web-based resources.

Literature Review: Students' Emotions and Relevant Studies

From among diverse definitions (see Rienties & Rivers, 2014), there is one that describes emotion as “an acute, intense, and typically brief psycho-physiological change that results from a response to a meaningful situation in an individual’s environment” (Artino, 2010, p. 1,236). It can be understood as an affective state that emerges out of a person’s interaction with sociocultural contexts. In the case of students, such a context may involve the instructor, teaching materials, and instructional methodology (Mainhard et al., 2018). As a response to sociocultural context, emotion is changeable and evolves fluidly, differing among individuals (Parlangeli et al., 2012), although students also experience stabilized emotional states (Henritius, Löfström, & Hannula, 2019). In the process of contextual interaction, students’ emotions are particularly mediated by their awareness of the usefulness of and their interest in the learning, whether the process or the outcome, and their perception of themselves (e.g., self-confidence) in handling the learning offered in a teacher-mediated context (Pekrun, 2014; Rienties & Rivers, 2014).

Emotion is an important part of the educational researcher’s agenda because students’ emotions have been found to be closely related to their learning performance. Generally speaking, positive emotions (e.g., happiness, anticipation) have facilitating effects while negative emotions have hindering effects on students’ motivation to learn (Pekrun et al., 2011). However, these distinctions are not always straightforward, as negative emotions can be drivers of learning, for example, when negative emotions, such as anxiety, compel students to work harder (Lang & Lang, 2010). Meanwhile, students’ engagement with learning can also feed into their reconstruction of emotional states; for example, positive practices contribute to or enhance students’ positive emotions (Artino, 2010; Pekrun, 2014).

Within the field of Web-enhanced learning, much research has demonstrated the complexity of students’ emotions and the role of these emotions in practices involving diverse disciplines (Rienties & Rivers, 2014). For learning that combines mandatory textbooks and OER, relevant research has thus far been limited to students’ learning processes and outcomes (Henritius, Löfström, & Hannula, 2019; Hilton, 2016; Stockwell et al., 2015). It is possible that researchers’ and educators’ attention has been focused on the technological affordance and richness of knowledge offered by Web resources (Parlangeli et al., 2012). Among the few studies that may relate to this current study, Parlangeli, Marchigiani, Guidi, and Mesh’s (2012) research concerned a blended course on English learning (in the classroom and online learning). The course was offered to adult learners and undergraduate students. Using quantitative analysis of questionnaires, their study showed that students generally had positive emotions toward both face-to-face and online learning. However, such emotions also differed among students depending on contextual factors experienced at an individual level. Students who were used to social interactions engaged more effectively in face-to-face teaching, but even students who had limited knowledge of technology felt more interest in online teaching. In discussing the results, Parlangeli et al. (2012) noted the importance of the instructional design of Web-based courses in relation to meeting students’ learning needs and style (their learning of vocabulary from the combined teaching methods; adults’ preference for more time online) and attributed good design to the formation of positive emotions. In all, these findings echo the results in the field of general education (e.g., Pekrun et al., 2011) that have illustrated the importance of positive

emotions in relation to students' learning and how students' positive emotions are related to instructional design that balances contextual factors and fosters students' emotions.

In terms of methodology, the research on student emotion in the fields of both general education and Web-enhanced learning has tended to use retrospective data, such as that collected from post-semester interviews or surveys (e.g., Parlange et al., 2012). However, such approaches have limitations. "These methods [are] often not able to capture the dynamic nature of state-type emotions" (Henritius, Löfström, & Hannula, 2019, p. 97). Researchers have suggested that it would be more optimal to elicit emotional states in the process of learning via qualitative approaches in order to gain a contextual understanding, since students' emotions in relation to learning are contextually grounded and changeable (Artino, 2010; Xu, 2018). Therefore, the current qualitative study seeks to fill these research gaps in both methodology and content by focusing on students' emotions when exposed to the conjugated use of textbooks and OER. To achieve this, the study was guided by the following two questions:

1. What was the students' emotional trajectory in the context that involved OER-based textbook use?
2. How did their emotions interact with the learning and instruction?

Methodology

The research was conducted through a case study. The decision to take this approach was driven by the research purpose, which focuses on the contextual understanding of a phenomenon. A case study approach, with an interpretive paradigm, would meet our needs and be most suitable for the study (Merriam, 1988).

Research Context

The study took place within the context of an argumentative writing course at a Chinese university. The classroom used a mandatory textbook; however, the textbook did not cover all necessary aspects of the course, as it did not provide sufficient content in composition. Indeed, valued writing regards writing as a meaning making process, where writers are expected to use appropriate linguistic resources, including grammar and vocabulary, to construct meanings beyond structural accuracy (Miller, Mitchell, & Pessoa, 2014). The meaning making occurs in valued writing at the levels of: (a) ideational meaning, which is the literal meanings as well the logical relationships that underlie a text; (b) interpersonal meaning, or the stances exuded by the text author or other participants, such as an external voice different from the text author; and, (c) textual meaning, indicating the meaning of coherence in organizing the two aforementioned meanings (Martin & White, 2005). For example, an assignment in the class that involved creating a counter-argument and a follow-up rebuttal required students to navigate opponents' arguments and their own argument at the level of interpersonal meaning (Miller, Mitchell, & Pessoa, 2014). This assignment also required students to use appropriate lexical and grammatical resources to achieve this, such as words indicating concessions (e.g., *admittedly*), and expressions indicating the transition to

authorial rebuttal (e.g., the explicit use of transitional words, such as *however*, and of attitudinal words to show authorial stance, such as *the argument is invalid, because ...*).

However, the mandatory textbook provided reading texts, focusing on students' comprehension, without sufficiently mentioning how the three types of meaning intersect with linguistic resources. A sporadic mention of the resources was made (e.g., *modal verbs in relation to interpersonal meaning*). To best help students use the book, the instructor, who was proficient in writing from the perspective of meaning making, included OER to systemically guide students to use the mandatory textbook. These OER were selected from websites and included multimodal resources such as texts and audio-visual materials. In order to ensure their reliability, they were peer reviewed in line with the mechanism of valued writing (Miller, Mitchell, & Pessoa, 2014; see also Zhang, 2018). These materials were sent to students one week prior to in-class instruction. In the classroom, students' knowledge was then mediated to ensure a deeper understanding through teacher-student co-deconstruction. Based on students' needs, additional materials, whose content difficulty was compatible with students' comprehension, were sent to students, along with relevant assignments, such as those that might allow students to apply independent use of knowledge in relation to their writing. Individual tutoring was also provided by the instructor based on need. As a part of a three-year research project on students' academic development, the current study focused on how students responded emotionally to material use.

Participants

The participants were from a sophomore argumentative writing course, in which students relied mainly on textbook learning. Twelve students were involved in the study and were each assigned a number from 1 to 12. They were chosen for the study because they were willing to share their emotions. Among the participants were students who had never experienced the conjugated learning of OER and a textbook. This group could be considered similar to students who do not have sufficient knowledge about writing and who need conjugated material use to enrich their knowledge repertoire. That is, their knowledge about writing was constrained more to language accuracy, rather than focusing on meaning making, which is a requirement of the valued writing approach (Zhang, 2018).

These students were categorized into two groups based on their self-reporting, and an analysis of their pre-semester writings conducted by two native English speakers to determine their level of language and content. Group 1 (students 1–6) was considered average and below; group 2 (students 7–12) was considered above average. In all, these students were representative of students who had to use textbooks, but who needed OER to fortify their learning.

Data Collection and Analysis

Data were collected from students' reflections, interviews, group discussions and field notes over one semester. Students' written reflections in the form of short essays occurred bi-weekly on average, with each student having produced eight pieces for a total of 96 pieces. Each essay is about 600 words. In these 96 pieces of reflection, students' feelings or emotions about their learning were revealed. Interviews were

conducted bi-weekly. In them, students were asked about their feelings about their learning, or questions were asked to clarify their reflections. Group discussions took place three times and were used to maximize the retrieval of information about students' emotions in relation to the use of OER. Field notes documented students' learning processes and the development of their writing, in terms of how they constructed three meanings with linguistic resources.

The data were combined and subjected to vigorous comparison (Merriam, 1988; Thorne, 2000). Initial codes were generated in this process. These codes included students' initial excitement, interactive feelings about the constantly changing variables, and malleable feelings over time. These codes were then combined to form themes that would allow the research questions to be answered. In particular, a further grammatical and lexical analysis was conducted on these themes in order to refine understanding of the students' emotions (Pekrun et al., 2012; Martin & White, 2005). For example, in the category of lexical analysis, the response, "it gets much better" suggested that students' emotions changed in a positive way and was thus coded that way, but "feeling a lack of motivation" was labeled and coded as a negative emotion. The analyses were checked by two other researchers for agreement prior to being reported below.

Results

Students initially stated that they had positive emotions (e.g., anticipation and interest) about the combined use of a textbook and OER and the blended knowledge they expected as a result. These emotions diverged later when students were challenged by classroom practices that guided their learning in different directions. Some students maintained their positive emotions, but others transitioned to negative emotions. When teacher mediation occurred and students' knowledge accumulated to a sufficient level, there was another change evident in the data. Students unanimously reported that their emotions had been enhanced and had moved in a positive direction, as the course supported their aim to develop literacy proficiency.

Students' Initial Emotions About OER-Based Textbook Adaption: Being Positive but Different in Willingness to Act Upon Emotions

Students' emotions in the initial phase were exemplified by their support of OER-based textbook adaption in terms of content and instructional styles. They used words such as *anticipation* and *interest* when talking about the course. As student 4 said, "It is not enough to learn from the textbook The combined use can provide a richer knowledge supply. We all know this. The more ... the better." Echoing student 4, student 10 noted, "We have been exposed to the mere use of the textbook, and we need some innovation and supplementary knowledge." The students' positive emotions were also related to the instructor's role. As student 9 noted, "The use of OER along with the textbook has been decided based on the teacher's evaluation of our learning performance. And I trust the choice." Overall, the inceptive emotions in relation to the OER-based textbook use were positive and emerged out of the students' prior experiences with textbook-based learning and their trust in the instructor.

Despite the dominance of the positive emotions expressed prior to the implementation of the material use, there were nuanced differences between the two groups. Group 2, which was the more proficient group, felt emotionally energized and displayed willingness to increase their knowledge. Student 7, who wanted to learn more about writing composition, wrote: “I am ready to learn this with the teacher ... [in order to] become a better writer.” Similarly, student 9 noted: “I need more than just language knowledge or general comprehension skills to write better ... and I am also ready to learn using these new blended materials.” However, students in group 1, although emotionally motivated, seemed more passive and a bit upset about the forthcoming learning. Student 3 stated, “I want to learn with these learning materials I do not want to be a bad student. But I do not know whether I can handle this.” Positive emotions did not manifest unanimously between the two groups with the same level of strength. This seemed to be related to students’ confidence based on their self-evaluation of their writing proficiency. As student 5 noted in the group discussion, “I am not a good writer even at the language level ... and feel a lack of confidence in meeting the needs of learning at the both language and content, so I worry I am not ready.” Taken together, students’ positive emotions in relation to experiencing a new mode of learning and instruction were also entangled with their level of confidence in their existing writing proficiency, yielding individual differences in the strength of their emotions.

Students’ Emotion-Driven Practices and Practices Grounded Emotional Reconstruction: Regularity and Irregularity

Students’ positive emotions were sustained in the early phase of actual OER-based textbook adaption. These positive emotions were buttressed by their experience with the instructor. For example, as revealed in the field notes, in the mandatory textbook, there was a section on the use of conjunctions. Prior to in-class teaching on conjunctions, the instructor had sent students OER, including both reading texts and audio-visual materials, about using conjunctions to construct meaning and other devices that were missing from the textbook, such as repetition through the use of synonyms. Additionally, the instructor later offered further instruction to supplement these materials. In response to this, students showed emotional endorsement. As student 7 said, “OER made it clear why textual meaning is the case and how textual meaning is important.” Even students who had less confidence in learning from OER and the textbook felt invigorated. As student 6 noted, “The learning started with the part I feel comfortable with. Maybe I had been over thinking.” In a group discussion, student 2 noted that: “This is the easiest part of all ... and we had part of the knowledge ... thanks to the instructor’s scrupulous design.” The student’s positive emotion in relation to the learning was connected to the instructor having considerably placed the more accessible content at the beginning of the course.

In addition, when students were applying their new knowledge to their writing, their emotional alignment was further enhanced. For instance, as revealed in the field notes on student 8’s second paper, she used synonymous repetition: “*Researchers conducted a study about...*” followed by, “*And in the study....*” As student 8 said, “I did not know about synonymous repetition, [and] now I have more ways to examine my writing in terms of textual meaning.” Putting their knowledge into practice made the students feel excited about OER-based textbook use. Student 5 said, “So far so good, [and] it [using OER] is a good beginning.”

In all, students unanimously expressed positive sentiments when talking about application of their newfound knowledge.

Nevertheless, students' emotions diverged when they were challenged with new content, especially the interpersonal meaning from OER. Student 8 noted, "The writing knowledge [from OER] is not only different from what we had learned but also there is difference between the paragraph of pro-argument and that of counter-argument." Student 9 said, "I felt I can understand what the instructor said in class but could not put it [the knowledge as delivered by OER] to practice on my own." The efforts needed to overcome the influence of their previous learning and the efforts needed to put newly acquired knowledge into practice affected their emotional states. This was understandable since informational text writing they had learned emphasizes implicit authorial stances, but they had to show their authorial stances in argumentative writing.

Although they were challenged, some students still felt emotionally energized. The students in group 2 felt the need for the use of OER, even though it was the source of some challenging content. Student 10 claimed, "The textbook content is accessible ... but I need to get out of my comfort zone ... and learn what is needed from OER." As student 8 noted, "It is difficult, but manageable. It only takes time I believe in myself. I have been good in my previous class." These students' sustained positivity seemed to be related to their self-confidence and their understanding of their own need to be challenged. Their emotions kept driving them to engage.

Indeed, field notes revealed that while the students from group 2 did not do well on their own with certain challenging content, when assisted by their instructor, they were able to actively analyze and use the new material. For example, in the first draft of their second paper, when the construct of interpersonal meaning had just been introduced and learned, some students failed to make concessions for counter-arguments, deeming them false though they lacked sufficient evidence for such a stance. Other students failed to project their authorial stance through the use of lexical resources, such as using *wrong*, or *illogical* when making rebuttals. In the face of these failed attempts, field notes showed that these students chose to interact with the instructor or seek assistance after class. They were challenged, but still emotionally invigorated in a positive sense; one used the word *manageable* to describe the emotional state. Their confidence in themselves and awareness of their learning needs motivated them to learn and apply the knowledge through their own will.

In comparison, when students from group 1 were challenged, the positive emotion they experienced early on started to wane, especially at the level of the blended knowledge. Student 6 claimed, "Now, I feel my passion is wearing out." Student 4 also noted, "It is difficult to continue with the OER ... I guess I am not ready for the content beyond the textbook." As the content from OER increased in complexity, students either kept silent, displayed limited passion, or simply did not make attempts to internalize the knowledge in class, as shown in field notes. Because of their negative emotions, these students, in writing their counter- arguments, simply did not try to incorporate their new knowledge. In student 3's writing, she simply relapsed into her old habits when introducing counter argument: "*In my opinion...*" In the group

discussion, student 3 noted, “I was not in a good condition so I did not use the knowledge, and got carried away Now I realize this [*in my opinion*] is used in opinionated essays.” Echoing student 3, student 4 said, “I am not a fast learner I am not good enough ... and feel a bit anxious.” These students’ general emotional state transitioned to being negative, which affected how they approached the learning and, in some cases, caused the students to give up. The differences in emotions experienced by these students from those in the second group may be a result of the students’ perceptions of their own competence.

Interestingly, some of the students who experienced negative emotions found that their emotional state motivated them to learn. These cases seemed to be related, at least in some way, to peer pressure. Student 6 said, “Other students are doing well, and were praised by the instructor, and I guess I need to work hard.” Student 3 said, “Since they are so good, I am lagging behind I guess I need to power through.” This increase in motivation might also relate to a regained awareness of their own learning needs. Student 2 noted in the discussion, “But lacking confidence or weak background is not an excuse. My failure in writing makes me understand the need for the knowledge to be a better writer.” Students had negative emotions but were nevertheless motivated to improve their practices.

The students who were driven to succeed because of negative emotions sought assistance from the instructor to clarify their new knowledge and make improvements in their follow-up drafts. As revealed in the field notes, students sought assistance in several ways. First, the students used their first language to ask for clarification in class, to which the instructor responded in the students’ first language. Second, they made additional rounds of editing as a result of the teacher’s mediation. Third, they visited the instructor for individualized assistance out of class. As student 1 noted, “It is taking me crucifying efforts but I feel I am making it.” In all, their negative emotions, when interacting with contextual variables such as peer pressure and the need for an expanded knowledge base, provoked them to work harder.

The Redistribution of Student Emotions: Dissimilar Trajectories but a Similar Ending

The students’ emotions affected their interactions with the aforementioned contextual factors related to each group in the classroom. In the end, their emotions became more stable and positive overall. As student 6 noted in the discussion, “My emotions are not fluctuating anymore It encourages me to use the knowledge from OER and the textbook with pleasure.” Agreeing with student 6, student 9 wrote, “The gains from the practices are rewarding It cheers me up and dissipates my diffidence My feelings have been the same for a while.”

Indeed, along with their stabilized positive emotions, students reported that their writing process had become less problematic and more aligned with expected standards. For example, field notes showed that student 11 had not been used to using logical connectors (e.g., *because*, or *as a result of*) in her writing, and had found it challenging both to learn how to use them and to change her habit of not using them. In her final essay, however, she used them explicitly. In the interview, she noted, “Keeping a positive attitude all the time is important. You see, I have made it It makes me feel more confident about being a persistent learner.” Students who had once had negative sentiments and temporary misalignment with the blended

materials also exemplified their updated practices. For example, field notes documented that student 5 appropriately used reporting verbs (e.g., *suggest* or *show*) to pull out evidence in a pro-argument paragraph. In the counter-argument paragraph, she also used an explicit sign, showing her authorial stance, when making rebuttals. She then noted, “Writing composition becomes a thing to be completed in a different yet happy way The success gives me a rewarding feeling.” In all, students’ emotional states, as a response to experiencing new contexts, moved in a positive direction and galvanized as a passion for their writing practices. The knowledge gained in the learning also fed into their emotional experiences, contributing to a more stable state where all of the students’ emotions were positive and they became inspired to use their new knowledge in their practices.

Meanwhile, students’ emotions in relation to the combination of a mandatory textbook and OER also stabilized. Student 8 said, “Through the semester’s experiences, I firmly feel that we need the textbook, but we also need supplementary materials like OER to engage in improved learning.” Even students who had thought about the potential challenges of blended use projected their new understanding. Student 2 noted, “Although it may involve more than the textbook ... and it needs additional efforts ... this way of material use should be promoted.” This new alignment seemed to be related to their experiences with knowledge provided from the blended materials. Student 6 noted, “The blended use enhanced my understanding of the value of blended use ... and the blended use is rewarding once we see what we get from the practices.” No matter what emotional state they started from, all students came to think positively and remain positive about the concurrent use of a textbook and OER in their course.

Conclusion and Implications

This case study centered on students’ emotional trajectories in relation to the simultaneous use of a mandatory textbook and OER. It has yielded the following important findings.

First, the study shows that students emotionally embraced the use of OER as a complement to their textbook because they were already aware of the limitations of the textbook content. In addition, constraints on students’ readiness was contextual; for example, individual differences, such as the level of students’ self-confidence in relation to their writing proficiency, seemed to weaken their support of OER-based textbook adaption. These contextual variables affected students’ emotional states and willingness to embrace the approach (cf. Stockwell et al., 2015; Tomlinson, 2003). In all, this finding echoes other researchers’ calls for the combined use of OER and textbooks, and their reminders of the constrained value of stringently learning from a textbook (Hess, Nann, & Riddle, 2016).

The study also reveals that when exposed to the conjugated use of OER and a textbook, students’ emotional configuration was complex and that it continued to interact with learning-related factors such as teacher assistance and the difficulties associated with knowledge assimilation. Regarding the emotional trajectory, some students maintained a positive outlook throughout the course, which also motivated their learning. Other students, who had limited confidence, transitioned to a more negative state, in which their

emotions caused them frustration before eventually motivating them to carry on learning and, in the end, regaining their positive feelings, with the help of teacher mediation. In this sense, this finding echoes previous studies on the fluctuation of student emotion and the impact of emotion on students' learning practices in general (Pekrun, 2014). At the same time, the finding contributes to research on material use (e.g., Tomlinson, 2003; Zhang, 2018), uniquely showing through a qualitative approach the importance and complexity of students' emotions in relation to the use of blended learning materials (cf. Parlangeli et al., 2012). In addition to affirming the benefits of a generally positive relationship between student emotions and practices, this finding is one of only a few (e.g., Lang & Lang, 2010) that have shown that students' negative feelings can also motivate learning. This may have arisen in this case because students felt ashamed of their learning progress and realized a need to catch up with others. The effects of this type of peer pressure have been seen in other research (Connor, 1994).

All students in this study ended up in a positive emotional state in terms of the combined use of OER and a textbook, and how it influenced the instructional style as well as their knowledge, although they arrived at this state at different paces. In particular, a stabilized positive emotional state was first facilitated at the knowledge level, attributable to the students' positive experiences in practice, and then at the macro level of blended material use, set against a teacher-mediated backdrop. This was understandable, as the knowledge imparted from the combined use was transparent and efficient in helping students' navigate the complexity of writing (Miller, Mitchell, & Pessoa, 2014), and thus may have enhanced the two levels of emotions through a chain reaction. In this sense, despite the complexity or fluctuation of student emotions (Rienties & Rivers, 2014), this study contributes to understanding the potential of fostering students' emotional stability by constantly mediating contextual factors in OER-based textbook use and developing positive experiences with academic navigation (Pekrun, 2014). The finding especially suggests the importance of the teacher's role in the use of blended materials, which is largely ignored in the research into material use (Zhang, 2018). The teacher's role, as revealed in this study, is important. A teacher can both provide manageable yet practical knowledge that helps students gain confidence through practice and re-conceptualize the value of material use, which stabilizes students' positive emotions (Mainhard et al., 2018; Parlangeli et al., 2012; Pekrun, 2014; Vo, Zhu, & Diep, 2017).

Implications of the study are relevant in several areas. One concerns research into the trend toward blending textbooks and OER. Integration of the two in relation to students' academic outcomes or aspects of the technology itself is usually the focus of research (Parlangeli et al., 2012). However, students' emotions need to be closely monitored in the process. This type of learning does not necessarily ensure a positive response from students but sometimes a moderation of students' negative emotions is also productive, as it may facilitate learning (Pekrun, 2014). Overall, teachers need to create a comfortable and friendly context through an instructional design that best suits students' level (Durlak et al., 2011; Stockwell et al., 2015).

A second concern is that complementing the textbook with OER may be a challenging process for a teacher (Durlak et al., 2011). Teachers may experience emotional fatigue when working to better suit students'

needs (Xu, 2018). Administrators may combat this problem by giving teachers support and professional knowledge through, for example, organized workshops to help make curriculum changes (Pekrun, 2014). Without these external supports, teachers would empower themselves and rely on themselves to regulate the emotions generated by the challenges presented by the integrated use of OER and mandatory textbooks (Stockwell et al., 2015; Xu, 2018). However, this may create additional stress and discomfort that can be avoided through extra support and training.

Third, while educational technology has been used in teacher education programs, research focused on understanding students' emotions is still lacking in relation to technology-based teaching (Henritius, Löfström, & Hannula, 2019). Teacher education courses should include information related to the regulation of student and teacher emotion. Such initiatives need administrators' attention and follow-up approval. In particular, the triadic relationship among textbooks, OER, and emotion should be highlighted in teacher education programs, given the importance of the three in context, especially where there is compulsory use of textbooks, but where the content has limitations (Rienties & Rivers, 2014; Zhang, 2018).

The limitations of this study also need consideration. First, the research was conducted through a case study approach; therefore, findings regarding students' emotions may not be easily transferable to a different context. Second, the research into students' emotions was limited to a specific discipline; future research can be conducted in other content areas (e.g., science). Third, the study only involved students who were willing to participate. Those unwilling to participate may have experienced different emotional states. Future research could involve more participants and thus provide added understanding of students' emotions in regard to OER use.

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