"Beyond EFL Writing Anxiety": Tapping into the Individual Emotionality of Proficient EFL Writers Through Semi-structured Analysis and Wearable Sensing Technology

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Abstract. A high level of writing proficiency is a critical foundation for undergraduate writing performance and general academic success in an English-medium university. The present study proposes a model of "deconstruction" of the "anxiety" plaguing EFL writers by using a case study (Study one). The purpose of this qualitative single embedded case study is to explore both perceived/real challenges and positive affective factors experienced and harnessed by competent Chinese EFL writers studying at an English-medium university. In order to further objectively uncover the writers' temporal emotion change, we will conduct a second study to continuously collect their physiological data through wearable and sensing technology. Both studies aim to add depth into our understanding of the link between anxiety and writing efficacy. Gaining an understanding of what is perceived as positive affective factors by competent EFL writers, stakeholders, instructors and institutions can utilize these facts to develop/adjust writing teaching techniques, methods, or beneficial interventions, thereby increasing the potential for academic success.

Keywords: Anxiety · Emotion · Writing · EFL · Physiological data · Chinese · Wearable and sensing technology · Classroom

1 Introduction and Background

The paradigm of written discourse first shifted from being a product to a writer's recursive process, and under a further shift, is currently recognized as a merger of cognitive and affective processes. In her seminal writings, A.G. Brand stated: "Understanding the collaboration of emotion and cognition in writing is both fundamental and far-reaching. It is in cognition that ideas make sense. But it is in emotion that this sense finds value. Without such priorities we could not think" ([5], p. 442). The singular most often cited descriptive emotion associated with English as a Foreign Language (EFL) writing is anxiety [13, 41]. Krashen's introduction of the affective filter hypothesis [21] confirms that mental upsets experienced by learners inhibits

language learning. Further, agreeing with McIntyre and Gardner [27]; Horwitz et al. [19] see the imposition on EFL writers the additional socio-cultural and linguistic demands that exacerbate a complex of self-perceptions, confidence, feelings, and conduct related to classroom language learning.

Launching from this cognitive-emotive theoretical construct, a plethora of research has evolved on the EFL learning front in search of pedagogical answers to minimize negative affective states related to both oral and written performance apprehension linked to Second Language Acquisition (SLA) [28]. This body of research ranges from various constructs and models and their implications [5, 9, 23, 30], emotional intelligence and mediating role of emotional control [43], writer motivation and attitudes [26], dissection of anxiety and apprehension [3, 7, 14], self-efficacy as predictors to text production [2, 29, 48], configuration and interaction among various emotions and personality traits [14, 32, 37, 46]. Complementing these fruitful lines of enquiry are novel methodologies and analytical instruments (scales) [10, 13].

A high level of writing proficiency is a critical foundation for undergraduate writing performance and general academic success in an English-medium university. Researchers, while agreeing that EFL learners face significant challenges in the language classroom, searched for solutions by examining and identifying primarily the perceptions and emotions of EFL writers prior to and after entering English-medium university that focused on negative factors and challenges [20, 22, 40, 44]. What is crucial, however, is the direct report on experiential journey (development of cognitive-emotive states) of successful EFL writers revealing their perceptions, usage of positive affective factors [40], as well as what they believe in, and how and what was adjusted to achieve writing proficiency.

This paper proposes a model of "deconstruction" using a case study (Study one) to mine this missing data. The purpose of this qualitative single embedded case study is to explore both perceived/real challenges and positive affective factors experienced and harnessed by fluent Chinese EFL writers studying at an English-medium university. This qualitative case study is utilized to obtain information regarding how, what and why something has occurred – to explore the perceptions and affective experiences, including the moderating role of effortful control – in the words of those who have experienced it, in the setting in which it occurred, and without manipulation [12, 33, 50]. For example, what were the subjects' emotional and intellectual cues that prompted them to start writing. What in fact does happen affectively between having an idea for writing and beginning a first draft? Such research provides understanding on why certain problems occur during the writing process and the solutions of skilled writers [5, 6].

Unlike the majority of previous studies on the association between language acquisition and emotions that only rely on structured- or unstructured interviews, objective measurements of the learning outcomes (among many, [1, 11, 17, 23, 39, 49]), used in our present study goes a step further to obtain writers' physiological data in order to characterize the temporal emotion change through wearable and sensing technology. The physiological data that is expected to be collected in Study two includes heart rate and skin temperature through Galvanic Skin Response (GSR) [25]. Results from affordable sensors have increasingly been adopted for understanding

target users' affect in education [15, 16, 31, 38, 45]. Ertin et al. [18] also designed a multi-sensor suit (embedded with a total of six sensors) to continuously measure a user's stress level.

2   Study One: The Qualitative Single Embedded Case Study

Participants for the study are purposively selected from a large metropolitan English-medium university in China to meet predetermined criteria. Purposive sampling is considered an efficient method to ensure alignment with specific goals of the study and to provide accurate and relevant data [50]. The units of analysis and comparison are the perceptions of upperclassmen in each of the following disciplines, namely, English, Accounting/Finance, Global Business, and Computer Science. A field-tested interview guide will set parameters for the semi-structured open-ended interviews. Data from the interviews will be recorded, transcribed verbatim, and triangulated with other units of analysis (GPA's, length of study, and other esoteric personal characteristics). Special attention will be paid to ascertain if the subjects' coping mechanisms also drew from aspects of Vygotsky's Sociocultural theory [47] – mediation, the obtainment of meaning, and the zone of proximal development – and the degree of SCT effectiveness for EFL writers [8, 51].

2.1   Qualitative Case Study

Theoretical Perspective. This study is guided by Pekrun's use of modern theories on process emotions [42], by which he describes emotions as "sets of interrelated psychological processes including affective, cognitive, physiological and emotional components" ([36] p. 37).

Questions Pursued in this Case Study

- Which academic emotions do students experience in EFL writing while pursuing homework, in-class, and timed class examinations?
- What are the components within the above-named emotional experiences?
- How do these emotions affect the process of learning and student achievement within EFL writing
- What are the sources of these emotions given the students' personality traits within the context of EFL writing?
- What are effective coping mechanisms regarding negative emotions and the pedagogical lessons on avoiding emotions detrimental to academic achievement and student educational life?

2.2   Research Methods

Participants. The 8 participants are all registered for four-year full-time undergraduate study. These are comprised of 6 seniors and 2 juniors who by their advisors-instructors' account possess excellent to high intermediate writing skills in EFL. Two of them are

English majors, two Accounting majors, two Finance majors, one Computer Science major, and one in Global Business. Their GPA ranges from 3.4 (lowest) to 3.9 (highest) out of 4.0. Their commonalities in educational background are that they are tier one level of students based on their college entrance examination and are eligible to enter this same university that utilizes English as the medium of instruction. Another common exam passed by all is the CET 4 that is required at the end of the first year as a prerequisite for them to graduate. Exceptional cases, where participants took more demanding English tests and other international exams (TOEFL, IELTS, GRE, and GMAT) will be mentioned subsequently where relevant. Two of the participants spent one semester studying abroad in an English-speaking country, while one participant did receive special tutoring on English during high school. Participants include both genders with ages ranging from age 20–22.

Procedures During the Individual Interview. A simple explanation of the objective of this study was given verbally at the start. The interview was recorded. Student participation was on a voluntary basis and none of the students receive any financial returns nor feedback of the results in exchange for participating. While guided by the list of questions below, the interviews had no time constraints. Each interview lasted between 1.45 to 2 h depending on the interviewee's willingness to share his/her experiences.

The participants were guided by the following prompts in our semi-structured interviews:

1. Description by the participant of his/her existing trait predisposition and emotionality when entering freshmen year.
2. Description of initial emotions in the face of EFL writing courses as freshmen.
3. What the participant believed were his/her motivations and positive academic emotions they started with and how these were sustained.
4. Description of the various individual emotions experienced during the process of completing homework writing assignments.
5. Description of emotions experienced during timed in-class exam and in-class writing.
6. Description and explanation of effective external mediating factors and support.

Once settled comfortably in a quiet environment, the researcher would start interviewing the participants using the above questions. Questions often do not take the same sequence as the interviewer will digress where there is a belief the participant is reporting an unusual or unexpected observation that merits further exploring.

2.3   Results

Responses to self-rating (at start of freshmen year) of attitude towards writing in general (e.g., writing in Chinese), being in a English medium university, level of English writing proficiency, tendency to over worry about situations rather than not, self-confidence in starting a new undergraduate life, and so on:

– None of participants claimed they like to write.
– Participants claimed they did reach an objective in their life by being admitted into a university. While still fearful, they hoped for the best and were willing to try it out.
– Participants expressed a low level of confidence and claimed to have a low-level quality in EFL writing when entering freshmen year. When probing their reasons for selecting an English medium university, all admitted that this institution was not their first choice. Two participants indicated parental pressure in entering this university and the major to take.
– One of the participants, unlike the rest, believes he is a worrier when encountering a problem. The others seem fairly even keel.

Emotions encountered when facing required Freshmen EFL Writing Courses:

– While the participants expressed resignation in the face of potential difficulties contending with English for the next four years, they also felt hopeful that with adaptation, they would successfully acquire a Bachelor degree with good English skills.
– Without any qualifications, the participants recognize the strategic significance in the ability to use English, in this case for EFL writing.
– The participants described an all-consuming uncertainty, almost fear, that there will be no appropriate employment at the end of the four years. This feeling that spans all their undergraduate years, is ubiquitous among their peers.
– At the start, all participants found the courses worrisome as they were fearful of failure in these pass/fail courses which would then have to be repeated.

Traumatic Journey of EFL Writing under the Homework Setting:

– Completing homework was unanimously voted as the experience where "effective" writing skills were learned.
– The participants experienced the highest intensity of emotions during the daunting task of completing writing assignments.
– Upon the receipt of an assigned writing homework, the aroused feeling of "anxiety" include emotions of confusion, dislike or frustration about the topic because the student has no idea about what to write on the topic, fear, shame, or shyness about asking the instructor for clarification, and lastly the worry that the student will not be able to write 3 pages.

Common coping/mediating mechanism in the following order of popularity:

– googling in Chinese for ideas on the topic
– brainstorming with peers
– consulting with instructor.

Unconventional (within the context of the 8 participants) answers:

– Three participants mentioned having emotions that can safely be assumed to be positive innate traits for purposes of academic achievement: "curiosity", "trust" (in himself).
– One even voiced anger at China's foreign language (i.e., English) program for middle school and high school which has created the unpreparedness for entering

freshmen. He had no wish and to this day does not talk to classmates about development of essay topics. He spends time thinking and developing his own ideas which he does not wish to share with others. In the actual writing portion, he spends the most time writing his introductory paragraph which would summarize all his ideas. The interviewee trusts his own judgment and he reported he did receive outside English tutoring when attending secondary school. Perhaps that experience rendered him more familiar with writing in English.

–   The participant who characterized himself as always being "curious" will spend days researching until he "believes" he has enough material. He gets progressively more excited with the material gathered and has used the word "inspiration" at least twice when he is ready to start the writing. He describes himself as agonizing over each paragraph and will not move to the next paragraph until he is satisfied with the quality and the expressions of the substance of that one paragraph. He also becomes upset when discovering he is still on paragraph 3 (his example) when he has 5 more to complete. He then describes himself as being ecstatic with a sense of satisfaction when he is near the finishing line of the assignment. He is delighted and feels a sense of accomplishment when the essay is completed to his satisfaction. He then feels so relieved after its submission.

Best pedagogical practices named in the learning process of how, what, when to write:

–   The participants named the instructor's clear demonstration of every step in the building of an essay of a particular genre as the best teaching method. Aside from the general skills in the overall structure of an essay, such as the thesis statement and paragraphing, the reading and examination with the students of samples of specific pieces of writing of all genres prior to the assignment, is also very helpful.
–   As reported, the participants reported disliking the holistic method used by some teachers in reviewing written essays. Correspondingly, the best feedback is the type where the instructor does comprehensive review of the essay. All participants generally agree that instructors who are empathetic and encouraging in their attitudes towards students definitely help boost students' self-confidence.
–   One participant emphatically mentioned that reading English books of all types – those with topics that interested him – was his secret weapon for honing writing skills. Whenever possible he will try to cover two books in three days.
–   Though without much love for the process of writing, one participant mentioned that she does write in her diary (in Chinese). She also mentioned an aversion to having her essays being read. She remarked insightfully that she has created a conflict for herself– how can she fulfill her desire to improve her writing unless her essays gets read and corrected or evaluated? This participant professes to be quiet, shy, not very talkative, and somewhat introverted.
–   As a corollary, emotions of gratitude, admiration, respect, and even affection, have been expressed towards instructors who have expended extra efforts in promoting students' learning.

Emotions experienced during English classes and timed in-class exam:

- It has been reported, the participants' attention and therefore their interest in the lesson are generally captured by skilled instructors where the teaching is engaging and can be readily followed by the class. Boredom is most often mentioned when the topic is not interesting. Discomfort was experienced when individual contribution in class participation was expected.
- Although exams can be the most stressful time, as compared to homework writing assignment, the time span is limited. All participants will spend 5–10 min to develop ideas about the topic before putting pen to paper. Some of the participants believe that the feeling of time pressure can sometimes be helpful in creating stronger powers of concentration and focus to bear on the writing.
- One participant complained that he dislikes English writing exams because it prevents him from taking his time to produce a better piece of writing, or to fully develop his ideas.
- Outcomes of tests would arouse disappointment (less than expected result) and joy, surprise (better than expected result).

Self-rated proficiency level of writing and the improvement of EFL writing with passage of time:

- Most participants mentioned that after the initial two years, writing in English felt easier and less of a struggle, although one mentioned it took only one year. Some remarked that perhaps this was a sign that their writing skills have improved and this fact may also have spilled into other courses that require English writing.
- The participants self-rated their current writing levels to be between B+/A−.

2.4   Analytical Discussion

China's Domestic Marketplace that is Awaiting the New Entering Workforce.
Given its economic globalization, nowhere more than in China is it true that a bachelor's degree is a minimum requirement to secure decent employment. The sought after firms (global or internationalized domestic firms) all require proficient practical writing and speaking English skills. In this competitive market where resources are tied to individual achievement, the academic degrees and grades are premium as they also serve as the only yardsticks for entering elite graduate schools overseas or to acquire that dream position.

This is the overriding motivation, the consistently overarching achievement pressure that constitutes the highest source of arousal driving all university undergraduates. Aside from landing that professional position, there is a sizeable number of students who are destined to undertake graduate work in English speaking countries.

To help better understand this study's qualitative results and to further the purposes for studying these multiple emotions involved in EFL writing, one could analyze the data from the perspective of seminal concepts on why and how emotions influence students' cognitive processes and performance. Pekrun [34] proposes to use the term

"academic emotions" to mean emotions that are directly linked to academic learning, learning in the classroom, and achievement such as enjoyment experienced in learning or the process of studying, pride in successfully completing assignments, or anxiety instigated by tests. His ideas regarding achievement emotions – emotions experienced in academic settings – can support students' motivation and influence academic performance [35] based on his concept of "appraisals of control and value" That is, these emotions arise from students' assessment of control (controlling outcomes) and value (value attributed to such outcomes [35].

There is also a dearth of empirical evidence and studies involving emotions in the academic field, focusing on the interaction of the rich diversity of academic and achievement emotions. When Pekrun [35] introduced his Control-Value Theory of Achievement Emotions, he offered an integrated system where emotions should be seen as "sets of interrelated psychological processes including affective, cognitive, physiological and motivational components" ([36] p. 37).

3   Study Two: Anxiety Elicitation Through a Wearable Sensor

3.1   Study Procedure

Following the study protocol in [15, 16, 31, 38, 45], a pilot study was conducted to correlate the heart rate and GSR data to anxiety. The subject wrote an essay (up to 10 min); the quality of the essay and the temporal emotion changes can then be used to not only characterize the temporal emotion states of the subject but hopefully also predict her anxiety. To the best of our knowledge, such a multimodal, layered analysis is rare in the literature.

3.2   Apparatus

The Microsoft Band 2 which is capable of recording both heart rate and GSR data was worn by the subject. Note that, though, Band 2 was discontinued by Microsoft in October 2016 and its SDK had been removed recently, it remains to be one of the few wearable and programmable sensors in the market that can record GSR data (Fig. 1).

Fig. 1. The Microsoft Band 2

During initial testing, we found out that Band 2 is not stable in continuously monitoring and recording the data; adjustment has to be made to ensure the band is properly pressed against the skin.

3.3   Results and Discussions

Figures 2 and 3 show the GSR and heart rate readings within five minutes while the subject was writing an essay.
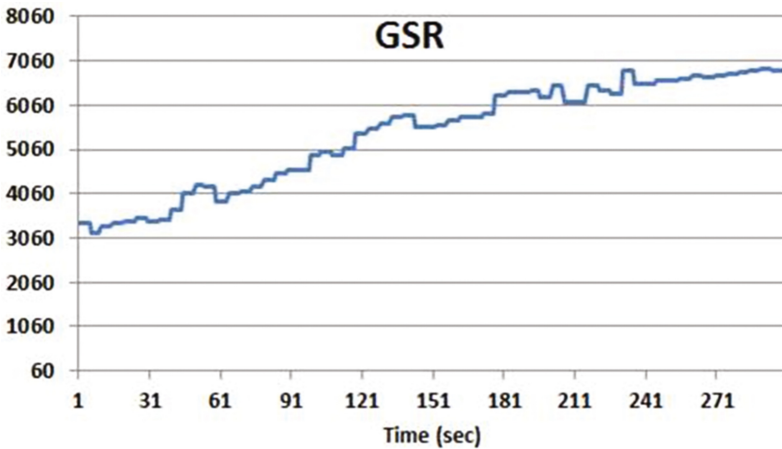

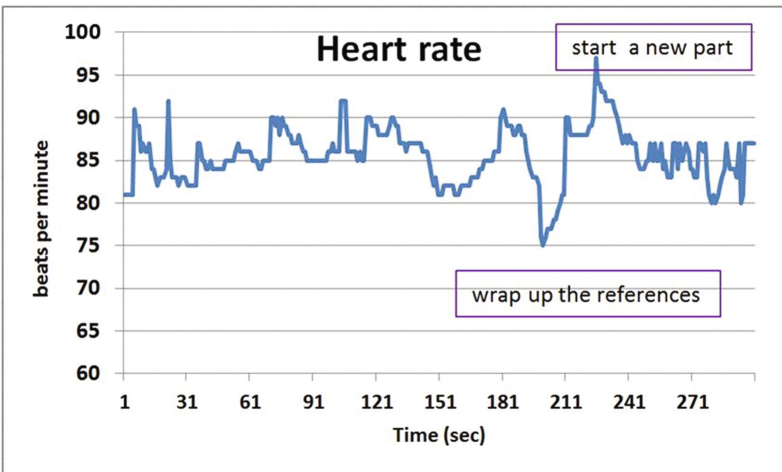**Fig. 2.** GSR readings over time

Fig. 3. Heart rate changes over time where a spike appeared when the subject starts a new part with new arguments

At odds with our prediction, the GSR data shows an increasing trend. But the heart rate readings did show two moments when the subject's heart rate dropped and increased significantly (see Fig. 3). During the interview with the subject, we found out that she expressed stress when starting the new paragraph because she has to find background sources to back her arguments up; and the anxiety was picked up by the heart rate reading only.

Plausible explanations of the lack of variability of GSR data might be related to the nature of the experiment; that is, more repeated experiments need to be conducted before a reliable link could be established between GSR and stress; in addition, the interplay of GSR and heart rate and the exterior environment might complicate the problem.

4 Concluding Remarks

Findings from the first study bring insights on how to improve current support programs such as peer mentoring, team/group collaboration, ESL courses, and intensive English writing programs. The second study aims to objectively measure the physiological measurement of the subject so as to characterize her anxiety level based on the temporal emotional changes. Plausible explanations of the lack of variability of GSR data might be related to the nature of the experiment; that is, more repeated experiments need to be conducted before a reliable link could be established between GSR and stress; in addition, the interplay of GSR and heart rate and the exterior environment might complicate the problem.

Both studies add depth into our understanding of the link between anxiety and writing efficacy. Gaining an understanding of what is perceived as positive affective factors by proficient EFL writers, stakeholders, instructors and institutions can utilize these facts to develop/adjust writing teaching techniques, methods, or beneficial interventions, thereby increasing the potential for academic success [24].

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