

Cognitive Processes and Emotional Experiences in Rubric-Based L2 Writing Self-Assessment: Differences Across Proficiency Levels

Xiaodong Li*

Guangdong University of Foreign Studies, Guangzhou 510420, Guangdong, China

**Author to whom correspondence should be addressed.*

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Abstract: Self-assessment is important, especially for Chinese English as a Second Language (ESL) university students. This study looked at cognitive processes and emotional experiences of Chinese university students at different L2 levels in writing self-assessment. It invited 24 Chinese university students to evaluate their L2 writing with a rubric and then asked them to recall their thoughts and feelings in doing. It is found that self-assessment is demanding work, both cognitively and emotionally. It is also found that students with high L2 proficiency followed a more recursive and coherent pattern in L2 writing self-assessment and they reported more positive emotions with low arousal. Low language level students followed self-assessment in a more straightforward way. They also had more negative experiences. These findings may be useful for teachers who are developing ways to support self-assessment in their classrooms.

Keywords: Cognitive process; Emotional experience; Self-assessment; L2 writing; Students with different language levels

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1. Introduction

Self-assessment is fundamentally important for students in universities. It can help students set and pursue personal and professional goals in and beyond schools^[1]. Even though valuable, it is not used as much as it could be^[2]. This is partly because teachers often lack guidance on how to help students do self-assessment. This is especially true in universities. Teachers might not have had the specific training and have had negative experiences with it in the past^[2,3]. They need guidance on conducting self-assessment activities in classrooms, especially in L2 writing in Chinese universities, where students have reported only moderate levels of assessment literacy (3.76 out of 7)^[4,5].

It is found that rubrics can help students to do self-assessment^[6]. However, little is known about how they work in practice. We also know little about how students think and feel when using them. This study focuses on Chinese ESL students. It examines how they use rubrics to assess their L2 writing. It also looks at their feelings during the process. In addition, the study compares high- and low-language-level students. It explores whether their cognitive processes and emotional experiences are different. The findings may help improve self-assessment instruction in universities.

2. Literature review

2.1. Self-assessment

In earlier work, researchers often treated self-assessment as part of self-regulated learning. They usually described it as a reflective evaluation of one's own work. In many cases, this definition did not include later revision or improvement. Over time, views on self-assessment have changed. Researchers in educational psychology began to see it as an important part of formative assessment^[6]. They paid more attention to its ongoing and iterative nature. This shift places more emphasis on its role in promoting learning.

At the same time, more researchers started to look at how self-assessment actually works. Some studies have examined the underlying processes. For example, based on interviews, Yan and Brown introduced a cyclical model of the self-assessment process. It involves three main stages, namely, determining criteria, seeking feedback, and self-reflection^[7]. Central to this model is seeking feedback through internal (e.g., gut reactions and intuition) and external (e.g., rubrics and others' feedback) resources^[8]. Using think-aloud methods, Panadero and his colleagues examined secondary and college students' self-assessment profiles as they self-assessed mathematical and Spanish writing tasks^[6]. They proposed a three-phase self-feedback model, including information processing, analysis, and self-assessment judgment^[6]. The model emphasizes that analyzing one's own work and seeking help from the external quality indicators (e.g., rubrics) can help students generate their self-feedback. They also note that engaging in the analysis of external standards and revising one's own work distinguishes the advanced and superficial self-assessment processes.

2.2. Cognitive processes and affective experiences in rubric-based self-assessment

As mentioned earlier, the use of external resources is crucial for self-assessment^[6,8]. Previous studies have proved that using rubrics can facilitate students' self-assessment in both K-12 and higher education. However, the effect size from high to low is far from reaching a consensus. Brown and Harris argued that most of these differences are attributed to how teachers guide students to use the rubric^[9]. Besides, some studies found that rubric use increases cognitive load, because students need to understand the descriptors, while other studies also reported that using rubrics can reduce the cognitive load^[3]. These mixed findings suggested that cognitive load and emotional responses may help explain the differences in self-assessment. However, the research on direct investigation of these processes is still limited. To date, only Rickey in his doctoral thesis has studied this gap. By examining the cognitive and affective processes of students in self-assessment, he found that different resources trigger different types of comparisons and are associated with different emotional responses^[3]. However, his study mainly regards learners as a whole, ignoring students' individual differences such as language levels. Further research is needed to unpack the differences in cognitive and emotional experience between students with different language proficiency levels.

2.3. Language proficiency in self-assessment

Previous studies have shown that students with different language levels interpret and use rubrics in different ways in self-assessment. For example, Zhao and Qi reported that low-proficiency university students encounter difficulty in understanding and using analytic rubrics. In their study, students pointed out that it is the abstract and technical language of the rubric that makes it difficult to be understood and used^[10]. The inability to understand and use rubrics affects students' participation in self-assessment, which ultimately influences their performance. This can be proved from Zhang and Yu's study. They identified that high-level students showed a more circular process in self-assessment, while middle and low-level students were more inclined to follow a linear path^[11]. The above research may show that students at different levels interpret and use rubrics differently in self-assessment. Therefore, this study is proposed to investigate whether students at different levels have different cognitive processes and emotional experiences in using the rubrics in self-assessing their L2 writing. Two questions were raised:

(1) RQ1

What cognitive processes and emotional experiences do Chinese university students experience when using rubrics to self-assess their L2 writing?

(2) RQ2

What are the differences between these cognitive processes and emotional experiences among students at different language proficiencies?

3. Method

3.1. Participants

In total, 24 first-year students participated in this study. They were from two English classes (A and B) at a Chinese university. Twelve participants, 3 males and 9 females, from Class A had a high English proficiency with a mean score of English placement test ($M_a = 85.5$, $SD_a = 5.4$), and the other twelve, 8 males and 4 females from Class B, is regarded as low English proficiency learners whose mean score of English placement test is low ($M_b = 70.2$, $SD_b = 7.6$). An independent samples *t*-test showed a significant difference between the scores of the groups ($t = 5.69$, $p < .001$). All participants volunteered and provided informed consent.

3.2. Materials

(1) Writing task

This study used the writing task from the June 2025 College English Test Band 4 (CET-4). The writing task asked students to express their opinions on the appropriate use of AI technology. It was used a class assignment.

(2) Rubrics

An analytic rubric validated for CET-6 writing by Li was used, covering content, coherence, sentence structure, grammar, and vocabulary, each rated on a 0–3 scale^[12].

3.3. Data collection

To minimize additional cognitive load, retrospective think-aloud was used. After completing the writing task, participants were invited one-by-one to a lab to self-assess their essays with the rubric. In the lab, a camera is placed on the rear side of them to record their whole process of self-assessment. Immediately after finishing the self-assessment, they were asked to recall their thoughts and feelings with the help of the video records. Their verbalizations were also recorded for further analysis.

3.4. Data analysis

First, I transcribed all participants' think-aloud recordings and then cross-checked the transcriptions with a research assistant. Then, we jointly coded 6 cases following the coding schema of Rickey^[3]. By coding the initial 6 cases, we developed and negotiated a coding framework. After reaching a consensus on coding, we independently coded another 6 cases (25%). These 6 cases showed that we achieved an 89.4% of inter-coder consistency. Then, the remaining 12 cases was coded. Finally, the categories were counted in frequency to display the differences between Group A (high language proficiency) and Group B (low language proficiency).

4. Results and discussion

As shown in **Table 1**, both groups have triggered many different cognitive processes and emotional experiences in self-assessment. This indicates that self-assessment involves an interaction of cognitive and emotional factors rather than a

single judgement^[3]. Generally, high-proficiency students reported more cognitive processes ($N_{ac} = 182$) but fewer affective experiences ($N_{aa} = 66$), possible because their emotions, such as relaxed (24.2%), satisfaction (21.2%) and confidence (18.2%) were more low-arousal which are not easy to notice in self-assessment, and positive which, in turn, promote cognitive processes. Low-proficiency students reported more frequent affective experiences ($N_{ba} = 97$), most of which were negative except for confidence (5.2%) in engaging the rubric, than cognitive processes ($N_{bc} = 93$). This may suggest that self-assessment is challenging for them, and frequent negative emotions further intensifies this difficulty.

Table 1. Cognitive processes and affective experiences across groups

| Activity | Category | Frequency and percentage within-group (%) | | |
|---------------------------------------|---|---|------------|------------|
| | | Group A | Group B | |
| Reading essay and generating feedback | Cognitive process | Searching for weaknesses | 23 (12.6%) | 20 (21.5%) |
| | | Remembering work | 18 (9.9%) | 17 (18.3%) |
| | | Evaluating quality | 22 (12.1%) | 9 (9.7%) |
| | | Explaining problems | 20 (11.0%) | 7 (7.2%) |
| | | Generating revision | 18 (9.9%) | 6 (6.5%) |
| | Emotional experience | Revising judgment and monitoring bias | 14 (7.7%) | |
| | | Relaxed | 16 (24.2%) | |
| | | Satisfied | 14 (21.2%) | |
| | | Frustrated | 10 (15.2%) | 13 (13.4%) |
| | | Confused | | 15 (15.5%) |
| Cognitive process | Anxious | | 11 (11.3%) | |
| | Uncertain | | 7 (7.3%) | |
| | Invoking criteria | 26 (14.3%) | 18 (19.4%) | |
| | Comparing with criteria | 25 (13.7%) | 16 (17.2%) | |
| | Adopting writing strategies implied in the rubric | 16 (8.8%) | | |
| Using rubric | Emotional experience | Confident | 12 (18.2%) | 5 (5.2%) |
| | | Uncertain | 6 (9.1%) | |
| | Cognitive process | Confused | | 16 (16.5%) |
| | | Anxious | | 13 (13.4%) |
| | | Frustrated | | 11 (11.3%) |
| Total codes | Overwhelmed | | 6 (6.2%) | |
| | Cognitive process | 182 (100%) | 93 (100%) | |
| | Emotional experience | 66 (100%) | 97 (100%) | |

4.1. Reading essays and generating self-feedback

Students with high language levels often reported that they searched for weaknesses and areas for improvement (11.0%) in reading essays. They also tried to generate revision ideas several times (9.9%). They also constantly revised their earlier judgments (7.7%). Their self-assessment process did not follow a fixed order. They moved back and forth between reading, evaluating, and revising. This pattern is in line with earlier findings^[11]. The feedback they produced was usually detailed. It was also easier to act on. For low language level students, they also reported evaluating quality (15.2%), explaining problems (10.7%), and revising (8.9%). However, their attention was often on surface features. They mainly focused on grammar and word choice. When they read their essay and thought about revision, many of them had negative feelings. A number of them felt confused (15.5%). Some usually felt frustrated (13.4%) and anxious (11.3%). A few expressed uncertainties (7.3%) about their judgment.

The difference between the two groups can be understood with the broaden-and-build theory of emotion^[13]. This

theory explains how emotions influence thinking. Positive emotions can help people build cognitive and behavioral resources. Negative emotions work in a different way. It narrows people's attention and limits their cognitive processing. In this study, high-level students reported more positive and low-arousal feelings. These experiences may help them expand their cognitive activities. As a result, they were able to pay more attention to higher-level cognitive processes, such as evaluation and revision. Low-level students reported more negative experiences. These feelings may reduce their attention. In many cases, their thinking is limited to a basic level. Their feedback was often limited and less helpful.

4.2. Using rubrics

When using rubrics, high-level students often recalled the criteria (14.3%). They often compared their writing with the rubric descriptors (13.7%). In addition, some of them expressed that they wanted to draw some writing strategies when reading rubrics (8.8%). In general, high-level students use the rubric more systematically. As emotional experience, high-level students usually showed a bit of confidence (18.2%), although they may sometimes feel uncertain about their judgments (9.1%). For low-level students, although they also reported that they invoked the criteria (19.4%) and did some comparison (17.2%), their judgements are often not clear enough and rarely produce actionable modifications. In terms of emotional experience, they often feel confused (16.5%), anxious (13.4%), frustrated (11.3%) and sometimes overwhelmed (6.2%). This shows that for low-level students, the use of a scoring scale may not be helpful. It may increase the cognitive burden of self-assessment and increase the difficulties. Therefore, when using rubrics for self-assessment, low-level students may need additional support.

5. Conclusion

This study examined the cognitive and emotional processes in the self-assessment of L2 writing in a university context. It also explored the differences in these processes among students with different levels of proficiency. It found that self-assessment is a complex process involving cognitive processes and emotional experiences. High language level students showed a more recursive and coherent process. They moved flexibly between evaluation, interpretation and modification. In contrast, students with low language levels followed a more linear process in self-assessing their L2 writing. They experienced more negative emotions in using rubrics, such as confusion, frustration, uncertainty, anxiety, and sometimes overwhelm. It revealed that rubrics can support systematic comparison, but it also introduced cognitive load, especially for low language level students.

Teachers can draw some pedagogical suggestions on self-assessment design in university classrooms. First, they should give a clearer explanation of the different levels of performance before guiding students to do self-assessment. They can combine some writing examples to explain how the text meets or fails to meet the relevant requirements. This helps students gradually form an intuitive understanding of the quality of writing. Second, self-assessment itself is not easy. Many students need to invest much effort in this process, and negative emotions may also occur. Teachers should remind students in advance that they may feel frustrated, anxious, or even overwhelmed. Helping students to adjust their emotions is also important. Third, students with low language skills often need more support. Teachers can use automatic feedback tools or large language models first to identify some grammatical and vocabulary issues in the writing of low-level language students. This step can help low language level students reduce their burden and give them more cognitive resources for deeper analysis.

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