

# **An Empirical Study of Writing Feedback Analysis of Non-English Majors in China with Natural Language Processing Technologies**

Ming Liu\*, Weiwei Xu, Qiuxia Ran

Southwest University, Beibei District, Chongqing, China, 400715

\* Corresponding author. Tel.: +86 15178719397; email: mingliu@swu.edu.cn

Manuscript submitted March 24, 2015; accepted May 29, 2015.

doi: 10.17706/ijeeee.2015.5.2.85-93

---

**Abstract:** English essay writing is a very essential skill for university students to master. This is particularly true for those non-English major students in China. Those students represent a large population of Chinese English as Second Language (ESL) learners and often do not receive timely written feedback on their writing from teachers since the size of their class is big. Therefore, it would be very useful if we can build an automated feedback tool for supporting writing. In order to understand the relationship between textual features and human teacher feedback, and how well those features were used for predicting feedback rating, we conducted a corpus analysis of 84 Chinese non-English majors' essays with teachers' feedback, by using Coh-Metrix, a computational linguistic tool, to extract rich semantic features from their writing. The study results demonstrated that teachers tend to give more local feedback, such as grammar and spelling, to Non-English majors. The local feedback are more predictable since the feedback was moderately correlated to some textual features (e.g. word count and frequency of content words were related to sentence diversity feedback). Consequently, this study is considered as a case study which should shed light on the construction of automated writing feedback tool for Non-English majors.

**Key words:** E-Learning, Chinese ESL writing, writing feedback, natural language processing.

---

## **1. Introduction**

In second language acquisition, the term feedback refers to the information given to learners which they can use to revise their interlanguage. Moreover, teacher feedback means any kind of feedback provided by the teacher which is intended to help students improve their writing, such as commentary and correction on grammatical errors and content of writing. Both teachers and students feel that teacher-written feedback is an important part of the writing process [1]-[3]. This is especially true for second language writing since the goal of second language writing is often to teach both the conventions of writing in a particular culture as well as second language grammatical forms [4]. Though second language writing teachers are aware of students' perceptions of written feedback and most try to give helpful feedback to their students, teachers may not be fully aware of how much feedback they give on local (i.e., spelling, grammar, and punctuation) and global (i.e., ideas, contents, and organization) issues nor whether the type of feedback they feel they should give adheres to their beliefs about written feedback.

Garcia [5] claims that feedback helps students to become aware of errors and other writing problems which they failed to notice or to do anything about when they handled in their drafts. Through feedback, the

writer learns where he or she has misled or confused the reader by not supplying enough information, illogical organization, lack of development of ideas or something like inappropriate word choice or tense. Hyland [6] argues that students can certainly learn from their mistakes, but this depends on the teacher adopting feedback methods that encourage them to return to their work after it has been assessed.

Non-English major university students enjoy a large percentage among English learners in China. In general, their English skills are not as good as English majors. They need large amount of training to evaluate the skill of language using. In addition, the number of university English teachers is relatively small, and they have not enough time and energy to correct and score large numbers of English essays. Statistics show that the number of college students in China has soared to twenty-six million in 2013 [7], accounting for the largest proportion of ESL learners worldwide. Since 1987, the writing test has become one important aspect of the College English testing in China. As for college students in China, college English has been an obligatory course to take. In a typical English course, students have to do 2-3 essay writing assignments and take 1 essay writing test in order to pass national English tests, such as College English Test (CET) 4 or Test for English-Major (TEM) 4. Essay writing is the last part of these tests. Novice writers need feedback to develop their writing skills; however, providing timely and meaningful feedback is time-consuming and expensive.

With the advanced development of information technology and natural language processing techniques, various numbers of automatic essay scoring (AES) systems have been proposed. Haswell [8] reviewed systems for automated feedback tracing back to the 1950s. These systems focused more on assessment of end products, and less on providing formative feedback [9], [10] The Writer Workshop [11] and Editor [12] both focus on grammar and style. Sourcer's Apprentice Intelligent Feedback system (SAIF) [13] is a computer assisted essay writing tool used to detect plagiarism, uncited quotations, lack of citations, and limited content integration problems. The Glosser system [14] aims to support reflection in writing through trigger questions. It uses text mining algorithms to help learners think about issues such as coherence, topics, and concept visualization. However, Glosser only provides generic trigger questions. Liu *et al.* [15], [16] investigated an automatic trigger question generation system which could support critical review writing.

The aim of this study is to investigate Non-English majors' essays with teacher comments. The primary goal of this study is to look at the frequent type of feedback used by human teachers and the relationship between the feedback and the textual features extracted by using the natural language processing techniques.

The rest of this paper is constructed as follows: Section 2 presents related work on feedback classification. Section 3 describes the study and discusses the results. Finally, Section 4 concludes this paper.

## **2. Relevant Work**

In the past decades, the field of second language acquisition has seen the emergence of interest in feedback analysis. A large number of studies on ESL writing investigated teacher feedback, peer feedback and the mixed feedback. The teacher feedback point out the strengths of students' compositions and area of improvement and engage them in substantive revision. In addition, teachers encourage and challenge students to work on their writing, an act of communication, and an opportunity to learn to write better.

Summer Smith [17] conducted extensive research on the types of comments that teachers tend to give on students' papers. In the study, she classified teacher comments into three categories: judgmental comments, reader response comments, and coaching comments. Praise, criticism, and qualified negative evaluations belong to the first group. Problem-posing questions, heuristic questions, and reflective statements are classified to reader response comments. Finally, corrections, advice, and indirect response are classified as

coaching comments. This classification helps us to define effective feedback templates.

Recent development in natural language processing techniques has made it possible for researchers to develop a wide range of sophisticated techniques that facilitate text analysis. Some tools, such as Coh-Metrix [18], LIWC [19] and Gramulator [20], are useful in this respect, and have certainly contributed to ESL knowledge [21]. Coh-Metrix is a powerful computational tool that provides over 100 indices of cohesion, syntactical complexity, connectives and other descriptive information about content [18]. Coh-Metrix has extensively been used to analyze the overall quality of writing [21] and one important aspect of writing quality, such as coherence [22]. For example, Crossley and McNamara found that computational indices related to text structure, semantic coherence, lexical sophistication, and grammatical complexity best explain human judgments of text coherence. This study focused on using Coh-Metrix to analyze more aspects of writing quality including, Supporting Ideas, Conclusion and Sentence Diversity.

The AES systems, such as Criterion [23], can provide feedback on some aspects of writing including grammar, usage, mechanics, style, organization, development, lexical complexity and prompt-specific vocabulary usage. For example, the organization feedback type includes Background, Thesis, Main-point, Supporting ideas and Conclusion. The Criterion categories are more relevant to our case since we aim to generate corrective feedback on different aspects of ESL student writing.

### 3. Experiment

We conducted an empirical study in analyzing Chinese ESL college student essays with teachers' comments and the relationship between the teacher feedback and textual features. Section 3.1 describes the annotation process, where each essay is scored in different aspect, such as *Grammar*, *Spelling*, *Coherence*, *Organization* and *Supporting Ideas*. Section 3.2 shows the textual feature extraction process. Section 3.3 illustrates the relationship between the textual features and each feedback category, while section 3.4 examines the predictive strength of the features in explaining the score variance in the each feedback score.

#### 3.1. Proposed Feedback Taxonomy

Table 1. Non-English Majors' Essay Feedback Frequency and Pearson Correlations between Raters

Feedback Category	Frequency	r
Grammar	58	.742
Spelling	47	.640
Word Count	31	.770
Sentence Diversity	20	.534
Conclusion	18	.774
Supporting Ideas	32	.622
Coherence	28	.661
Chinglish Expression	40	.325
Organization	35	.548

Our dataset containing 84 Non-English majors' essays with teachers' feedback was collected from a large university in China. Two experienced English teachers volunteered to rate the quality of the essays. They had at least five years of teaching composition course for English majors. Their first task was to identify the most frequent feedback type adapted from the standardized rubric used for grading college English. 9 frequent feedback categories were found, including *Grammar*, *Spelling*, *Word Count*, *Sentence Diversity*, *Conclusion*, *Supporting Ideas*, *Organization*, *Coherence* and *Chinglish* (See Appendix I). Table 1 shows that Grammar and Spelling categories were more frequent than others, while Conclusion, Sentence Diversity and Coherence were less frequent. We observed some feedback categories were similar to the Criterion categories, such as Grammar, Spelling and Supporting Ideas. But, the Chinglish Expression and

Conclusion categories only appeared in our dataset.

The teachers' second task was to give a score to each feedback category regarding to the rubric (See Appendix I) on a scale of 3. 1 means negative feedback on the category while 3 means positive feedback on the category. The Correlations between the raters are located in Table 1. The raters had the highest correlations for judgments of Grammar, Word Count, Conclusion and Supporting Ideas and the lowest correlations for Chinglish Expression.

For further analysis, the dataset was randomly divided into training set (n=54) and testing set (n=30). A training set was used to identify which of the textual features most highly correlated with each feedback score. Moreover, the training set was used to train a multiple regression model to examine the amount of variance explained by each writing feature. The model was then applied to a test set to calculate the accuracy of the analysis.

### **3.2. Textual Feature Extraction**

We used Coh-Metrix 3.0, which could retrieve 108 scores of textual features. More information can be found on the website (<http://cohmetrix.Memphisedu/cohmetrixpr/index.html>).

*Descriptive indices:* It includes the number of paragraphs, number of sentences, number of words, number of syllables in words, mean length of paragraphs etc.

*Cohesion:* Cohesion is a key aspect of understanding language discourse structure and how connections within a text influence cohesion and text comprehension [24]. Coh-Metrix employs referential cohesion including noun overlap, argument overlap, stem overlap, and LSA-based semantic overlap.

*Sentence Complexity:* The grammatical structure of a text is also an important indicator of human evaluations of text quality. Difficult syntactic constructions (syntactic complexity) include the use of embedded constituents, and are often dense, ambiguous, or Ungrammatical [18]. Syntactic complexity is also informed by the density of particular syntactic patterns, word types and phrase types.

*Lexical sophistication:* Lexical sophistication refers to the writer's use of advanced vocabulary and word choice to convey ideas. Lexical sophistication is captured by assessing the type and amount of information provided by the words in a text. Words are assessed in terms of rarity (frequency), abstractness (concreteness), evocation of sensory images (imagability), salience (familiarity), and number of associations (meaningfulness). Words can also vary in the number of senses they contain (polysemy) or levels they have in a conceptual hierarchy (hypernymy).

Moreover, we propose and extract 8 new features that are not available in Coh-Metrix. These features refer to characteristics of ESL learners' writing style and reflect on the importance of the introduction section, conclusion section and mechanics in errors including spelling errors and grammatical errors. In the database, each essay is stored as a plain text, where each line is a paragraph. We use Java API to extract the first line and last line text, as introduction and conclusion section respectively. For checking spelling errors, an open source spelling error checker, called LanguageTool (<http://www.languagetool.org/>), is employed to scan each word. For checking grammatical errors, the Link Grammar Parser [25] is used to check the grammar of a sentence based on natural language processing technology. If the link grammar could not generate links (relations between pairs of words) after parsing a sentence, this sentence would be considered as ungrammatical.

*Number of words in Introduction:* the total number of words in the first paragraph considered as the introduction section.

*Number of words in Conclusion:* the total number of words in the last paragraph considered as the conclusion section.

*Introduction Portion:* the ratios of number of words in introduction to the total number of words in the document.

*Conclusion Portion:* the ratios of number of words in conclusion to the total number of words in the

document.

*Spelling errors*: the number of spelling errors. We employ an open source spelling error checker called LanguageTool (<http://www.language-tool.org/>), which is part of the OpenOffice suite.

*Grammatical errors*: the number of sentences with grammatical errors. We use the Link Grammar Parser [25] to check the grammar of a sentence, which is also widely used in ESL context.

*Percentage of spelling errors*: the ratios of the number of word spelling errors to the total number of words in the document.

*Percentage of grammatical errors*: the ratios of the number of sentence with grammatical errors to the total number of sentences in the document.

Therefore, there are totally 116 features extracted from each essay.

### 3.3. Pearson Correlation

Table 2. Correlations between Textual Features Scores and Raters' Feedback Scores

Feedback Category	Features	R	P value
Chinglish	number of grammatical errors	.525	<0.05
	first person plural pronoun incidence	.489	<0.05
	causal connectives incidence	.475	<0.05
Coherence	syntactic complexity	.490	<0.05
	causal connectives incidence	.475	<0.05
Conclusion	conclusion portion	.477	<0.05
	LSA overlap between adjacent paragraph	.494	<0.05
Supporting Ideas	temporal connectives incidence	.589	<0.01
	causal verb incidence	.551	<0.01
	word count	.473	<0.05
Grammar	grammar portion	-.540	<0.01
Sentence Variety	word count	.543	<0.01
	CELEX Log minimum frequency of content words	.457	<0.05
Spelling	Spelling Errors	-.635	<0.01
	grammar portion	-.780	<0.01
Organization	number of paragraphs	.586	<0.01
	word count	.516	<0.01
Word Count	word count	.754	<0.01

Based on the system producing feature scores and the human annotators' score on each category, we used IBM SPSS for evaluating the Pearson correlation between textual features and each category. Over 30 textual features demonstrated significant correlations with the human ratings of each feedback category. Table 2 shows the *Chinglish* was more related to the number of grammatical errors occurred, the causal connectives and the first person plural pronoun incidence. The *Coherence* was correlated to causal connectives incidence and syntactic complexity. As expected, the *Conclusion* was more related to the features of conclusion portion and cohesion between adjacent paragraphs. We have not defined specific features which can detect the *Supporting Ideas*. However, some features, such as temporal connective and causal verb incidence, have shown their moderate correlations with the category of *Supporting Ideas*. As we had expected, the *Grammar* and *Spelling* were negatively related to the features of grammar error portion and spelling error portion. The *Word Count* was highly correlated to the number of words in an essay. *Organization* was correlated to the number of paragraphs and word count since the essays with only 1 or 2 paragraphs were given lower scores by human annotators since they did not have a clear essay structure, *introduction, body and conclusion*. Crossley and MacNamara [26] got the similar study results, where six features including the *total number of paragraphs* were significant predictors in the regression to the raters' organization evaluations.

### 3.4. Test Set Model

We used the training set to train a regression model for each feedback category and evaluated the model in testing set. Table 3 shows the performance of each regression model for predicting essay feedback ratings. It has been found that Word Count ( $r^2=.568$ ), Grammar ( $r^2=.494$ ) and Spelling feedback ( $r^2=.439$ ) were easier for prediction, since some textual features were correlated to those feedbacks. It also demonstrated that the combination of the textual features accounted for 56.8% of the variance in the word count evaluation of the 30 essays comprising the test set. On the other hand, Chinglish Expression, Supporting Ideas and Conclusion were difficult to predict since  $r^2=.240$ ,  $r^2=.280$  and  $r^2=.284$  respectively since the textual features were not correlated to those feedback ratings.

Table 3. Linear Regression Analysis to Predict Essay Feedback Ratings in Testing Set

Feedback	R	R <sup>2</sup>	SE
Chinglish Expression	.490	.240	.551
Coherence	.577	.332	.532
Conclusion	.533	.284	.554
Supporting Ideas	.529	.280	.566
Grammar	.703	.494	.372
Sentence Variety	.630	.396	.448
Spelling	.677	.439	.526
Organization	.666	.444	.694
Word Count	.754	.568	.641

Notes: SE is standard error

### 4. Conclusion

Writing is one of the essential skills that university students should master. As to Non-English majors who are studying in ESL environment in China, teacher feedback is a vital form of language input and it has been an important component in writing instruction since the process approach to writing was introduced in the last 1970s. However, the normal English class size is big since it has more than 100 students in a class, so receiving timely and effective feedback from teachers is a challenging task.

With the advanced development of information technologies, particularly in natural language processing techniques, many automated essay evaluation tools have been proposed. But, most of them focus on giving holistic scores, rather than content-related feedback. Furthermore, some tools, such as E-rater, were designed for ESL students taking international English test, such as TOFEL. Those students normally have better English than ordinary ESL students. Thus, we conducted an empirical study to investigate the frequent feedback types and examine the feasibility of using existing natural language processing tools to automatically measure the feedback.

In the study, we collected 84 essays written by Non-English majors and some teachers' comments at a large university in China. Two English teachers first found 9 frequent feedback categories based on the teachers' comments. Some feedback categories are consistent with the Criterion category. Then, they gave a score on a scale of 1 to 3 to each feedback category of each student essay. The study results showed that the feedback had moderate correlations with some features extracted by using Coh-Metrix, a computational writing analysis tool, and some proposed new features. For example, *Organization* was correlated to the number of paragraphs and word count since the essays with only 1 or 2 paragraphs were given lower scores by human annotators since they did not have a clear essay structure, *introduction*, *body* and *conclusion*. Moreover, it has been found that some feedback, such as Word count, grammar and spelling, were more predictable. It indicated the feasibility of using existing NLP tools to measure the quality of feedback.

Our future work will focus on building an automatic essay feedback generation system. Specifically, we will investigate the feedback generation mechanism by using association rule mining algorithms. In



addition, we will look at how to incorporate effective feedback strategies, such as formative feedback theory, into feedback generation templates.

## Acknowledgment

The authors would like to thank those teachers and student participants. This work is partially supported by Chongqing Social Science Planning Fund Program under grant No. 2014BS123, Fundamental Research Funds for the Central Universities under grant No. SWU114005, No. XDJK2014A002 and No. XDJK2014C141 in China. The project is partially sponsored by the Scientific Research Foundation for the Returned Overseas Chinese Scholars, State Education Ministry.

## Appendix

Table 4. Nine Traits Rubric for Essay Writing

Category	Scoring
Organization	<p>1 Rudiment of organization apparent, but may be illogical, ineffective or different to understand the sequencing of ideas</p> <p>2 Satisfactory organization of sections, but the sequencing of paragraphs within sections may be problematic.</p> <p>3 Effective method of organization for both section and for paragraphs within sections.</p>
Supporting Ideas	<p>1 Minimal use of examples and facts to support the writer's idea.</p> <p>2 using some examples and facts to discuss strengths/weakness of some opinions, but may have difficulties (1) choosing appropriate facts; (2) sufficiently explaining those facts; (3) connecting them to present thing.</p> <p>3 Effective supports the strengths and weakness of one's opinion; Generally effective use of choice of examples and facts, although some material may be extraneous or not adequately explained</p>
Grammar	<p>1 Uses simple sentence constructions, but there are still numerous errors (greater than 7).</p> <p>2 Uses simple sentence with minor errors (between 5-7).</p> <p>3 Uses complex sentence with minor errors (less than 5).</p>
Sentence Variety	<p>1 Little complex sentences or longer sentences (less than 2) are used</p> <p>2 Moderate number of complex sentences or longer sentences (between 2 and 4) are used</p> <p>3 A Effective use of complex sentence construction or longer sentence (greater than 4)</p>
Coherence	<p>1 Some apparent sequencing of sentences within paragraphs, relying primarily on a limited set of cohesive devices (e.g. first, second, third) and basic connection words (e.g. however, also, because). However, there may be frequent points in which the reader has difficulties understanding sequencing of ideas.</p> <p>2 Writer sequences ideas, relying primarily on a limited set of cohesive devices; some errors or unclear transitions, but they do not significantly impair understanding of the text.</p> <p>3 Coherent and logical sequencing of ideas, using a wider range of cohesive devices (e.g. pronominalization, passive, etc;) only minor and occasional errors.</p>
Word Count	<p>1 Less than 50 words</p> <p>2 Between 50 and 150 words</p> <p>3 Around 200 words</p>
Conclusion	<p>1 No conclusion key words found; Conclusion is inappropriate; No conclusion</p> <p>2 briefly summarized some points</p> <p>3 It stresses the importance of the thesis statement, gives the essay a sense of completeness.</p>
Spelling	<p>1 greater than 3</p> <p>2 within 1 and 3</p> <p>3 no spelling error</p>
Chinglish Expression	<p>1 greater than 5</p> <p>2 within 3 and 5</p> <p>3 less than 2</p>

## References

- [1] Cohen, A. D., & Cavalcanti, M. C. (1990). Feedback on compositions: Teacher and student verbal reports. In B. Kroll, (Ed.), *Second Language Writing: Research Insights for the Classroom* (pp. 155-177). Cambridge: Cambridge University Press.
- [2] Ferris, D. (2002). *Treatment of Error in Second Language Student Writing*.
- [3] Ferris, D. R. (2006). Does error feedback help student writers? New evidence on the short- and long-term effects of written correction. In K. Hyland, & F. Hyland, (Eds.), *Feedback on Second Language Writing: Contexts and Issues* (pp. 1-104), New York.
- [4] Hedgcock, J., & Lefkowitz, N. (1992). Collaborative oral/aural revision in foreign language writing instruction. *Journal of Second Language Writing*, 1, 255-276.
- [5] Frankenberg-Garcia, A. (1999). Providing student writers with pre-text feedback, *ELT Journal*, 53(2), 100-106.
- [6] Hyland, K. (1990). Providing productive feedback, *ELT Journal*, 44(4), 279-285.
- [7] Bureau of Statistics of China. (2013). *China Statistical YearBook*.
- [8] Haswell, R. (2006). The complexities of responding to student writing or looking for shortcuts via the road of excess, *Across the Disciplines*, 3.
- [9] Shermis, M. D., & Burstein, J. (2003). Automated essay scoring: A cross-disciplinary perspective (p. 16).
- [10] Williams, R., & Dreher, H. (2004). Automatically grading essays with Markit©, *Issues in Informing Science and Information Technology*, 1, 693-700.
- [11] Anderson, J. (2005). Mechanically Inclined: Building grammar, usage, and style into writer's workshop.
- [12] Thiesmeyer, E. C., & Theismeyer, J. E. (1990). *Editor: A System for Checking Usage, Mechanics, Vocabulary, and Structure*.
- [13] Britt, M. A. et al. (2004). Using intelligent feedback to improve sourcing and integration in students' essays. *Int. J. Artif. Intell. Ed.*, 14, 359-374.
- [14] Villalon, J. et al. (2008). *Glosser: Enhanced Feedback for Student Writing Tasks* (pp. 454-458).
- [15] Liu, M., Calvo, R. A., & Rus, V. (2010). Automatic question generation for literature review writing support. *Springer's Lecture Notes in Computer Science*.
- [16] Liu, M., Calvo, R., & Rus, V. (2014). Automatic generation and ranking of questions for critical review. *Educational Technology & Society*, 17, 333-346.
- [17] Smith, S. (1997). The genre of the end comment: Conventions in teacher response to student writing. *College Composition and Communication*, 48, 249-268.
- [18] Graesser, A. C. et al. (2004). Coh-metrix: analysis of text on cohesion and language. *Behavior Research Methods, Instruments, & Computers*, 36, 193-202.
- [19] Pennebaker, J. W., & Francis, M. E. (1999). *Linguistic Inquiry and Word Count (LIWC)*.
- [20] Rufenacht, R. M., McCarthy, P. M., & Lamkin, T. A. (2011). Fairy tales and ESL texts: An analysis of linguistic features using the gramulator. *Proceedings of the Twenty-Fourth International Florida Artificial Intelligence Research Society Conference* (pp. 287-292).
- [21] Crossley, S. A., & McNamara, D. S. (2012). Predicting second language writing proficiency: The role of cohesion, readability, and lexical difficulty. *Journal of Research in Reading*, 35, 115-135.
- [22] Crossley, S. A., & McNamara D. S. (2011). Text coherence and judgments of essay quality: Models of quality and coherence. *Proceedings of the 33rd Annual Conference of the Cognitive Science Society*.
- [23] Burstein, J., Chodorow, M., & Leacock, C. (2004). Automated essay evaluation: The criterion online writing service. *AI Magazine*, 25, 27.
- [24] Kintsch, W., & Dijk T. van. (1978). Towards a model of text comprehension and production, *Psychological Review*, 85, 363-394.



- [25] Lafferty, J., Sleator, D., & Temperley, D. (1992). Grammatical trigrams: A probabilistic model of link grammar. *Proceedings of the AAAI Conference on Probabilistic Approaches to Natural Language*.
- [26] Crossley, S. A., & McNamara, D. S. (2011). Understanding expert ratings of essay quality: Coh-Metrix analyses of first and second language writing. *International Journal of Continuing Engineering Education and Life-Long Learning*, 21, 170.

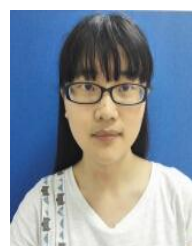


**Ming Liu** is currently a lecturer at the School of Computer and Information Science, Southwest University, China. He received the PhD degree in artificial intelligence in education from the School of Electrical and Information Engineering, The University of Sydney, Australia in 2012. He obtained his master degree of information technology from the University of Tasmania, Australia, in 2007. He worked as a postdoctoral researcher at the University of Sydney in 2013.

Dr. Ming Liu has great research interests in learning analytics and intelligent tutoring system. He participated in national and international projects funded by ARC Linkage (Australia), Young and Well CRC, Office of Teaching and Learning, Google and Chinese National Fund. He is an author of over 20 publications papers in prestigious conferences and journals, such as Intelligent Tutoring Systems, IEEE transactions on Learning Technologies, Journal of Educational Technology and Society.



**Weiwei Xu** holds a doctorate degree in English from Macquarie University, Australia. She acquired her MA degree in English from Newcastle University, UK. She has been working as a lecturer teaching English academic writing at College of International Studies, Southwest University in China for 8 years.



**Qiuxia Ran** comes from the School of Computer and Information Science at Southwest University. She is now a senior student majoring in educational technology. She shows great research interests in data analysis and won several prizes in Mathematical Contest in Modeling in Chongqing and in Innovation Program Funded by the school.