

Linguistic differences in pre-service and in-service teachers' online reflections and the implications

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Abstract

Reflections can make considerable contributions to teachers' professional development. They can also reflect teachers' inner thoughts and professional skills. In this study, we collected 261 in-service primary teachers' reflections in a teacher training activity about the application of information technology in teaching. And we also collected 141 pre-service teachers' online reflections in a course named "modern educational technology". These text reflections are analyzed by a linguistic inquiry and word count tool named to get the linguistic features. Then a comparative research was done between pre-service and in-service teachers' reflections. The results show that: 1. There are significant linguistic differences between pre-service and in-service teachers' reflections. 2. Pre-service teachers tend to use more first-person pronouns, achievement words and emotional words. They also have more words per sentence and wordcount in their reflections. 3. These differences could be helpful in teacher training.

Key words: Linguistic analysis, online reflections, in-service teachers, pre-service teachers

Introduction

Teachers' professional development has gotten attention all over the world. A lot of countries such as Japan, Turkey [1], Singapore [2], France [3], and China [4] have arranged different kinds of teacher training programs to promote teachers' professional development. In these programs, face-to-face training was the commonly used method. However, this kind of training is a time-consuming task and heavy burden for in-service teachers, because in-service teachers always do not have enough time to attend these face-to-face training programs. So online training and blended training have been widely accepted by both training organizations and teachers[5-7]. In these programs, trainees generated a lot of data in the online environments. These data always contain a lot of useful information and they can be used to analyze training process and learning outcome. Among these data, online reflection is a very important data but it has gained little notice[8, 9]. Reflections can promote use of operation skills[10] and inquiry skills[11]. And it can also enhance learning motivation[12]. In teacher training, self-reflections provide the opportunity for teachers to revise their unit designs and implementation process and their awareness about their strengths and weakness[13]. So, how to analyze these reflection data has gained more and more notice in teacher training and learning analysis. Reference [14] focused on the automatic classification of the reflections. Reference [15] proposed a framework based on four domains of reflection: scientific,

artistic, moral and technical reflection. These researches reveal a lot of useful information hidden in the reflections. However, there are still a lot of questions needs to be further explored on reflections. For example, are there any differences existed between pre-service teachers' reflections and in-service teachers' reflections? What's the linguistic meaning hidden in teachers' reflections? In this paper, we try to analyze the linguistic differences between pre-service teachers' reflections and in-service teachers' reflections using linguistic analysis. Through linguistic analysis, we can better understand meanings behind reflections, and reveal the language style differences between pre-service and in-service teachers. These differences can be suggestions for us to make strategies in teacher training.

Linguistic analysis

Linguistics is the scientific study of language, and involves an analysis of language form, language meaning, and language in context [16]. Linguistic analysis studies the deep meaning and language styles of words. Compared to the traditional data analysis methods such as questionnaire and interview, linguistic analysis is much more objective and it has little influence on the learners. The typical analysis tools include Linguistic Inquiry and Word Count (LIWC), Coh-Matrix, Landscape Model, TextMind, etc. These tools have been widely used to analyze those text materials generated in online learning and training. Reference [17] used the linguistic features in self-introductions to predict students' final performances. Reference [18] analyzed the posts on facebook to predict students' self-monitoring skills. In our research, we use TextMind which is a Chinese language psychological analysis system developed by Computational Cyber-Psychology Lab (<http://ccpl.psych.ac.cn/textmind/>). It has a psychological category list completely compatible with LIWC, and the dictionary is in Chinese. With the help of this tool, we can calculate the percentage of words in each linguistic category in the test materials and the grammatical features such as the percentage of the punctuations, the total word count of the materials, the average number of words per sentence, etc.

Data collection

To compare the differences between pre-service teachers and in-service teachers, we collect data from two learning communities. The first one is an online teacher training course. The content of the course is training teachers to use information technology in their classes. All the trainees are in-service teachers. During the course, all the trainees are asked to write reflections about two topics which are related to the application of education technology in teaching. The second one is a course in a normal university for the pre-service teachers which are

juniors. The course is also about how to use technologies in teaching and learning named “modern educational technology”. All the students in this course are also asked to write reflections about two topics about educational technology. The data is shown in Table 1.

TABLE I
 DATA DESCRIPTION

No.	Object	Number of teachers	Males	Females
1	In-service teachers	261	54	207
2	Pre-service teachers	138	34	104

All the reflection text of one teacher will be merged together as a document. All the documents will be analyzed by TextMind to calculate the value of each linguistic category.

Research results

To compare the differences between pre-service teachers and in-service teachers, a T-test is done on the two datasets of in-service teacher and pre-service teacher. The results show that there are significant differences in 64 linguistics features among 102 features which are provided by Textmind. These features can be classified into 8 categories. We will introduce the them in the following sections.

A. Significant differences on part of speech

Among those 64 linguistics features, 21 features of them are part of speech features. These 21 features can be classified into 8 categories: function words, personal pronoun, verb, adverb, preposition, conjunction, quantifier and tense words. Among these features, in-service teachers use a high percentage of third person plural pronouns than pre-services. The other features have the opposite situations. In these features, the differences on personal pronouns have important guiding significance on teacher’s professional development. Table 2 shows the t-test result on personal pronouns between in-service and pre-service teachers.

TABLE 2
 T-TEST ON PERSONAL PRONOUNS

feature	group	Mean	Sd	t
Pronoun	in-service	1.37%	0.85%	-28.499***
	preservice	5.61%	1.6%	
PPron	in-service	0.8%	0.64%	-25.963***
	preservice	3.8%	1.29%	
I	in-service	0.37%	0.5%	-18.781***
	preservice	2.07%	1.0%	
We	in-service	0.3%	0.32%	-16.297***
	preservice	1.64%	0.94%	
They	in-service	0.11%	0.16%	2.443*
	preservice	0.07%	0.15%	
iPron	in-service	0.60%	0.51%	-16.973***
	preservice	1.8%	0.74%	

*p<0.05, **p<0.01, ***p<0.001

PPron: Specific personal pronouns

I: Pronoun for the first-person singular

We: Pronoun for the first-person plural

They: Pronoun for third person plural

iPron: non-specific personal pronoun

From the results we can see that in-service teachers and pre-service teachers have significant differences on personal pronouns. Pre-service teachers used more personal pronouns than in-service teachers. They also use high percentages of pronoun for first-person than in-service teachers such as “I”, “my”, “we” etc. However, in-service teachers use more

percentage of pronoun for third person plural such as “they”, “their” and “theirs”. From their reflection text, we can find that pre-teachers use a lot of sentences to depict their own opinions, feelings, and thoughts. Typical sentences like “I learned that...”, “I think ...” and “I am not satisfied about...”. On the contrary, in-service teachers always use “they” and “them” to refer to students. They emphasize to concern the feelings and thoughts of students. It seems that the in-service teachers are more “student-centered” than pre-service teachers. The main reason may be that in-service teachers have teaching experiences, so they know that teachers should pay attention to the status of students. Pre-service teachers have no teaching experiences. So, they can only imagine the classes from their learning experiences. This may cause them more “self-centered” in reflections.

B. Significant differences on social experience words

There are 3 social experience features which have significant differences between in-service and pre-service teachers. They are social words, family words and human words. The t-test result of these 3 features are shown in table 3.

TABLE 3
 T-TEST ON SOCIAL EXPERIENCE WORDS

feature	group	Mean	Sd	t
Social	in-service	2.7%	1.08%	-20.401***
	preservice	5.71%	1.54%	
Family	in-service	0.05%	0.14%	3.923**
	preservice	0.008%	0.05%	
Human	in-service	0.56%	0.49%	-19.566***
	preservice	2.20%	0.92%	

*p<0.05, **p<0.01, ***p<0.001

From the results we can see that pre-service teachers use more social experience words than in-service teachers. As to different features, pre-service teachers use more human words and less family words than in-service teachers. Pre-service teachers use more big words such as “people”, “human”, “members”, etc. While in-service teachers pretend to use small words such as “parents”, “kids”, “baby”, etc. The main reason of this phenomenon may be the differences of ages. Though we don’t have the precise age data of these participants, the general condition can be inferred. Those pre-service teachers are juniors. The average age of them should be around 21, and few of them are married. Those in-service teachers are collage graduates and have at least 5 years of teaching experiences. Part of them have already married. These differences may cause the differences of social experience words in reflections.

C. Significant differences on emotional words

In-service and pre-service also show significant differences on emotional words. The main emotional features which have significant differences are shown in table 4.

TABLE 4
 T-TEST ON EMOTIONAL WORDS

feature	group	Mean	Sd	t
Affect	in-service	5.42%	1.58%	11.681***
	pre-service	3.93%	0.96%	
PosEmo	in-service	4.13%	1.58%	16.123***
	pre-service	2.30%	0.69%	
NegEmo	in-service	0.20%	0.24%	-6.882***
	pre-service	0.45%	0.38%	
Anxiety	in-service	0.01%	0.05%	-3.53**
	pre-service	0.05%	0.12%	
Sad	in-service	0.03%	0.08%	-6.340***
	pre-service	0.14%	0.19%	

*p<0.05, **p<0.01, ***p<0.001

PosEmo: Positive emotional words

NegEmo: Negative emotional words

From the results we can see that in-service teachers use more emotional words than pre-service teachers. And among these emotional features, in-service teachers also use more positive words and less negative words than pre-service teachers. Pre-service teachers use more anxiety-related and sad-related words than in-service teachers. From the reflection text, we find that in-service teachers use a lot of positive words to express the advantages of information technology in teaching, such as “with the help of information technology (IT), students are happier than traditional classes. Because the teaching material is more interesting.” On the contrary, pre-service teachers always use “difficult”, “confused”, “worried” to depict their learning experience. The typical sentences include: “I think how to integrate IT and subject teaching is very difficult for me.” “I know these tools are very important, but I cannot use any of them. This makes me feel very anxious.” From these typical sentences, we can see that in-service teachers are more positive about IT in teaching. The main reason of this is they have enough teaching experience, and they have already known what IT can help them in classes. As to pre-service teachers, they know that IT is important in teaching from their own learning experience, but they are not sure they can master these tools or not. And this thought makes them anxious and sad.

D. Significant differences on cognitive process words

Cognitive process words refer to those words which are used to depict the cognitive process, such as insight words, causality words, tentative words, certain words, inclusive words, exclusive words, etc. The T-test result shows that pre-service teachers have higher percentages of all these features over in-service teachers except the causality words. Pre-service teachers use more words to depict their cognitive process than in-service teachers. They describe how they absorb the content in classes, and how they will use new technologies and tools in their teaching. As to in-service teachers, they use more causality words to analyze the reason of a good or bad class. These differences show that both pre-service teachers and in-service teachers do a lot of cognitive activities in their reflections. Pre-service teachers use even more than in-service teachers. But pre-service teachers have less attribution thinking than in-service teachers. The reason may be that pre-service teachers have little teaching experiences, so they have little chances to reflect the practical effect of information technologies in teaching.

E. Significant differences on perception experience words

Perception experience words refer to those word which describe the quality of being aware of things through the physical senses. There are 6 perception experience features which have significant differences between in-service and pre-service teachers. They are: perception, see, feel, biology, body and sexual words. The t-test result shows that in-service teachers have higher percentages of all six perception experience features than pre-service teachers. This phenomenon seems to reflect that in-service teachers pay more attention on perception than pre-service teachers. From the reflection text, we can find that in-services use many sentences to describe the learning state of students: what they see, hear and feel of the students. Then they can adjust their strategies according to the dynamic states of students. As to pre-service

teachers, they use less perception experience words to describe their physical sensations. And they tend to use more word to depict their cognitive process of the teaching contents.

F. Significant differences on achievement and leisure words

In-service and pre-service teachers also have significant differences on work and leisure words. The t-test result of the word and leisure words is shown in Table 5.

TABLE 5
 T-TEST ON WORK AND LEISURE WORDS

feature	group	Mean	Sd	t
Time	in-service	2.1%	1.0%	-15.075***
	pre-service	3.88%	1.18%	
Work	in-service	17.76%	3.02%	15.982***
	pre-service	12.95%	2.52%	
Achieve	in-service	6.8%	1.8%	8.867***
	pre-service	5.15%	1.67%	
Leisure	in-service	1.70%	0.83%	6.508***
	pre-service	1.14%	0.77%	

***p<0.001

From the results we can see that pre-service teachers use more time related words than in-service teachers. But in-service teachers use more words about work, achievement and leisure. From the reflection text, we can find that in-service teachers use achievement words to describe the learning performances. Typical sentences like: “with the help of online resources, students can have a higher learning efficiency and better test scores”. Meanwhile, they use leisure words to depict the classroom climate. Examples: “Multimedia materials can create a relax and interesting classroom climate”. “Information technology tools can change words into beautiful pictures and sounds, and give students a good learning experience”. These thoughts come from their teaching experiences. This may be the reason why pre-service teachers use less achievement and leisure words.

G. Significant differences on filler words

In-service teachers and pre-service teachers also have significant differences on filler words. These filler words include: ah, er, um, so, etc. These filler words are always meaningless. In-service teachers use a much higher percentage of these kinds of words in reflections. The reason may be that pre-service teachers are younger than in-service teachers. So their reflection texts seem to be more close to spoken language. In-service teachers tend to be more formal than pre-service teachers.

H. Significant differences on punctuations and words per sentence

In-service and pre-service teachers also have significant differences on punctuations and words per sentence. The results are shown in Table 6.

TABLE 6
 T-TEST ON PUNCTUATIONS AND WORDS PER SENTENCE

feature	group	Mean	Sd	t
Period	in-service	1.69%	1.19%	-9.876***
	pre-service	2.83%	0.89%	
Comma	in-service	9.65%	1.61%	8.302***
	pre-service	8.32%	1.34%	
Colon	in-service	0.04%	0.11%	-6.435***
	pre-service	0.17%	0.23%	
Exclam	in-service	0.12%	0.40%	3.758***
	pre-service	0.03%	0.07%	
Brackets	in-service	0.05%	0.21%	-2.933**
	pre-service	0.17%	0.45%	
Wordsper	in-service	60.83	34.27	11.859***

sentence	pre-service	33.28	11.11
***p<0.001 **<0.05			

From the results we can see that pre-service teachers use more periods, colons and brackets than in-service teachers. While in-service teachers use more commas, exclaims. And in-service teachers also write longer sentences than pre-service teachers (they have a bigger words per sentence than pre-service teachers). According to [19], words per sentence is an important indicator of linguistic simplicity. In-service teaches have a much higher words per sentence (almost twice of pre-service teachers) and lower percentage of periods than pre-service teachers. This phenomenon indicate that in-service teachers use more complex linguistic description in reflections than pre-service teachers. Pennenbaker et al indicate that linguistic complexity may have correlation with cognitive load [20]. The higher linguistic complexity means that more cognitive process is involved.

Conclusion

In this paper, we collected reflection texts from two online learning communities. One of them is a teacher training for in-service teachers. The other is an online course for pre-service teaches. Through linguistic analysis we can see that there are significant differences of linguistic features between in-service and pre-service teachers. In summary, compared to pre-service teachers, in-service teachers tend to use more third-personal plural, more family words, more affect and positive emotional words, causality words, perception experience words, achievement and leisure words, and have bigger words per sentence. According to these differences, we can infer that in-service teachers pay more attention to students' feeling and creation of classroom climate. They deliver more positive emotions and involve more cognitive process in their reflections. Pre-service teachers focus more on teaching content understanding. Due to sparse teaching experience, they have less descriptions about students than in-service teachers. The trainers should give them more chances to access to teaching practice. Next phrase, we will collect more data from different subjects to evaluate our conclusions.

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