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## The Impact of Using Social Media Platform WeChat for Formative Feedback of Teaching and Learning on Student Satisfaction

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FORMATIVE FEEDBACK IMPACTS STUDENTS' SATISFACTION

THE IMPACT OF USING SOCIAL MEDIA PLATFORM WECHAT FOR FORMATIVE  
FEEDBACK OF TEACHING AND LEARNING ON STUDENT SATISFACTION

By

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A Dissertation Presented to the George Fox University E.D.D. Faculty

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UNIVERSITY

COLLEGE OF EDUCATION | EDD

“THE IMPACT OF USING SOCIAL MEDIA PLATFORM WECHAT FOR FORMATIVE FEEDBACK OF TEACHING AND LEARNING ON STUDENT SATISFACTION,” a Doctoral research project prepared by SUXIA CHEN in partial fulfillment of the requirements for the Doctor of Education degree in Educational Leadership.

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## FORMATIVE FEEDBACK IMPACTS STUDENTS' SATISFACTION

### **Abstract**

This quantitative study utilized a quasi-experimental design and SPSS (Statistical Package for Social Science) as an analysis tool to measure the correlation between independent variables and dependent variables in SETs (student evaluations of teaching) in experimental and control groups. Social learning theory is a foundational theory for building the conceptual framework of this study. Two other theories—motivation theory and self-efficacy—are sub-foundational theories to support the conceptual framework. The study applies social learning theory to motivate and enhance students' self-efficacy. It analyzed the correlation between using WeChat for formative feedback and students' satisfaction with teaching, as well as with response rates. It also analyzed the correlation in four pairs of factors: students' gender and students' satisfaction with teaching; students' parental educational level and students' satisfaction with teaching; students' satisfaction and students' Java grade; as well as student gender and students' Java grade. The findings showed that using WeChat for formative feedback can significantly increase students' satisfaction with teaching. Females' satisfaction with teaching was lower than males' satisfaction but females' satisfaction was not statistically significantly lower than males after using formative feedback (posttest). Parental educational level did not correlate to students' satisfaction with teaching. There was no correlation between student satisfaction and their Java grade. Students' gender did not have a statistically significant impact on their Java grade, but the females' average of grades was higher than males and the females' grades were concentrated in the middle, while males' grades were distributed in the highest and lowest points. Furthermore, parental educational level did not correlate to students' satisfaction with teaching.

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## **Chapter One**

### **Purpose of the Study**

The purpose of this study was to develop a screening tool that helps schools improve the efficiency of student evaluations of teaching, which also improving student satisfaction and achievement as well as teacher performance by using the social media platform WeChat for formative feedback. The survey study also explored the potential correlation between student demographic variables such as gender, background (such as the educational level of students' parents), and the extent of student satisfaction through the implementation of WeChat feedback. Furthermore, I sought to find the particular correlation between students' satisfaction and Java grade, in order to convince parents and administrators that student satisfaction is also essential for students' learning, achievement and mental health. College Teacher Qualification Examination (2019) illustrates that teachers and parents, as two sculptors of student learning working side by side, share the same goal and work together to help students improve. As instructors, we hope that students not only earn a high grade, but also are satisfied with the quality of the education because we love our students. Loving students is the first duty of teachers, the soul and core of teachers' professional ethics, the emotional foundation of teaching students, and the touchstone of teachers' professional ethics.

### **Statement of the Problem**

There are three main problems to Student Evaluations of Teaching (SETs): the first is low response rates in SETs. The second is that SETs are not used to improve students' learning; instead, they have become a matter of routine and do not improve teachers' pedagogy. The third

main problem is that in China, administrators and parents focus more on grade rather than attaching importance to students' degree of satisfaction. Currently, schools use SETs to rank, reward, and promote instructors (Goos & Salomons, 2017). Exploring other methods of student-teacher communication may help to address these problems. Social media is a good tool to facilitate communication between teachers and students. Using the social media platform WeChat may improve teaching performance, increase students' satisfaction and learning outcomes through feedback, and conduct student evaluations of teaching more effectively. Innovation is essential for teachers to keep up with technological changes in society and education. Also, teachers should remain student-centered and consider students' benefits and improvement first. A teacher's duty is to improve education, responsibly teach and cultivate students' learning, and create a positive internal education environment.

### **Quantitative Research Question**

RQ1: To what extent do students' response rates differ by formative-feedback type?

RQ2: To what extent do students' ratings of satisfaction with teaching differ by feedback type?

RQ3: What is the correlation between students' satisfaction and each of the following variables: java grade, gender, and parent's educational background?

RQ4: What is the correlation between students' Java grade and students' gender?

### **Key Terms**

SETS, WeChat, Social Learning Theory, Motivation theory, and Self-efficacy theory are essential terms in my dissertation.

*SETS*: Student Evaluations of Teaching means that students are the evaluators and make value judgments on teachers' teaching and their own learning process according to certain teaching criteria and evaluation standards (Chen & Hoshower, 2003).

*WeChat*: WeChat is a widely used social media platform in China and is a reliable, trustworthy, and stable application (Lien & Cao, 2014).

*Social Learning Theory*: Social Learning Theory (Bandura, 1971) emphasizes social impact and external and internal social reinforcement. For example, the use of rewards can reinforce good behaviors.

*Motivation Theory*: *College Teacher Qualification Examination* (2019) illustrates that learning motivation is an internal process or mental state that stimulates the individual to carry out learning activities, maintains induced learning activities, and directs the behavior toward a certain learning goal.

*Self-efficacy Theory*: Students' judgment on their ability to organize and complete courses to meet specified requirements (Bandura, 1986).

## **Limitations**

Due to the fact that the social media platform WeChat is used primarily in China rather than other countries, the experience may not be generalizable to different countries. Also, teachers and students have to own and apply the growth mindset to face new challenges in the workplace. If people support a growth mindset, they can address conflict or new problems more effectively and productively. For example, they can realize that conflict can provide power for innovation and development. Making conflicts open “can provide a creative tension that inspires problem solving” (Schmuck et al, 2012, p. 228).



**Delimitations**

One of the delimitations in my study is the selection of the school. The scope was narrowed to analyze the perspectives of urban students and teachers in one Chinese college. The primary focus of the study is whether using the social media platform WeChat for feedback can increase student satisfaction and enhance SET's effectiveness to help overall school improvement for better education. Another delimitation is that I am focusing on participants who are taking or teaching science classes instead of asking participants who work and study in other disciplines. When I piloted a study with both a science and literature class, I found that the science students provided more feedback and asked more questions through WeChat than the students in the literature class.

**Bracketing**

I have 22 years of experience teaching computer science and I am also an academic research leader in a public college in China. I have been teaching and conducting scientific research on the front line. My knowledge is mostly in the science field. However, when I lived in Portland, Oregon for four years I learned English and higher education leadership. I believe I should dedicate myself to my teaching career and my love for students. This includes teaching and educating people, rigorous scholarship, serving society, and being an outstanding teacher. My values are fairness, diligence, responsibility, and pragmatism.

Chinese culture is hierarchical and collectivist, with top-down management style which often leads to following leaders and therefore suppresses innovation. But, in the teaching methods field, educators are freer to conduct research for reform. As a school, we advocate teaching reforms. Teachers do not need too many approval procedures, and many of them go out

to study, train, and make classroom teaching reforms themselves. We also have enough space to experiment with new methods and instructors can try a new method that they believe benefits teaching and learning. Furthermore, they can strive to get rewards to increase their professional accolades, which benefit themselves. My school leaders would like to give instructors more flexibility to do research for educational reform.

## **Chapter Two**

### **Review of the Literature**

#### **Introduction**

Young generations use social media on their cell phones more than older generations. According to Westlund and Ghersetti (2018), the older generation prefers to use traditional news media, while the younger generation prefers to use digital media. Using new technology opens new doors for higher education. In this context, how can instructors guide students using social media effectively to help their learning through student evaluations of teaching (SETs)? Student evaluations of teaching mean that students, as the evaluators, make value judgments on teachers' teaching and their own learning process according to certain teaching criteria and evaluation standards (Chen & Hoshower, 2003).

The research shows that SETs are important because they can provide an effective feedback mechanism for instructors to improve and better meet their students' needs. How can instructors motivate students to more effectively participate in the evaluation process and subsequently improve learning outcomes? They have a mission to cultivate, motivate, and engage students in the learning process, which involves transitioning from a macro perspective encompassing all of the instructor's duties, to a micro perspective focusing on specific content. This is an essential factor for researchers to consider. Various forms of social media, including the prominent Chinese platform WeChat, may help increase participation rates because they are popular with students and provide a more convenient means for them to communicate with their instructors, while also helping increase formative evaluations. Social media is a tool for collaboration and communication, and while the SET questionnaire is posted openly, the

completed survey will be submitted privately. Also, Chen and Hoshower (2003) show two important ways in motivating students to participate in the teaching evaluation process. The first way is listing the purpose of the teaching evaluation on the evaluation instrument. The second way is to show participants the data will truly be used to improve the learning experience.

There are three main problems: the first is low response rates in SETs. Second, SETs don't improve students' learning and don't help to improve teachers' pedagogy. Third, In China, administrators and parents focus more on grade rather than attaching importance to students' degree of satisfaction. Currently, schools use SETs to rank, reward, and promote instructors (Goos & Salomons, 2017). SETs are not used to effectively improve teaching (Zabaleta, 2007). Since evaluations come at the end of the semester, results can have no immediate and tangible effect as the class progresses. As a result, students may perceive that their suggestions will not be acknowledged, and their expectations will not be met.

### **Three Theories**

I have identified three theories which connect to my dissertation and to the notion of using WeChat for conducting teaching evaluations: Social Learning Theory, which was foundational to building my conceptual framework; Motivation Theory; and Self-Efficacy Theory. Both Motivation Theory and Self-Efficacy Theory provided further support to my conceptual framework.

#### ***Social Learning Theory***

Bandura (1971) states that there are three factors of social learning theory which include individual, environment such as environmental stimuli, and behavior such as observation. These are interconnected systems. Social learning emphasizes social impact and external and internal

social strengthening. For example, the use of rewards can reinforce good behavior. Social learning theory can be used to interpret the synthesis of individual student interaction, classroom environment, teaching performance, and student evaluation. Terrell (2015) states that the construction of knowledge comes from interaction with the environment. Furthermore, Bandura (1971) states that learning is continuous mutual interaction between individual and community. In the social learning system, new behavior patterns can be obtained by directly experiencing or observing the behavior of others. Some of the responses they tried were unsuccessful, while others produced better results. Through this process of difference enhancement, the successful behavior mode is finally selected from the exploratory activities, while the invalid behavior is discarded (Bandura, 1971). In social learning theory, behavior is not only adjusted by direct external experience, but also impacted by substitution reinforcement and self-reinforcement. Social learning theory recognizes that external feedback plays an important guiding role, but it produces a wide range of reinforcement effects. Due to the influence of others, people also adjust their behavior to a certain extent based on the observed consequences and the consequences created for themselves (Bandura, 1971). Social Learning Theory is a foundational theory encompassing Motivation Theory and Self-efficacy Theory.

### ***Motivation Theory***

Seifert and Sutton (2012) illustrate that the perspective based on self-efficacy of motivation helps students avoid learned helplessness. Teachers enhance students' self-efficacy by supporting knowledge and experience to improve their needs for autonomy, competence, and relatedness to others. Social media is an entertainment tool which attracts student engagement and consequently improves their autonomy, ability, and connection with others. Motivation has

three functions: activating, pointing, and strengthening. The *College Teacher Qualification Examination* (2019) illustrates that learning motivation is an internal process or mental state that stimulates the individual to carry out learning activities, maintains the induced learning activities, and directs the behavior toward a certain learning goal. Learning motivation is comprised of internal motivation and external motivation. According to the *College Teacher Qualification Examination*, the stimulation of learning motivation includes:

- 1 Creating problems for students to solve and implementing heuristic teaching: using problems that are challenging but not far beyond the students' ability leads to better adaptation.
- 2 Controlling the motivation level properly according to the difficulty of homework: the medium level motivation is the most conducive to the improvement of learning effect.
- 3 Making full use of feedback and properly balance reward and criticism: praise and reward can stimulate students' learning motivation more effectively than criticism.
- 4 Making use of competitive psychology to properly organize learning competitions: let all students participate in competition at the same level and ensure that every student enjoys competition.
- 5 Correct application of guidance motivates students to continue their efforts: guide students and direct their efforts.

### ***Self-efficacy Theory***

Bandura and Adams (1977) found that exposure to and exploration of something people fear will increase their confidence. When they increase their confidence, they will reduce their

anxiety. The researchers state that through desensitization treatment, the anxiety of visual threats is eliminated, and the self-efficacy is improved to varying degrees (Bandura & Adams 1977).

Applying this idea to the learning environment, how can we cultivate students' self-efficacy? In the WeChat environment, teachers can let students be involved in the parts of everyday life that induce anxiety, particularly those anxieties linked to learning in new ways and adapting to new (learning) technologies. For instance, some students do not want to talk to teachers in the class; consequently, when they feel confused about some content in the lesson, they dare not question the teacher. However, using WeChat, they can send a message which is not spoken out in public or in front of all their classmates. For this study, we use the WeChat platform for two separate functions. One is using WeChat for formative feedback to help teach and learn. Another function of WeChat is providing a link to a questionnaire. The questionnaire is hosted on Microsoft survey, which is separate from their WeChat accounts and is completely anonymous, this method of communication can reduce their anxiety. As a result, students' self-efficacy can improve, which can help students' study. Bandura and Adams (1977) show that self-efficacy can be gained from exposure treatment. Furthermore, if people have stronger self-efficacy, they can conduct their lives more actively and easily eliminate their fears. In addition, emotional arousal may negatively impact self-efficacy because emotional arousal causes stress and tension which debilitate performance. According to Taylor (2014), "the best thing to do when fear has a neck hold on you is to befriend someone who lives in real and constant fear" (p.85). In making this comment, Taylor urges us to bravely face fear and misfortune, and practice the ability to deal with misfortune instead of getting rid of it. According to Bandura and Adams (1977), if people's self-efficacy is stronger, they will be more proactive in coping with difficulties, and it will be

easier for them to use their experience to eliminate obstacles. If people tend to avoid difficulties, their ability to overcome obstacles will become weaker. People fear taking part in events they feel are beyond their coping skills, but if they feel they can manage the difficulties, they will be more willing to participate. The authors' view is that people are afraid of potentially disturbing events, and they interpret them as beyond their ability to cope, but if they believe they can control these events, they will not find them frightening. If a person's level of self-efficacy is increased, they will have a reduced level of fear when faced with a situation that they previously found threatening (Bandura and Adams, 1977, p.298). The cognitive contributions to behavioral change should be promoted to work on students' learning.

Bandura et al. (1980) believe the amount of fear one has prior to an event is directly related to the person's perceived lack of coping efficacy. The point is that the more people believe they will be successful in something, the more likely they will be willing to try. Bandura et al. (1980) believe self-efficacy and fear are inversely correlated. If people have low self-efficacy, they may have more fears when they encounter the same challenge as those who have high self-efficacy and self-efficacy is positively correlated with performance attainments. Minimizing unreasonably high levels of anxiety may also help people who have low self-efficacy to foster self-efficacy, which requires society to get involved by providing supportive learning environments. According to Bandura et al. (1980): "The higher the level of self-efficacy, the greater is the stress tolerance and the more venturesome is the behavior" (p. 64). People tend to conduct anticipatory cognitive simulations. It means that people who have high self-efficacy are willing to consciously seek and rehearse appropriate solutions to potential problems, whereas people with low self-efficacy are more inclined to imagine failure scenarios



and indulge in how things will fail, without devising fallback plans or coping mechanisms. A large number of studies have shown that in cognitive simulations which mean when ones' brain is thinking about a problem and how that problem is going to be solved, individuals' imaginations impact and enhance subsequent performance (Bandura, 1986; Corbin, 1972; Feltz & Landers, 1983; Kazdin, 1978). Self-efficacy and cognitive simulation influence each other: high self-efficiency promotes the contemplation of efficient actions, and vice versa devising efficient and actionable plans strengthens self-efficacy (Bandura & Adams, 1977; Kazdin, 1979). Higher self-efficacy enhances students' self-esteem and helps them to acquire new knowledge to improve their learning outcomes.

“Initial analyses with the cognitive simulation developed by Woods et al. (1987) show that qualitative reasoning mechanisms are important for models (1) to capture diagnostic behavior when multiple interacting explanations can account for the current perceived state and (2) to capture one important characteristic of expertise in which experts are highly sensitive to domain behavior that departs from the expected, given the current situational assessment” Woods (1990).

Davidson (2015) states that getting to know people individually and collectively, as well as seeking feedback can improve satisfaction and provide development opportunities for people. Letting people be involved in the working environment and having sufficient communication is also a good way to improve satisfaction.

### **Response Rates of SETs**

A major concern with traditional SETs is typically low response rates (Hoel & Dahl, 2019) because of the general lack of student interest in giving feedback. According to Bassett et al. (2017):

Students' motivation for the evaluation process may be low for several reasons. These reasons include the perception that student evaluations do not have important consequences, that students are not read instructions about the potential uses of their responses, students are not shown evidence of actual uses of previous evaluations, and that students may evaluate several courses over a short span of time. (p.434)

In other words, the authors believe that the low student motivation in evaluations of teaching comes from students' feeling that evaluations were not applied effectively, and their perception that their evaluations are not useful, as well as the fact that the students might evaluate several courses in a short period of time. The main reason cited is the participants' lack of belief that their feedback would receive attention or use. Compounding this problem, according to Goos and Salomons (2017), already low response rates will be even lower with online evaluations. In Weng et al's. (2014) view, the voluntary nature of these surveys coupled with student difficulty accessing technology like Wi-Fi results in consequently low response rates. Treischl and Wolbring (2017) add that in-class surveys are better than out of class, because students will be more likely to respond to the survey within a group setting. This shows the need to consider the contextual settings of the survey (in class vs. after class).

However, a small number of research studies show response rates had no impact on the results of an evaluation. Risquez et al. (2015) agree that the response rates of a convenient, in -

class, paper-based sample are usually higher than the out-of-class self-selection online sampling. They conclude that both online and paper methods yield the same evaluation results, even though the response rates may be different. In addition, Zumrawi et al. (2014) mentions that potential factors such as teacher confidence levels, margin of error, and class sizes affect the usefulness of evaluation for teachers. For example, if the instructor accurately estimates that there are more students who like the class and the teaching style, a lower-than-average response rate can still provide valuable data. If the class size is bigger, the response rates can be lower, which still can reflect “the reliable inferences from student evaluations of teaching” (Zumrawi et al., 2014, p. 557). Beyond these factors, there are also additional sociological factors that affect response rates.

Porter and Umbach (2006) report some factors impact response rates, including gender, race, intelligence, and private school versus public school. In addition, the authors remark that the response rates at urban schools are 10% lower than rural schools. First-year and senior female students are more likely to respond to a greater extent as well. Finally, SAT scores are positively related to student survey response rates; students with higher SAT scores have higher response rates.

To increase students' response rates, Treischl and Wolbring (2017) favor online surveys, believing that if students are absent, they still can answer questionnaires and surveys online. In this way, online evaluations can be a more effective mode than face-to-face, paper-based methods. In addition, the authors compare two online modes of survey which are Transaction Authentication Number (TAN) and email. As the direct links in SET emails were seen as being easier than manually typing links in TAN, email links were productive in terms of response rates.

Furthermore, Treischl and Wolbring (2017) claim when comparing response rates between paper and online surveys, online response rates are higher than the paper survey.

In addition, an online survey is more reliable since the participants can freely express their ideas. Treischl and Wolbring (2017) state that “we found that survey mode does not impair the reliability of online SET” (p. 917). In making this comment, Treischl and Wolbring (2017) urge teachers to accept the online SET and choose different modes, such as email or social media, because they believe any mode of online survey keeps the reliability of online SETs. In fact, creating communication can facilitate students' response in evaluation of teaching. Crisp et al. (2009) believe in the need for continuous communication between students and faculty to better integrate student expectations with the realities of university learning and culture. If a university uses the students' response as the communication basis between teachers and students, the students' expectation and satisfaction may align.

### **The Importance of SETs to Help Student Learning and Improve Teacher Teaching**

SETs are important because students are direct audiences in the teaching process, so their feedback and opinions are of the utmost concern. Furthermore, they can help promote instructors to improve through a feedback loop mechanism (Hoel & Dahl, 2019; Tsai & Lin, 2012). Using student evaluations of teaching (SETs) improves teaching quality and assists administrative decision making (Hoel & Dahl, 2019). Wolbring and Treischl (2016) illustrate that online student evaluations not only further improve teaching quality in instructional formation, but also may help address measurement bias since the establishment of online-based evaluations are strengthened by gathering information at all levels and programs.

Furthermore, SETs can reflect the teacher's self-evaluation and observers' evaluations, which helps teachers have more perspectives when rethinking their teaching. Goos and Salomons (2017) state that SETs are positively correlated with the teacher's self-evaluation and the evaluations of trained observers. In other words, Goos and Salomons believe that SETs can help instructors improve by comparing and contrasting the important variables in their teaching, such as which parts they need to improve and which parts they are teaching well and should keep consistent. Teachers can find variables to improve their performance in class by using the SET scores and focusing on the extremes compared to the total results. If the course evaluation scores are high, instructors should continue the classroom performance. If course evaluation scores are low, instructors should identify the need to adjust some variables to improve. The overall evaluation can be improved by including more student scores to the total, and also by using a random evaluation process for the testing procedures. Hoel and Dahl (2019) illustrate that student evaluations are valuable tools to measure the effectiveness of teaching because they help instructors to reflect on the course content and provide improved feedback to students. SETs are the most common measurement for the quality of teaching in higher education (Goos & Salomons, 2017) because "SETs are both widely used and highly weighted" (Goos & Salomons, 2017, p. 342). Other methods such as peer assessment and teacher certification are less common and often give little weight by administrators when assessing the quality of teaching (Goos & Salomons, 2017). SETs are a method of acquiring the evidence to determine the level of students and the effectiveness of education. This is not always an ideal measurement tool, and not everyone agrees this is best. SETs include summative evaluation and formative evaluation.

Summative evaluation is an evaluation conducted to understand the final effect of the teaching activity after the end of the teaching, such as the examination and assessment of various subjects at the end of the term or the end of the school year. Summative evaluation focuses on results and mainly examines students' knowledge and skills.

Formative evaluation is an evaluation of students' performance in the daily learning process, their achievements, and their reflected emotions and attitudes. It can conduct a comprehensive examination of students; the purpose is to promote the overall development of students. In the daily teaching process, we must pay more attention to formative evaluation so as to improve the learning process, adjust the teaching plan, and promote the progress and development of students. Using WeChat also can help teachers improve their teaching by providing them with continuous formative feedback.

Hong (2007) states that the assessment of higher education quality is mostly based on the product quality view in the era of the industrial economy. This view of assessment in higher education concentrates on the input and output rather than the services that the process of higher education offers. This neglect of the service process will inevitably lead to the lack of student-oriented status. Students are the essential stakeholders in higher education, so the evaluation of higher education quality should pay attention to its service process. Therefore, taking the service quality view as the guide to make students become the primary evaluators will help correct the long-term deviation of the value orientation in Chinese higher education. It is of great significance to monitor the service quality of higher education through student satisfaction evaluation to cope with the challenges of popularization, marketization, and internationalization.

Meng (2010) illustrates that in student evaluations of teaching in China, teaching administrators generally have dominant power, while the power of teachers and students is marginalized. Stakeholder patterns of college student evaluation systems will change from authority control to stakeholder participation, because the stakeholder pattern emphasizes that students, teachers and administrators are the main stakeholders of the school. The interests of the three parties should be balanced through management, and the interests of students should dominate Meng (2010).

### **New Technologies Motivation of Students' Participation in SETs**

How do educators motivate students to participate in evaluations effectively? Integrating new technologies into the assessment process brings benefits to students. In Backer's (2010) view, using new technologies such as smartphones and Facebook as alternate forms of assessment can enhance student motivation, self-learning, and sense of responsibility. Social media is a good tool to assess teaching because as Backer (2010) illustrates, when students enter the university, they may feel comfortable and have the motivation to use technology to evaluate teaching in a new and interactive way. Social media is used not only for evaluation but also for enhancing student learning. Ferguson et al. (2017) discuss how one social media platform, Twitter, can enhance student learning over a more traditional approach. In their study, they found through the use of Twitter, students' attention to tasks, investment in activities, and experience and satisfaction with studying increased. Therefore, it is hoped that social media can stimulate students' participation in the evaluation process.

Social media is an effective tool that matches people's needs for communication and learning. Šerić (2019) remarks that Spanish students emphasize teacher-student relationships in

the curriculum and believes that using social media is a valuable means of enhancing these relationships because Spaniards live in the moment and pay attention to the present. The changes brought about by the development of science and technology to human life include accelerating the rhythm of social life and changing the way people work, communicate, learn, and play. This trend may increase more and more people's emphasis on the present. According to Montoneri (2015), most students appreciate the openness of teachers using Facebook to communicate with them, so this impacts the students' evaluations of teaching. Communication via social media can motivate students to evaluate teaching and give teachers higher evaluations (Montoneri, 2015). Students feel more connected to teachers who use social media. According to Terrell "I've taught a lot of online classes throughout the years. While doing that, one thing I've learned is that students interacting among themselves contributes greatly to their satisfaction and success" (2015, p.113), so the author created a Facebook page to utilize for the courses. In addition, Terrell claims that he learned as much from studying with his friends as he did from studying with a teacher in the classroom.

### **Using WeChat and Technology Helps Students' Learning**

Social media is an internet-based platform which can be used for sharing, collaboration, and participation online. Popular examples include Facebook and WeChat. Many students use these social media tools to communicate with others, and they have also been widely used in education (Top, 2012). Existing research on social media reveals that using social media in classrooms facilitates language learning (Arnold & Paulus, 2010; Thurairaj et al., 2012; Tao et al., 2017). Wang (2017) indicates that instructors can apply WeChat to create a better self-directed learning environment to enhance learning flexibility and improve learning effectively.



The teaching designs may shed light on further innovations in this area. Gan (2017) indicates that using WeChat can motivate learners to obtain useful and valuable information and satisfy their needs from others' posts. Learners who apply WeChat to studying not only keep good relationships but are also motivated to share knowledge. Che (2017) states that WeChat is an acknowledged learning tool as well as an innovative and challenging teaching approach.

Particularly, WeChat as a social media platform commonly used in China, is a reliable, trustworthy and stable application (Lien & Cao, 2014). It can promote students' communication and learning. Using WeChat motivates participant cooperation and communication (Zeng et al., 2016; Zhang et al., 2019), which illustrates that WeChat, as a new platform, stimulates students' interest and enthusiasm for learning, improves their independent learning, and enhances cooperation with their peers. For example, teachers can post assignments in a WeChat group, and students can collaborate to answer questions. In turn, this has promoted educational reform. Using this platform, instructors can communicate with students to find the overlap, if any, in students' needs, and can more quickly provide answers. Using WeChat focuses on interactive, personalized, and computer multimedia teaching styles (Zeng et al., 2016). In sum, WeChat is a useful tool to meet the students' needs and receive feedback from the instructors.

Gu (2016) illustrates that a mobile teaching management system can be created using the WeChat platform and a system-building method. The system was mainly based on the JavaME framework and the use of the layered software development. Ji (2018) illustrates that WeChat is the most widely used software platform on school campus at present in China, and almost all teachers and students on campus are loyal fans of WeChat. Therefore, the development of a WeChat public platform can be conducive to the implementation and development of teaching

management and teaching evaluation. Ji (2018) developed a teaching system software based on the WeChat platform and JAVA development technology that reduced the teaching cost of the school, enhanced the enthusiasm of students and teachers in learning and teaching, and promoted the teacher-student interaction and teaching evaluation.

Wang and Zhang (2017) illustrate that online evaluation systems based on the WeChat platform are very practical, their application range is very wide, and if there is a network available, anyone can use the system. In addition, they are based on mobile phones which do not restrict the student to the traditional computer platform. Online evaluation systems based on WeChat can assist schools' teaching supervision departments to complete complicated statistical work and to more conveniently guide the students to participate in the evaluation of teaching. The system is easy to operate because, if WeChat can be used on mobile phones, students can evaluate their teachers.

Liu (2004) explains that at the core of evaluation is the idea of co-construction, which emphasizes the shared needs, concerns, and responses to questions of all people involved in the evaluation. Co-construction is important to this process of dialogue and negotiation. Through dialogue and negotiation, a gradual consensus is reached. Perhaps the use of WeChat can stimulate this communication and similarly help achieve the goal of co-construction. Zhang, Li, and Li (2019) show that the use of WeChat improves students' motivation and the integration of knowledge. Therefore, the use of WeChat for problem-based learning is feasible and acceptable. Also, using WeChat improves teacher-student relationships, helps teachers instantly discover problems, and assists in understanding students' learning needs. In addition, it helps students use fragmented time and use their cell phones to conveniently and flexibly learn (Wang, et al, 2019).

In traditional teaching, formative evaluation is difficult to achieve because of the lack of technical means. However, formative evaluation can be achieved by the WeChat platform now that online evaluation is very convenient (Han et al., 2016). According to Han et al. (2016), using WeChat evaluation can reflect the timeliness of information. Students can evaluate teaching more quickly and efficiently through WeChat because it can offer private or group instant communication. Moreover, WeChat teaching can enhance students' interest in learning, expand communication between teachers and students, and build a harmonious relationship between the two (Li, 2018).

The application of WeChat in learning and teaching is a new approach, and it gives teachers the opportunity to utilize their creativity to match the students' curiosity. WeChat provides students the opportunity to publicly post and read each other's assignments, which is a modeling approach to the assignments. WeChat may extend the community originally formed in the physical classroom into an online space (Arnold & Paulus, 2010). Most importantly, WeChat breaks the barrier that prevents people from communicating. Some messages posted in WeChat can give students a lot of information with little difficulty and will motivate students to study by themselves. WeChat can help students “build a flexible, positive and student-centered learning environment” (Wang, 2017, p.146). If teachers were to provide all information face-to-face, the students may feel nervous because it is overwhelming. On the other hand, if an instructor posts in WeChat, it can allow students more thinking time, which can give their thoughts time to percolate. In this way, the learners find ways to “tune the mind so that it can collect a mix of external perceptions and internal thoughts that are relevant to the project at hand” (Carey, 2014, p.146).

Bogart and Wichadee (2016) propose that the best way to use educational technology in motivating student learning is to allow learning to happen in a technology-supported environment. Also, using technology-supported methods can improve curiosity. Campbell and Williams-Rossi (2012) state that technology tools support students in learning science, increasing academic vocabulary, and practicing their study skills. The authors also claim that technology tools help improve students' interactions with each other and their communication skills. The best way to use educational technology to motivate student learning is using mobile technologies and social media because social media has positively affected motivation and achievement of goals and has led to students feeling more engaged in the learning and teaching process. Also, social media has motivated students to join in the discussion and has improved their study experience (Chai et al., 2016; Cooke, 2017).

Gumb (2014) proposes that the best way to use educational technology to motivate student learning is by choosing an effective technology tool and evaluating it by a scorecard, which is designed to guide the rating, motivation and final choice of a specific technology tool for educational purposes. The scorecard is a quantitative tool. The scorecard evaluation tool takes into account both personal interests and educational needs. Based on evaluating results, educators can choose the most appropriate educational technology tools to motivate student learning. This paper not only contributes to advancing the debate in regard to whether educational technology enhances student motivation, but also adds a statistically valid evaluation tool for measuring how effective technology is in motivating students to learn. Heflin et al. (2017) claim that the best way to motivate student learning in higher education is using mobile technology, because using mobile technology is conducive to students' cooperative learning.

Huffman and Huffman (2011) claim that the best way to motivate student learning in higher education is to use educational technology because it can motivate students to learn and obtain a higher grade. This article shows that the frequency of using the computer and the purpose of using technology are affected by the convenience of technology. Moreover, instructors think that technology impacts the academic success of students. According to Huffman and Huffman (2011), technology usually most heavily impacts educational outcomes when students who use technology earn higher grades than those who do not use it. Students who use technology that the professor considers important also obtain better grades. Menzies et al. (2017) indicate that a good way to use educational technology to motivate learning is by using Facebook because Facebook can be used as a platform for collaborative learning, interactive discussions and delivery of teaching and learning materials. Moreover, students enjoy using Facebook to manage educational materials, and it is a useful supplemental educational medium.

### **Formative Evaluations as a Tool to Help Students Learn**

Formative evaluations are frequent, diagnostic, small-size procedures which ask what is working, what needs to be improved, and how it can be improved (Fitzpatrick et al., 2011).

There are four reasons for and 10 tips about formative feedback to fit in professional learning. Four reasons include: Weimer (2010) states that first of all, the formative feedback from students is meaningful. Second, formative feedback is more helpful than summative evaluation because formative evaluation allows teachers to ask for particular details to help students to revise their drafts, ideas, and arguments. Third, formative feedback can be used to provide timely feedback. Fourth, formative feedback is not for judging teachers but to improve teaching and learning.

Briefly synthesis of the ten tips for formative feedback to fit in professional learning include:

- Eberly Center (2020) illustrates that the best time to collect feedback in ongoing courses is early in the term and early in the class period.
- Also, the teacher should tell students to give constructive feedback, because teachers want to improve, and let students know that instructors will share the results with them.
- Once instructors have the feedback, they should prioritize recurring topics and group them by type.
- Then they can share the three to five areas of importance with the students, both positive and constructive.
- Teachers must always stay in a positive mindset when reporting feedback and engaging students in finding solutions to the areas that need adjustment. Formative feedback helps educators be more effective and aids their performance. This matches the outcome standard for professional learning-outcomes, which says “Professional learning that increases results for all students addresses the outcomes and performance expectations education systems designate for students and educators.” (Standards for professional learning, n.d.).

The benefits of formative feedback are very practical. Ambrose et al. (2010) state that students have a better chance of reaching their goals when they receive formative feedback. For example, when we are using a global positioning system (GPS) to drive, we are going toward a goal, a given address, or a given location. If we take a wrong turn or head the wrong direction,

the GPS immediately lets us know that we are off track and tries to get us back on the right track. So, as professors and teachers, we need to be like a GPS, constantly giving our students directions to guide them toward the goals we have set for them. This was a perfect analogy to talk about the importance of formative feedback.

Weimer (2010) illustrates that using open-ended questions is a great way to do formative assessment. The best assessment is almost like a conversation. Instructors can begin a conversation around the feedback, but the students need to know that instructors are reading and listening to what they say. To that end, we need to create a tool that allows the students to ask questions and see that professors engage with their questions. Then they need to see instructor changes- what instructors are doing right now based on students' formative feedback. Using technology to support formative feedback can shape students' experiences and guide curricula together. The formative feedback leads to a growth mindset. Formative feedback and growth mindset have been the key that has helped students achieve more (Zorman, 2016). They believe they can, so students try harder, and when they do, they are more successful.

In sum, the best way is using open-ended questions to start formative feedback, and then instructors must engage in the feedback to adjust and match the students' needs. Furthermore, using a technology tool is a great way to help the meta-conversation for formative feedback. Formative feedback supports people to gain a growth mindset, which encourages students to improve. There are three dispositions that faculty should keep in mind which are: being a good listener to involve students' suggestions and voices, having a growth mindset to help students to grow, and being humble to let students feel comfortable to open their hearts to communicate with instructors.

### **Online SETs' Improvement of Formative Evaluation**

Online SETs can provide formative evaluation and urge students to participate in the evaluation process. Winchester and Winchester (2012) show online formative evaluation of teaching to be an effective feedback tool, and that it can stimulate students to participate in the evaluation process. In Winchester and Winchester's view, once students perceive their opinions are being taken seriously and included in the instructor's future materials, they have more passion to complete the questionnaire. In 1963, the American scholar Cronbach claimed that the biggest contribution of evaluation is determining where teaching needs improvement (Cronbach, 1963). If instructors and students can use social media to more easily communicate with each other, instructors can more appropriately judge which parts of their teaching could be improved.

Student evaluations of teaching may be an effective tool to help a school improve overall. As the famous education evaluation expert Daniel (1966) proposed, the most important purpose of evaluation is not to approve or disapprove, but to improve. Practice has shown that in the process of educational evaluation, the evaluator and the evaluated should have an interactive relationship, and the evaluation process should be a process of understanding and dialogue. Therefore, any effort made towards including more perspectives in educational evaluation is one of the most important strategies for exploring the essence of educational evaluation (Yin, 2002). Accordingly, formative evaluation is an effective way to help instructors' improvement and students' learning.

Winchester et al. (2012) illustrate that for a novice lecturer, formative SETs can help them judge if they are doing the correct thing and for an experienced lecturer, formative SETs can help them monitor a new module. Formative evaluation focuses on helping mentors find and



solve the problems that the new teachers encounter (Fitzpatrick et al. 2011). Formative evaluation not only focuses on the improvement of an organization but also promotes more participation in the procedure. The fourth generation of education evaluation theories advocates and evaluates that the stakeholder groups should be involved in the process, and express their interest demands. The evaluators are more like a coordinator at this time, and constantly reconciling differences in order to finally reach a consensus (Guba & Lincoln, 2008).

Using WeChat for formative feedback may improve educational fairness. Yi , Yun, Duan, and Lu (2021) state that “Smart classroom provides the possibility of classroom fairness and individual development of each student” (p.480), for example using WeChat because in the smart classroom, a cloud platform is used to build a variety of interactive environments for students to match students’ personality and capability. WeChat offers a wide variety of ways to support students learning. According to the individual development of each student, so each student is given what they need to be successful. China's current policy orientation in dealing with the relationship between equality and efficiency is summarized as efficiency gives priority to equality. The efficiency priority means that we must take improving the efficiency of higher education as the primary goal at present. Equality means to satisfy the people's demands for higher education to the greatest extent on the premise of ensuring efficiency. At present, we cannot use the ideal goal of equality to demand reality. We can only look at reality from the perspective of development and do our best. In China, we have a lot of students in one classroom, so not every student has opportunities to ask questions and get answers. Using WeChat to communicate can help improve this situation.

### **The Impact of Students' Attitude and Subjective Norms on SETs**

I need to also consider other factors such as students' attitude and subjective norms. Weng et al. (2014) remark that attitude and subjective norms can motivate students to use online evaluation of teaching. First, attitude is the most critical consideration affecting students' willingness to participate. Therefore, teachers are advised to explain to students the value of the course evaluation process and the importance of student feedback (Norris & Conn, 2005 as cited in Weng, Weng, & Tsai, 2014). In addition, schools should emphasize the benefits of assessment, point out the objectives of the assessment process, and explain how to achieve these goals in order to prompt better individual "learning outcomes and overall quality of education" (Weng et al., 2014, p. 111). Second are the subjective norms of students, or "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991, p. 188). The more a person feels that he/she has any particular social expectation, pressure, or responsibility to do something, the more he/she has the motivation to follow the example set by others. I will choose WeChat not only because it is a good communication platform, but also because it can make it easier to achieve the formative evaluation. WeChat is already popular in China as well as inexpensive and convenient to apply. The increased convenience may help us to conduct evaluations many times during one semester.

### **Conclusion**

As time goes on and technology continues to advance and to be integrated into people's lives, student evaluation of teaching continues to become more and more important and easier with social media. Student evaluations of teaching can greatly promote instructors' awareness of how to improve and better meet student needs and expectations. However, response rates are

often low and online response rates are even lower than paper-based evaluations. Social media can motivate students to participate more comfortably in the evaluation process. Moreover, instructors can guide students' attitude and adjust subjective norms in order to increase response rates of evaluations. Furthermore, students' GPA and students' satisfaction have a positive correlation. If someone is dissatisfied of the quality of teaching, they are likely to have a lower GPA. If they are very satisfied, they may have a higher GPA. SETs not only impact teachers through social media platform, but also impact students' educational engagement and success.

## **Chapter Three**

### **Methodology**

#### **Introduction**

There are four research questions which include the following: RQ1 —To what extent do students' response rates differ by formative-feedback type? RQ2—To what extent do students' ratings of satisfaction with teaching differ by feedback type? RQ3—What is the correlation between students' satisfaction and each of the following variables: Java grade, gender, and parent's educational background? RQ4—What is the correlation between students' gender and students' Java grade and?

This study used a quantitative research method and a quasi-experimental design. I did not randomly assign the students to different groups, because the school had assigned the students to two groups, each in its own classroom. I used SPSS as the analyzing tool to conduct the correlational statistics. I have developed a survey and administered it with a different group of students to be sure they understand the questions and respond in a manner that elicits the data I hope to see. However, the sampling data was not used for my dissertation. The research design mainly includes five parts: First, a quantitative survey instrument was utilized twice for SETs to compare student satisfaction between pre-test and post-test within the experimental groups. Second, this study explored the potential correlation between student demographics (such as student gender, and family educational background) and the extent of student satisfaction, and students' grade. Third, I analyzed the correlation between students' satisfaction and students' grade in the experimental group. Fourth, the quantitative survey was implemented in the

experimental and control groups to compare the response rates. In addition, I compared the average of students' Java course grades between the two groups.

### **Setting**

I chose Java, a computer language program taught in the computer science department to conduct my research. I selected one teacher who had about 100 students from a college in Zhengzhou, China, where I am teaching. Half of the students, the experimental group of about 50, were assigned to use WeChat with informal feedback in SETs, while the control group, the other 50 students, used WeChat without informal feedback in SETs.

### **Participants**

There was one teacher who had about 100 students in 2 classrooms teaching a course on the Java computer language. The students were assigned to feedback groups, as detailed above. The instructor was interested in educational innovation, and she wanted to find a new method to meet student needs and expectations. The associate professor Jiang and the two groups of students were at a College where I am teaching in Zhangzhou, China.

### **Variables**

The first independent variable is using WeChat for formative feedback; the dependent variables are students' satisfaction and students' grade. The second independent variable is students' satisfaction, and the dependent variable is students' grade. The third independent variable is students' demographics, and the dependent variables are students' satisfaction and students' grade. The purpose is to find the correlation between the independent and dependent variables.

**Example of correlation between two variables****The Relationship of Students' GPA and Their Satisfaction**

In order to discover the correlation between students' GPA and their satisfaction to explore the feasibility of this study, I applied PowerStats and pulled the data from the Baccalaureate and Beyond Longitudinal Study repository from the US Department of Education, National Center for Educational statistics (NCES) database. It uses five levels of satisfaction to measure average GPA. The dependent variable GPA is overall grade point average for 2015-16 bachelor's degree. It uses an average that belongs to the Measure of Central Tendency. The independent variable is satisfaction with the quality of undergraduate education. NCES examines satisfaction with the quality of undergraduate education by using five levels which are comprised of very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, and very dissatisfied.

Table1: The average of students' GPA table below shows that when students have a higher degree of satisfaction with the quality of their undergraduate education, their GPAs are higher. For example, when students are very satisfied, their average GPA is 3.3, and when students are very dissatisfied, the average GPA is 3.1.

**Table 1**  
*The average of students' GPA*

**National Center for Education Statistics PowerStats**

Overall GPA for 2015-16 BA degree 1 by Satisfaction with quality of undergraduate education, as of B&B:16/17 interview.

Overall GPA for 2015-16 BA degree 1 by Satisfaction with quality of undergraduate education, as of B&B:16/17 interview.	
	Overall GPA for 2015-16 BA degree (Avg>0)
<b>Estimates</b>	
Total	3.3
Satisfaction with quality of undergraduate education, as of B&B:16/17 interview	
Very satisfied	3.3
Satisfied	3.3
Neither satisfied nor dissatisfied	3.2
Dissatisfied	3.2
Very dissatisfied	3.1

The names of the variables used in this table are: B1GPA and B1INCHO.

Based on the Overall GPA for 2015-16 bachelor’s degree by satisfaction with quality of undergraduate education, as of B&B:16/17 interview, we can see that when students have a high degree of satisfaction with the quality of their undergraduate education, they will have a higher GPA. However, I would like to know if I can create an equation to find the correlation model through linear regression.

In examining GPA, two options are available, to treat GPA as a continuous variable, or a categorical variable. I used this variable as a continuous variable and considered zero as a missing value. The independent variable is satisfaction with the quality of undergraduate education. I selected a reference category: Neither satisfied nor dissatisfied. In addition, I chose to include a Correlation Matrix with my output because I would like to analyze the correlation between the two variables. Degrees of Freedom is 200 in the linear regression database. In table-2: linear regression, the first, we analyze p-value. If the p-value is low, we assume that it was not random and that there is a pattern. The correlation is statistically significant if the p-value is less

than 0.01. If there's a high p-value (>0.01), we can assume that it was random, and there's no pattern.

**Table 2**

*linear regression*

**Estimated Full Sample Regression Coefficients**

	b	S.E.	t	p-value	Lower 95%	Upper 95%
Intercept	3.156	0.021	151.732	0.000	3.115	3.197
Satisfaction with quality of undergraduate education, as of B&B:16/17 interview						
Very satisfied	0.175	0.022	7.866	0.000	0.131	0.219
Satisfied	0.118	0.021	5.500	0.000	0.075	0.160
Dissatisfied	0.040	0.034	1.178	0.240	-0.027	0.106
Very dissatisfied	-0.071	0.078	-0.915	0.361	-0.225	0.082

Dependent variable: Overall GPA for 2015-16 BA degree, .  
 For Satisfaction with quality of undergraduate education, as of B&B:16/17 interview, reference category includes: Neither satisfied nor dissatisfied.

The names of the variables used in this regression are: B1GPA and B1INCHO.

Source: U.S. Department of Education, National Center for Education Statistics, B&B:17 Baccalaureate and Beyond Longitudinal Study.

The Table2 linear regression table shows very satisfied and satisfied have very low P-values which both are 0.000, so students' GPA can be predicted by a students' degree of satisfaction with the quality of their undergraduate education. Dissatisfied and very dissatisfied are not statistically significantly related to students' GPA in terms of the p-value. However, based on "view descriptive statistics" as seen in table 3, the two level of satisfaction, very satisfied and satisfied, have occupied 89.7% of the total data. We can see in the table, for the very satisfied level, the percentage is 46.26. For the satisfied level, the percentage level is 43.33. So very satisfied and satisfied can almost represent the whole population.

Table2 also shows regression coefficients which are in the column labelled "b". Based on the b value, it shows the regression coefficients are small, but we still can create equations; for



example, for the very satisfied level, the equation is  $Y = 0.175x + 3.156$  and so on. The 3.156 is the intercept, 0.175 is the very satisfied regression coefficient, X is the degree of Satisfaction with the quality of undergraduate education, Y is GPA. Students' GPA may depend on many factors, and Satisfaction is just one factor.

**Table 3**

*view descriptive statistics*

The screenshot shows the IES NCES National Center for Education Statistics interface. On the left, a table displays satisfaction levels with their respective percentages and labels. On the right, the 'MAKE MY OWN CATEGORIES' panel shows the selected variable 'Satisfaction with quality of undergraduate education, as of B&B:16/17 interview' and a list of reference categories for selection.

Value	Percentage	Value label
1	46.26	Very satisfied
2	43.44	Satisfied
3	7.10	Neither satisfied nor dissatisfied
4	2.54	Dissatisfied
5	0.65	Very dissatisfied
-3	0.00	{Skipped}

**MAKE MY OWN CATEGORIES**

USE DEFAULT CATEGORIES

Satisfaction with quality of undergraduate education, as of B&B:16/17 interview

Categories in braces are skips or missing values. [Learn more.](#)

View descriptive statistics

Select a reference category:

Reference Group	No.	Category
<input type="radio"/>	1	Very satisfied
<input type="radio"/>	2	Satisfied
<input checked="" type="radio"/>	3	Neither satisfied nor dissatisfied
<input type="radio"/>	4	Dissatisfied
<input type="radio"/>	5	Very dissatisfied
<input type="radio"/>	-3	{Skipped}

SAVE

To sum up the four tables, if someone is dissatisfied, they are likely to have a lower GPA. If they are very satisfied, they may have a higher GPA and the independent variable satisfaction can predict students' GPA well because the P-Values are less than 0.01 which means statistically significant.

**Research Design**

The teacher selected was willing to fully participate in the study and had the necessary experience to remain objective in collecting data from students. The teacher also had two

classrooms at the college in China, were designated as the experimental and control groups. I compared students' satisfaction level with teaching performance based on the data collected from the questionnaire. The satisfaction instrument (see Appendix 6) used a 5-point Likert scale to measure students' satisfaction and was given two times to the experimental group at the beginning and end of the trial. In order to interpret the collected data, I used SPSS as the analyzing tool to measure the correlation between independent variables and dependent variables in SETs in the experimental and control groups. The topics and questions in the survey stayed consistent. The reliability of the instrument was checked by using SPSS. I used Cronbach  $\alpha$  reliability coefficient which was the most commonly used. The  $\alpha$  coefficient evaluated the consistency between the scores of each item in the scale and belongs to the internal consistency coefficient. This method is suitable for the reliability analysis of attitude and opinion questionnaires. The reliability coefficient of the total scale is preferably above 0.8, and 0.7-0.8 is acceptable; the reliability coefficient of the subscale is preferably above 0.7, and 0.6-0.7 is still acceptable.

The course started March 1, 2021 and ended on June 27, and the students took the final exam on June 28. The total time was 17 weeks. Students used WeChat for formative feedback from May 1 to May 28, and the discussion covered six weeks. During each week, students were invited to provide both positive and negative feedback about the teaching. The student leader (who was a student) and I summarized the feedback about the learning each week. After that, the student leader or I talked to associate professor Jiang about the formative feedback, which included points showing where the teacher did well, which students hoped the teacher could continue to implement. Furthermore, the student leader and I shared points that were not perfect,

that the students hoped the teacher could improve upon while satisfying the students' thirst for knowledge and meeting their expectations. Students in the other classroom did not use WeChat for formative feedback.

I gave the experimental group a questionnaire to evaluate associate professor Jiang's teaching on May 1st (Week 11) to analyze student satisfaction as a pre-test. At the end of the semester (Week 17) both the experimental group and control group students took the questionnaire, to compare the response rates and find if formative feedback through WeChat improves students' response rates. It was also a post-test for the experimental group. In short, the pre-test was taken on May 1st, and the post-test was taken on June 27th.

Moreover, after I collected the data on May 1st (Week 11), I used SPSS to analyze students' satisfaction in the experimental group as a pre-test. In the first ten weeks, the formative feedback did not start because students needed to be involved in the learning and perceive their feelings gradually. In the eleventh week, the experimental group started formative feedback by using WeChat. In the seventeenth week, on May 27th, the two groups took the questionnaire survey. I collected the data and then used SPSS to compare the satisfaction mean between the pre-test and the post-test. Also, I analyzed the statistically significant difference of the means based on the P-value.

I facilitated the discussions on WeChat in the experimental group. I asked students to summarize positive and negative feedback about the teaching during each week. Moreover, students could brainstorm about the confusing concepts or contents in the experimental group. If, through our discussion, students could solve the problems, the classroom leader and I would not tell the teacher. In my school, every classroom has an advisor, who is a staff member, that helps

students deal with learning and life problems. The advisor takes the responsibility to help students solve any problems. In this study, the advisor would not tell the associate professor Jiang if they saw which students made critical comments in WeChat. Also, if students felt uncomfortable criticizing their teacher publicly. In that case, they could send me a message privately, so any other people in the WeChat group would not be able to see the messages except me. Students could post information in the group publicly and send messages to me privately to talk about the class.

The associate professor Jiang talked to students about providing the students' grades to my research. In China, students' grades are not secret. Sometimes, classroom leaders posted students' grades in a WeChat group publicly. When students typed their name on the Informed Consent form, they knew I would read their grades and use their grades in my research.

After teachers adjusted their teaching methods based on students' feedback, the students took the satisfaction survey again to evaluate their teaching. The teacher was not instructed how to adjust her teaching, but if the teacher could do well, she could initiate questions in professional seminars and use the contributions of professional teaching and research groups to resolve problems. These students would be assured of their confidentiality, and that all results would be anonymous. During the use of WeChat, students might feel pressure to not talk honestly about which part of the course they could not understand, because the teacher might assume the student did not study hard, which might lower their grade. For this study, we used the WeChat platform for two separate functions.

One function was using WeChat for formative feedback to help teach and learn. Formative feedback through WeChat would be confidential because, in the WeChat group, the

students and I would talk about Java, a computer language program, without the instructor. All of the experimental group students could give feedback about their opinions and suggestions on Java. The classroom's student leader could summarize two pieces of positive and three pieces of negative feedback about the teaching each week. After that, the student leader or I would talk to associate professor Jiang about the formative feedback. This includes two points the teacher did well, which students hope the teacher can continue to implement. Furthermore, the student leader and I will share three issues that the students hope the teacher can improve upon to satisfy their thirst for knowledge and meet students' expectations. In this process, associate professor Jiang will not know what every student said. She will receive the summary of students' feedback for adjusting her teaching to match students' needs and expectations. Students in the other classroom will not use WeChat for formative feedback.

Another function of WeChat is providing a link to a questionnaire. The questionnaire is hosted on Microsoft Survey, which is separate from their WeChat accounts and is completely anonymous, but I will remind students to submit their questionnaire to Microsoft Survey by sending them an invitation to complete the questionnaire through WeChat. During the survey portion of the research, risks are very minimal, as the survey is completely anonymous, and no one will know what the students have said on the survey. I will give the two classrooms a questionnaire to evaluate associate professor Jiang's teaching on June 27<sup>th</sup> in week seventeen and count the response rates. After an adequate number of surveys have been completed, the results will be analyzed to demonstrate the change of students' satisfaction with the teacher's performance by using WeChat for teaching feedback.

### **Data Analysis**

I used SPSS to quantitatively analyze student satisfaction with data from the questionnaire. I also analyzed the students' achievements on the final exam at the end of the semester. For example, associate professor Jiang taught Java, a computer language program in the computer science department. She was teaching Java in two classrooms and each classroom had about 50 students. I chose a classroom, Computer Information Management Classroom One, to set up a WeChat group to get formative feedback for this course as an experiment group. All of the students in the experimental group gave some feedback about their opinions and suggestions on Java, the computer language program. Students in the other classroom did not use WeChat for formative feedback. I gave the experimental group students a questionnaire to evaluate associate professor Jiang's teaching in week eleven to analyze student satisfaction with teaching as a pre-test. At the end of the semester (week 17), both the experimental group and control group students took the questionnaire to compare the response rates. This determined if formative feedback through WeChat improved students' response rates and also analyzed student satisfaction in the experimental group as post-test.

Moreover, after I collected the data in week eleven, I used SPSS to analyze the level of students' satisfaction through the mean of every item in the experimental group as a pre-test, the first test. In the first ten weeks, the formative feedback was not started because students needed to be involved in the learning and perceive their feelings gradually. In the eleventh week, the experimental group started formative feedback by using WeChat. At the end of the semester (week 17), I asked the experimental group to take the questionnaire for the second time to compare their level of satisfaction with teaching to the pre-test.

Next, I analyzed the correlation between the students' satisfaction and the students' demographics such as gender and background in the experimental group in post-test (week 15). I checked the response rates between the experimental and control group. Furthermore, I checked the grades of the experimental group and control group to compare their GPAs and identify if formative feedback through WeChat improved students' GPAs. Also, in the experimental group I analyzed if the students' satisfaction correlated to their GPAs and if those GPAs correlated to student demographics in the experimental group. Moreover, I analyzed if students' satisfaction correlated to student demographics such as gender and background.

**Table 4**

*Timeline*

Evaluation	<b>Experimental group (50 students)</b>	<b>Control group (50 students)</b>
questionnaire (18	Pre-test on April 24 <sup>st</sup> (week 10)	
items)	Post-test on May 27 <sup>th</sup> (week 15)	Take the survey on May 27 <sup>th</sup> (week 15)
	Compare the mean of student satisfaction between (pre-test and post-test)	1. Compare response rates to the post-test of experimental group
	2. Analyze the correlation in post-test between student satisfaction and student demographics (May28 <sup>th</sup> )	2. Compare the Java grade to experiment group in final exam (Jun 28 <sup>th</sup> )
	3. Analyze the correlation between student satisfaction	

	<p>and student Java grade in final exam (Jun 28<sup>th</sup> in post- test</p>	
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Reason for changing the timeline:

All of the students in my college had a vacation from May 28 to June 16 because of Gaokao, a university entrance exam. Students who took the college entrance examination in my school on June 9 had to live in our school's dormitories for one week quarantine and then take the exam. For this reason, my research was conducted over a period of six weeks for formative feedback, even though the original plan called for eight weeks. When the students returned to school, the instructors were busy grading the final exam. When students returned on June 16, they did not have enough time for additional class sessions, as they needed to prepare for the semester's final exams. When students came back to campus and took the final exam on June 24, I collected their Java grades for analysis.

**Ethical Considerations**

Because this study examines human subjects, IRB approval was needed through George Fox University. Students and teachers were informed that taking the survey may cause emotional or interpersonal stress and were assured that any results of the study would remain anonymous. Furthermore, because this study relies on the internet, instructors guided students to understand the ethics of internet communication and encouraged them to follow the rules of the internet, improve their internet ethics cognition, and use internet resources efficiently. I ensured participants' anonymity and confidentiality by explaining that the Microsoft Survey



questionnaire would only show results to me, not names. Moreover, I explained that the survey was conducted individually to reduce participants' social pressure while taking the survey. Participation in this study would be voluntary and they could withdraw when they wanted to. To lower the risk to participants, I planned on disposing of the data after using it.

Each participant's identity was treated as confidential during the use of WeChat in the course. For the WeChat discussions, only students in the WeChat classroom and their advisors were able to see the comments. No one else, including the teacher, could see these discussions. Every week, I copied the WeChat communication to analyze and summarize the comments for the teacher to see. This data was saved without any identities included.

Each participant's identity was protected by keeping the survey anonymous. The questionnaire was hosted on Microsoft Survey, which was separate from their WeChat accounts and was anonymous. I was only able to see the results of the survey; all other information was anonymous. All survey data was saved in a secure online server for 3 years, after which it will be permanently deleted. Furthermore, the data collection platform Microsoft Survey does not collect IP addresses. In summary, the WeChat formative feedback was confidential, and the survey was anonymous.

### **Potential Contributions of the Research**

My dissertation's scholarly contribution is that it applies social learning theory to motivate students and enhance their self-efficacy. It expands the motivation theory through focusing more on helping students' engagement instead of just providing traditional encouragement, e.g., "*Study hard*," "*Concentrate*," etc. It applies the instructor's professional values—such as fairness, diligence, responsibility, and pragmatism—toward helping students

pursue their dreams, and obtain technical knowledge and skills. It provides a meaningful meta-analysis, because meta-conversation for formative feedback provides a great scaffold to help students learn. It also applies how to use social learning theory to enhance collective learning, which consists of individual thinking, environmental stimuli, and observing peers' activities through a technology platform. The general technique is to guide students to study through top-down concepts. For example, instructors have a mission and value to cultivate and motivate students, and then students engage in the learning process, which is from a macro perspective to a micro perspective. However, my dissertation study focuses on bottom-up concepts. For instance, I guided and pushed my students to speak out about the obstacles to their learning, which focused on their engagement. After students engaged more, they had more motivation to learn and then helped instructors obtain their mission or values, which served students more completely. A teacher's mission is to cultivate and facilitate student improvement. This learning process moves from a micro to a macro perspective. As educators, we are trying to see the process of learning and teaching in ways that are both from the big macro perspective such as value and mission, and also into a very pragmatic understanding of what's going on in all the complexity of teaching abstract theory and concepts, so we can get a real handle around what vision means there. We used the example of how to use some Java concepts to code. Students read the concepts and thought they looked easy, whereas applying the concepts to code to solve real problems was very complicated. So, with both perspectives we gained a holistic understanding of the learning process. However, students saw teaching value and mission (e.g., teachers telling students that we should learn science or code to make people's life better and easier) as abstract or virtual. Students like to focus on concrete, specific, real, and problem-

solving methods first. However, students may see teaching value and mission as abstract or virtual, and would prefer to focus on concrete, specific, real, and problem-solving methods first. Values and mission are useless without pragmatic strategies for guiding students toward not only finding answers but formulating questions.

As educators, we understand the unprecedented variety of distractions in today's globalized, digital age, so we must explore effective ways to motivate students to engage in the learning process. Getting learners engaged in the 21st century is a mission that new technologies often seem to derail. In short, educators confront a clear dilemma. Technology either helps students learn or provides distractions such as playing games, etc. If educators guide well, technology can help students learn more. However, if educators ignore technology, they may lag behind the times and become less effective. In order to engage learners, educators have to apply different strategies or modes of learning.

My dissertation makes practical contributions to educational practice by using social media for formative feedback, which may increase student satisfaction and enhance SET's effectiveness to help overall educational improvements. Using technological tools is a great way to improve meta-conversation through formative feedback. Formative feedback encourages people to gain a growth mindset by finding and solving problems during the learning process. This prevents students from feeling helpless, which can stifle their educational ambitions.

Technological tools can also give equal attention also to the lower ranking students, who may not want to speak out based on feelings of embarrassment and a learned sense of inferiority. I believe effective teaching requires a focus on the needs of the individual. We cannot allow the

best opportunity to go only to the top-ranking students, many of whom have had more institutional advantages both in and out of the classroom.

In short, there are two sections of potential contributions of the research. The scholarly contribution applies social learning theory to motivate and enhance students' self-efficacy. The practical contribution is comprised of three parts: The contribution to students is using social media for formative feedback which may increase student satisfaction and achievement. The contribution to faculty is helping faculty adjust and improve teaching activities to match students' needs and expectations. The contribution to school is helping students and instructors effectively engage in the teaching and learning process and enhancing SETs' effectiveness to help overall educational improvements.

### **Summary**

As time goes on and technology advances and integrates into people's lives, student evaluation of teaching is becoming more important and easier with social media. Student evaluations of teaching can greatly promote instructors' awareness of how to improve and better meet student needs and expectations. The basic requirement of SETs is the combination of positive and negative evaluations, dynamic and static evaluations, single and comprehensive evaluations, and quantitative and qualitative evaluations. The principles of evaluation are objectivity, scientific nature, education, and democracy. In essence, teaching evaluation is an activity of value judgment. It includes formative evaluations, which are ongoing, and summative evaluations, which occur after the teaching is complete. Social media can motivate students to participate more comfortably in the evaluation process. Moreover, instructors can guide students' attitudes and adjust subjective norms in order to increase response rates of evaluations. This

study proposes to develop a student evaluation of teaching through WeChat that will help improve teaching performance and increase students' satisfaction and learning outcomes, in order to conduct student evaluations of teaching effectively. WeChat can be an educational technology if people use it in this proposed method. The influence of educational technology on the development of higher education is vast. It can improve the quality and efficiency of teaching, increase a single teacher's reach, adapt to the individual differences of students.

## **Chapter Four**

### **Analyze Data**

#### **Introduction**

Research Questions

Data analyzed in this section were collected in response to the four research questions, and data corresponding to each question was analyzed in a specific way: Data relating to Research Question 1 (To what extent do students' response rates differ by formative-feedback type?) was analyzed using descriptive statistics. For Research Question 2 (To what extent do students' ratings of satisfaction with teaching differ by feedback type?), a paired samples t test and descriptive statistics were used. For Research Question 3 (What is the correlation between students' satisfaction and each of the following variables: java grade, gender, and parent's educational background?), descriptive, correlation, and independent samples t tests were used. Research Question 4 (What is the correlation between students' Java grade and students' gender?) correlations statistics, independent samples t test, and descriptive statistics were used.

### **Reliability of the SET Scale**

Reliability is the consistency and trustworthiness of measurement results. It is an index that reflects the extent of random errors in the measurement and shows the consistency of the evaluation result, that is, how reliable the evaluation score is. Depending on the error sources of test scores and the different methods of estimating the reliability, the reliability can be divided into five categories: homogeneity reliability, split-half reliability, test-retest reliability, alternate-form reliability, and scorer reliability. In this study, we will focus on homogeneity reliability, which refers to the consistency of test content or the consistency of all questions within the test, that is, the degree of item homogeneity, also known as the degree of internal consistency (Sun et al., 2021). There are many homogeneity reliability coefficients, and Cronbach's  $\alpha$  coefficient is one of them. This study used Cronbach's  $\alpha$  coefficient.

Before analyzing the correlations, it was important to determine the internal consistency of the scale for the SETs. Cronbach's  $\alpha$  was conducted for each item of the questionnaire. Sun et al., (2021) state that the reliability coefficient of the total scale is preferably above 0.8, and 0.7-0.8 is acceptable; the reliability coefficient of the subscale is preferably above 0.7, and 0.6-0.7 is still acceptable. For this SET scale, the Cronbach's  $\alpha$  of the total is 0.951, which is very reliable and the scale for the SETs has a high level of internal consistency. Table 5 contains the Cronbach's  $\alpha$  scores on the SET scale.

**Table 5**

*Reliability of SET Scale*

<b>Reliability Statistics</b>	
Cronbach's Alpha	N of Items
.951	21

**Table 6**

*Cronbach's  $\alpha$  coefficient of the 21 variables relative to the total reliability*

<b>Item-Total Statistics</b>				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
gender	76.64	119.182	.419	.951
Mdegree	74.91	127.378	-.203	.963
Fdegree	74.79	125.711	-.125	.962
SET1	73.22	113.300	.643	.949

SET2	73.22	112.598	.776	.947
SET3	73.28	109.958	.886	.945
SET4	73.24	110.748	.830	.946
SET5	73.21	110.202	.901	.945
SET6	73.21	111.395	.734	.947
SET7	73.12	111.126	.903	.946
SET8	73.40	108.629	.798	.946
SET9	73.33	110.610	.802	.946
SET10	73.36	109.147	.782	.947
SET11	73.17	111.654	.801	.947
SET12	73.24	110.713	.864	.946
SET13	73.17	110.882	.824	.946
SET14	73.28	111.326	.821	.946
SET15	73.26	110.616	.854	.946
SET16	73.29	111.369	.835	.946
SET17	73.21	110.167	.904	.945
SET18	73.28	109.887	.832	.946

Table 6 shows the change of total reliability if each item is deleted. If the educational degree of the father and mother were deleted, the total reliability coefficient will be improved. For example, the total Cronbach's  $\alpha$  coefficient is 0.951; if the variable mother's degree is deleted, the total Cronbach's  $\alpha$  coefficient will be 0.963. If the variable father's degree is deleted, the total Cronbach's  $\alpha$  coefficient will be 0.962. As seen in the Corrected Item-Total Correlation column, except for the mother's educational degree and the father's educational degree, the other 19 variables' reliabilities show high correlation to the total reliability. The mother's educational degree correlated to the total reliability is -0.203. The father's educational degree correlated to the total reliability is -0.125.



**Principal Component Analysis of the SET Scale**

Based on the principal component factor analysis, Table 7 shows only one component, which means this SET scale cannot be divided into different factors because every item has very high correlation and internal consistency. In this SET scale, every item is combined to reflect the overall satisfaction with teaching. Furthermore, each of the 18 variables (items) contributes significantly to the Principal Component 1 based on the variable coefficient such as 0.701 SET1, 0.817 SET2, 0.918 SET3, etc. So, the data reduction to several factors is not needed. The component matrix is shown in Table 7. Satisfaction is a latent variable because it cannot be measured directly, so this study uses 18 questions, each coded using a Likert scale ranging from “strongly agree” (5) to “strongly disagree” (1). Based on table 7, 18 questions are aspects of the same underlying variable because of one component in the component matrix, and therefore, summable into one overall scale.

**Table 7**

*Component analysis of SET scale*

<b>Component Matrix<sup>a</sup></b>	
	Component
	1
SET1	.701
SET2	.817
SET3	.918
SET4	.860
SET5	.910

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SET6	.792
SET7	.924
SET8	.816
SET9	.828
SET10	.815
SET11	.820
SET12	.883
SET13	.866
SET14	.848
SET15	.894
SET16	.870
SET17	.932
SET18	.855

---

**The Descriptive Statistics of the SET Pretest**

Table 8 shows the sum and mean of every item and all points of total items. The data demonstrates that most students are satisfied with the teaching because the means are all near 4, which represents satisfied.

**Table 8**

*The Sum and Mean of Satisfaction with Teaching*

---

<b>Descriptive Statistics</b>					
N	Minimum	Maximum	Sum	Mean	Std. Deviation

---

SET1	58	1	5	233	4.02	.737
SET2	58	1	5	233	4.02	.662
SET3	58	1	5	230	3.97	.725
SET4	58	1	5	232	4.00	.725
SET5	58	1	5	234	4.03	.700
SET6	58	1	5	234	4.03	.772
SET7	58	1	5	239	4.12	.651
SET8	58	1	5	223	3.84	.875
SET9	58	1	5	227	3.91	.756
SET10	58	1	5	225	3.88	.860
SET11	58	1	5	236	4.07	.697
SET12	58	1	5	232	4.00	.701
SET13	58	1	5	236	4.07	.722
SET14	58	1	5	230	3.97	.700
SET15	58	1	5	231	3.98	.713
SET16	58	1	5	229	3.95	.686
SET17	58	1	5	234	4.03	.700
SET18	58	1	5	230	3.97	.772
Valid N (listwise)	58					
<b>sum</b>				4168		

**Relationship among Students' Satisfaction and Their Gender, and Parents' Educational Background**

Appendix 1 describes the bivariate correlation. Correlation between gender and some items is significant at the 0.01 level (2-tailed), which includes SET 5, 0.002; SET 7, 0.004; SET 8, 0.001; SET 10, 0.003; SET 11, 0.003; SET 12, 0.000; SET 14, 0.001; SET 15, 0.001; SET 16, 0.002; SET 17, 0.000; SET 18, 0.003. For example, SET 12: “The instructor provides timely feedback.” The response of this question is highly correlated with gender, because the Significance level (2-tailed) is 0.000. Table 14 shows the mean of female satisfaction is 3.61, and

the mean of male satisfaction is 4.26. The females' satisfaction is statistically significantly lower than males' satisfaction.

**Table 9**

*The Significant Correlation between Gender and the Items*

The correlation is significant at the 0.01 level (2-tailed) between the students' gender and their answers to questions 5, 7, 8, 10, 11, 12, 14, 15, 16, 17, and 18.
Question 5. The supplementary materials were sufficiently clear and coherent.
Question 7. The instructor spent time communicating course organization.
Question 8. The instructor spent time communicating practical matters such as homework policy, attendance policy, behavior policy and contingency plans.
Question 10. I am satisfied with the quality of teaching in this course.
Question 11. The instructor was present regularly during the contact hours of this course (lectures, tutorials)
Question 12. The instructor provides timely feedback.
Question 14. The instructor was accessible by WeChat or in person.
Question 15. The instructor created an atmosphere where questions and comments were valued.
Question 16. The instructor created an environment that stressed collaboration and collegiality.
Question 17. The instructor presented materials in a manner that was interesting.

Question 18. I would recommend this instructor to other students.

The correlation between student satisfaction and parents' educational background was not statistically significant. One item shows a significant negative correlation between a student's satisfaction and the educational background of the student's mother, which is Question 6: "The instructor made efforts to make the course interesting." Table 10 shows that the level of significance (2-tailed) is 0.002, which is significant at the 0.01 level which represents a strong correlation between the students' mothers' educational background and the students' satisfaction with teaching. Moreover, the correlation coefficient is -0.401 which represents a negative correlation between the mothers' educational background and the students' satisfaction. If mothers have a higher level of educational background, the students are less satisfied that the instructor made efforts to make the course interesting. The frequency of Question 6 is shown in Table 10.

**Table 10**

*The Correlation between Mother's Educational Degree and Students' Satisfaction*

<b>Correlations</b>			
		Mdegree	SET6
Mdegree	Pearson Correlation	1	-.401**
	Sig. (2-tailed)		.002
	N	58	58
SET6	Pearson Correlation	-.401**	1
	Sig. (2-tailed)	.002	
	N	58	58

\*\* Correlation is significant at the 0.01 level (2-tailed).

**Table 11**

*SET6 Stem-and-Leaf Plot for  
Mdegree= 1*

Frequency	Stem & Leaf
6.00	4. 000000
5.00	5. 00000
Stem width: 1	
Each leaf: 1 case(s)	

Table 11, Stem-and-Leaf Plots, shows that when the students' mothers' degree is primary school, six students selected 4 (agree) and five students selected 5 (strongly agree) in answer to Question 6: "The instructor made efforts to make the course interesting." Table 12 shows that when students' mothers have a bachelor's degree, one student selected 1 (strongly disagree) and one student selected 4 (agree) on the same statement.

**Table 12**

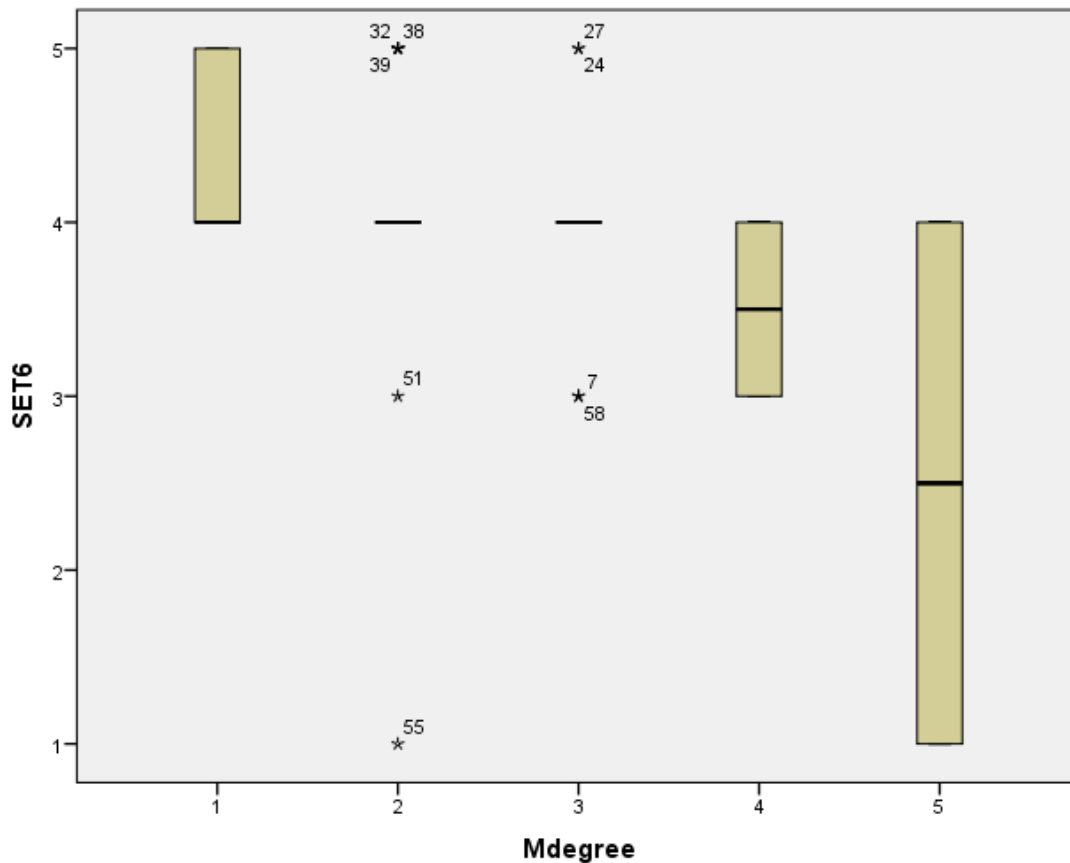
*SET6 Stem-and-Leaf Plot for  
Mdegree= 5*

Frequency	Stem & Leaf
2.00	0. 14
Stem width: 10	
Each leaf: 1 case(s)	

Table 13 shows the frequency relationship between mothers' degrees and students' satisfaction. When the mother's degree was primary school, students chose 4-5; when the mother's degree was college, students chose 3-4; when the mother's degree was bachelor, students chose 2.5 mean. The detailed results for question 6 can be found in Appendix 2, and shows that when the mother's degree was primary school, the mean of students' satisfaction with teaching was 4.45; when the mother's degree is middle school, the mean of students' satisfaction with teaching was 4.04; when the mother's degree was high school, the mean of students' satisfaction with teaching was 4.00; when the mother's degree is college, the mean of students' satisfaction with teaching was 3.5; when the mother's degree was bachelor, the mean of students' satisfaction with teaching was 2.5. According to Vogt (2014), "In effect, patterns in the quantitative data can provide "clues" for coding and analyzing some [underneath reason] (p.436)." If student mothers have higher educational level, the students may have more learning experiences because their mother was more educated can offer the students a variety of learning experiences. Students may have much more exciting ways to learn in the students' lives than the teacher is teaching right now. Their mother has been educated, and she knows as an educator need to teach their children many different ways, not just one way. The College Teacher Qualification Examination (2019) illustrate that motivation has three functions: activating, pointing and strengthening. Every individual has a different activating point that an instructor can work on. Single or centralized methods may not stimulate everyone's trigger points.

**Table 13**

*Frequency of SET 6*



Furthermore, Appendix 1, the Correlation Table, shows a strong positive correlation between the mothers' and fathers' educational level. Finally, the table shows a strong correlation between almost every item in this SET scale.

Vogt (2014) states that the T-test and the F-test, known as analysis of variance (ANOVA), are two standard significance tests to test the difference. Because the t-test is more accurate for small samples, it is commonly used to study two groups that are described by one



categorical independent variable. For example, one independent variable is gender, and the two groups are male and female in this study.

**Comparison of Means between Male and Female**

Table 14, which contains the result of the Independent-Sample T Test, shows that females have a lower mean than males in items 5, 7, 8, 10, 11, 12, 14, 15, 16, 17 and 18, which means that the level of satisfaction for females is lower than for males. 0 represents female and 1 represents male. In addition, females and males evaluate teaching differently, in a statistically significant way because Sig. (2-tailed) is less than 0.01 shown in Appendix 3, which represents that the variables are statistically significant at 0.01 level. This proves that male and female satisfaction is significantly different.

**Table 14**

*The Mean of Male and Female Satisfaction in Several Items*

<b>Group Statistics</b>					
	gender	N	Mean	Std. Deviation	Std. Error Mean
SET5	0	23	3.70	.765	.159
	1	35	4.26	.561	.095
SET7	0	23	3.83	.717	.149
	1	35	4.31	.530	.090
SET8	0	23	3.39	.941	.196
	1	35	4.14	.692	.117
SET10	0	23	3.48	.898	.187
	1	35	4.14	.733	.124
SET11	0	23	3.74	.810	.169
	1	35	4.29	.519	.088
SET12	0	23	3.61	.722	.151

	1	35	4.26	.561	.095
SET14	0	23	3.61	.783	.163
	1	35	4.20	.531	.090
SET15	0	23	3.61	.722	.151
	1	35	4.23	.598	.101
SET16	0	23	3.61	.722	.151
	1	35	4.17	.568	.096
SET17	0	23	3.65	.714	.149
	1	35	4.29	.572	.097
SET18	0	23	3.61	.722	.151
	1	35	4.20	.719	.122

### One-way Analysis of Variance

One-way ANOVA is a test of the difference between the mean of the dependent variables in the process of a single factor influence. The single factor is gender, and the dependent variables are items 5, 7, 8, 10, 11, 12, 14, 15, 16, 17, and 18. The basic ANOVA output gives researchers an overall statistical significance level and it also shows the comparisons and a significant effect somewhere. Table 15 shows that the male and female have statistically significant differences: for example, P value less than 0.01 such as 0.002, 0.004, 0.001, 0.003, 0.003, 0.000, 0.001, 0.001, 0.002, 0.000, and 0.003. The minimum is 0.000 which includes SET 12: “The instructor provides timely feedback,” and SET 17: “The instructor presented materials in a manner that was interesting.” It means that the response of these questions highly correlated to gender based on the significance level sig.(2-tailed) less than 0.01.

**Table 15**

*The statistical significance of the items*

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
SET5	Between Groups	4.376	1	4.376	10.403	.002
	Within Groups	23.555	56	.421		
	Total	27.931	57			
SET7	Between Groups	3.308	1	3.308	8.886	.004
	Within Groups	20.847	56	.372		
	Total	24.155	57			
SET8	Between Groups	7.839	1	7.839	12.275	.001
	Within Groups	35.764	56	.639		
	Total	43.603	57			
SET10	Between Groups	6.130	1	6.130	9.529	.003
	Within Groups	36.025	56	.643		
	Total	42.155	57			
SET11	Between Groups	4.146	1	4.146	9.848	.003
	Within Groups	23.578	56	.421		
	Total	27.724	57			
SET12	Between Groups	5.836	1	5.836	14.745	.000
	Within Groups	22.164	56	.396		
	Total	28.000	57			
SET14	Between Groups	4.853	1	4.853	11.775	.001
	Within Groups	23.078	56	.412		
	Total	27.931	57			
SET15	Between Groups	5.333	1	5.333	12.628	.001
	Within Groups	23.650	56	.422		
	Total	28.983	57			
SET16	Between Groups	4.395	1	4.395	10.964	.002
	Within Groups	22.450	56	.401		
	Total	26.845	57			
SET17	Between Groups	5.571	1	5.571	13.952	.000
	Within Groups	22.360	56	.399		

	Total	27.931	57			
	Between Groups	4.853	1	4.853	9.346	.003
SET18	Within Groups	29.078	56	.519		
	Total	33.931	57			

**Comparison of Sum between Male and Female**

In sum, to answer the research question: “RQ3: What is the correlation among students’ satisfaction and their gender, and parent’s educational background?” According to the pre-test of the experimental group, the level of satisfaction for females in items 5, 7, 8, 10, 11, 12, 14, 15, 16, 17 and 18 is lower than for males in those questions. Gender statistically significantly impacted students’ satisfaction. Vogt (2014) illustrates that females tend to have higher grade than males, but females tend to have lower grade than males when learning in computer programming courses. Moreover, the correlation between student satisfaction and their parents’ educational background is negative, which means the higher educational background their parents have, the lower satisfaction the students have, but this is not statistically significant.

**Using WeChat for Formative Feedback**

***Students’ Feedback in the First Week:***

1. Some students can keep up at the beginning, but they feel a little bit confused later, and cannot focus.
2. Some students can't remember the code, so they make mistakes in coding.
3. Suggestion 1: During the fourth hour, the instructor can guide students to practice more, and to help students become more proficient.

4. Some students understand the general meaning of an English word, but not its meaning in the context of computer code.
5. Suggestion 2: The teacher takes some time to explain the meaning of the coding terminology, so they understand how the terms are used in the application. Then students can draw inferences from one another and use them confidently in different coding situations.
6. Some students can understand the code explained in the book, but have trouble producing similar code in order to solve new problems on their own. This problem was particularly evident during the most recent final exam.
7. Some students struggle due to the fact that the class is four hours once a week, which makes them fatigued and less able to absorb information during class.

Suggestion 3: Students want to learn in groups, letting peers who have good Java skills help them. Students who learn Java quickly can be group leaders and help slow-learning students. The internal learning committee members could divide the students into 6-8 groups, according to individual learning situations.

***The First Week Instructor's Feedback:***

1. We are changing according to students' feedback suggestions.
2. The instructor has assigned four students with good Java skills as teacher's assistants to help other students who are having trouble with Java.
3. The instructor will ask students more questions in the future to help them understand the program.

***Student Feedback and Suggestions in the Second Week:***

1. If students study hard, most of them can keep up. Some students need help because they don't know how to use some Java terms, or they are not familiar with some terms.
2. Students who have not studied Java seriously should make full use of the review and feedback, as well as try to keep up with the pace of the teacher's lecture, with help from the group leader.
3. Some students are satisfied with the teacher's lectures and organization of the class, but they hope the teacher will introduce more new material and progress faster than during last Thursday's class. This would give students enough time to digest new concepts, without slowing down the lesson too much. The first week they requested that she slow down, but this week they felt like it was too slow. They would like something in the middle.
4. The instructor should guide students to review what they have learned during the first hour of class, talk about new knowledge during the second and third hours, and practice that new knowledge in the fourth hour.

***The Second Week Instructor's Feedback:***

The experimental group did not miss the class during the holiday, so it was two weeks ahead of the control group. Due to this situation, I was not in a hurry to teach new content this Thursday. I let the students review what they had learned before, and I wanted most of them to thoroughly understand the contents before moving on to the next step. Therefore, I taught very little in Thursday's class in order to wait for students who are slow in learning Java. Some

students might think I slowed down because of the last week's feedback and did not consider students who can learn Java more quickly. They might not know that it was also because the other group missed a class. Now that students are learning the basics of object-oriented programming, they will need a lot of practice before moving on to the next step. The method of formative feedback is being applied in the experimental group, and it is supposed that the learning effect is therefore much better than in the control group. I appreciate your help to improve my teaching, but I feel very guilty that the control group doesn't have the opportunity to use this formative feedback.

***The Third Week Students' Feedback:***

1. We reviewed the previous content today, including method overloading, method rewriting, static variables and polymorphism. At the beginning, the teacher asked us to write programs by ourselves. After reading the question, some students didn't know how to proceed. We almost always read the book first, imitate the methods being demonstrated, and then write a program according to the question; but sometimes we just imitate, and we do not know why. Some students aren't given enough time to practice newly introduced concepts or examples. Other students can understand a little bit, but when answering a question on their own, they don't know how to write programs.

For example,

```
public static void baodao {  
    total++;  
    System.out.println("A student has come to report total="+total);  
}
```

The group leader explained by giving the above example that after using static to modify member methods as static methods, the total will increase by 1 when the object is called total++, indicating that the number of people reported is gradually increasing; and finally, the output statement is "A student has come to report." Also, the number of students in this report is shown. After the group leader explained, the students understood well. Communicating with classmates or group leaders greatly helps the students who cannot clearly and thoroughly understand some coding.

Some students prefer that those who complete their homework ahead of time help their slower peers understand and complete the assignment. Also, slower students can observe what their classmates are doing and discuss anything they cannot understand well.

2. The students think the instructor is very good, because she has been constantly improving over the past two weeks according to student suggestions, so that the students can learn Java better now.
3. Spending two hours to review the last lesson's concepts and contents, one hour to learn new content, and one hour to practice new content is preferred by students. The speed of teaching and organizing is good.



***The Third-week Instructor's Feedback:***

The instructor finds that the group leaders are earnest and responsible, and they love learning Java. It doesn't matter if they don't understand some knowledge or concepts because they will understand later in the textbook. Some students are not interested in learning Java and play on their cell phones in class, so there is no way to help them. Some students type code mechanically without using their brains. I will explain what they don't understand in the next class. [Educators confront a clear dilemma. Technology either helps students learn or provides distractions such as playing games, etc. If educators guide well, technology can help students learn more. However, if educators ignore technology, they may lag behind the times and become less effective. In order to engage learners, educators have to apply different strategies or modes of learning. Technology is a double-edged sword, which can both advance and hinder education. Some students seem addicted to playing games on their cell phones. Even though teachers continue to improve teaching methods to promote students' involvement in learning, the results are not obvious. Schools or education management departments should set up relevant policies to prevent students from indulging in mobile games.

I will explain the program that the student does not understand well. It is a case comparison: when the total variable is an ordinary member variable, it belongs to each object. Every time the variable is called, the object increases by 1. You can see that the three objects call the method separately, and the variable values all are 1. When the total is set as a static variable, it is a class variable that belongs to all class objects. After the three objects call this method, the variable value is accumulated, and the final result is 3. When the member method has the static keyword, the method is static. Static methods can be called directly using the class name, while

ordinary member methods must be called by the object. It is enough for students to grasp these now.

According to the students' suggestion, spending two hours to review the last lesson's concepts and contents, one hour to learn new content, and one hour to practice new content is preferred by students. At the same time, the instructor will adjust to spending one hour on reviewing, two hours teaching new contents and one hour practicing.

***The Fourth-week Students' Feedback:***

1. The instructor first asked us to review the previous object-oriented programming in class. The importance of review is to consolidate better and remember the previous lesson. The instructor used a question to prompt us to locate the parts in which we have proficiency, and the parts in which we are not yet skilled. This is a perfect teaching method. The teacher started to teach the next step slowly through this question, and the previous content was also mentioned in the study, which made us remember more clearly.
2. In the last hour of today's classes, we learned some basic Java methods to create a simple user interface and practiced some examples in the book. On the whole, today's Java class was quite efficient, not only reviewing the previous lessons but also learning new knowledge.
3. The instructor did a good job this morning. Some students were not very good at super usage, but most students understood it well after the teacher explained it. At that time, when practicing in class, the students still did not understand well. After asking the teacher, they understood much better, such as the rewrite

after super inheriting a parent class method. Some students were not very skillful at using super to call a super class method. [Students would like to focus on concrete, specific, real, and problem-solving methods first. In fact, if no pragmatic scaffolding is provided to support their learning, they could feel helpless and give up learning. Students would like to talk about which specific concepts, Java methods or coding cannot be understood. When they understand more, their motivation for learning Java may increase, and their self-efficacy may become stronger].

4. In this Java class, the instructor guided students step by step. The instructor also gave a new topic, and we wrote a practice program by ourselves, but when we encountered a problem, the group leaders helped us. If we compare the two methods: using formative feedback or not using formative feedback, the former is a superior method. The instructor gave students enough time for practice, and with the help of the group leaders, students can learn better because students can get more help from their peers. [Social learning theory implementation: Terrell (2015) states that the construction of knowledge comes from interaction with the environment. Furthermore, Bandura (1971) states that learning is continuous mutual interaction between individual and community. Students found that they studied better and more productively when they talked with group leaders, the instructor, and peers. Also, some students illustrated that they observed peers' code and imitated it to complete the assignments. Social learning emphasizes social impact and external and internal social strengthening.]

5. Some students think the instructor focuses on the students who are grasping Java faster and understanding well. The group leaders focus on helping only 1-2 students in the group. The students who were learning slowly asked the teacher, and the teacher just told them what to input without giving them a full explanation. [Some students have given up learning Java because they thought they could not learn well, or they were not smart enough to understand Java. Also, teacher and students have to own and apply the growth mindset to face new challenges in the workplace. If people have a growth mindset, they can address conflict or new problems more effectively and productively.]

***The Fourth-week Instructor's Feedback:***

Those students in the experimental group who learn Java more easily (group leaders) better understand Java now than the control group.

[When they have a study group, the group leaders who have opportunities to help the more challenged students may explain the same coding again and again, which allows them to understand the concepts and the contents thoroughly. After they thoroughly understand the concepts, they can learn Java by analogy and synthesis.]

In response to the students' feedback, the instructor will leave more practice time for students in the future and try to answer questions in more detail.

***The Fifth-week Students' Feedback:***

1. The Java class is too stressful for me. I recently transferred to the computer science major, so I do not have coding skills and experience. It is too difficult for me to learn Java and I can't understand the java class now.

2. Through review and discussion, I have a deeper understanding of defining the keyword: *interface*. The methods in the *interface* don't contain any implementation, so we cannot call the methods in the *interface* by instantiating objects. We need to define a *class* and use the *implements* keyword to implement all the methods in the *interface*. [This student not only promised that he would study Java hard but also would like to encourage his 7 roommates to study Java hard. He became more interested in studying Java, because he experienced the benefits of learning by discussion. He noticed that social learning could help him better understand complicated Java methods and coding. Discussion can help students deepen the understanding of what is learned, distinguish right from wrong, obtain new conclusions or perspectives, organize themselves, stimulate thinking, express their opinions to achieve consensus and exchange, and share different opinions. Discussion is part of social learning theory which emphasizes cooperation and social impact.]

Interface example:

```
interface Animal {
String ANIMAL-BEHAVIOR= "animal's behavior"
void breathe ();
void run ();
}
Class Cat implements Animal {
Public void breathe () {
System.out.println(ANIMAL-BEHAVIOR+": " + " A cat is breathing ");
}

Public void run () {
System.out.println(ANIMAL-BEHAVIOR+": " + " A cat is running");
}
Public class S {
Cat c=new Cat ();
```

3. The instructor taught very well in today's class because she patiently explained the subject matter that the students did not understand. The group leaders were also helping the students understand the program better. In the future, I will work harder to learn java and cooperate with the instructor and group leaders. And today, we mainly reviewed the content of the previous class because it was a bit difficult. Then the students lived up to the teacher's expectations and almost wholly understood what they were learning.
4. When reviewing in class, I found that I did not master the *for-loop* statement and polymorphism well. Through the review, the instructor guided students to find what they have not learned well. Students like that the instructor teaches students to see what they had trouble learning and then helps them solve the problems; furthermore, students need to remember some specific keywords for new content and concepts.
5. Today's class focused on reviewing *interface* and *polymorphism* exercises, and form design. There was no difficulty in reviewing and learning. However, after I wrote the practice program, the output statement *system.out.Print* needs to add a manual blank line by writing *System.out.println ()*.

### ***The Fifth Week Instructor's Feedback:***

The method in the *interface* does not write the method body but defines the inputs and outputs. A certain *class* implements this *interface*, and then we need to write the functionality of the method. We will find that different *class* objects give different behavior when implementing this method. That is to say, the *class* can *implement* the method and write out the method's body

as we need. It is the meaning of the *interface*. When we define this method in the *interface*, it may not be clear what the method actually does. When the *class* implements this interface, it can write the method body according to the actual situation, so different *class* implements this *interface*, and write the method body differently.

I really can't help the student who recently transferred to this computer science major. He didn't understand Java at all. He always plays on his cell phone in class.

### ***Feedback Analysis***

Formative feedback through using WeChat may lead to more student engagement, thereby increasing student learning. After students are involved in learning, they can answer more questions and understand Java more, enhancing students' self-efficacy. Students study Java by using social learning theory which includes three factors: individual cognition, communication with peers and instructor, and observation and imitation of peers' coding. Social learning theory motivates students' engagement and decreases students' learning helplessness which in turn enhances self-efficacy.

One positive outcome from the formative feedback loop is that some students actively promised that they would study Java hard and also encourage roommates and peers to study hard. Implementing social learning and motivation theory facilitates students' self-efficacy and stimulates students to create a social learning environment, which builds up a virtuous circle of learning. The social learning model strengthens students' engagement and motivation and then facilitates more social learning. Social learning emphasizes social impact and external and internal social strengthening (Bandura, 1971).

There may be interaction effects between efficacy and engagement, which means if students engage in more learning, it enhances students' self-efficacy and vice versa. Furthermore, the impact of the formative feedback loop by using WeChat in student engagement occurred over six weeks. Indeed, I noticed that during the first two weeks, more top students were involved in formative feedback; during the third and fourth weeks, intermediate students gave more formative feedback. During the fifth and sixth weeks, students with relatively poor levels of progress began to be willing to give formative feedback. The effects of engagement on learning take time. In addition, in the beginning, students provided more general feedback such as teaching agenda, teaching methods and course organization. Then students gave more specific subject matter feedback such as Java methods, coding, and programming.

***The Sixth Week the Students' Feedback:***

1. The Java class reviewed interface, inheritance, and looping today. The most impressive thing is the method in the *for loop*, which can be implemented in some other ways. The method of using the *for loop* is simpler, more convenient and more flexible.
2. The instructor required students to write code by hand on paper because the computer lab cannot be used today. This method makes students more proficient in coding. The instructor's questions made students more proficient in grasping *for loop*. The instructor explained the programming process very clearly in class. Finally, the teacher gave us practice questions, which helped the students to master the new content more effectively and thoroughly.



3. Because we didn't have the class in the computer lab today, our coding was written on paper. We didn't have the previous function of checking errors through a computer. We didn't dare to make more decisions, but we finally wrote it out. We just didn't know if there were any problems with the details. I want to write a little bit in the following computer class after using a computer to check the programs.
4. I used to write programs and didn't know what it meant, and then I didn't really understand the subject matter of Java. If I asked the teacher to explain again, I could understand better. Maybe the knowledge is not in my mind, or I haven't really understood it.
5. I feel that I have been studying very well recently and have improved faster than before, because of the group study as well as I feel that the learning atmosphere in our class has also improved recently.

***The Sixth Week Instructor's Feedback:***

The students and I feel that they have made significant progress during the formative feedback period. Your help is very timely, mainly to make students no longer afraid of learning Java. Students are more and more willing to speak out and list what they don't understand and then discuss the subject matter of Java together. I hope the students can keep this positive learning state.

**Summary of Formative Feedback loop**

Students wanted to learn in groups, letting peers who had good Java skills help them. They suggested that the teacher took more time to explain, in Chinese, the meaning of the coding terminology, which is in English, so they understand how the terms are used in the application.

Some students felt the instructor focused on the students who were grasping Java faster and understanding well. Finally, after using formative feedback for several weeks, students felt that they have been studying very well and have improved faster than before, because of the group study and the instructor asked more question to guide them thinking. They wanted more cooperation therefore, some students not only promised that they would study Java hard but also would like to encourage their roommates or classmates to study Java hard. They became more interested in studying Java, because they experienced the benefits of learning by discussion. Some students noticed that discussion could help them better understand complicated Java methods and coding. The instructor assigned four students with good Java skills as teacher's assistants to help other students who were having trouble with Java. The instructor asked students more questions to help them understand the Java program. The instructor said that group leaders in the experimental group better understood Java after a few weeks using formative feedback than the students who grasped Java well in the control group. The instructor gave more practice time for students and tried to patiently answer questions in more detail.

**Post-Test Analysis**

**Answer Research Question 1:**

Using descriptive statistics answered research question 1: To what extent do students' response rates differ by formative-feedback type?

**Table 16**

*The Sum and mean of Satisfaction with Teaching*

<b>Descriptive Statistics</b>			
	N	Sum	Mean
SET1P	58	256	4.41
SET2P	58	252	4.34
SET3P	58	251	4.33
SET4P	58	251	4.33
SET5P	58	251	4.33
SET6P	58	252	4.34
SET7P	58	256	4.41
SET8P	58	254	4.38
SET9P	58	252	4.34
SET10P	58	252	4.34
SET11P	58	252	4.34
SET12P	58	255	4.40
SET13P	58	255	4.40
SET14P	58	248	4.28
SET15P	58	254	4.38
SET16P	58	255	4.40
SET17P	58	251	4.33
SET18P	58	255	4.40
Valid N (listwise)	58		
<b>Sum</b>		4552	

There are 57 students in the control group and 26 students responded to the questionnaire, for a response rate of 45.6%, and Vogt et al. (2012) state that “if your response rate is less than 50%, you can have little confidence in the generalizability of your answers” (p.18). Whereas the experimental group response rate is 100%. According to Bassett et al. (2017), low student motivation in evaluations of teaching comes from students’ feeling that evaluations were not applied effectively, and students’ perception that their evaluations are not useful. The main reason cited is the participants’ lack of belief that their feedback would receive attention or be used to improve student learning. However, during these six weeks using the formative feedback teaching method, students perceived that their feedback really is useful and helpful for their learning and for the instructor’s teaching. After they saw the positive consequences of teaching evaluations, they were motivated to participate in the evaluation process, which led to a significant increase in the response rates.

***Answer Research Question 2:***

Using paired samples t test and descriptive statistics answered research question 2: To what extent do students' ratings of satisfaction with teaching differ by feedback type? The level of student satisfaction significantly increased according to the data below. According to students’ formative feedback, the instructors helped students create study groups, and then students could use group inquiry and group communication as well as the teacher’s summary and feedback, which greatly facilitated the students’ enthusiasm for learning and reduced their sense of helplessness. Interactivity and communication are the characteristics of social learning theory (College Teacher Qualification Examination, 2019).

Comparing the sum of student satisfaction in Table 8 (4168 total points) with that in Table 16 (4552 total points) shows that the student satisfaction level with teaching increased. The compared means which were provided in Table 17 all increased. Also, Table 19 shows that the means differ significantly because all of Sig. (2-tailed) are less than 0.01 level except for the following: pair 2 (0.011); pair 5 (0.023); pair 6 (0.013); pair 11 (0.02); pair 14 (0.013), and pair 17 (0.021), which are all statistically significant at 0.05 level. Table 19 illustrates that formative feedback through using WeChat significantly increases student satisfaction with teaching.

#### Paired Samples T Test

There are three statistical tables for the results of the paired-samples t-test. Table 17 reports the pre-test and the post-test results of descriptive statistics. It includes mean, the number of cases, the standard deviation, and the standard error of the mean. According to Table 17, all means in the post-test are higher than the pre-test. This proves that through using WeChat for formative feedback, the student satisfaction with teaching increased. Table 18 reports the correlations between the pre-test and post-test. According to Table 18, Paired Samples Correlations, the p-values were all greater than 0.05—that is, the correlation was not significant. Table 19 reports t-value, degrees of freedom, and double-tailed tests for two paired samples: sig. (2-tailed). Table 19 shows that all pairs' p-values are less than 0.05. This demonstrates that after using WeChat for formative feedback, student satisfaction with teaching is higher than when not using WeChat for formative feedback. This proves that using WeChat for formative feedback is effective.

**Table 17**

*Compared Satisfaction mean of pre-test and post-test*

		<b>Paired Samples Statistics</b>			
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	SET1	4.02	58	.737	.097
	SET1P	4.41	58	.497	.065
Pair 2	SET2	4.02	58	.662	.087
	SET2P	4.34	58	.608	.080
Pair 3	SET3	3.97	58	.725	.095
	SET3P	4.33	58	.604	.079
Pair 4	SET4	4.00	58	.725	.095
	SET4P	4.33	58	.543	.071
Pair 5	SET5	4.03	58	.700	.092
	SET5P	4.33	58	.604	.079
Pair 6	SET6	4.03	58	.772	.101
	SET6P	4.34	58	.479	.063
Pair 7	SET7	4.12	58	.651	.085
	SET7P	4.41	58	.531	.070
Pair 8	SET8	3.84	58	.875	.115
	SET8P	4.38	58	.489	.064
Pair 9	SET9	3.91	58	.756	.099
	SET9P	4.34	58	.479	.063
Pair 10	SET10	3.88	58	.860	.113
	SET10P	4.34	58	.515	.068
Pair 11	SET11	4.07	58	.697	.092
	SET11P	4.34	58	.479	.063
Pair 12	SET12	4.00	58	.701	.092
	SET12P	4.40	58	.493	.065
Pair 13	SET13	4.07	58	.722	.095
	SET13P	4.40	58	.493	.065
Pair 14	SET14	3.97	58	.700	.092
	SET14P	4.28	58	.586	.077

Pair	SET15	3.98	58	.713	.094
15	SET15P	4.38	58	.489	.064
Pair	SET16	3.95	58	.686	.090
16	SET16P	4.40	58	.493	.065
Pair	SET17	4.03	58	.700	.092
17	SET17P	4.33	58	.509	.067
Pair	SET18	3.97	58	.772	.101
18	SET18P	4.40	58	.493	.065

**Table 18**

*Paired Samples Correlations*

<b>Paired Samples Correlations</b>				
		N	Correlation	Sig.
Pair 1	SET1 & SET1P	58	-.068	.614
Pair 2	SET2 & SET2P	58	-.102	.446
Pair 3	SET3 & SET3P	58	-.214	.106
Pair 4	SET4 & SET4P	58	-.045	.740
Pair 5	SET5 & SET5P	58	-.069	.608
Pair 6	SET6 & SET6P	58	-.033	.807
Pair 7	SET7 & SET7P	58	.005	.969
Pair 8	SET8 & SET8P	58	-.147	.271
Pair 9	SET9 & SET9P	58	-.207	.119
Pair 10	SET10 & SET10P	58	-.102	.444
Pair 11	SET11 & SET11P	58	-.072	.589
Pair 12	SET12 & SET12P	58	-.203	.127

Pair 13	SET13 & SET13P	58	-.127	.341
Pair 14	SET14 & SET14P	58	-.019	.886
Pair 15	SET15 & SET15P	58	-.081	.543
Pair 16	SET16 & SET16P	58	-.094	.484
Pair 17	SET17 & SET17P	58	-.180	.177
Pair 18	SET18 & SET18P	58	-.102	.447

**Table 19**

*The results Paired Samples T test*

		<b>Paired Samples Test</b>		
		t	df	Sig. (2-tailed)
Pair 1	SET1 - SET1P	-3.295	57	.002
Pair 2	SET2 - SET2P	-2.643	57	.011
Pair 3	SET3 - SET3P	-2.657	57	.010
Pair 4	SET4 - SET4P	-2.697	57	.009
Pair 5	SET5 - SET5P	-2.337	57	.023
Pair 6	SET6 - SET6P	-2.565	57	.013
Pair 7	SET7 - SET7P	-2.664	57	.010
Pair 8	SET8 - SET8P	-3.829	57	.000
Pair 9	SET9 - SET9P	-3.366	57	.001
Pair 10	SET10 - SET10P	-3.388	57	.001
Pair 11	SET11 - SET11P	-2.403	57	.020
Pair 12	SET12 - SET12P	-3.228	57	.002
Pair 13	SET13 - SET13P	-2.697	57	.009
Pair 14	SET14 - SET14P	-2.565	57	.013
Pair 15	SET15 - SET15P	-3.366	57	.001
Pair 16	SET16 - SET16P	-3.871	57	.000
Pair 17	SET17 - SET17P	-2.383	57	.021



Pair 18	SET18 - SET18P	-3.429	57	.001
---------	----------------	--------	----	------

A paired samples t-test was used to compare the means of paired samples (pre-test before using WeChat for formative feedback, and post-test after using WeChat for formative feedback). Based on Table 19, students' satisfaction level with teaching changed significantly from pre-test to post-test.

**Table 20**

*The Sum of Students' Satisfaction*

Gender	Pretest	post-test
0	1524	1782
1	2644	2770
Sum	4168	4552

Table 20 shows that the sum of females' satisfaction with teaching is 1524 points in the pre-test and 1782 in the post-test. The sum of males' satisfaction with teaching is 2644 points in the pre-test and 2770 in the post-test. The total sum of student satisfaction with teaching is 4168 points in Pretest, while the sum for Post-test is 4552. The total of student satisfaction with teaching increased in post-test.

**Answer to Research Question 3**

Using descriptive statistics, correlation, and independent samples t test statistics answered research question 3: What is the correlation between students' satisfaction and each of the following variables: grade, gender, and parents' educational background?

**Table 21**

*Comparison the Java grade between Experimental Group and Control Group*

Experimental Group	Number	Number	Control Group
Average	77.42%	74.73%	Average
No Pass	1	7	No Pass
Passing Rate	98.25%	87.50%	Passing Rate
Standard Deviation	9.70	17.45	Standard Deviation

To summarize, the Java final exam average of the experimental group was 77.42%, whereas the average of the control group was 74.73%. One student did not pass the final exam in the experimental group, but 7 students did not pass the final exam in the control group. The passing rate of the experimental group was 98.25%, in contrast, the control group was 87.50%. In addition, the standard deviation of the experimental group was 9.70, while the control group was 17.45. According to Urdan (2016), “The standard deviation is a very useful statistic that researchers constantly examine to provide the most easily interpretable and meaningful measure of the average dispersion of scores in a distribution” (p.22). The standard deviation measures the average distance between the observed value and the average. Standard deviation provides the measurement of the average dispersion of scores in this study. Comparing a standard deviation of 9.7 and 17.4 reveals that student grades in the experimental group are closer to their average than the control group and their grades do not range as widely.

In the pre-test, the correlation was significant at the 0.01 level (2-tailed) between the students' gender and two different factors: their answers to questions about teaching methods (e.g., providing feedback) and the arrangement of the teaching environment (e.g., creating cooperation opportunities, etc.). One key finding was that the females were less satisfied than the males. In contrast, after using WeChat for formative feedback for six weeks, these problems were almost solved because even though gender still impacted students' satisfaction level with teaching a little, there was not a statistically significant difference. In short, the females' satisfaction was a little lower than the males' in the post-test, but this difference was not statistically significant. In addition, there was no correlation in the post-test between student satisfaction and parents' educational background and there was no correlation between student satisfaction and their Java grade.

According to the results found in Appendix 4, the impact of gender was not statistically significant. From Appendix 1, the correlation was significant at the 0.01 level (2-tailed) between the students' gender and their answers to questions 5, 7, 8, 10, 11, 12, 14, 15, 16, 17, and 18 in the pre-test, whereas in the post-test, gender did not impact student satisfaction. The formative feedback had helped to increase the satisfaction with teaching among female students. Appendix 4 still shows a strong correlation between almost every item in this SET scale.

Comparison of means between male and female

**Table 22**

*The satisfaction means of males and females in post-test*

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**Group Statistics**

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	Gender	N	Mean	Std. Deviation	Std. Error Mean
SET1P	1	35	4.43	.502	.085
	0	23	4.39	.499	.104
SET2P	1	35	4.37	.646	.109
	0	23	4.30	.559	.117
SET3P	1	35	4.34	.684	.116
	0	23	4.30	.470	.098
SET4P	1	35	4.37	.490	.083
	0	23	4.26	.619	.129
SET5P	1	35	4.34	.639	.108
	0	23	4.30	.559	.117
SET6P	1	35	4.37	.490	.083
	0	23	4.30	.470	.098
SET7P	1	35	4.49	.507	.086
	0	23	4.30	.559	.117
SET8P	1	35	4.40	.497	.084
	0	23	4.35	.487	.102
SET9P	1	35	4.37	.490	.083
	0	23	4.30	.470	.098
SET10 P	1	35	4.37	.547	.092
	0	23	4.30	.470	.098
SET11 P	1	35	4.37	.490	.083
	0	23	4.30	.470	.098
SET12 P	1	35	4.40	.497	.084
	0	23	4.39	.499	.104
SET13 P	1	35	4.40	.497	.084
	0	23	4.39	.499	.104
SET14 P	1	35	4.40	.497	.084
	0	23	4.09	.668	.139
SET15 P	1	35	4.43	.502	.085
	0	23	4.30	.470	.098
SET16 P	1	35	4.46	.505	.085
	0	23	4.30	.470	.098
SET17 P	1	35	4.40	.497	.084
	0	23	4.22	.518	.108

SET18	1	35	4.43	.502	.085
P	0	23	4.35	.487	.102

According to Table 22, the overall females' satisfaction level was lower than the males', but this is not statistically significant because the variance differences Sig.(2-tailed) were all greater than 0.05, which is displayed in Appendix 5, Independent Sample T-Test.

In short, to answer research question 3, there was no strong correlation between student satisfaction and their Java grade. There was no strong correlation between student satisfaction and their gender in the post-test, but student satisfaction is correlated to gender in the pretest. There was no strong correlation between student satisfaction and parent's educational background except for question 6 as student satisfaction correlated with their mother's educational level.

***Answer to Research Question 4:***

Using correlations, independent samples t test and descriptive statistics answered research question 4: What is the correlation between students' gender and students' java grade?

Table 23 shows that the correlation between gender and grade is not statistically significant because of Sig. (2-tailed), 0.076, which is greater than 0.05. Gender did not strongly correlate to the students' grades. However, some items to note in Table 24 were that the mean grade for females was 80.22, while the mean grade for males was 75.53. The Standard Deviation of females, 6.431, is lower than males' 11.223. It means that the grades of females have a narrower spread than those of males. For example, in the experimental group, the highest grade of 92% was awarded to a male student, while the lowest grade of 40% was also awarded to a

male. It covered the biggest range. Table 25 shows the mean, median, and mode of each gender's grades. Urdan (2016) states that "The mode simply indicates which score in the distribution occurs most often or has the highest frequency" (p.13). The females' mode was 72%, while the males' mode was 78%. Overall, in the experimental group, the highest and lowest scores are from males. Conversely, the females' scores are more in the middle.

**Table 23**

*The Correlation between Gender and Grade*

<b>Correlations</b>			
		Gender	Grade
Gender	Pearson Correlation	1	-.237
	Sig. (2-tailed)		.076
	N	57	57
Grade	Pearson Correlation	-.237	1
	Sig. (2-tailed)	.076	
	N	57	57

**Table 24**

*The Mean of Gender's Grade*

<b>Group Statistics</b>					
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Grade	0	23	80.22	6.431	1.341
	1	34	75.53	11.223	1.925

**Table 25**

*The Grade of Gender Descriptive Statistics*

		<b>Statistics</b>		
	Gender		Gender	Grade
0	N	Valid	23	23
		Missing	0	0
	Mean		.00	80.22
	Median		.00	82.00
	Mode		0	72 <sup>a</sup>
	Minimum		0	63
	Maximum		0	88
	Sum		0	1845
1	N	Valid	34	34
		Missing	0	0
	Mean		1.00	75.53
	Median		1.00	78.00
	Mode		1	78 <sup>a</sup>
	Minimum		1	40
	Maximum		1	92
	Sum		34	2568

**Summary**

This chapter analyzed the SET scale's reliability and showed the scale was very reliable because the Cronbach's  $\alpha$  of the total was 0.951. The principal component analysis of the SET scale showed that every item contributed to one factor in the questionnaire, which proved the items had a very high correlation and internal consistency. The descriptive statistics of the SET in the pre-test showed the means and sums of every item. The relationship between students' satisfaction and their gender and parent's educational background in the pre-test showed that

student satisfaction in most items had a statistically significant correlation to students' gender and that females' satisfaction with teaching was lower than males'. The parent's educational level did not correlate to students' satisfaction with teaching except for question 6, showing that student satisfaction had a statistically significant correlation with their mother's educational degree.

Students' formative feedback and the instructors' responses created a feedback loop during the six weeks. Furthermore, it included some analysis reflecting the educational theories involved in this study. After using WeChat for formative feedback, students' satisfaction with teaching was higher than when not using WeChat for formative feedback in the experimental group. The students' response rate in the experimental group was higher than the control group, and the mean of students' Java grade in the experimental group was higher than the control group. Students' satisfaction level with teaching showed a significant increase in the post-test by analyzing paired sample t-tests. Using WeChat for formative feedback showed a statistically significant increase in student satisfaction and an increase in student response rate and student Java grade. It provided evidence that using WeChat for formative feedback is effective. Comparing means between males and females in the post-test showed that the overall females' satisfaction level was lower than the males', but the difference was not statistically significant. At the same time, the correlational analysis answered the four research questions. Students' Java grade using WeChat for formative feedback in the experimental group was higher than the control group without using WeChat for formative feedback. There was no strong correlation between student satisfaction and their GPA. This study could only explore the correlation between the satisfaction and Java grade of female and male groups, not individuals, due to the anonymity of the data collection. The female group had lower satisfaction than the male group,



but was not statistically significant; moreover, females had a higher average Java grade than males but was also not statistically significant. Therefore, there was no strong correlation between student satisfaction and their Java grade. The correlation between student gender and their GPA was also not statistically significant. Still, the average females' GPA was higher than males, whereas males had a higher mode and the highest grade in the experimental group. The next chapter explores the practical implications of the findings as well as suggestions for future research.

## Chapter Five

### Discussion and Conclusions

#### Summary of the Findings

There were 57 students in the control group, and 26 students responded to the questionnaire. The response rate was 45.6%, whereas the experimental group response rate was 100%. The main points of the teaching evaluation questionnaire, (see Appendix 6) included teaching quality, teaching ideas, teaching content, teaching methods, arrangement of the teaching environment, and the actual effect of teaching. The feedback loop directly impacted students' learning, truly highlighting students' accrual of knowledge and development, and emphasized evaluating teaching according to students' learning, so students were willing to participate in the teaching evaluation process.

In the experimental group, the study showed student satisfaction with teaching significantly increased in the post test compared with the pretest. The total score of student satisfaction was 4168 in pretest, while in the posttest, the satisfaction score totaled 4552, which is statistically significant because many of the p-values were less than 0.01 and several were less than 0.05. Meta-conversation for formative feedback provided a great scaffold to help students learn, and decreased students' learning helplessness because students did not worry as much about difficult content when they knew they could find help from their group leaders and the instructor. The formative feedback method always focuses on what questions students have. It also shows how to use social learning theory (Bandura, 1971) to enhance collective learning, consisting of individual thinking, environmental stimuli and observing peers' activities through a technology platform. Formative feedback helped students in this study solve problems in a

timely way and used social learning theory to motivate students to engage in learning. After students understood the subject matter of Java well, their self-efficacy increased, as predicted by Bandura and Adams (1977), who showed that self-efficacy can be gained from exposure treatment. Furthermore, some students promised to study Java hard and encouraged classmates to learn Java to create a better environment to learn from each other. When these students recognized they could ask a question at any time and always should challenge themselves to find questions, they were not scared by difficult topics and concepts. According to Bandura and Adams (1977), exposure to and exploration of fear will increase their confidence. In this situation, many students felt learning Java was very difficult because they could not understand Java well. The formative feedback learning method asked students to list all of the problems that they encountered. Students did not need to dodge the problems but faced the problems directly. When students focused on looking for questions and submitting the questions, they found that there were not as many problems as they imagined. Furthermore, the problems were quickly solved by the instructor, group leaders, and peers, so students who found learning problems could move forward smoothly. When students increased their self-efficacy, their anxiety was reduced (Bandura & Adams, 1977).

In the pretest, gender significantly impacted student satisfaction with teaching in several items (questions). The females had lower satisfaction with Java teaching. Vogt (2014) illustrates that females tend to have lower GPAs in computer programming courses than males. Whereas in the posttest, gender did not statistically significantly impact students' satisfaction with teaching; the females' satisfaction with teaching was still lower than males' but it was not statistically significant. Formative feedback is an intervening or mediating variable because formative

feedback mediated the gender impacts. According to Vogt (2014), “Intervening or mediating: causal link coming between the IV and the DV. If the regression coefficient for an IV mediating goes down after including this, that is evidence of a mediating effect” (p.318). After formative feedback was involved in this study in the posttest, the impact of gender decreased. Gender’s impact is greater in the pretest than the posttest. However, the correlation between student satisfaction and their parents’ educational background does not have correlation in this study, with the exception of Question 6 in the pretest.

### **Practical Implications**

This study showed that using WeChat for formative feedback can significantly increase students' satisfaction with teaching and tremendously increase response rates. Schools should offer assistants to guide students involved in challenging courses by reviewing the subject matter students are learning. WeChat is just a tool to gather formative feedback, while formative feedback is most important to enhance students' learning. The benefits of formative feedback are very practical. Ambrose et al. (2010) believe that students have a better chance of reaching their goals when they receive formative feedback because formative feedback collects feedback in a timely manner and helps students solve problems and avoid frustration. Formative feedback requires that instructors keep in mind:

- Being an excellent listener to include students' suggestions and voices.
- Having a growth mindset to help students learn.
- Being humble to let students feel comfortable opening their hearts to talk about their struggles with learning.

### **Limitations of the Research**

Although this study explored and examined several correlations, it focused on participants taking or teaching science classes, and the impact of gender might not generalize to other courses. According to Vogt (2014), most case study researchers neither limit themselves to a case that prohibits all generalizations nor use the results of case studies to formulate universal laws. Furthermore, formative feedback strongly correlates to students' satisfaction with teaching, so a causal study may need to be conducted. A control variable (growth mindset) should be considered. According to Vogt (2014), the control variable is "something you do not want to investigate in this study" (p.318). Some participants do not have a growth mindset in this study. For example, one student in the experiment group understood Java well and was selected as a learning Java group leader, but he did not want to help other students. He thought he was intelligent and other students were not as smart as him, so he refused to be a group leader in assisting other students. Moreover, he was dissatisfied with how the instructor slowed down to guide another student to understand the material better. How to control this phenomenon is limited in this study. Vogt (2014) states that "you want to see your results [of your study] without examining its [control variable] influence or with its influence subtracted" (p.318). Further, how does this phenomenon affect the research results? We don't know yet. This variable-- growth mindset--does not relate to the research questions, but it may be essential to control (Vogt, 2014).

### **Suggestions for Future Research**

This study explored the relationship between student response rates and their use of formative-feedback through WeChat. It also studied whether using formative-feedback through

WeChat affected students' ratings of satisfaction with teaching quality and if students' satisfaction correlated to their Java grade, gender, parental educational background, and the relationship between students' Java grade and students' gender. A further study with a larger sample from multiple universities could develop the initial findings and generalize the results. Furthermore, the future study can apply a multiple regression. In multiple regression, researchers can use several independent variables to explain a dependent variable. For example, Students GPA can be a dependent variable, while "using WeChat for formative feedback", "student's satisfaction with teaching", gender, motivation, and self-efficacy level can be independent variables. Vogt (2014) states that researchers apply multiple regression in order to answer three questions:

1. How do all of the independent variables together impact a dependent variable?
2. If one independent variable increases 1-unit while other independent variables remain constant, to what degree is the dependent variable impacted?
3. Which of the independent variables has the strongest impact on the dependent variable?

One multiple regression equation can be used to explore the future research:

$$Y (\text{GPA}) = B_1 X_1(\text{formative feedback}) + B_2 X_2(\text{satisfaction}) + B_3 X_3(\text{social interaction}) + B_4 X_4(\text{motivation}) + B_5 X_5(\text{self-efficacy}) + B_6 X_6(\text{gender}).$$

Vogt (2014) states that researchers can consider different kinds of relationships among variables when applying regression analysis:

- **antecedent variable** – a variable of interest to you, but not included in the chain of causality (e.g., gender)

- **control variable** – a variable that the researcher prefers not to explore (e.g., participants who do not have growth mindset)
- **extraneous variable** – a variable which must be controlled but is not related to the questions posed in the research (e.g., participating students who play games during class)
- **intervening or mediating variable** – a variable that changes the degree of correlation between an independent variable and a dependent variable (e.g., formative feedback)
- **interacting variables** – variables that, when combined, create greater or different effects (joint or multiplier), than individually (e.g., self-efficacy, formative feedback)
- **collinear variable** – correlated variables whose effects are difficult to differentiate (e.g., motivation and self-efficacy).

Through a future multiple regression study, researchers can create an equation to test the dependent variable's change resulting from all of the independent variables, exploring to what extent student satisfaction, formative feedback, motivation, and self-efficacy impact student GPA.

### **Conclusion**

This study examined the relationships between using WeChat for formative feedback and student satisfaction with teaching, as well as response rates; students' gender and students' satisfaction with teaching; students' parental educational level and students' satisfaction with teaching. The study looked for the correlation between student satisfaction and student Java grade, as well as student gender and students' Java grade.

The findings showed that using WeChat for formative feedback can significantly increase student satisfaction with teaching, increase response rate and student Java grade. Females' satisfaction with teaching was lower than males. In addition, in the pretest, females' satisfaction was statistically significantly lower than males, but females' satisfaction was not statistically significantly lower than males after using formative feedback (posttest). There was no correlation between student satisfaction and their Java grade. Students' gender did not have a statistically significant impact on their Java grade, but the females' average of grades was higher than males and the females' grades were concentrated in the middle, while males' grades were distributed in the highest and lowest points. Furthermore, parental educational level did not correlate to students' satisfaction with teaching except question 6 in the pretest that student satisfaction had a statistically significant correlation with their mother's educational degree.

Educators should take the results of this study into consideration when teaching and planning curriculum for future courses, including in subject areas outside of Java. Schools should provide assistants to guide students involved in challenging courses by reviewing the subject matter students are learning. In order to implement and take advantage of formative feedback, educators must: Be excellent listeners to include students' suggestions and voices. Have a growth mindset to help students learn. Maintain a humble and approachable demeanor so that students feel comfortable opening their hearts to talk about their struggles with learning.



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	Sig. (2-tailed)	.000	.126	.050	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58	58	58	58	58	58	58
SET 18	Pearson Correlation	.378*	-.105	-.169	.433*	.585*	.782*	.690*	.749*	.591*	.742*	.746*	.687*	.734*
	Sig. (2-tailed)	.003	.434	.206	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58	58	58	58	58	58	58

**Correlations**

		SET12	SET13	SET14	SET15	SET16	SET17	SET18
gender	Pearson Correlation	.457**	.275*	.417**	.429**	.405**	.447**	.378**
	Sig. (2-tailed)	.000	.037	.001	.001	.002	.000	.003
	N	58	58	58	58	58	58	58
Mdegree	Pearson Correlation	-.186	-.188	-.168	-.278*	-.217	-.203	-.105
	Sig. (2-tailed)	.163	.157	.206	.034	.102	.126	.434
	N	58	58	58	58	58	58	58
Fdegree	Pearson Correlation	-.104	-.223	-.160	-.245	-.204	-.259*	-.169
	Sig. (2-tailed)	.435	.093	.231	.064	.124	.050	.206
	N	58	58	58	58	58	58	58
SET1	Pearson Correlation	.543**	.591**	.511**	.601**	.522**	.577**	.433**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.001
	N	58	58	58	58	58	58	58
SET2	Pearson Correlation	.718**	.695**	.683**	.707**	.658**	.718**	.585**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58
SET3	Pearson Correlation	.794**	.809**	.758**	.780**	.737**	.798**	.782**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58
SET4	Pearson Correlation	.725**	.770**	.656**	.746**	.670**	.725**	.690**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58
SET5	Pearson Correlation	.822**	.759**	.719**	.774**	.734**	.821**	.749**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58



	N	58	58	58	58	58	58	58
SET18	Pearson Correlation	.746**	.760**	.712**	.764**	.825**	.879**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	58	58	58	58	58	58	58

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Appendix 2 the Relationship between Mother’s Educational Degree and Student’s Satisfaction**

**Descriptives**

Mdegree		Statistic	Std. Error		
SET6	1	Mean	4.45	.157	
		95% Confidence Interval for Mean	Lower Bound	4.10	
			Upper Bound	4.81	
		5% Trimmed Mean		4.45	
		Median		4.00	
		Variance		.273	
		Std. Deviation		.522	
		Minimum		4	
		Maximum		5	
		Range		1	
		Interquartile Range		1	
		Skewness		.213	.661
		Kurtosis		-2.444	1.279
		2		Mean	4.04
95% Confidence Interval for Mean	Lower Bound			3.69	
	Upper Bound			4.40	
5% Trimmed Mean				4.14	
Median				4.00	
Variance				.680	
Std. Deviation				.825	

	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		0	
	Skewness		-2.216	.481
	Kurtosis		8.327	.935
3	Mean		4.00	.103
	95% Confidence Interval for Mean	Lower Bound	3.79	
		Upper Bound	4.21	
	5% Trimmed Mean		4.00	
	Median		4.00	
	Variance		.211	
	Std. Deviation		.459	
	Minimum		3	
	Maximum		5	
	Range		2	
	Interquartile Range		0	
	Skewness		.000	.512
	Kurtosis		2.980	.992
4	Mean		3.50	.500
	95% Confidence Interval for Mean	Lower Bound	-2.85	
		Upper Bound	9.85	
	5% Trimmed Mean		.	
	Median		3.50	
	Variance		.500	
	Std. Deviation		.707	
	Minimum		3	
	Maximum		4	
	Range		1	
	Interquartile Range		.	
	Skewness		.	.
	Kurtosis		.	.
5	Mean		2.50	1.500



95% Confidence Interval for Mean	Lower Bound	-16.56	
	Upper Bound	21.56	
5% Trimmed Mean		.	
Median		2.50	
Variance		4.500	
Std. Deviation		2.121	
Minimum		1	
Maximum		4	
Range		3	
Interquartile Range		.	
Skewness		.	.
Kurtosis		.	.

**Appendix 3 Results of T test for Two Independent Samples**

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
SET5	Equal variances assumed	.099	.754	-3.225	56	.002	-.561
	Equal variances not assumed			-3.027	37.271	.004	-.561
SET7	Equal variances assumed	.527	.471	-2.981	56	.004	-.488
	Equal variances not assumed			-2.802	37.502	.008	-.488
SET8	Equal variances assumed	2.450	.123	-3.504	56	.001	-.752
	Equal variances not assumed			-3.290	37.367	.002	-.752
SET10	Equal variances assumed	1.027	.315	-3.087	56	.003	-.665

	Equal variances not assumed			-2.960	40.480	.005	-.665
SET11	Equal variances assumed	.357	.552	-3.138	56	.003	-.547
	Equal variances not assumed			-2.872	33.857	.007	-.547
SET12	Equal variances assumed	.605	.440	-3.840	56	.000	-.648
	Equal variances not assumed			-3.644	38.919	.001	-.648
SET14	Equal variances assumed	2.293	.136	-3.432	56	.001	-.591
	Equal variances not assumed			-3.174	35.252	.003	-.591
SET15	Equal variances assumed	.320	.574	-3.554	56	.001	-.620
	Equal variances not assumed			-3.417	40.928	.001	-.620
SET16	Equal variances assumed	1.173	.284	-3.311	56	.002	-.563
	Equal variances not assumed			-3.151	39.315	.003	-.563
SET17	Equal variances assumed	.059	.810	-3.735	56	.000	-.634
	Equal variances not assumed			-3.568	39.903	.001	-.634
SET18	Equal variances assumed	.001	.973	-3.057	56	.003	-.591
	Equal variances not assumed			-3.055	47.088	.004	-.591

**Independent Samples Test**

	t-test for Equality of Means		
	Std. Error Difference	95% Confidence Interval of the Difference	
		Lower	Upper
SET5 Equal variances assumed	.174	-.910	-.213







SET13P	Pearson Correlation	.009	.245	.051	.679*	.647*	.734*	.686*	.675*	.821*	.702*	.746*	.895*	.903*	.895*
	Sig. (2-tailed)	.948	.064	.706	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58	58	58	58	58	58	58	58
SET14P	Pearson Correlation	.264*	.207	.038	.625*	.565*	.682*	.704*	.682*	.779*	.754*	.730*	.842*	.784*	.842*
	Sig. (2-tailed)	.046	.119	.776	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58	58	58	58	58	58	58	58
SET15P	Pearson Correlation	.125	.262*	.034	.786*	.555*	.641*	.779*	.760*	.853*	.803*	.854*	.928*	.864*	.928*
	Sig. (2-tailed)	.349	.047	.803	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58	58	58	58	58	58	58	58
SET16P	Pearson Correlation	.153	.280*	.051	.750*	.530*	.616*	.751*	.734*	.821*	.769*	.819*	.895*	.903*	.895*
	Sig. (2-tailed)	.252	.033	.706	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58	58	58	58	58	58	58	58
SET17P	Pearson Correlation	.177	.262*	.057	.703*	.592*	.729*	.684*	.672*	.823*	.788*	.830*	.895*	.833*	.895*
	Sig. (2-tailed)	.184	.047	.672	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58	58	58	58	58	58	58	58
SET18P	Pearson Correlation	.081	.280*	.128	.750*	.647*	.734*	.751*	.734*	.821*	.836*	.819*	.895*	.834*	.895*
	Sig. (2-tailed)	.547	.033	.339	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58	58	58	58	58	58	58	58

**Correlations**

		SET12P	SET13P	SET14P	SET15P	SET16P	SET17P	SET18P
Gender	Pearson Correlation	.009	.009	.264*	.125	.153	.177	.081
	Sig. (2-tailed)	.948	.948	.046	.349	.252	.184	.547
	N	58	58	58	58	58	58	58



	N	58	58	58	58	58	58	58
SET11P	Pearson Correlation	.895**	.895**	.842**	.928**	.895**	.895**	.895**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58
SET12P	Pearson Correlation	1	.856**	.828**	.892**	.856**	.870**	.928**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58
SET13P	Pearson Correlation	.856**	1	.707**	.819**	.856**	.801**	.784**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	58	58	58	58	58	58	58
SET14P	Pearson Correlation	.828**	.707**	1	.852**	.828**	.926**	.828**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	58	58	58	58	58	58	58
SET15P	Pearson Correlation	.892**	.819**	.852**	1	.964**	.901**	.892**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	58	58	58	58	58	58	58
SET16P	Pearson Correlation	.856**	.856**	.828**	.964**	1	.870**	.856**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	58	58	58	58	58	58	58
SET17P	Pearson Correlation	.870**	.801**	.926**	.901**	.870**	1	.870**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	58	58	58	58	58	58	58
SET18P	Pearson Correlation	.928**	.784**	.828**	.892**	.856**	.870**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	58	58	58	58	58	58	58

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### Appendix 5 Independent Samples Test of post-test

#### Independent Samples Test



		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
SET 1P	Equal variances assumed	.323	.572	.277	56	.783	.037	.134	-.232	.307
	Equal variances not assumed			.278	47.427	.783	.037	.134	-.233	.307
SET 2P	Equal variances assumed	.425	.517	.408	56	.685	.067	.165	-.263	.397
	Equal variances not assumed			.420	51.756	.676	.067	.160	-.253	.387
SET 3P	Equal variances assumed	2.749	.103	.236	56	.815	.039	.163	-.289	.366
	Equal variances not assumed			.254	55.841	.800	.039	.152	-.265	.342
SET 4P	Equal variances assumed	.599	.442	.756	56	.453	.111	.146	-.182	.403
	Equal variances not assumed			.721	39.519	.475	.111	.153	-.200	.421
SET 5P	Equal variances assumed	.238	.627	.236	56	.815	.039	.163	-.289	.366
	Equal variances not assumed			.242	51.468	.809	.039	.159	-.280	.357
SET 6P	Equal variances assumed	1.144	.289	.518	56	.607	.067	.130	-.192	.327
	Equal variances not assumed			.522	48.589	.604	.067	.128	-.191	.325
SET 7P	Equal variances assumed	.128	.722	1.280	56	.206	.181	.142	-.103	.465
	Equal variances not assumed			1.254	43.930	.217	.181	.145	-.110	.473

SET 8P	Equal variances assumed	.657	.421	.394	56	.695	.052	.132	-.213	.317
	Equal variances not assumed			.396	47.90 5	.694	.052	.132	-.213	.317
SET 9P	Equal variances assumed	1.144	.289	.518	56	.607	.067	.130	-.192	.327
	Equal variances not assumed			.522	48.58 9	.604	.067	.128	-.191	.325
SET 10P	Equal variances assumed	2.372	.129	.482	56	.632	.067	.139	-.212	.346
	Equal variances not assumed			.498	51.92 8	.621	.067	.135	-.203	.338
SET 11P	Equal variances assumed	1.144	.289	.518	56	.607	.067	.130	-.192	.327
	Equal variances not assumed			.522	48.58 9	.604	.067	.128	-.191	.325
SET 12P	Equal variances assumed	.017	.896	.065	56	.948	.009	.134	-.259	.276
	Equal variances not assumed			.065	47.08 8	.948	.009	.134	-.260	.278
SET 13P	Equal variances assumed	.017	.896	.065	56	.948	.009	.134	-.259	.276
	Equal variances not assumed			.065	47.08 8	.948	.009	.134	-.260	.278
SET 14P	Equal variances assumed	.002	.964	2.044	56	.046	.313	.153	.006	.620
	Equal variances not assumed			1.924	37.67 9	.062	.313	.163	-.016	.643
SET 15P	Equal variances assumed	3.718	.059	.945	56	.349	.124	.132	-.139	.388
	Equal variances not assumed			.958	49.36 3	.343	.124	.130	-.136	.385
SET 16P	Equal variances assumed	5.101	.028	1.157	56	.252	.153	.132	-.112	.417
	Equal variances not assumed			1.175	49.57 4	.246	.153	.130	-.109	.414

SET 17P	Equal variances assumed	1.654	.204	1.346	56	.184	.183	.136	-.089	.454
	Equal variances not assumed			1.334	45.794	.189	.183	.137	-.093	.458
SET 18P	Equal variances assumed	1.540	.220	.606	56	.547	.081	.133	-.186	.348
	Equal variances not assumed			.610	48.240	.545	.081	.132	-.185	.347

### Appendix 6 Questionnaire

#### Student Evaluations of Teaching

Course evaluation at this college is WeChat-based: each month, students receive an invitation by WeChat to evaluate the course that they participate in. If students do not respond within one week of receiving the evaluation push notification, a reminder information is sent. Each course evaluation consists of around 18 questions. The questionnaire was designed and modified according to Goos & Salomons (2017, p. 345) and the form of Concordia University Portland evaluation.

Table 1 gives a set of evaluation questions covering teaching

Table 1 Evaluation questions

1. What is your gender?

- ① Male
- ② Female
- ③ Other

2. What grade are you?

① 1

② 2

③ 3

④ 4

3. What is your mother's degree?

① Primary school

② Middle school

③ High school

④ College

⑤ bachelor's degree

⑥ master's degree

⑦ Doctoral degree

3. What is your father's degree?

① Primary school

② Middle school

③ High school

④ College

⑤ bachelor's degree

⑥ master's degree

⑦ Doctoral degree

**5 Strongly agree; 4 Agree; 3 Neutral; 2 Disagree; 1 Strongly disagree**

1. The instructor makes clear what knowledge and skills I should acquire to pass this course

5; 4; 3; 2; 1

2. This course's teaching methods (e.g. lectures, assignments, usage of online learning environment) have helped me prepare for the course examination

5; 4; 3; 2; 1

3. The teaching methods (i.e. lectures, tutorials, assignments, etc., taken together) stimulated me to participate actively

5; 4; 3; 2; 1

4. The study materials (slides, online learning environment, etc.) helped me understand the course material

5; 4; 3; 2; 1

5. The supplementary materials were sufficiently clear and coherent.

5; 4; 3; 2; 1

6. The instructor made efforts to make the course interesting

5; 4; 3; 2; 1

7. The instructor spent time communicating course organization.

5; 4; 3; 2; 1

8. The instructor spent time communicating practical matters such as homework policy, attendance policy, behavior policy and contingency plans.

5; 4; 3; 2; 1

9. The instructor provided opportunities to assess my progress during the course (e.g., by welcoming questions, giving assignments or midterm exams, providing an online discussion forum)

5; 4; 3; 2; 1

10. I am satisfied with the quality of teaching in this course.

5; 4; 3; 2; 1

11. The instructor was present regularly during the contact hours of this course (lectures, tutorials)

12. The instructor provides timely feedback.

5; 4; 3; 2; 1

13. The instructor was very knowledgeable in the content area of the course

5; 4; 3; 2; 1

14. The instructor was accessible by WeChat or in person.

5; 4; 3; 2; 1

15. The instructor created an atmosphere where questions and comments were valued.

5; 4; 3; 2; 1

16. The instructor created an environment that stressed collaboration and collegiality.

5; 4; 3; 2; 1

17. The instructor presented materials in a manner that was interesting.

5; 4; 3; 2; 1

18. I would recommend this instructor to other students.

5; 4; 3; 2; 1

**Appendix 7 Consent Letter to Survey Participants**

**Informed Consent**

**RESEARCH SUBJECT INFORMED CONSENT FORM**

Prospective Research Subject: Read this consent form carefully and ask as many questions as you like before you decide whether you want to participate in this research study. You are free to ask questions at any time before, during, or after your participation in this research.

<b>Project Information</b>	
Project Title: The Impact of Using Social Media Platform WeChat for Formative Feedback of Teaching and Learning on Student Satisfaction	Project Number: 2202046
Site IRB Number:	Sponsor: George Fox University
Principal Investigator: Suxia Chen	Organization: Henan Light Industry Vocational College
Location: Henan Light Industry Vocational College, Zhengzhou, China	Phone: 971-280-1320, 08613014582922
Other Investigators: Dr. Linda Samek, Dissertation Committee Chair	Organization: George Fox University
Location: GFU-Newberg Campus	Phone: 503-554-2855

### 1. PURPOSE OF THIS RESEARCH STUDY

- You are being asked to participate in a research study conducted by Suxia Chen, a doctoral candidate at George Fox University in Newberg, Oregon. The purpose of the study is to explore whether using the social media platform WeChat for formative feedback can improve student satisfaction and achievement and increase the response rates of student evaluations of teaching (SETs). This study seeks to discover if there is a potential correlation between student demographic variables such as gender, background and the extent of student satisfaction through the implementation of WeChat feedback, as well as if it has a particular correlation between students' satisfaction and Java grade.

### 2. PROCEDURES

- You may be asked to give feedback on your opinions and suggestions on learning Java, but don't have to say anything if you don't want to. Your feedback will be compiled by your student leader and the researcher and we will talk to Associate Professor Jiang about this feedback to adjust her teaching. Your name will be kept confidential, and the professor will not know who provided the feedback.
- You may complete a survey two times, on May 1st and June 27th, that should take approximately 10 minutes each time.
- Your participation in this survey is voluntary.
- The course started on March 1st, 2021 and will continue until June 27th, 2021. You will take the final exam on June 28th. The total time is 17 weeks. You may use WeChat for formative feedback from May 1st to June 27th, and the discussion will cover six weeks. During a week, you may give two positive and three negative feedback comments about the teaching. The student leader and I can sum up about two positive and three pieces of negative feedback about the learning and teaching each week. After that, the classroom leader or I will talk to associate professor Jiang about the formative feedback. It includes which two points the teacher did well, and so you hope the teacher can continue to implement them. Furthermore, the student leader and I will share three points that are not perfect, that you hope the teacher can improve upon, satisfy your thirst for knowledge and meet your expectations.
- I may give you a questionnaire to evaluate associate professor Jiang's teaching on May 1st (week 11) and June 27th (week 17), to determine your satisfaction with teaching.
- I will facilitate the discussions on WeChat. I will ask you to provide both positive and negative feedback about the teaching during the week. Moreover, you can have a brainstorm about the confusing concepts or contents in the WeChat group. Through the discussion, if you can solve the problems, the classroom leader and I do not need to tell the teacher. The advisor takes the responsibility to help you solve any problems. The advisor will not tell the associate professor Jiang if they see which students make critical comments in WeChat. Also, suppose you feel uncomfortable criticizing your teacher. In that case, you can send me a message privately, so any other people in the WeChat group cannot see. You can post information in the group publicly and send messages to me privately to talk about the teaching.



- The associate professor Jiang will provide your Java grades. I will read your grades and use your grades in my research.
3. *POSSIBLE RISKS OR DISCOMFORT*
- While you may feel pressure in WeChat to not talk honestly about which parts of the course you cannot understand, because you fear that the teacher will assume you did not study, or that you are not taking the course seriously. You don't need to be concerned about that because all surveys will be anonymous and all communication in the WeChat group are confidential.
  - The WeChat may be used for formative feedback to help teach and learn, and it is confidential because, in the WeChat group, you and I talk about Java, a computer language program, without the instructor. The questionnaire is hosted on Microsoft survey, which is separate from your WeChat accounts and is completely anonymous, but you will receive the questionnaire through the WeChat platform for informing and reminding you to submit your questionnaire to Microsoft survey.
  - Your advisor and I can see your comments, but our purpose is to help your learning. We will not share the information with associate professor Jiang about who makes the comments, and I will summarize the comments without identity.
4. *POSSIBLE BENEFITS*

*Using social media for formative feedback may impact your satisfaction with teaching because it may help faculty adjust their teaching activities to match your needs and expectations. Furthermore, it helps you and your instructors be more engaged in the teaching and learning process together.*

5. *FINANCIAL CONSIDERATIONS*

*There are no financial benefits or considerations for your participation in this study.*

6. *CONFIDENTIALITY*

*Your identity will be treated as confidential on WeChat and anonymous in the survey, and your instructor will not see the data.*

*All survey data will be saved in a secure online server for 3 years before being permanently deleted. Your identity will be protected by keeping the survey anonymous. Furthermore, the data collection platform Microsoft Survey does not collect IP addresses.*

7. *TERMINATION OF RESEARCH STUDY*

*You can withdraw from the study at any time.*

8. *AVAILABLE SOURCES OF INFORMATION*

*Any further questions you have about this study will be answered by the Principal Investigator: Suxia Chen, by phone: 13014582922, or by email: chensusu2005111@126.com or schen19@georgefox.edu*

*Any questions you may have about your rights as a research subject will be answered by the Faculty Dissertation Chair, Dr. Linda Samek, by email: lsamek@georgefox.edu Phone Number: 503-554-2855*

9. AUTHORIZATION

*I have read and understand this consent form, and I volunteer to participate in this research study. I understand that I will receive a copy of this form. I voluntarily choose to participate, but I understand that my consent does not take away any legal rights in the case of negligence or other legal fault of anyone who is involved in this study. I further understand that nothing in this consent form is intended to replace any applicable Federal, state, or local laws.*

Participant Name (Printed or Typed): \_\_\_\_\_

Date: \_\_\_\_\_

Principal Investigator Signature: Suxia Chen

Date: 4-22-2021

Appendix 8 IRB Approval

2202046

GEORGE FOX UNIVERSITY HSRC INITIAL REVIEW QUESTIONNAIRE

Page 9

Title: The Impact of Using Social Media Platform WeChat for Formative Feedback of Teaching and Learning on Student Satisfaction

Principal Researcher(s): Suxia Chen

Date application completed: March 31, 2021

(The researcher needs to complete the above information on this page)

COMMITTEE FINDING:

For Committee Use Only

(1) The proposed research makes adequate provision for safeguarding the health and dignity of the subjects and is therefore approved. Expedited #3

(2) Due to the assessment of risk being questionable or being subject to change, the research must be periodically reviewed by the HSRC on a basis throughout the course of the research or until otherwise notified. This requires resubmission of this form, with updated information, for each periodic review.

(3) The proposed research evidences some unnecessary risk to participants and therefore must be revised to remedy the following specific area(s) on non-compliance:

(4) The proposed research contains serious and potentially damaging risks to subjects and is therefore not approved.

  
\_\_\_\_\_

Chair or designated member

4-20-21

Date

