

# STUDENT PERCEPTION ON MOBILE LEARNING TECHNOLOGY - CLASSROOM RESPONSE SYSTEM

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**Abstract** -Clicker is one of the most popular mobile classroom response systems. A number of studies reported that clickers could effectively encourage students to participate in class. However, most of them are not talking about Chinese students and their finding seldom reported the difference in perception between Chinese and international students on using the mobile classroom response system in learning. The study can fill in the gap to collect their perception on using clickers in Hong Kong. The result shows that both Chinese and international students are keen on using clickers in class. The clicker is found to be able to advance learning efficacy and can raise student participation in class.

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**Keywords**- Classroom response system, Clickers, Hong Kong, student perception, leaning efficiency.

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## I. INTRODUCTION

Over last decades, most of universities encourage instructors to use innovative teaching methods to raise the teaching qualities and students' learning efficacy. According to Han and Finkelstein (2013), classroom response systems such as clickers are interactive and effective teaching technologies for tertiary education. The clicker is a wireless classroom response system and it can effectively allow students to answer questions and let instructors make timely feedback to students in class. The questions and the answers as well as student responses can be shown to students at once. Both formative assessment and real-time feedback to students to improve their learning and engagement in class are the main purposes for adopting the "clicker" (Han and Finkelstein, 2013). One of the main function of "clicker" is to help the instructors adjust the flow of their lecture materials based on students' feedback, which is regarded as positive outcome of "clicker" by a number of studies (e.g., Dufresne et al., 1996; Cue, 1998; Draper et al., 2002 and Elliott, 2003).

Numerous studies have presented that adapting appropriate teaching instruments, like clickers, can promote student engagement and learning performance (Fies & Marshall, 2006, Hoekstra, 2008; Kaleta & Joosten, 2007 and Rice & Bunz, 2006). As Bruff (2009) showed that teaching along with wireless classroom response systems such as clickers could raise student attendance and learning interest. Judson & Sawada (2002) also confirmed that using clickers in teaching improved student engagement and involvement in class. A number of scholars also supported that the immediate feedback using clickers was indeed effective in improving examination results of students. (Draper et al., 2002; Lantz, 2010; Lantz and Stawiski, 2014; O'Donoghue and O'Steen, 2007; Ghatala, 1981; Glisky & Rabinowitz, 1985; Hirshman & Bjork, 1988 and Tacconat et al., 2008).

Numerous studies have found that clicker could decrease the response reticence especially in large-sized lectures (Cue, 1998; Draper et al., 2001 and Elliott, 2003). Mayer et al., (2009) also showed that by adopting the "clicker" in class, students were supposed to get more involved in cognitive activities in the following three aspects: 1) students could be more attentive to the learning material beforehand; 2) students would have more incentive to organize the learning material, when they were answering the questions; and 3) after getting immediate feedback, students intended to develop knowledge and skills for thinking how well they understood the learning materials. Hence, it is believed that using clicker in teaching could change students' involvement in learning from passive bystander to active learner. Thus, it is reasonable for us to assume that the "clicker" can improve students' learning efficiency and raise their engagement in class.

Like New York, Hong Kong is one of well-known international cities and there is also a lot of international students (DeLoach, Mark, & Olitsky, 2015). Students who study abroad will obtain a number of advantages over the local education. For example, they can obtain international business education, internalize foreign concepts and experience foreign countries and cultures (Aggarwal & Goodell, 2015). A lot of literature has found the difference in learning styles and preference between foreign and Asian students. Albaum (2011) and Cheng (1987) find that international students in the United States often change from the lecture mode to more open teaching and problem-solving learning approaches. Bramorski (2002) finds that cultural differences among international students can promote differences in learning and teaching methodology as well as learning materials content between Europe and the United States. Compared with foreign students, Chinese students come from an dictatorial educational system, so they are relatively timid and seldom participate in class discussion. (Bista, 2015;

Lee, 2011; Van Auken, Wells, & Borgia, 2009). Hence, it is believed that there is a different perception of using clickers in learning between Hong Kong Chinese and international students. Hence, the study intends to examine if Hong Kong Chinese and international students have different perception of using clickers in learning.

There are two objectives of the current study. The first one is to collect student perception (both Hong Kong Chinese and international students) using clickers in class, i.e. whether students enjoy using clicker in class and whether using clicker is useful to them to improve their learning competency. The second is to investigate whether using clickers can improve student learning efficacy, which is measured in term of their final examination results

The structure of the paper is organized as follows. Section 2 provides the background of the study in which a set of research questions will be developed based on significant and relevant literature. In Section 3, we will provide methodological details including data collection and instruments. Result analysis is provided in Section 4. Finally, we will conclude the findings of the study in Section 5.

## II. BACKGROUND

A number of studies have shown that using appropriate teaching instruments, like clickers, can increase student engagement in class. (Rice and Bunz, 2006; Fies and Marshall 2007; Kaleta and Joosten 2007; Hoekstra 2008; Shon & Smith, 2011 and Lantz and Stawiski, 2014). As Bruff (2009) showed that teaching along with wireless classroom response systems e.g. clickers can stimulate student attendance and learning interest. Han and Finkelstein (2013) found that adopting the clicker could provide instructor with a tool to provide real-time response to students to improve their understanding of learning materials and raise their engagement in class. Judson & Sawada (2002) also found that use of clickers improved student engagement in class. Using "clicker" in teaching and learning activities make students more actively engage in class activities. Some studies also pointed out that using clicker in teaching could change the students' involvement in learning from passive bystander to active learner (Cue 1998; Jones et al., 2001 and Elliott, 2003). Hence, we believe that using clickers would promote students' engagement and involvement in class. The first research question of the study is:

1st RQ: To what extent does the use of clickers effectively raise both Chinese and international undergraduate students' involvement and engagement in class?

Apart from that, clicker is an effective means of formative assessment as it can provide the instructors with a way to adjust the flow and teaching

materials based on student feedback, which is shown as positive outcome of adapting clicker in class activities by a number of studies (e.g. Dufresne et al., 1996; Cue, 1998; Draper et al., 2001 and Elliott, 2003). Draper & Brown (2004) also found that clicker was an effective tool to improve the communication between students and instructors and make instructors understand better about their students. Wit (2003) and Flavell (1979) also found that adapting clicker in class activities could quickly spot student misunderstandings by their responses. Hence, based on above-mentioned studies, we believe that using clickers would improve students' understanding of the topics. The second research question is:

2nd RQ: Will both Chinese and international undergraduate students of International Finance course perceive that clickers can increase their "understanding of the topic"?

Regarding student perception of fun using clickers in class, many studies support that find that "using clickers in classroom could maintain their interest and attention in a class (Beatty et al. 2006; Fies & Marshall, 2006 and Wolf, 1978). Prior studies also show that students love clicker-based classes more than non-clicker based classes (Burnstein & Lederman, 2001; Dufresne, Gerace, Leonard, Mestre, & Wenk, 1996; Fies, 2005). Poirier & Feldman (2007) found that students using clickers could achieve better final examination results and reported positive attitudes toward utilizing clickers in class. Based on these results, we hypothesize that students would support using clickers as fun. Thus, the third research question is:

3rd RQ: Will Chinese and international undergraduate students perceive that the use of clickers to answer questions is "fun"?

In addition, prior studies provide evidence to support that using clicker can improve student academic performance in term of their examination results. They find that clicker users can accomplish better examination results than "non-clicker" users. (Freeman et al., 2007; Poirier and Feldman, 2007; Ribbens, 2007; Morling et al., 2008; Crossgrove and Curran, 2008; Shaffer and Collura, 2009; Mayer et al, 2009; Flynn, 2012 and Lantz & Stawiski, 2014;). However, a few studies like Karaman (2011) mentioned that the main impact of clicker on student learning results is limited. A few of studies such as Tregonning et al. (2012) which find that there was no difference in final examination results between clicker user group and non-clicker user group. Based on these studies, we assume that the final examination results of clicker users will be better than non-users and so the forth research question of the study is:

4th RO: Will the final examination results of clicker users be better than non-users in financial subjects?

### III. METHODOLOGY

#### A. Sample Size

Students who participated in this study were enrolled in the business faculty of Hong Kong Polytechnic University in year-3 International Finance classes. A total of 170 students across four separate sessions participated in the study and students were classified into control and treatment groups. Of the 170 students, 50 students from one session who did not receive clickers, were classified in the control group. The treatment group using clickers consisted of 120 participants from three other sessions. Two Different instructors taught four of the sections sampled for the study. One led the treatment group and another one took the control group. Participant information includes their responses of the survey and final examination results.

#### B. Instrument

Student learning performance was measured by their final examination results. Data on student perception on using clickers in class was collected using a questionnaire from Chan's survey in 2013 which consists of 100 questions based on items from Terrion's (2012) and Morling's (2008) previous works about student mobile device ownership and application technology acceptance towards using mobile devices for learning, and student engagement. The students who used the clicker completed a questionnaire at the completion of the course. The questionnaire consists of 86 items with responses on a five-point Likert scale.

#### C. Data Collection

In the study, academic performance of students was assessed based on their final examination results and was compared across clicker user group and non-clicker user group. Two different doctoral level instructors with 5 years of teaching experience taught four classes, participating in this study. In the course, teaching materials including lecture notes and problem sets. The course was taught in a face-to-face setting. For the course with multiple choice (MC) questions, the average percentage of MC questions to content was 20%, and the instructor of the clicker using sessions employed clickers throughout the lecture. Upon student response to MC questions, results were instantaneously showed on a bar graph. If the result showed 10% or more of incorrect responses, the instructor will teach the topic again by providing additional explanations to questions. If more than 90% of students selected the correct answers, the lecturer would provide a brief explanation and then move on next question.

### IV. RESULT ANALYSIS

Participants in the international finance classes totaled 170 students of which 50 students were in the control group and 120 participants were in the treatment group in which 98 students completed the questionnaires. Thus, survey data was analyzed based on 82% of the 120 total students (N=98) in the treatment group. Inferential statistical analysis was used for the fourth research questions comparing the final examination results of students between treatment and control groups. Descriptive statistics on the student perception of clicker application were collected on the treatment group for the first three research questions.

Based on the results, we found that approximately 90% of student in the treatment group owned at least one smart device and over 60% of them are IOS and Android smartphones (Figure 1). The main response devices for in-class clicker activities were IOS smartphones, followed by Android smartphones, IOS tablets and Android tablets, respectively (Figure 2).

Regarding the first research question: "To what extent does the use of clickers effectively raise both Chinese and international undergraduate students' involvement and engagement in class?", we found that using clickers effectively increase both Chinese and international students' involvement and engagement in class. In the survey, over 70% (60%) of Chinese students (international students) agreed that clicker application in class contributed significantly to their learning interest in the course (Figure 3) and most of them also expressed that using the clicker classroom response system made them more engaged and involved in class discussions (Figure 4). Over 80% of international students found clickers very useful in their learning (Figure 5). As a result, we can confirm that the use of clickers effectively can raise student involvement and engagement in class.

For the 2<sup>nd</sup> research question about whether both Chinese and international undergraduate students of International Finance course perceive that clickers raise their "understanding of the topic", the results provided evidence to support the hypothesis. The result showed that over 60% of Chinese and international students found that using clickers enabled instructors to provide them with timely responses (Figure 6) and to clarify concepts that make them confused (Figure 7). More or less 50% of them agreed that benefits from using clickers could outweigh any disadvantages and a few of them reported negatively towards the use of clickers (Figure 8). Over 60% of students agreed that a continuous usage of clickers was good for their learning (Figure 9).

With regard to the third research question about whether Chinese and international undergraduate students in International Finance course perceive that the use of clickers to answer questions is “fun”, the result also supported this hypothesis. The result found that 71% (60%) of Chinese (international) students agreed that they had fun using clickers in learning and only a few of students had reservation about the clickers (Figure 10). The result also found that over Chinese and international students were positive towards clickers with the average rating of 3.2 or above for various questions to study their acceptance of the classroom response system (Table 1). There is not any significant difference between Chinese and international students’ perception using the clickers in learning.

For the fourth research question about whether the final examination results of clicker users be better than non-users in international finance course, we conducted an independent t test to decide whether there is a significant difference ( $p < 0.05$ ) in mean score of final examination results between clicker users and non-clicker users. The test result was statistically significant,  $t(170) = 7.326$  and  $p\text{-value} < 0.05$ . Students using clickers (mean = 76.8, SD = 12.5) scored higher than students not using clickers (mean = 71.3, SD = 13.4). The degree of the clicker impact was computed by eta squared<sup>1</sup> and found to be 0.043 showing that about 4% of the variance in the final examination results was accounted for the difference of clicker users and non-clicker users. Hence, the results confirmed that clicker user group would perform better than non-clicker user group in term of their final examination results.

## CONCLUSION

In line with prior studies, the study provided evidence to support importance of clicker in learning and teaching. Using clickers positively affect students’ conceptual understanding (DiBattista et al, 2004) and their class participation (Draper & Brown, 2004 and Masikunas, Panayiotidis, & Burke, 2007), student motivation (Boyle & Nicol, 2003), final examination results (Mayer et al, 2009 & Ribbens, 2007), and their enjoyment of lecture (Elliott, 2003 and Masikunas, Panayiotidis & Burke, 2007). The result also showed that the clickers could provide instructors with a device to collect information about students’ understanding (Elliott, 2003). Like international students, most of Chinese students agreed that using clickers in class was fun. Overall, the results of the study found that using clickers in learning and teaching could improve learning efficacy of undergraduate students in Hong Kong.

<sup>1</sup> Eta-squared is a measure of effect size for use in ANOVA analysis and it is analogous to R-square in the multiple linear regressions.

However, there are a few limitations in the study. For example, the result of the study cannot be generalized to other instructional settings as the study was focused on international finance classes only and potential measurement errors may exist for research questions. We will look at the issues in future and make an improvement. In spite of these limitations, we believe that the study makes contributions to the ongoing research about the impacts of clickers and other classroom response systems on the student learning performance.

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Appendix I: Figures and Tables

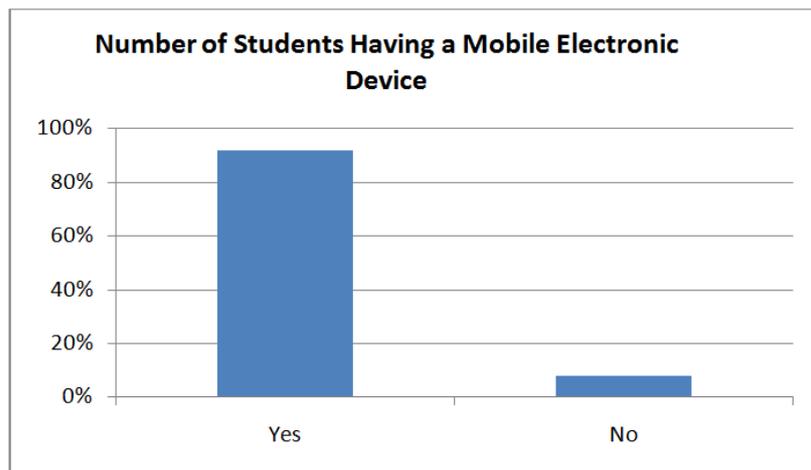


Fig.1. Number of Students Having a Mobile Electronic Device

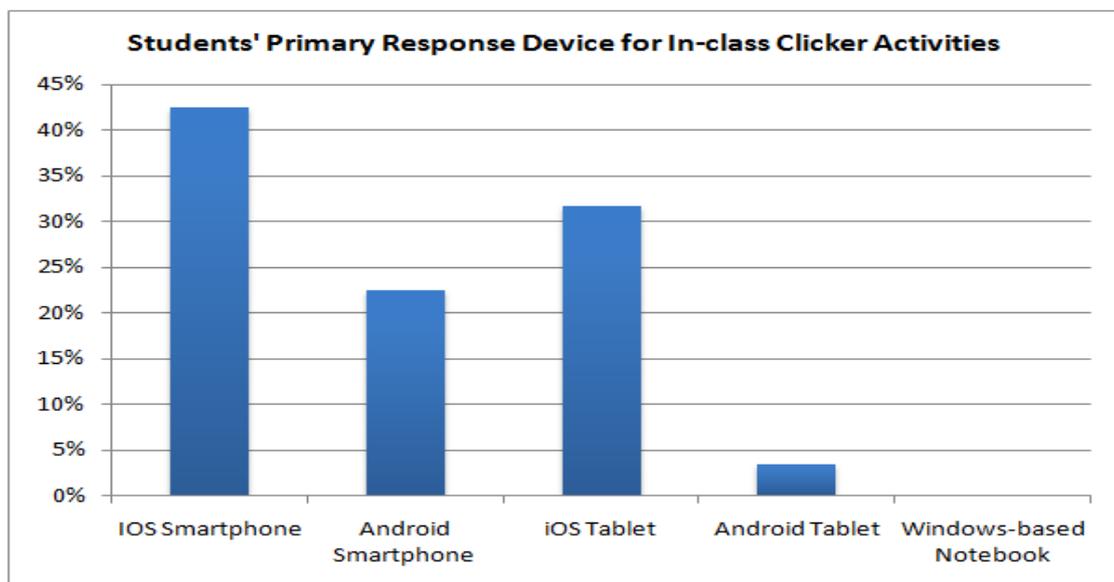
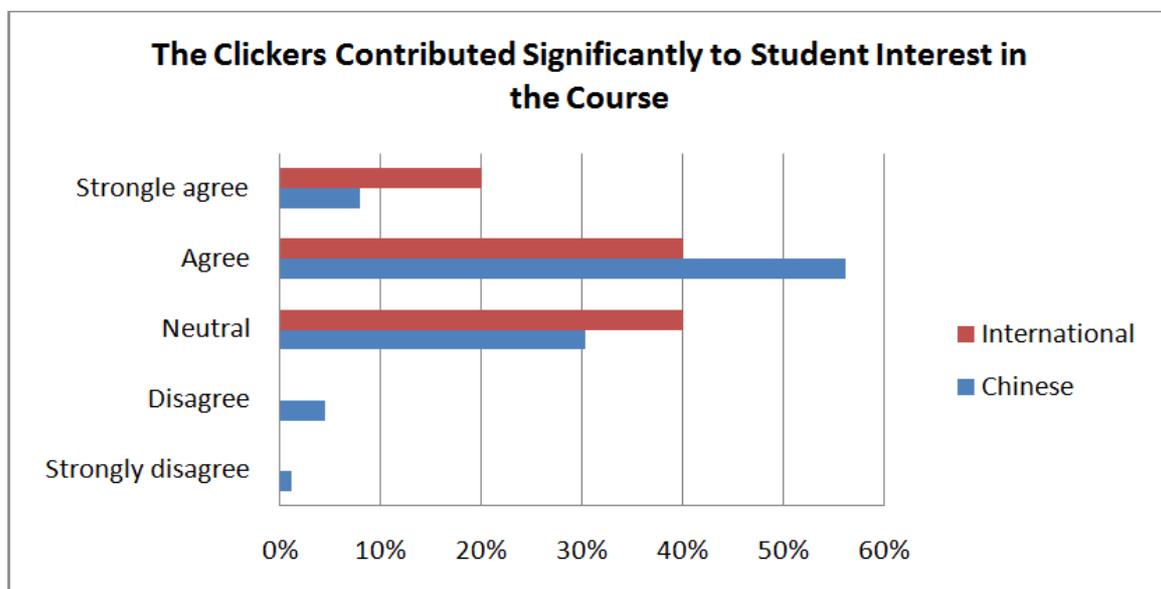
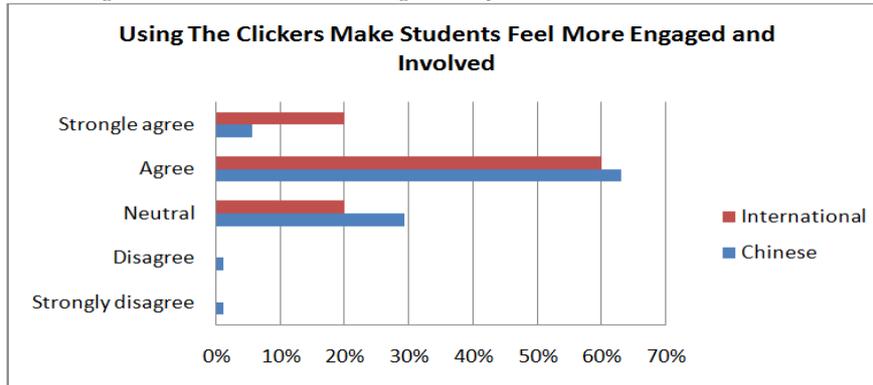


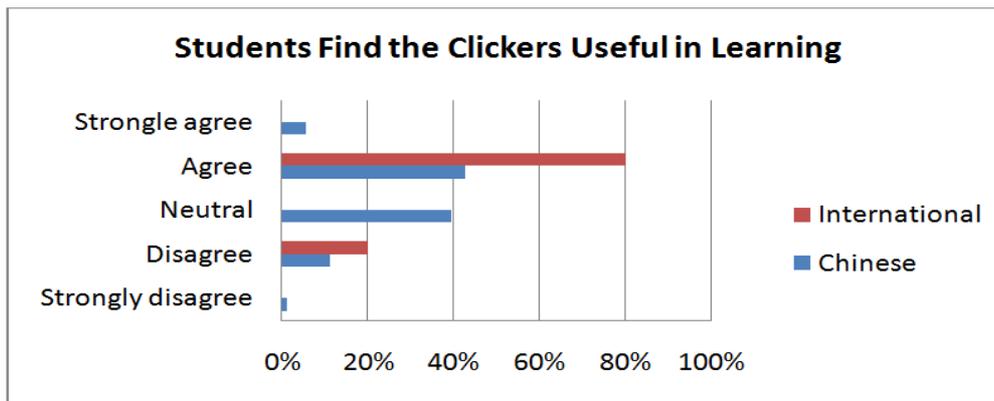
Fig. 2. Students' Primary Response Device for In-class Clicker Activities



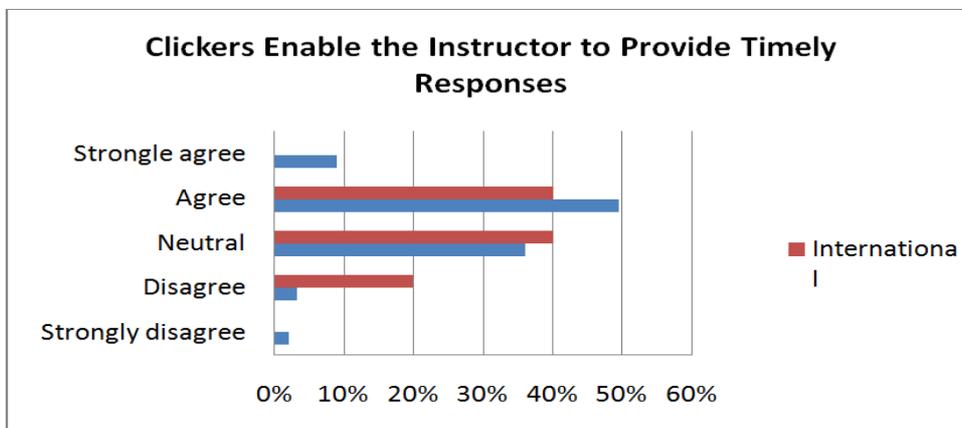
**Fig.3. The Clickers Contributed Significantly to Student Interest in the Course**



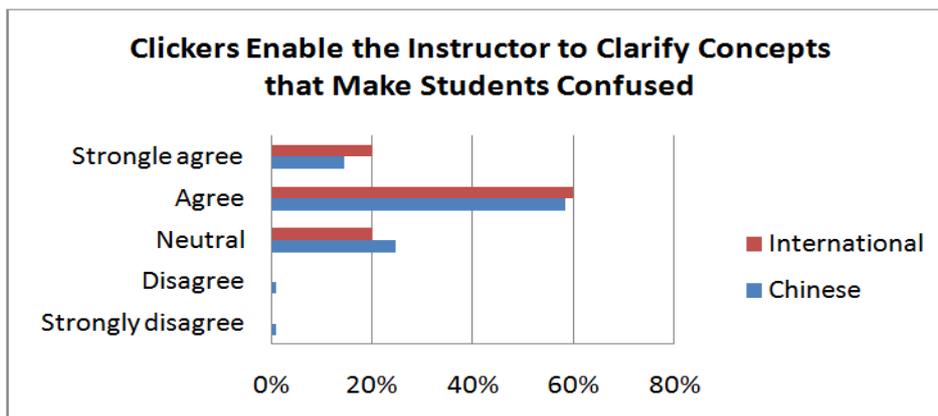
**Fig. 4 Using the Clickers makes students feel more engaged and involved**



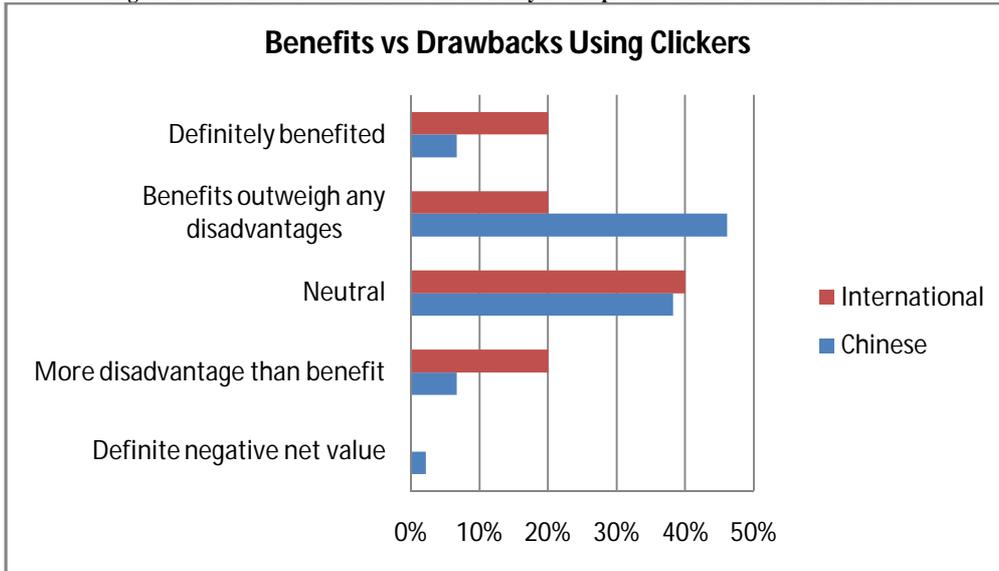
**Fig. 5 Students Find the Clickers Useful in Learning**



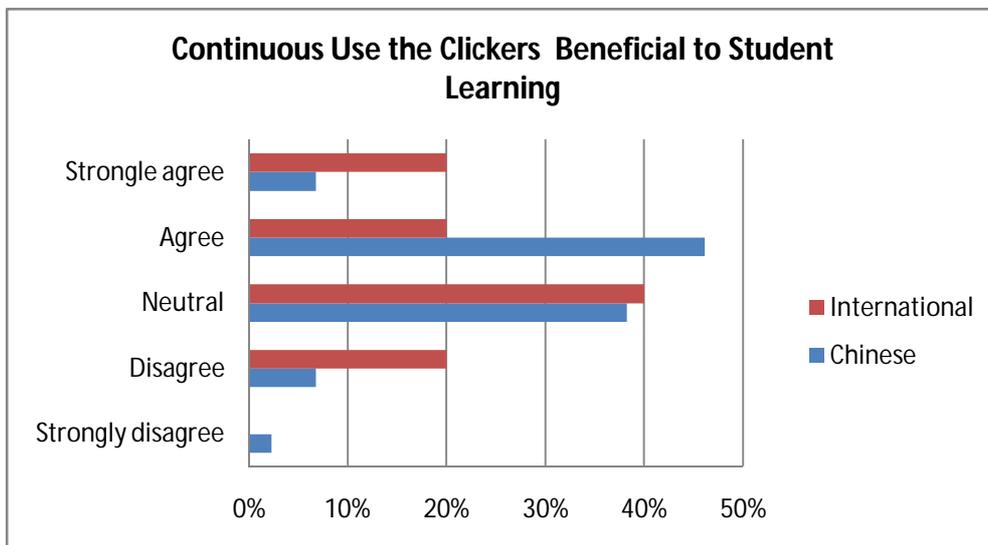
**Fig. 6 Clickers Enable the Instructor to Provide Timely Responses**



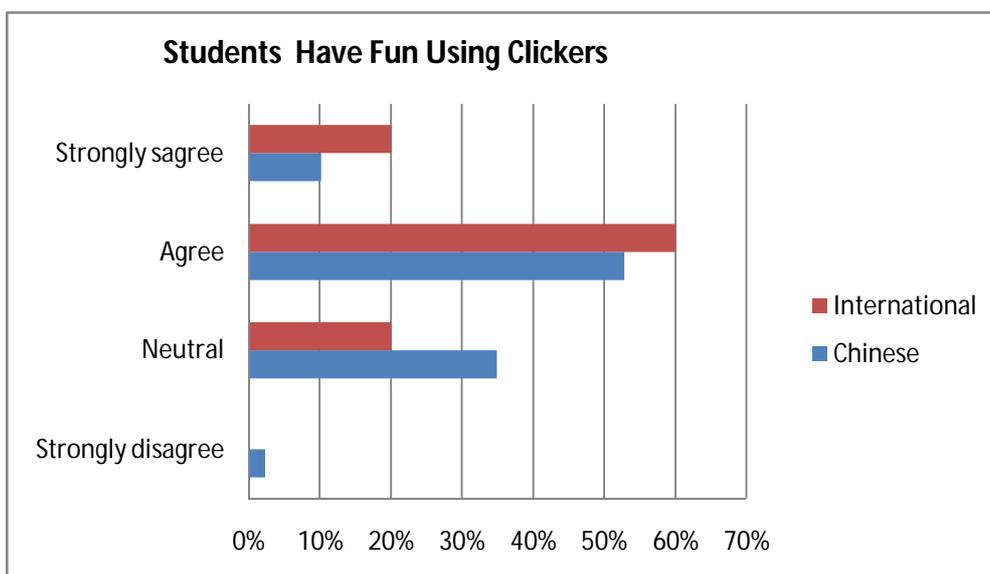
**Fig. 7 Clickers Enable the Instructor to Clarify Concepts that Make Students Confused**



**Fig. 8. Benefits vs Drawbacks using Clickers**



**Fig.9. Continuous Use of Clickers Beneficial to Student Learning**



**Fig. 10. Students Have Fun Using Clickers**

**Table 1: Student Perception Towards Using Clickers**

Questions	Mean response for international students	Mean response for Chinese students	T-test result
I find using the Clickers to be enjoyable.	3.4	3.2	0.519
The actual process of using the Clickers is pleasant.	3.2	3.2	0.00
I have fun using the Clickers.	4	3.7	0.917
I would find the Clickers useful in my learning.	3.5	3.4	0.523
Using the Clickers enables me to accomplish learning tasks more quickly.	3.5	3.1	0.921
Using the Clickers increases my learning productivity.	3.4	3.12	0.633
If I use the Clickers, I will increase my chances of getting more competence.	3.5	3.48	0.333

★★★