

Question SMS – SMS Based Student Feedback System

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Abstract

Classroom Response System was introduced in National University of Singapore to improve the student interaction. This system generated high level of interest among the teaching staff and students who found it useful as the system offered instant feedback of class understanding of subject matter providing insights to the instructors. However, the usage was not widely adopted due to various reasons that were impediment to the success of this service. This laid foundation to move towards 'QuestionSMS'. A SMS based Feedback System for cheaper cost, wider compatibility and greater adoption. The paper also discusses the challenges of SMS based system and the roadmap for this initiative.

Introduction

The Centre for Instructional Technology at National University of Singapore acquired Classroom Response System (CRS) around the fall of 2006. This commercial system encompasses of remote type keypads, radio frequency receivers connected to lecturer's PC via USB Port, and the client software to enable the interaction between the clickers and the lecturer's PC. The CPS or clickers, is a device that allows the students to anonymously respond to the question and thereby increasing the overall class participation.

Purpose of Introducing CRS

Classroom response system was introduced in NUS to assist the instructors, often confronted with silent majority that is reluctant to respond to questions in the class asked by the instructor. This fear of being ridiculed among their peers is often hindrance to measure the knowledge retention among the students (Hong et al, 2009). In this context, CPS's ability to hit the nail on the head has contributed towards its growing popularity. The reason for this are two folds, firstly peer interactions facilitates wider learning and secondly instant knowledge retention feedback via this system forces the instructor to reinforce the

concepts that students didn't understand instead of being oblivious to the underlying problems (Duncan, 2004).

In a survey conducted over two weeks with two groups (Group A – 246 students and Group B - 288 students) at the Department of Physics, Hong et al (2004) reported 91.1% of the class felt positive and did not feel the clickers were distracting or unhelpful (See Annex 1). In terms of facilitating the understanding of subject matter, 78.9% of Group A and 23.9% of Group B felt CRS improved their understanding (See Annex 2). This disparity was noted due to the quality of question framed by the instructor. Likewise, responding to CRS promoting more focused discussion during class tallied to 73.8% versus 50.9% between two groups (See Annex 3). 80% of students deemed the CRS contributed to motivate their participation in class (See Annex 4). The NUS lecturers found CPS to be useful tool to conduct class albeit it entailed some effort to prepare before the class. 10.2% of students in Group A felt using CRS in class is too time-consuming as oppose to 24.5% from Group B. This view amongst student is pronounced when their involvement does not bring them any immediately benefits like tutorial grading not tied to participation (See Annex 5). Also 27.4% of students reported difficulties getting their clicker to work in class (See Annex 6).

Therefore CRS does assist to counter the attention deficiency among the students by keeping them engaged and offer benefits to the instructors in measuring the student's understanding, clarify misconceptions, test knowledge retention, and facilitate discussion (Duncan, 2004). In addition to the ability of instant feedback on the screen to monitor response, reporting features and ease of use is the pull factor for the repeat customers. Students have also reflected in their feedback report on how CRS helps not only to remember the content of the current lecture and recap the previous lecture's content as well (Todd 2009).

Key Challenges

Despite the CRS benefits, the usage was not widely adopted at NUS due to various reasons that were impediment to the overwhelming success of this service.

- Logistics: Acquiring CRS is not cheap and using it for fairly big size (300-400 students) needs technical assistance as reported in educause learning initiative's article (2005) and poses other challenges.

- Preparation: CRS calls for some effort before the class as reflected by one of the lecturers “I am thinking of using the Classroom Response System again. I will however be hesitant to use it for big classes – imagine carrying several bags to the lecture theatre, and of course, one can’t do it alone if there are too many to carry! Moreover, the logistics of distributing the handsets to students at the beginning of the session, and collecting them at the end, is a hassle if the class is too big, and the process may of course eat too much into one’s lecture time.” (Dr Ismail Talib gets his students clicking with the Classroom Response System, 2007).
- Long Term Loan: Since CRS service is offered by CIT on loan basis, this prohibits to issue CRS for the whole term in all fairness to the other departments.
- Maintenance: Although the battery used in the pad is standard ‘AAA’ batteries but monitoring and changing it periodically is cumbersome.
- Range of Receivers: Students sitting at the back row of large lecture theatre may face difficulties responding to the question if they happen to be outside the receiver’s range.
- Upgrade and compatibility: New product upgrades, acquisition of another competing product by the vendor does not guarantee the compatibility among the different CRS.
- System limitations: CRS used at NUS supports only feedback from the whole class displaying results graph for the entire class, but not individual teams (Todd 2009).
- Changed Role of Instructor: Using CRS means mastering demands of new skill that could be challenging and demanding. Instructors are required to prepare in advance by authoring, editing, preparing and arranging effective and quality questions (Beatty, 2004).

Hence these challenges formed the basis to move towards SMS based solution to address issues of logistics, receiver range, compatibility and supporting the responses of individual teams. The key advantage with this approach is the scalability with minimum cost and maintenance.

Need for SMS based solution

With the rising adoption of mobile phones with 3G and wireless connections among students, it's not surprising that students prefer to use their mobile devices as a voting tool versus carrying an additional voting device and the cost of acquiring one. It is cost-effective as mobile subscription plans comes with free SMS bundled in student plans thus adding no additional cost of voting through their mobile devices.

Another factor is the need for live responses from any venue and not just within the range of a voting system area. A student watching a live lecture from home may use his mobile device to SMS his feedback on the session. SMS responses are gathered and refresh on the web in almost real time or each time there is a change in the votes.

An SMS voting system also requires lesser time for lecturers to setup as no software application installation is required thus reducing the learning curve and students are already familiar with the use of mobile devices to send SMS text messages.

The most important factor is the SMS responses itself. Feedback on a lecture can be gathered in the form of the text based questions or options based responses thus allowing the lecturer more freedom in structuring his lecture and gathering feedbacks on his session more effectively. Student responses remain anonymous thus increasing interactivity and participation among students.

Developing SMS based solution

The development of an SMS based solution was based on the several factors and assumptions. The solution should be accessible for lecturers anywhere, anytime and results can be viewed instantaneously and can be exported for further analysis. The assumption was that most students own an SMS enabled mobile devices and they bring it with them everywhere and the lecturers have access to an internet connection from where they are located. Results should be real-time and the anonymity of the sender should be maintained. Mobile service providers network which students are subscribe to should not be down at time of usage.

With the above factors in mind, we develop a web application SMS solution called 'QuestionSMS'. The web application is written in ASP.net framework with C# as the

programming language and SQL server as the database server. The website which is single-sign on enabled only for lecturers to access, allows them to create an SMS code and the two types of feedback question: one answer voting options (Annex 8) or text answers (Annex 7). Each SMS code is unique within the time and date span and is tied to the SMS questions being send by the students. This allows the instructor to capture the responses of individual teams within the same class by creating two different codes.

SMS codes, feedback question or poll can be created in the website days ahead before the start of the lecture session thus reducing disruption to their lecture. The feedback question and the phone number for students to send the SMS can also be included in their PowerPoint slides at the end of their presentation slides.

SMS send by the students are received by the mobile service network and delivered to a third-party SMS Gateway (Figure 1). The data from the SMS Gateway is then send to the Application Server that is tied to the website reporting page using a Document Object Model (DOM) to render the poll results (Annex 9) and text responses send by the students (Annex 10). A timer will be activated each time the SMS Response page is access to display real-time responses send by the students. The lecturer is able to read the responses live and may choose to answer the questions immediately and checked off remaining questions to be answered after the session.

Regardless of the number of times a student send an SMS poll vote, the last SMS send by the student will be regarded as the final response thus there will be no duplication of entries in the results. Results are displayed in graphical format with percentages and numerical responses included as well. Detailed responses of each student in a table format can be exported for further analysis.

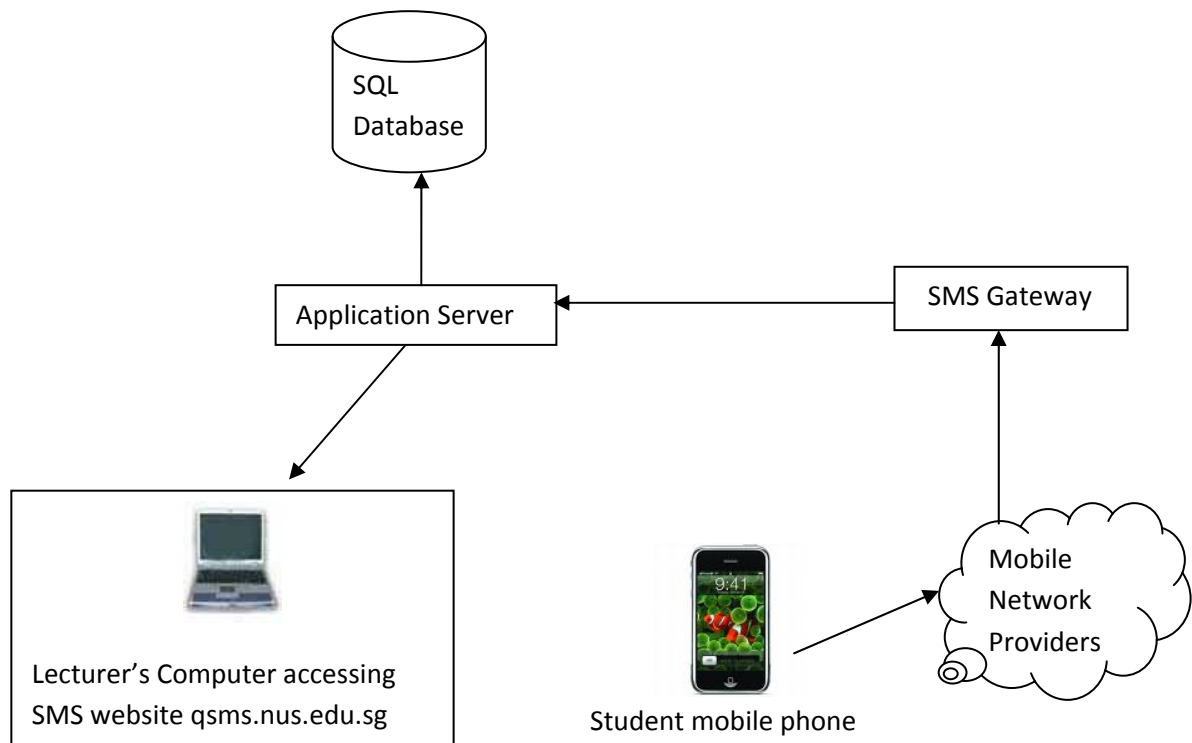


Figure 1: Infrastructure of Web-based SMS Solution

Use of QuestionSMS in NUS

One of the lecturers from Communications and New Media Programme in NUS has been using 'QuestionSMS' during their lectures. Her lectures are structured in such a way where SMS are used to find out the level of understanding of the students based on each lesson or topic she has taught within two hours of lecture.

Questions on the lesson just taught are prompt on the screen and students SMS responses are displayed in real time. Statistics of the different options responded by students allows the lecturer to decide if the lesson she has just taught were well received by her students or if she has to go through the lesson again. This also benefits the students by promoting critical thinking skills as they have to listen to the lecture carefully and think of solutions after each lesson or topic is covered. The correct answers displayed after the SMS response period, enable the students to quickly review their self-understanding of the lesson.

Even though SMS responses are helpful in her teaching, there are some problems encountered caused by the delay in transmitting the SMS due to mobile networks or the students promptness in sending the SMS.

Pitfalls of Current SMS based solution

Short Messaging Service (SMS) are dependent on the mobile network service providers. Text message entered by the sender is transmitted to a Short Message Service Center (SMSC). With a large base of SMS users, and one of the most preferred means of communication between users, SMS transmission time is unpredictable.

The SMS Gateway provider should have a strong infrastructure and understand the compatibility issues with different mobile service providers. A good support team from the SMS Gateway provider is also important in order to resolve issues quickly and be contactable when a problem arises. If the SMS transmitted by the mobile service provider is not received by the SMS Gateway, the data reflected on the SMS based solution website will be affected. Accuracy and delay in transmitting the responses will affect the effectiveness of the SMS feedback system.

As the SMS based solution is a web-based solution, it is also important to maintain and regularly monitor the web application server and database storing the SMS responses. Any downtime on the web server or database will mean the web based SMS solution will not be available for users to access.

And lastly, since the use of mobile device are required in sending SMS, it also important to note the availability of the mobile network within the range of where the lesson is being conducted and responses of the lesson taught are required.

Roadmap for SMS based solution

CIT will monitor the system and collect user feedback to further enhance the performance. Meanwhile following enhancements are already identified for the next release;

1. Increase SMS response to improve user experience.
2. Maintain the stability of the service and enhance the infrastructure to support more users.
3. Five digit Hotline number to SMS.
4. Integration to university learning management systems (IVLE). SMS responses send by students can be viewed in IVLE and data can be tabulated with the class size and participation marks can be granted to active class students.

5. Enhancements to current reports display of the SMS responses.
6. More options to export report charts to other formats such as Microsoft Excel.
7. Option to enable lecturers to identify the students.

Conclusion

CIT truly believes that leveraging on the mobile technology is the way to go for Classroom Response System. It will continue to enhance 'QuestionSMS' further to ensure it meets the customer expectations. In addition it will also explore commercial offerings catering to web and mobile platforms. Combined to work in tandem with its home grown product, CIT is confident the solution will dish out an attractive buffet for the NUS community.

Reference

Hong Chong Ming, Kenneth and Lam Poh Fong, Lydia, 2009, 'Effectiveness of the Classroom Response System in Tutorials', *CDTL Brief*, April, Vol. 12 No. 1

Duncan, Douglas 2004, *Clickers in the Classroom, How to Enhance Science Teaching Using Classroom Response Systems*, Pearson, Singapore

Todd, Dr Peter A 2009, 'Using an Electronic Classroom Response System to Facilitate Quizzes, Activities and Games (QAG) in a Large Class Scenario', *CDTL Brief*, Jan, Vol. 13 No.

CITations, 1 November 2007, Dr Ismail Talib gets his students clicking with the Classroom Response System

<http://blog.nus.edu.sg/citations/2007/11/01/dr-ismail-talib-gets-his-students-clicking-with-the-classroom-response-system/>

Beatty, I 2004, [Transforming student learning with classroom communication systems](#), viewed 17 March 2010

7 things you should know about clickers, Educause Learning Initiatives, viewed 17 March 2010, <http://net.educause.edu/ir/library/pdf/ELI7002.pdf>

Annex 1: Results for Question 1 (I found the use of clickers distracting and unhelpful.)

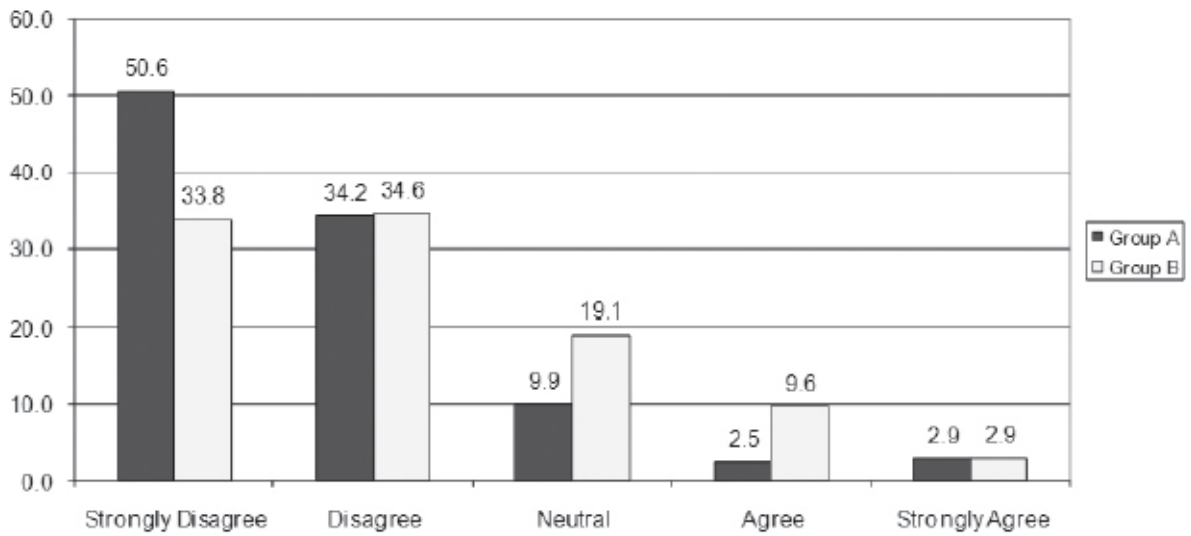


Image Source: CDTL Brief / April 2009, Page 4

Annex 2: Results for Question 2 (Learning with clickers improves my understanding of the course content.)

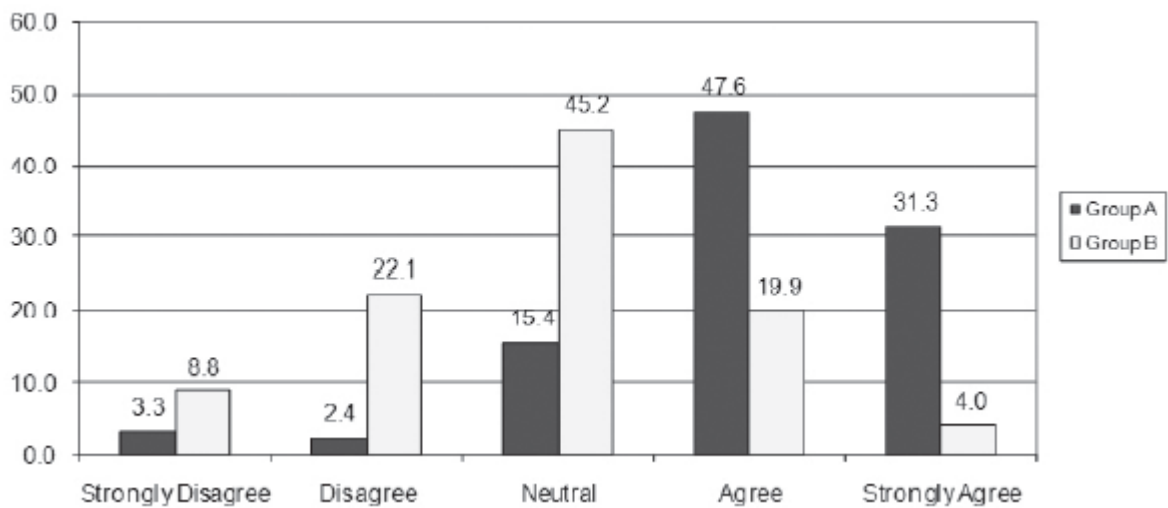


Image Source: CDTL Brief / April 2009, Page 4

Annex 3: Results for Question 3 (Using clickers promotes more focused discussion during class.)

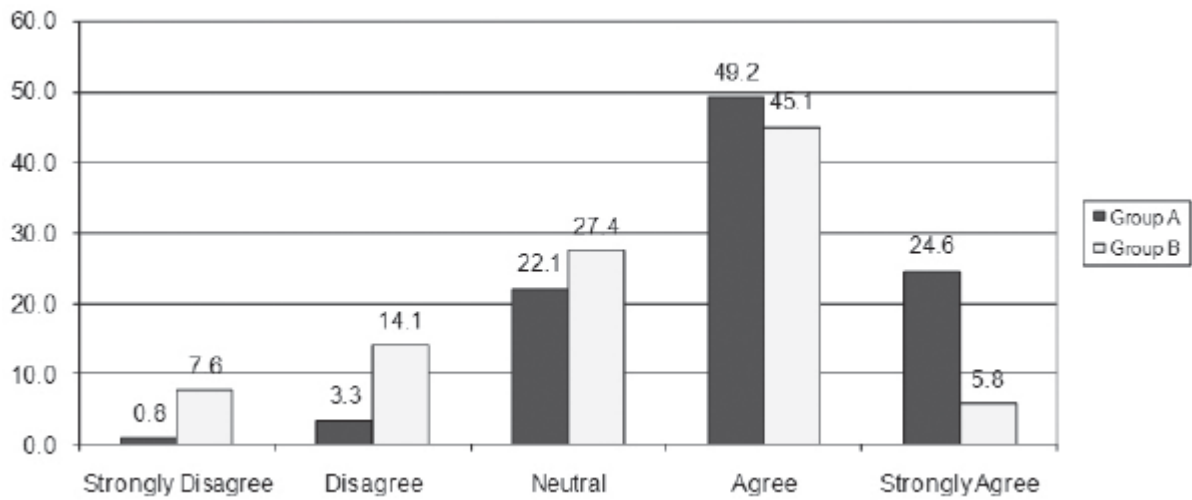


Image Source: CDTL Brief / April 2009, Page 4

Annex 4: Results for Question 4 (Using clickers motivates my participation in class.)

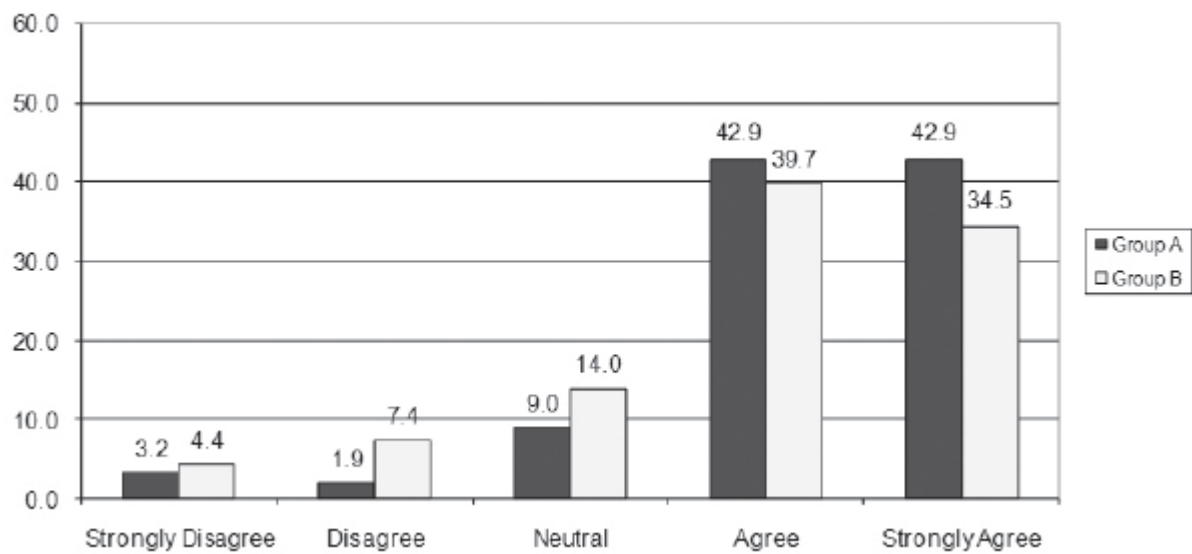


Image Source: CDTL Brief / April 2009, Page 4

Annex 5: Results for Question 5 (Using clickers in class is too time-consuming.)

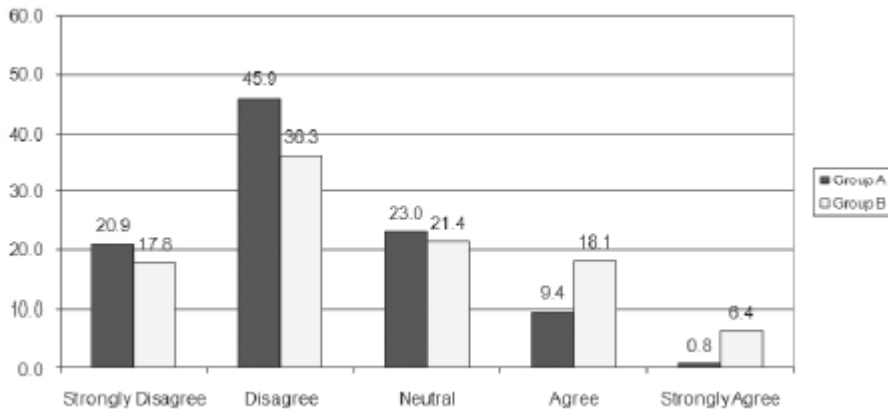


Image Source: CDTL Brief / April 2009, Page 5

Annex 6: Results for Question 6 (I had difficulties getting my clicker to work in class.)

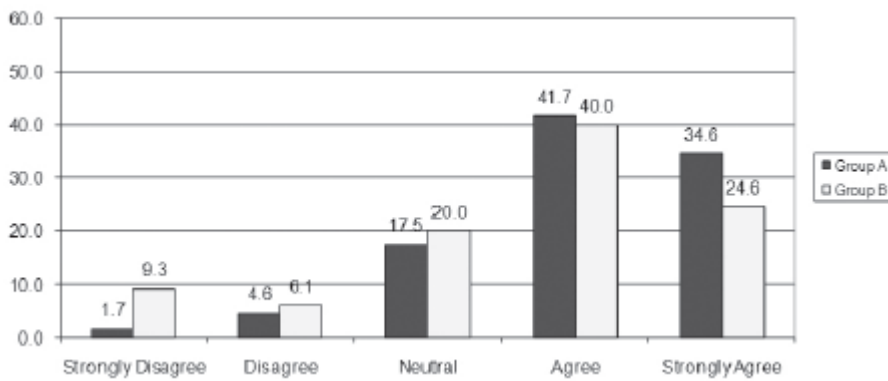


Image Source: CDTL Brief / April 2009, Page 5

Annex 7: Creating Free Text Question

questionSMS To send SMS, type **NUS code message to 9002 8065**

questionSMS | SMS Codes -> [Create SMS Code](#)

[About](#) | [SMS Codes](#) | [SMS Response](#)

Free Text Question | [Multiple Choice Poll](#)

* Code: Mandatory
Enter up to 5 chars code to use this SMS service.

Question:

Do not display this question to student.

Annex 8: Creating Multiple Choice Questions

questionSMS To send SMS, type **NUS code message to 9002 8065**

questionSMS SMS Codes -> Create SMS Code

About
SMS Codes
SMS Response

Free Text Question Multiple Choice Poll

* Code:
Enter up to 5 chars code to use this SMS service.

* Poll Question:

Do not display this poll question to student.

* Poll Option:
Poll option separated by comma, no spacing allowed.
Example: Yes,No or y,n or True,False or T,F or A,B,C

1. * is mandatory
2. Students are allow to change their answer as long as the code is valid.

Annex 9: Viewing Responses

questionSMS To send SMS, type **NUS code message to 9002 8065**

questionSMS Show SMS Codes

About
SMS Codes
SMS Response
Admin
View All SMS

Qns: ellgek07 Poll: cnm2219b

Based on the video, how would you describe the worldview at Google?

1. Asymmetrical
2. Symmetrical

1: **9.2% (8)**
2: **90.8% (79)**

Total Responses: 87

Check to list all student responses to poll.

Last Update On 16-Mar-2010 05:21:41 PM

Annex 10: Free Text Responses

questionSMS

To send SMS, type **NUS code message to 9002 8065**

questionSMS Show SMS Codes Refresh

About
SMS Codes
SMS Response
Admin
View All SMS

Qns: ellgek07 Poll: cnm2219b

Any views on narration? Expire now

11 Mar 2010 11:05 AM 6597838XXX says:

kind of like the child narrator seeing his father holding hands with another woman as nothing special but we readers suspect an affair. -ethel □

11 Mar 2010 11:02 AM 6597838XXX says:

the first person narrator unreliable due to the narrator itself. Like the narrator is child who sees something that he views as a simple eve □

11 Mar 2010 11:01 AM 6596484XXX says:

Yu Su: the lawyer's words can be a third second or first narration, 1st to assume, 2nd to accuse n 3rd to defend. □

11 Mar 2010 10:57 AM 6581281XXX says:

a court judgment reads sometimes like a 3rd sometimes like a 1st person narrative □

11 Mar 2010 10:57 AM 6591717XXX says: