

TWELVE TIPS

Rules of engagement – 12 tips for successful use of “clickers” in the classroom

KALYANI PREMKUMAR & CYRIL COUPAL

University of Saskatchewan, Saskatoon, Canada

Abstract

Background: Student response system or clickers is an electronic application where a receiver in the instructor's computer captures responses to questions from student keypads. Used effectively, clickers can promote learner engagement and serve to improve learning. It can be used in a variety of ways such as to provide feedback to learners and instructor, to start discussions, for peer evaluation, for formative and summative assessment, to build a learning community, and to experiment on human responses.

Aims and Methods: Using our experience in the use of this technology and literature review, we provide twelve tips for successful use of the student response system.

Results and Conclusions: We have found these strategies useful and envisage that the application of these tips can help maximize learner engagement and learning.

Introduction

Student response system (SRS), personal response system, classroom communication system, audience voting system, clickers or electronic voting system all describe an electronic application where a receiver located in the instructors' computer captures information from student keypads in response to questions posed by the instructor. SRS can be used in various situations – such as in conferences and committee meetings where members vote anonymously, in small or large classes to poll, start a discussion or conduct an assessment. The interactivity that SRS provokes, significantly improves student learning if used effectively in class room situations (Robertson 2000; Beatty 2004; University of Tennessee 2006).

SRS has been introduced in a variety of ways in teaching. It can be used for formative and summative assessment. For example, during classes, it can be used for formative feedback. Here, a question posed during class can be used to provide feedback to the learner on how well he/she has understood the material and compare her progress with that of other classmates. The performance of the class can provide feedback to the instructor on whether concepts have been understood by the whole class or require further elaboration. If questions relating to delivery are used, the instructor can obtain information on teaching effectiveness and modify techniques accordingly. As an aid to assessment, SRS allows for easy administration of questions, instant marking of answers providing quick feedback.

SRS can also be used by students to anonymously assess their peers when presentations are made. This enables

students to give more objective feedback to their peers. Instructors can utilize SRS to build the learning community by polling for information that helps students become aware of their learning environment, such as the academic background, age distribution, gender and ethnicity of their peers. SRS enables collection of human responses that cannot be easily obtained by a show of hands, as in psychology courses. A student, hesitant to raise a hand in response to a sensitive question may feel no inhibition to responding using the SRS.

A creative way of using SRS is to help start discussions. For example, by posing a controversial question, the responses obtained can be used as a starting point for discussion. These are just some ways SRS can be and has been used, but each instructor has to modify its usage according to the topic, objectives of the course, his/her own comfort level and that of students with the technology.

In recent years, post secondary institutions are increasingly adopting SRS in their teaching (Duncan 2006). With the introduction of newer devices that use infra red or radio frequency for transmission of information, and smaller keypads it is now possible to carry these devices from class to class, unlike the time when the receiver and device had to be electrically connected and fixed to a location. There has also been a marked reduction in the cost of SRS. The primary reason for adoption by institutions is the belief that it would improve class room teaching by enhancing interactivity. The effectiveness of this system in improving teaching and learning depends on whether sound pedagogical principles are being used by the instructors. Unfortunately, it is easily misused or overused. For example, instructors may use SRS just to take attendance.

Correspondence: Kalyani Premkumar, MBBS MD MSc (MedEd) PhD, Associate Director Educational Support & Development, Department of Community Health & Epidemiology, College of Medicine University of Saskatchewan, Room B103 Health Sciences Building, 107 Wiggins Road, Saskatoon, Saskatchewan Canada S7N 5E5. Tel: 306 966 1409; fax: 306 966 7920; email: kalyani.premkumar@usask.ca

Based on our experiences in using this tool in classes and faculty development workshops, we share twelve tips for using SRS effectively to enhance learning.

Tip 1

Pedagogy should be the focus – not the technology

The employment of SRS, like other strategies such as small group discussions, reflective writing and role play, can be used to increase learner engagement. Literature indicates that when students are actively engaged in the content that they are learning, critical thinking skills are improved, and there is increased motivation, retention and transfer of new information (Middendorf & Kalish 1996; Beatty 2004). Knowing that the attention span of students diminishes after the first 15–20 minutes into a lecture, an instructor can plan to use the SRS to trigger a discussion or ask a question every 20 minutes as a ‘change-up’ (Middendorf & Kalish 1996). It is important that the SRS be used appropriately based on the topic. The use of SRS should not distract from learning. The question has to be clear and should benefit learning and the learner – not just the teacher. The instructor should ensure that the main focus is on learning and not the handsets.

Tip 2

Check your readiness for using this strategy

The use of SRS as an active learning strategy requires prior planning and time commitment from instructors. For instance, the instructor has to spend some time to learn to navigate through the software. Some time is also required to create the questions and the participant list (Rodgers & Starrett 2007). A participant list is required if you want to link an individual student with the response he/she gave.

You must be prepared with alternatives should there be a technical problem. Any technology can fail. Potential problems you may need to face are: failure of a battery in a transmitter; the receiver not receiving responses; the software not responding to the receiver; computer failing (powers down, will not project, crashes, etc.) It may become necessary to alter your intended instruction for the class when such an event occurs, especially since it is unlikely that there will be technical support people close by.

For those instructors who are beginners at using active learning techniques in large classes, the SRS technology can be intimidating. Each person has to adopt the SRS according to his/her comfort level. But don't let this stop you from trying out the technology.

Tip 3

Practice using the technology – learn to input questions ahead of time and on the fly

You should become familiar with all the features available in the software. For example, it is possible to input a variety of questions such as multiple choice, yes/no, ranking, scale and

in some cases, even short answer questions. It is easier to input questions ahead of time and test them. Sometimes, an instructor may want to create questions and obtain responses during the presentation. To do this, the instructor needs to be conversant with the software. It is also possible to incorporate a timer while posing questions. Following the poll, the instructor should project the results in the best manner possible. There is benefit to both learners and instructors when they see how the whole class has fared. To the learner, it indicates whether he/she has understood the concept or needs to review further. To the instructor, the results indicate if he/she should proceed or spend more time on the concept.

You should be comfortable with the software functions you intend to employ prior to using them during your class. Our experience has been that if the instructor fumbles with the technology trying to get something to work, it causes disruption and impatience among the students. This makes it that much harder to engage (or re-engage) them in the remainder of the topics. If you get an idea during class that would require using some part of the technology that you have not tried before, it is best to practice with it first, and then use it in a subsequent class.

Tip 4

Identify purpose of posing questions

It is not enough to learn the technology. More importantly, the instructor has to identify the purpose of posing questions. The following questions have to be answered:

- How is this question related to my objective?
- What do I want to achieve by asking this question?

Depending on the answers, the question has to be worded accordingly. For example, to start a peer discussion, the question may be worded as a statement to which one agrees, disagrees, or has an option over a varying range of agreement (Likert scale).

If SRS is being used for a review question (formative feedback), it has to be related directly to the objective or concept being addressed. If information regarding an embarrassing or sensitive issue (anonymous) is required, features in SRS for anonymous answers may be used.

Tip 5

Less is better than more

During faculty development workshops on SRS, one of the frequently asked questions is: How many questions should one use? The number of questions relates to the purpose of using SRS. If you are using it as an active learning strategy to keep the attention of students in a lecture setting, one question every 20 minutes i.e. 3–4 questions in a 60 minute lecture, can be considered as adequate. This estimate takes into account that the student's attention span wanes in approximately 20 minutes. If the purpose is formative assessment or review, any number of questions may be attempted. However, for learning to occur, a debriefing session to give

explanations as to why an option is correct or incorrect should be incorporated.

It should also be noted that this is just one of the many techniques available for introducing active learning. Use of SRS day after day, in every lecture, may become tiresome to both instructors and learners alike. You may want to consider using a variety of strategies in your classroom teaching.

Tip 6

Write the question and test it

Every instructor needs to understand that writing technically correct question is a skill and requires training and practice. Rules governing the writing of multiple choice and other types of questions have to be followed. To get the desired outcome, the questions should be valid and reliable – especially when using the responses for assessment. It is important to test the question ahead of time for two reasons.

- (1) Technical reason: To ensure that the responses are accepted by the receiver.
- (2) Pedagogical reason: To test the reliability and validity.

For 1, the instructor should input the question into the presentation, project the question on the screen and look at the size of font, visibility of text, reception of responses using simulated data, visibility of timer and the charts showing final data. For 2, the instructor may show the questions to other content experts and/or students to test validity. If using previously tested questions, item scores may already be available and this may be scrutinized for reliability.

Tip 7

Plan for contingency teaching

One of the exciting ways SRS can be and is used by instructors is for contingency teaching. Here, the instructor comes prepared to change the information addressed based on student response to questions. For example an instructor may come prepared with questions on various topics. By looking at the student response to questions in each topic, the instructor may then choose to spend more time on concepts addressed in the topic where student performance was inadequate. It allows the instructor to spend less time or totally skip concepts well understood by students.

Tip 8

Build in time for the activity

If using SRS in a class, the instructor has to allow for at least 3–5 minutes for each question. Again, it depends on the question and how it is administered. For example, you may choose to project the question, ask students to respond, then discuss the answer with their neighbor and respond again.

Following this you may show the students the correct answer and debrief. Such an approach requires more class time. However, this is an effective way to enhance learning. By using this technique you allow students to commit to an answer based on their own learning, encourage talking, listening and learning from peers, followed by reinforcement of concepts as you debrief. Such activities also allow for reflection – an important element needed for deep learning and long-term retention.

If using questions for assessment, less time can be allocated for each question. Even so, allow between 2–3 minutes per question.

Instructors using SRS for the very first time should allocate longer time for each question. In our medical school, a novice instructor found that he lost at least 10 minutes in each class for various reasons relating to SRS. For instance, the keypads were given to students at the beginning of each class and then collected soon after. Time was lost at the beginning of the class as students collected the keypad. Sometimes, the instructor found that he lost time due to technical reasons such as forgetting to reset the slide before polling. If the slide is not reset, it fails to receive data from students.

Tip 9

Decide if individuals have to be linked to questions or not

Most often, instructors use SRS to facilitate student participation. In this case, knowledge of how each student performed is not of importance. If the questions are used for assessment, it may be beneficial to both instructor and student to link responses to the individual student. By collecting data and sharing it with students, both teacher and student can see how individuals and the class as a whole performed throughout the course and take actions accordingly. If the instructor desires to link the keypad to individual students, the class list and other background data must be imported along with the ID number of each keypad.

Tip 10

Decide on whether you want to use the output or not

Another decision that has to be made regards use of the data collected from students. The instructor needs to decide on how the collected raw data will be analysed and used to improve teaching and learning. As an instructor, you need to decide

- Do you want to compare the performance of one class with another?
- Do you want to use the data for research purposes, e.g. how did students with no background in the subject perform in this course as compared to those with background?
- Is there a difference based on gender? Age?

All this and more data manipulations are possible – but require planning ahead of time.

Tip 11

Evaluate effectiveness

If the focus is on teaching and learning, the effectiveness of SRS on learning outcome has to be addressed. Again, effectiveness closely relates to the quality and purpose of the questions used. Mid-term and end-of-course evaluations may reveal the effectiveness of using SRS. Most often, problems with the use of SRS are due to the quality and quantity of the questions, rather than the technology itself.

Tip 12

Enjoy the process, be creative

Choose to use SRS, only if you enjoy the process and are comfortable with the software. SRS is best utilized by instructors who have identified and see a purpose for this technology within their particular teaching environment and technique. You should not feel coerced or forced to use SRS in your teaching just because the University has paid for technology and made it available to students.

Conclusions

SRS is an innovative technology that can help instructors incorporate active learning strategies into their teaching. Using our experience and literature review, we have given 12 teaching tips to help teachers use SRS effectively in their classrooms.

In any situation where an instructor uses or contemplates using technology in teaching, the foremost thing to keep in mind is that technology is only a teaching and learning tool. Learning is enhanced only if pedagogy takes first place and technology second. While planning to use SRS, the instructor needs to constantly ask the questions:

- What is the purpose of asking the question?
- How does it relate to my objectives?

- Is SRS the best method for enhancing learning in my classroom?
- How can I use the student responses to improve learning outcome?
- Are my students and I having fun?

Notes on contributors

KALYANI PREMKUMAR is the Associate Director, Educational Support & Development Unit, College of Medicine, University of Saskatchewan, Saskatoon, Canada. She is a physician with a specialization in Physiology. She has a Masters degree in Medical Education (MSc) and a doctoral degree in Educational Technology. Her research interest includes evaluation and use of technology in medical teaching/learning.

CYRIL COUPAL is the supervisor of the Instructional Support Group, whose mandate is to identify, evaluate and implement technologies that can support teaching and learning and provide support to adopters. He has a Masters (MSc) and a doctoral degree in Computer Science. His research interests include software development modeling and methodologies and the application of technology to learning.

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