SRS overview

Welcome
To the student response system

Student
Teacher

Trond Morten Thorseth
Gabrielle Hansen-Nygård
John Birger Stav
Knut Bjørkli
Pascal Pein

Sør-Trøndelag University College

17.04.2012
## Contents

Introduction.......................................................................................................................... 3  
What is a Student Response System (SRS)? .......................................................................... 4  
What are the benefits of using an SRS? .............................................................................. 5  
  The teacher perspective ........................................................................................................ 5  
  The student perspective ........................................................................................................ 5  
Technical overview of the SRS ............................................................................................ 6  
Using the SRS in classes ....................................................................................................... 7  
Methodical best practises .................................................................................................... 13  
  Logistical considerations .................................................................................................... 13  
  Timed versus non-timed voting sessions ......................................................................... 13  
  The teacher’s role ................................................................................................................ 14
Introduction
As part of the Edumecca project, a new type of student response system (SRS) for next-generation handheld devices (such as iPod Touch or iPhone) has been developed.

At college or university level, classes are quite large (more than 60 students per class). Due to time constraints, it's often not possible for the lecturer to interact directly with the students during the lecture. Furthermore, many students find it difficult or embarrassing to ask questions in class; which reduces the level of student-teacher interaction even further.

Because of the lack of feedback during class, it's difficult for the lecturer to assess how many of the students actually follow and understand the subjects being taught. Conversely, from the students' perspective, their understanding of the material is rarely put to the test during class - such tests usually take the form of written assignments and exercises which are corrected and returned weeks later. In other words, neither the teacher nor the students have a good "real-time" indicator of learning effect.

Again, because of time constraints, the students are rarely given time to discuss and interact with each other during class. If a student finds it hard to understand what's being taught in class, it is therefore difficult to gauge whether he or she is the only one who doesn't follow the proceedings.

A normal class lasts 45-60 minutes. Cognitive research indicates that attention wanes dramatically after about 20 minutes, which would indicate that unless the students are allowed some pause for thought, a significant portion of the curriculum is lost on the students during class.

The main objective of the SRS is to address these issues; in particular:

- Break the monotony of a lecture and allow the students to actively take part in the lecture
- Increase teacher-student interaction and student-student interaction
- Give both teacher and students "real-time" feedback on learning effect
What is a Student Response System (SRS)?

A student response system (SRS) is technology designed to promote and support:

- Response
- Communication
- Interaction

In a classroom context, a student response system is a set of technologies (hardware and software) that allows a teacher or instructor to gather real-time responses from the students.

The teacher/instructor poses a quiz question about a subject that's just been taught, using some suitable medium (e.g. written on a blackboard; shown on a projection screen). This question can be multiple-choice, or a free text answer may be submitted. The students give their response to the question using either a mobile device (laptop, mobile phone, or other handheld device) or a computer.

Once the students have submitted their answers to the question, the teacher gets a graphical display of how the students voted.

Based on how the students voted (and on how many got the answer correct) the teacher will then process to explain what the correct answer was, and why it was the correct answer.

Using the SRS in this fashion directly benefits both the students and the teacher:

- The teacher gets immediate feedback on the students' level of understanding. If a high proportion of students submit a wrong answer, it's an indication that the students don't follow, and that the teacher should recapitulate the section pertaining to the question.
- Because the quiz question covers a particular subject, the students get instantaneous feedback on whether they understood the being taught. Answering a quiz question in class also gives them a chance to actively take part, as opposed to being passive listeners during a lecture.
What are the benefits of using an SRS?
If used properly, the SRS has the potential to benefit both the teacher and the students.

After extensive evaluation (online surveys; group interviews, in-depth interviews), we have a clear understanding on how the teacher and the students see their respective roles in using the SRS, and what the main benefits are.

The teacher perspective
For the teacher, the SRS acts as a real-time gauge of whether the students follow the lecture. Posing two questions during a 45-minute lecture is enough for the teacher to get a good feel of whether the students have understood the main points, or if further revision is needed.

The teacher faces two main challenges in using the SRS:
- It takes time to develop good conceptual questions – they should be constructed so as to provoke common misconceptions or misunderstandings. Using the SRS to test textbook knowledge (rather than conceptual understanding) doesn’t harness the potential of the SRS, and questions should be designed accordingly
- Classes become more interactive, and consequently more unpredictable, in the sense that the teacher may need to adjust explanations according to how the students answer (if the majority of students get the answer wrong, a more in-depth explanation is needed than if most of them get it right).

Obviously, some care is needed to make the quiz questions an integral part of the lecture, but the teacher would not have to completely restructure the way a subject is taught. It’s more a matter of putting one conceptual question every 20-30 minutes of lecturing.

The student perspective
Based on our evaluations, the students see several immediate benefits of the SRS:
- Increased involvement - the students are no longer passive listeners, but are given a chance to actively take part in classes
- They can submit their answers anonymously (without the embarrassment of giving a wrong answer in class), and they get instant feedback on whether their answer was correct
- The SRS is often used in conjunction with group discussions - i.e. the students will discuss between themselves in groups before submitting an answer. This gives them a chance to discuss curricular matters in class, which is not often the case (especially in higher education)
• The teacher’s explanation to a quiz question, which they’ve worked through themselves beforehand gives closure and gives immediate feedback on their understanding – it’s not so much which answer was correct, but why it was correct that is the key to learning.

Technical overview of the SRS

The SRS consists of three main components:

1. The voting device which the students use to submit a response during a voting session. This device can be any HTML-compatible mobile unit (e.g. PC, laptop or any HTML-compliant mobile device)
2. The control interface (SRS-CI), which runs on a computer in the classroom and is used to set up and run voting sessions by the teacher
3. The SRS server, which coordinates the communication between the control interface (SRS-CI) and the voting devices. The server also stores all the data of each individual voting session, so that the data can be analyzed at any time

A graphical representation of how the various components of the SRS work together can be found below:

![Diagram of SRS components](image)
Using the SRS in classes
Below is a timeline of a typical SRS session, with images illustrating each step of the process:

Students have access to a voting device in the form of a laptop, PC or mobile device.

The students are presented with a multiple-choice quiz question, where one or several alternative may be correct. The question can be shown on a blackboard; a flip over chart; a projection screen or any written medium.

The students are given time to discuss between themselves.

From the SRS interface, the teacher starts the voting session (a timer/countdown mechanism can be used, if desired).
Each student casts a vote as to what the correct answer is, using the voting device. The vote closes and the results are shown to the students in the form of an histogram.

The instructor will comment the various alternatives and highlight the correct one - explaining thoroughly why it’s the correct one; and why the other ones are incorrect.

The lecture proceeds as normal.

To further illustrate the process of using the SRS in class, the table below shows the process from the perspective of both the teacher (who sets up the voting session) and the students (who submit the vote/response using the voting units).
# SRS overview

<table>
<thead>
<tr>
<th>Teacher user interface (run on a PC in the classroom)</th>
<th>Student user interface (run on a PC, laptop or mobile device)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher starts the control interface by double-clicking the SRS icon on the desktop of the PC used to run votes</td>
<td>The students turn on their PC/laptop/mobile device</td>
</tr>
<tr>
<td>The teacher logs on to the server which hosts the session and opts to either create a new session code, or use an existing session code.</td>
<td>The students access the SRS student interface by clicking the web shortcut on their desktop/home screen</td>
</tr>
<tr>
<td>The teacher opts to either create a new session code (by clicking on ) or to generate a new session code.</td>
<td>The students stand by for the session code</td>
</tr>
</tbody>
</table>

**April 2012**
The students type in the designated session code and optionally their name (enables the system to track who votes what) and the page "please wait" appears – this page is a confirmation to the students that the session code has been correctly set and that the device is ready for voting.

The students discuss between themselves what the correct answer is.

The teacher moves the mouse cursor to the toolbar which is partially hidden at the right hand side of the screen. Once visible, the teacher clicks the button.
The teacher selects the relevant options for the vote, and selects the appropriate question type to initiate the vote. Note that clicking the button toggles the option for multiple correct answers.

Once a question selection is made the play controller appears. Press (play), and the vote is in progress. The vote can be paused at any moment by pressing (the students can continue voting while the session is paused, but the countdown stops).
The vote is in progress

Each student receives a confirmation that the vote has been registered. They can change their mind at any time by clicking another button. They can also select multiple correct answers, if this option is enabled by the teacher.

Once the vote is closed, a histogram of the votes appears. The histogram can be moved freely around.

The teacher highlights the correct answer by clicking on the bar corresponding to the correct alternative, and explains why the alternatives are correct or incorrect.

In our experience, the students very keen to "defend" their vote when challenged by the teacher (the teacher may challenge some of the students to explain why they voted as they did).
Methodical best practises
Rigorous testing of various methodical approaches is being planned, to see which approach maximizes learning effect. At this stage, no statistically valid results are available from our testing.

Based on observations so far, however, on a purely qualitative basis, it appears that the peer instruction approach (in which each student is given time to think through the question before the group discussion) engages the students to a greater extent than going directly into a group discussion before the vote is cast.

Logistical considerations
The SRS is designed to be used in large classes, and the server/client infrastructure is very scalable. However, the simple task of handing out handheld units for hundreds of students can present a logistical challenge.

The most efficient way to distribute a large number of handheld units is to have the students pick up a unit as they enter the classroom, and hand it back as they leave the class.

Alternatively, handheld units can be given on loan to the students at the start of a term, on the condition that the unit is handed back in at the end of the term. In this scenario, each student would be individually responsible for his or her unit – making sure it’s charged; bringing it to classes and so on.

Timed versus non-timed voting sessions
The SRS is designed to be used in large classes, and maintaining order and discipline is a priority. After a group discussion, the teacher will want to start a voting session. But it can be challenging to restore order and attention in a class in which hundreds of students have been engaged in serious discussion. In particular, to make all the students, some still fiercely involved in the discussion, aware that a voting session is about to begin.

To aid the teacher in restoring order for the voting session, the SRS can be set to play back a “ticking clock” sound during the countdown (see below).
Our experience shows that using such a sound is invaluable in shifting the students’ attention away from the discussion, and over to the voting session in progress.

In our experience, a 30-second countdown is sufficient – any longer than that and the students quickly lose patience. Remember that when the vote starts, the students have already completed their discussions and made up their minds. Therefore, 30 seconds should be enough for everybody to cast a vote.

**The teacher’s role**

Based on the feedback we’ve received, it’s critically important for the students that the teacher

- Thoroughly explains what the correct alternative was, and why
- Puts a lot of effort into stimulating the discussion between the students – in some classes, the discussion can be a bit heavy-going unless the teacher aids the process along. This problem is exacerbated if the students don’t know each other very well