

Five (5) SRS Course Redesign Questions

Please review and consider the following five questions for redesigning a course using SRS prior to the workshop on July 15th.

Selection

Please look at the list of possible functions or uses of Student Response Systems (SRS) on the other side of this page. Which of these do you plan to use? What new learning opportunities do your proposed uses of SRS provide?

How much/how often?

When you introduce a new practice to your course, it's important to decide how pervasive you intend it to be. How often will you use SRS? Overall, how important will your SRS "routines" become for the learning in your course?

Integration

One of the key values of introducing a new practice or set of routines in a course is to make sure that each use of an SRS contributes to the overall learning in the course, instead of just an "add-on." How will you integrate your uses of SRS with the other learning activities in your course? How will student uses of SRS be built into your overall evaluation of student work in your course?

Assessment

The purpose of using SRS is to enhance teaching and learning in your course. How will you know if it succeeds in doing so? In other words, how will you measure or assess the impact of SRS on your course? Will this assessment plan provide opportunities for you to adjust your use of SRS, as appropriate, during the course itself?

Support

Students sometimes have trouble adjusting to new technologies as well as the implications of those technologies for their own learning strategies in a course. How will you assist your students to master the skills and habits needed to use SRS effectively?

What problems do you anticipate students will have using this technology, and what troubleshooting procedures will you set in place to support your students if the technology fails?

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15 July 2005**

Breakout Session: Developing Uses of SRS

In your small groups, please choose one person whose Fall course will be the focus of your work in this breakout. Then, identify at least one use for SRS in this course. Please refer to the attached list of potential SRS uses as you do this.

1. You should make sure that the use you select is accompanied by a specific example that shows, on a step-by-step basis, what is going to happen in the classroom when SRS is used.
2. Which of your course learning objectives will be met more satisfactorily by the use of SRS that you have chosen? How will this use of SRS better help you to achieve these learning objectives?
3. Finally, discuss how you might measure or otherwise document how the students have benefited from the use of SRS that you have selected.

After 15 minutes, all of the groups will report out to the session at large.

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Uses or Functions of SRS

1. **Participation and Attendance.** SRS will increase student attendance and participation. Students have to attend class regularly. When they are in class, they have to pay attention. Further, instructors can use SRS to creatively ENGAGE students in their own learning. Engagement is a natural fallout of the ongoing feedback functions of SRS, and is reinforced by the use of SRS to foster collaborative learning (discuss-then-click exercises).
2. **Retention of Reading Material.** Instructors (and student) can gauge students' retention of the reading material based on student assessments administered via SRS at the start of class. The information obtained can identify weaknesses in the information retained and can be used to customize instruction by targeting lectures. For example, instructors can use low-stakes quizzing composed of 10 items to make sure that students have done their reading before they come to class.
3. **Guided Lectures.** Instructors can develop guided lectures based on immediate assessments of students' knowledge in a specific area. Targeted lectures will strengthen student weaknesses based on the results of the assessment. Instructors can find out whether students understand key concepts during lecture and tailor the remainder of their lecture accordingly. For example, instructors can offer feedback to students on a specific calculation or example that can then be worked through and mastered in detail.
4. **Critical Thinking.** Instructors can foster critical thinking skills by asking questions throughout lecture using SRS that requires a synthesis of the information received in order to provide a correct answer. For example, in a science class such questions can address the formulation and testing of hypotheses based on already presented observations. Instructors can design to elicit responses ranging from experimental methods (dealing with what CAN be done) to ethical questions (what SHOULD/SHOULDN'T be done). The latter are pathways not only to critical thinking skill development, but to overall scientific literacy.
5. **Class Discussion.** Faculty can stimulate class discussion based on immediate student responses or feedback received from SRS data received. For example, instructors can perform correlations on the spot -- e.g., gender and attitudes towards gay marriage -- that demonstrate provocative connections among ideas for further class discussion.
6. **Formative Assessment.** Instructors can gain immediate student feedback -- both quantitative and experiential -- as formative assessments of the course in order to make adjustments as needed.
7. **Performance Feedback.** SRS can provide students with instant feedback on the success or failure of their efforts allowing subsequent correction and study skills development. At the same time, it can provide faculty with feedback on student performance allowing for intervention.
8. **Teaching Research.** SRS can be used for data collection to conduct research or assess teaching. For example, SRS will allow the collection of student demographic data at the start of a semester and later correlation of this data with student response to course content and challenge questions.
9. **Course Exams.** Instructors can assess students' complete knowledge of course content. Instructors would distribute hardcopy exams can be given, students can take them at their own pace, and the results can be automatically graded and exported to a D2L-usable format.

Challenges and Concerns

Yes, there are limitations, problems and challenges in the use of SRS!! The purely technical “how do I do” questions will be addressed on your respective campuses during SRS training, and by tech support. Here we focus on the challenges in clicker system use. Some are inherent in the technology, others are pedagogic. You encountered some of these in earlier sessions exploring how you will use SRS in your own courses. Others are personal, based on our individual teaching styles. Let’s begin by naming 4 categories of SRS challenges:

- **Structural and Technical issues (e.g., clicker failure, cheating).**
- **Interfacing with D2L, including grade book issues, what to upload, etc.**
- **Redesign issues: integration means more than just addition to your lectures.**
- **Mental preparedness.**

The goal of this session is to explore these challenges and possible solutions. The outline below is intended to keep the discussion focused, but we will deal with problems as you think of them, rather than in any particular order. We would like you to leave this workshop with the feeling that most problems have solutions, and that the benefits of using student response systems far outweigh the challenges.

Agenda

- | | |
|--------------------------------|--|
| I. Structural problems | - Known problems: <ul style="list-style-type: none">a) tracking/maintaining your databaseb) cheating (one student uses several clickers)c) clickers fail - Anticipated problems (from the group): |
| II. D2L interfacing | This sounds like a purely technical issue, but it isn’t! In fact it deals with how we individually use (or plan to use) D2L to support our classes. We should discuss grade book issues, the need to avoid duplication of effort, posting challenges, etc. |
| III. Redesign Issues | These are likely to be discipline-specific. We’ll try to get a general discussion going based on sharing issues raised in earlier workshop sessions or new ones. |
| IV. Mental Preparedness | Course redesign means rethinking how we teach. Thankfully, incorporating SRS is technically easy and a pretty painless way to enhance student participation and learning. But we have been teaching our classes our way for a while, and it may be necessary to proactively change some habits of mind. Let’s recount anecdotes to illustrate some examples, and try to anticipate others. |

Considerations in Integration of SRS

1. Using SRS takes time away from pure lecture. When you use SRS, you are trading off breadth of coverage against depth of understanding. You are, in effect, inviting students to participate in your course rather than merely to be present to witness the performance of your lecture. What are you giving up? What are you gaining? Always think in terms of your learning objectives.
2. If you simply add the use of SRS on top of what you already do in your course, you will wind up with what we call the course-and-a-half syndrome – too much stuff and too little time! SRS typically takes a little more processing time, partly because of the technology, but mainly because the students are actually involved in the process of teaching and learning!
3. After you've gained some experience using SRS, try to go beyond the basic uses such as attendance and quizzing. Research shows that the use of higher-level stem & response slides are much more likely to improve student learning and foster engagement.
4. It's extraordinarily difficult to get students to participate in larger classes. The use of SRS to allow students to "speak" is key to its success as a pedagogical device.
5. Use SRS frequently – at least once a week – but draw upon a repertoire of different uses rather than depend upon one or two uses that you repeat ad infinitum. Don't give students an impression that SRS is solely a disciplinary tool that becomes yet another hurdle to clear for them to get a good grade in your course.
6. SRS lends itself to low-stakes assignments that rely upon immediate feedback. Take advantage of the rhythm of SRS work by breaking up your lecture into short periods of talking interspersed with broad-ranging discussion and other classroom activities.
7. SRS allows you to explore diverse types of student learning that involve text, diagrams and graphs, pictures, video, artifacts, and even equations or scientific notation. Some work better than others for your students, in your discipline. Which ones?
8. Provide a brief training session the first day you will use clickers in your class room. Make sure to include an introductory explanation on how to use the technology and the purpose of the technology. Students need to develop a perceived validity of the system.
9. The use of Classroom Assessment Techniques (CATs) such as entrance or exit assignments, and active learning strategies such as "think-pair-share" can promote the creation of a peer learning community in your class. Opportunities to group students for purposes of discussion, debate, and deeper examination of important ideas should be central to your SRS plan.

Assessing Levels of Student Learning using SRS

Pre-Assessments: Administer before semester or before module/section starts

- What do students already know?
- What are students' misconceptions?

Mid-topic Assessments: Administer in the middle of mini-lectures or before another major concept

- Do they understand this principle?
- Can they connect this principle/idea to the previous one?
- Can they apply this concept?
- How is their thinking changing?
- Can they broaden their own perspective to include other points of view/opinions?

Post-Assessments: Administer at the end of a topic or class sessions

- What is their overall conceptual framework?
- Can they synthesize the concepts to solve problems?
- How has their understanding changed?

Sample Assessment: SRS Items for Higher-Order Pedagogical Objectives

It's important to go beyond the Q&A format that solely emphasizes the recall of specific information. In addition, one should present practical or real-world situations to the students. These problems may use short paragraphs describing a problem in a practical situation. Alternatives include the use of other sorts of items that require interpretation: diagrams, pictures, charts, tables, equations, or quotations.

Then SRS test items can be written which call for the application of principles to the solution of these practical problems, or the evaluation of several alternative procedures.

Examples

1. Disregarding the relative feasibility of the following procedures, which of these lines of research is likely to provide us with the most valid and direct evidence as to evolutionary relations among different species?

- Analysis of the chemistry of stored food in female gametes
- Analysis of the enzymes of the Krebs cycle
- Observations of the form and arrangement of the endoplasmic reticulum
- Comparison of details of the molecular structure of DNA
- Determination of the total percent protein in the cells

2. While you are stopped at a traffic light, a homeless person comes up to you and asks for money for food. You give the homeless person \$2, and s/he says 'thank you.' You never see that person again. What type of reciprocity has just occurred?

- Generalized
- Balanced
- Negative
- Redistribution
- Market exchange

3. If Homer wrote *The Iliad* today, Stanley Fish and Harold Bloom would argue, respectively, whether the work should be classified as:

- Existential vs. romantic
- Postmodern vs. classical
- Modern vs. romantic
- Postcolonial vs. modern
- Preliterate vs. postliterate

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Taxonomy of Items: How to Best Assess Different Levels of Learning

Taxonomy refers to the cognitive processes required to answer the item (Bloom, et al, 1956). The construction of the stem and responses, utilization of visual materials as well as the process and content of the item all contribute to the classification of an item by taxonomy level. The following taxonomy levels are described to assist you in developing items that not only assess basic knowledge, but also extend beyond to assess higher order thinking and abilities. Below are sample items from the biological sciences.

To Assess	Sample Questions
Prior knowledge, misconceptions, and background knowledge	Which of the following are the raw materials for photosynthesis? A. Water, heat, sunlight B. Carbon dioxide, sunlight, oxygen C. Water, carbon dioxide, sunlight D. Sunlight, oxygen, carbohydrates E. Water, carbon dioxide, carbohydrates
Recall, Comprehension	If living cells similar to those found on earth were found on another planet where there was no molecular oxygen, which cell part would most likely be absent? A. Cell membrane B. Nucleus C. Mitochondria D. Ribosome E. Chromosomes
Analysis and Critical Thinking	Mitochondria are called the powerhouses of the cell because they make energy available for cellular metabolism. Which of the following observations is most cogent in supporting this concept of mitochondrial function? A. ATP occurs in the mitochondria. B. Mitochondria have a double membrane. C. The enzymes of the Krebs cycle, and molecules required for terminal respiration, are found in mitochondria. D. Mitochondria are found in almost all kinds of plant and animal cells. E. Mitochondria abound in muscle tissue.
Synthesis and Evaluation	Disregarding the relative feasibility of the following procedures, which of these lines of research is likely to provide us with the most valid and direct evidence as to evolutionary relations among different species? A. Analysis of the chemistry of stored food in female gametes. B. Analysis of the enzymes of the Krebs cycle. C. Observations of the form and arrangement of the endoplasmic reticulum. D. Comparison of details of the molecular structure of DNA. E. Determination of the total percent protein in the cells.
Application and Performance	Phenylketonuria (PKU) is an autosomal recessive condition. About one in every fifty individuals is heterozygous for the gene but shows no symptoms of the disorder. If you select a symptom-free male and a symptom-free female at random, what is the probability that they could have a child afflicted with PKU? A. $(.02)(.02)(.25) = 0.0001 = 0.01\%$, or about 1/10,000 B. $(.02)(.02) = 0.0004 = 0.04\%$, or about 1 /2,500 C. $(1)(50)(2) = 100\% = \text{all}$ D. $(1)(50)(0) = 0 = \text{none}$ E. $1/50 = 2\%$, or 2/100

Breakout Session: Integrating SRS and Assessing Student Learning

We've found that one issue that can arise when faculty introduce a new technology such as SRS into their teaching is that it may be simply added to whatever is already being done in the course. This can lead to the "course-and-a-half syndrome" because the instructor is just trying to do *more* (i.e., adding on more stuff) without redesigning the course to take account of the new technology.

A related issue is that a new technology may not be employed in a way that provides feedback to the instructor about whether student learning is actually being improved by its use. It's crucial to gain this feedback by finding a way to document the effect of the new technology on student learning.

1. How will you *integrate* your use of SRS into your course in such a way that it complements your current instructional practices without overloading the course? In other words, what will you change or eliminate with your use of SRS? What will it replace in your course?
2. Please sketch a sample of an SRS question that will document your students' higher-order learning. Be as specific as you can. Once you have developed the item, discuss with your partner the level of learning and/or type or problem demonstrated in your SRS question. Use the examples and taxonomy to guide you.

Please think for a few minutes and make some notes to yourself. Then we'll ask you to pair up with the person next to you to discuss your ideas for about 15 minutes, before everyone reports out to complete the larger session.

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UWS SRS Project Evaluation

Our goal for the SRS Project evaluation is to produce results that illustrate the effectiveness of SRS in the classroom as well as the effect of SRS on teaching and learning. In doing so, we will utilize both quantitative and qualitative methodologies in evaluation of the project outcomes. Qualitatively, the faculty and staff involved will develop a set of criteria to assess the usefulness of SRS. We will organize various debriefing sessions and focus groups in order to gather faculty reports on the SRS for analysis. Also, a thematic analysis of narratives will be conducted using individual comments and stories gathered during one-on-one training appointments and from email correspondence from faculty queries and problems during the Project. Further, we will examine faculty's perceived effectiveness of SRS across disciplines.

We will gather anonymous student evaluations by survey, which will contain a series of questions that asks about students' attitudes towards the use of SRS in the classroom as well as their evaluation of the course itself. In addition, we will administer surveys to examine students' evaluation of the clicker (e.g., ease of use, cost), evaluation of course design, overall effectiveness, and others. We will conduct various multivariate analyses in analyzing the data to produce quantifiable results of the effectiveness of the technology.

For selected faculty participants, we will conduct a case study focusing on two courses conducted in parallel with one lecture utilizing a student response system and the other offered in a traditional setting without SRS. We will examine several variables to measure the overall value.

Methods

- 1.) Student Likert Survey (demographics, previous technology use, evaluation of SRS, satisfaction, performance, learning, and others)
- 2.) Faculty Likert Survey (demographics, course details, evaluation of SRS, etc.)
- 3.) Parallel Case Studies
- 4.) Learning Assessments (gathered throughout the semester)
- 5.) Grades and Pass Rates – Performance indicators (from previous semesters and semesters prior to SRS)
- 6.) Student Evaluations (from current and previous semesters prior to SRS)
- 7.) Faculty Focus Groups (and debriefing sessions)

Research Questions

How do students evaluate SRS?

How does students' previous technology use affect the evaluation of SRS?

How do students' demographics affect the evaluation of SRS?

How does students' SRS use and SRS evaluation influence course evaluations?

How does SRS impact student learning? (student's perspective and raw performance data/assessment data)

How do students evaluate SRS impacts on course design?

How does SRS impact student performance (student's perspective and raw performance data/final grade/pass rate)

