

## **Matrix Surveys: A New Tool for Evaluation and Research**

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With a traditional survey, every respondent usually sees the same thing: the same questions worded the same way.

In contrast, the personal characteristics of respondents to a *matrix survey* determine what questions they each see and how their response forms are worded. The best-known example of a matrix survey is a statewide primary election; voters see different sets of candidates and ballot questions, depending on their addresses and political party registration.

However, the use of matrix surveys for elections only hints at their potential: **matrix surveys enable survey authors to ask qualitatively different, more pointed, and less ambiguous questions.**

The example of the primary election also points up another difference between traditional surveys and matrix surveys. Traditional surveys are created by one guiding mind – a person or a committee. In contrast, matrix surveys can be created by a coalition of stakeholders; each stakeholder can ask questions of a subset of all potential respondents.

To explore how matrix surveys open new options for evaluation, assessment and research about higher education, we have been experimenting with Flashlight Online 2.0, a new survey system powered by the Skylight Matrix Survey engine. Skylight, and the Flashlight Online 2.0 system, were developed by the Washington State University's Center for Teaching, Learning, and Technology (CTLT) working in collaboration with the TLT Group. Major funding for the work was provided by the Fund for the Improvement of Postsecondary Education (FIPSE).

In this article we report briefly on several of these initial development efforts, including matrix surveys for:

1. Evaluating workshops and courses;
2. Scholarship of teaching and learning
3. Guiding ePortfolio initiatives
4. Improving the teaching and learning of information literacy;
5. Assessing the use and effectiveness of classroom technologies

### ***What is a Matrix Survey?***

A traditional survey asks the same questions of all respondents. There is only one “respondent pool” (a group of people who see the same questions).

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	Question Group
Respondent pool	<ul style="list-style-type: none"> <li>• Question 1</li> <li>• Question 2</li> <li>• (etc.)</li> </ul>

In contrast, a statewide primary election (a matrix survey) looks like this:

	Question Group 1: Party A candidates for position 1	Question Group 2: Party B candidates for position 1	Question Group 3: Ballot question for District 1	Question Group 4: Party A candidates for position 2	...	Question Group N
Respondent pool 1: Voters in Party A, District 1	X		X	X		
Respondent pool 2: Voters in Party B, District 1		X	X			
Respondent pool 3: Voters in Party A, District 2	X			X		
Respondent pool 4: Voters in Party B, District 2		X				
...						
Respondent Pool M						

The election is a single survey: the data from all these respondent pools flow to the same place for analysis. However, unlike a traditional survey, many of the ballot questions are addressed to only a subset of the voters (respondents). In a matrix survey, voters are divided into different *respondent pools*. Each voter sees only those groups of questions that are valid for that pool to answer. In the table above, each row represents a respondent pool. If an X appears in a cell in that row, the respondents in that pool will see that particular *question group* (one or more questions that either appear together, or else not at all, on each response form).

A respondent pool might consist of a single person, or many. A question group might consist of a single question, or many.

One final term to introduce: the information that determines in advance which questions each respondent sees is called *metadata* about their respondent pool.

We originally developed this new approach for student course evaluation, so that students in each course could receive feedback forms tailored to the

characteristics of that course and, potentially, so that different stakeholders could each address questions to relevant students (e.g., the writing program could pose questions to students in 'writing-intensive courses;' the IT department could pose questions about smart boards only to classes meeting in rooms with smart boards; an instructor could write a question that would be seen only in one section taught by that particular instructor).

As we have begun using Flashlight Online 2.0, however, we have begun to realize that matrix surveys can be used to carry out strikingly powerful, pointed kinds of inquiry in many areas of assessment and evaluation. In this article, we will summarize several of these applications<sup>1</sup>:

1. Evaluating workshops and courses;
2. Scholarship of teaching and learning
3. Support of Innovation: Guiding ePortfolio initiatives;
4. Multiple technologies used for multiple activities: student polling (e.g., clickers);
5. Programmatic improvement: Improving information literacy;
6. Assessing the use and effectiveness of classroom technologies

### **1. Evaluating workshops and courses; scholarship of teaching and learning**

One of the earlier uses of Flashlight Online 2.0 for matrix surveys was developed by Raymond Pina and his colleagues at California State University, Sacramento. Feedback forms were created for IT workshops. The questions for participants in each workshop were identical, but the response forms each included the name of the workshop. Data could be analyzed for separate workshops (respondent pools) or across workshops. Workshops were offered, and data was being gathered, over many months. But it was still all one survey, and data received to date could be analyzed at any time over that period.<sup>1</sup>

At Washington State University, the engine is being used in a slightly more ambitious way.<sup>1</sup> For example, feedback forms are tailored by:

- Whether a chemistry course includes a lab and requires questions on that topic
- Whether a course includes a teaching assistant, about whom feedback is being gathered;

More ambitious uses of matrix surveys for student feedback become possible if faculty can select a) the issues about which it is most important to gather feedback, and/or b) what type of feedback they want for each such issue: summative (how successful or effective is it?) or formative (how can it be improved?)

Matrix surveys for course evaluation can take advantage of another feature of matrix surveys: *pluralistic authoring*. Different stakeholders could piggyback on the form to ask their questions of some, or all, students:

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- The Writing Program can add specific questions that would be asked only of students registered for courses flagged in the catalogue as "writing intensive".
- The Technology Services unit could ask some questions about a feature of the course management system only of students in courses that had used that feature.
- The Disabilities service could add questions about services for a disability, questions that are seen only by those students who have that particular disability.

When it comes time to analyze the data from the feedback, each course's responses could be analyzed on its own. Or a report can be written showing, activity by activity, how students' responses in this course relate to students' responses in all the other courses that also specified that particular activity.

### ***2. The Scholarship of Teaching and Learning; Example of information literacy***

We define the Scholarship of Teaching and Learning (SoTL) to be inquiry by educators into the learning of their own students, and sharing of valuable findings and experience of inquiry with colleagues. The example on the companion web page<sup>1</sup> focuses on information literacy, and includes two sample response forms created with the same matrix survey, as well as a sample faculty form that faculty could use to create such response forms.

Matrix surveys can make it easier for faculty members to:

- a) create tailored surveys for each course they teach, without creating questions on their own; instead they can work with colleagues and staff as a community of practice, sharing the work of developing feedback questions appropriate for each issue. Each time a member of this community needs to develop a student survey or feedback form, he or she can select from the question groups developed by the community.
- b) Follow trends. If an individual faculty member uses the same matrix survey over a period of years to study activities (e.g., how students interact online), it becomes possible to see whether progress is being made in teaching and learning.
- c) Pool data. As we will see in the discussion of information literacy below, phenomena that might not be visible if a question is only asked of, say, 15 students in one class may become much more obvious if 10 faculty pool their data to create a bigger sample.

Let's return for a moment to the discussion of student course evaluation. Student course evaluation, especially online, is more likely to elicit high response rates if students have been surveyed earlier in the term, and can see that the instructor has heard them and that the course has improved. Using online surveys for student course evaluation will be more effective if faculty use online surveys for SoTL.

### **3. Support of Innovation: Example of ePortfolios**

Evaluation of innovation, and using that data to guide next steps, has been challenging for a number of reasons:

- The innovation may be used in different ways by different faculty. The more empowering the innovation, the more likely this is. But this variety makes it difficult to use the same tools of inquiry across faculty and courses.
- Different stakeholders (faculty, students, IT staff, librarians, space planners, teaching center staff, assessment specialists, distance learning) may be involved in implementing the innovation. Which one(s) should write the survey? Which should respond?

Both these questions can be answered in fresh ways by using matrix surveys. As the Portfolio examples on the companion web page<sup>1</sup> demonstrates, a matrix survey of students can be tailored by getting prior input from faculty: which of a dozen use of ePortfolios are relevant to this class and what name students use for their electronic portfolios.

### **4. Support of innovation: Student Response Systems**

In the past, when people wanted to learn about the value of technology, they sought direct relationships between technology and outcomes. Do students who use software X learn more than students who don't? That type of inquiry has long been discredited. Technology's role is indirect; use of technology makes certain activities easier, and the activities can lead to learning. (If you doubt that, ask yourself what the relationship is between tons of paper used at a university and its learning outcomes.) So it makes sense to focus on activities, asking on the one hand whether different technologies have implications for that activity and, on the other hand, whether the activity leads to desired or undesired outcomes.

Matrix surveys can be ideal for this type of study. Consider, for example, the rising popularity of student polling. Most people's attention has focused on one particular technology for polling: handheld consoles called "clickers." But many other technologies can be used to support similar teaching/learning activities: cell phones, show of hands, holding up colored cards and, if students are online, the polling modules built into some online conferencing systems.

The activities supporting by polling vary by class as well: peer instruction, instant quizzes, tests of memory, and taking attendance. As the example on the companion web site<sup>1</sup> show, matrix surveys make it possible to gather data about student polling and its outcomes across classes that are using different technologies, calling those technologies by different names, and using them or different mixes of activity.

## **5. Evaluating classroom technologies and facilities**

At most institutions, different classrooms are equipped with different mixes of technologies (e.g., wireless, document cameras, an equipment cart, a projector on the ceiling, computers at student desks) as well as other features (chairs on wheels, desks, laboratory equipment).

A traditional survey of faculty about classroom technologies and features could only ask, "how satisfied were you with the facilities in your classroom?"

In contrast, authors of a matrix survey can use the institution's database of information about classroom technologies and features plus the institution's database of which faculty teach in each of those rooms in order to create response forms that ask faculty specific questions about technologies in the rooms they have used.

For each technology, faculty might be asked whether they were comfortable enough with the technology to use it, whether they had in fact used it for that course, for what activity(s) it was used, the 'fit' of the technology to the activity, and about any problems applying the technology to that activity. The questions could be designed specifically for each technology (e.g., a new kind of touch screen on the lectern might deserve a question about the user friendliness of the display.)

Once faculty have reported about which technologies were used in a course, a matrix survey could be created for students in those courses, to get their feedback on the value of those technology-supported activities.

## **Conclusion: Using Matrix Surveys**

Over 140 institutions<sup>ii</sup> can already use Flashlight Online 2.0 for easy creation of matrix surveys. The examples described above represent just a hint of the transformative impact of this kind of tool. We hope that readers of this article will be among the pioneers who use such surveys to push forward the frontiers of research in their fields.

## **About the Authors**

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<sup>i</sup> Examples of all the matrix surveys cited in this article can be found at <http://tinyurl.com/clemmj>.

<sup>ii</sup> To see if your institution is among those with access to Flashlight Online 2.0, see <http://tinyurl.com/66b244>. For information about subscriptions, see <http://tinyurl.com/5qkvm2>.