

L \TeX goes with the flow

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Abstract One advantage of \TeX and friends is that they fit naturally into a work flow where there are many tools, each good at its own job. This paper gives an example involving a system for doing class evaluations online.

My college gives students in every class a chance to provide feedback on that class. We now use a paper-based form but are looking toward online evaluations.

Some advantages of an online system would be: timeliness (reports for a class would be available immediately after the feedback period instead of six months later), flexibility (for instance, data could easily be tracked over time), and customizability (more on this below). So for the institution, all of the bullet points lead in the same direction.

We've had no luck finding a vendor. As one approach, I wrote some scripts. In my system, called Sphyg, part of the job involved moving the data from the database to the summary documents. For that, the right tool was L \TeX .

1 Sketch of the system

To understand how L \TeX fits into its flow, we must first understand the evaluation system.

1.1 Customizing the data in

Each semester's process starts with an email to the academic Vice President and to the Department Chairs. This mail has a link to an online form.

For instance, the VP's form allows the input of questions that will eventually appear on each evaluation seen by each student in each class in the college. These questions will appear either at the top of those evaluations or at the bottom.

Similarly, each Chair can enter questions for the courses in their department. These questions appear either at the top of the forms, below the VP's questions, or at the bottom above the VP's.

Each administrator's form comes up already filled out with last semester's questions. Thus if the administrator does not respond, or makes no changes, then last semester's questions will just be reused—this is what will typically happen.

If they do edit the form then for each question there is a place to write the text of the question, such as "I learned a great deal in this course." They also select among question types, including choose types such as choose-one-to-five, paragraph answer types, and many others (adding new types is easy). For choose types they also insert a space for students to make a brief comment.

Next, each instructor gets an email. It has links to a page where the instructor can add questions to the forms for their classes. One link allows them to put in questions on each form for any of their students. Other links go to different pages for each section that the instructor is teaching. That is, evaluation forms can be customized not only by college, by department, and by instructor, but also by section. As with the administrators, if an instructor does not respond then Sphyg uses the questions asked last semester by this instructor on all forms.

Now, with the forms made up, each student gets an email. It links to a page listing the student's classes and linking to the evaluations for those classes. Of course, students can submit at most one evaluation per section.

When the period for evaluations closes, Sphyg generates the reports. Each instructor gets a summary of all responses, for all questions, from students in each of their sections. That summary preserves the students's anonymity.

1.2 Customizing the data out

As described above, the system allows extensive customization of the input. But the output is customized as well.

Administrators do not get the same reports as instructors. The Vice President's report shows only the summaries for institution-wide questions. And, each Department Chair's report summarizes only the questions for the institution or for the department. This allows the instructor to ask developmental questions such as "What could I have done better?" that would not fit in an evaluative context.

However, this customization adds complexity to the production of the reports since they cannot just be forms into which the data is inserted.

2 The L^AT_EX generation

There are many ways to get data out of a database and into a report. Just to name one, the programming language Perl makes generating plain text reports straightforward. But plain text has shortcomings, such as a lack of graphics capability and colors, and character encodings can be awkward.

I wanted the reports to be nicer than that, for instance to show bar charts for choice-type questions. That, and also that everyone can read it, means that the natural format for the report is PDF. Since direct production of PDF would be very hard, generating the reports using L^AT_EX makes the most sense.

So Sphyg's document work flow is: a Python script takes the data from the database and outputs L^AT_EX source files. These are turned into a report by running them through X_YL^AT_EX. The variant X_YL^AT_EX was chosen because it makes convenient the use of a wider character set.


I wrote a custom .sty file for the reports. That means that less of the L^AT_EX code is mixed in with the Python.

Here is an example showing part of a page, using some of the sample data.

Responses for MA 406 A: Abstract Algebra I

There are 21 students enrolled, of which 2 returned a survey. Grades in this section are: 2 A's, 9 B's, 7 C's, 0 D's, 0 F's (with 0 other, 3 none), and a quality point ratio of 2.7.

Question 1. The instructor is knowledgeable about the subject.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No response								
1 (50%)	1 (50%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)		SA	A	N	D	SD	NR

In this section the mean is 4.5 and the standard deviation is 0.7 with 2 responses. For 2 sections in the Mathematics Department the mean is 4.5 and the standard deviation is 0.7 with 2 responses. For 2 sections across all departments the mean is 4.5 and the standard deviation is 0.7 with 2 responses.

Additional comments:

a laf a f lkasj dlk al;s dflkaj flk

A number of things appear in this sample. For instance, \LaTeX generates page headers that change depending on the class section. Also notice that the mean and standard deviation summary information about responses are given for this single section, across the department, and across the college. Finally, notice the optional comment shown with the question summary (here there is just one comment but had there been more they would have been listed in alternate shadings).

An advantage of using \LaTeX in this work flow is that some of its features make easy things that might otherwise be quite hard.

One example is that the document style uses the `graphicx` package to make a macro to draw the bar charts, as shown in the screenshot above.

Another example of leveraging \LaTeX is that the report style uses the `longtable` package to alternatively shade adjacent comments, and to automatically insert “*(continued on next page)*” where appropriate.

Still another example is that the `hyperref` package makes document navigation easy. For instance, administrative reports have a table of contents with a link from the instructor’s name to the first page of the summary for that instructor. There is also an index with a link to the summary for each section of each course. Those links are created automatically, obviously.

The final aspect of the reports to note is that they can be quite long. The Vice President’s report has a summary of all of the college-wide questions, including students’s optional comments, for each instructor. In the tests using dummy data this report was over a thousand pages. While that length would be a cause for worry with some document-handling programs, \LaTeX has no trouble. Further, compilation of the document takes less than a minute.

3 Status

Sphyg’s \LaTeX subsystem performed flawlessly. In particular, for the characters encountered in testing (only Latin-1 characters), \XeLaTeX had no trouble at all.

The main challenge with the larger project of online evaluations is that students do not fill them out—in one of my experiments the most common return rate was 0%. A person can reflect on the desirability of collecting responses that users seem not keen on giving, but at my college there is a mandate to be proactive about feedback. So we need an incentive. One is to only allow students to see their grades online after they have filled out the evaluation. That is why in the

system described above students are sent to a page filled with links: once they have filled out the evaluation then in the place of the link appears their grade. For this incentive we must temporarily suppress access to the mechanism that ordinarily allows students to see their transcript online. At the moment the online evaluation initiative is stalled at this point (our online-transcript vendor wants a great deal of money). In short, whether Sphyg will ever get running is unclear.

What is clear, however, is that $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ fits well into this kind of flow. For example, if I had instead tried writing the PDF directly from the database then graphics and pagination would be quite a problem. Instead, with $\text{T}_{\text{E}}\text{X}$ and friends, it was a solved problem.