Lessons Learned: A Database-supported Workflow for Midterm Course Assessments

Dr. Ken Yasuhara, University of Washington

Ken Yasuhara is an instructional consultant and assistant director at the Office for the Advancement of Engineering Teaching & Learning (ET&L) at the University of Washington. He completed an A.B. in computer science at Dartmouth College and a Ph.D. in computer science and engineering at the University of Washington. When he finds the time, he plays with bicycle tools and knitting needles.

Dr. Jim L. Borgford-Parnell, University of Washington

Dr. Jim Borgford-Parnell is Director and Instructional Consultant of the Office for the Advancement of Engineering Teaching & Learning at the University of Washington. He taught design, education-research methods, and adult and higher education theory and pedagogy courses for over 35 years. He has been involved in instructional development for 20 years, and currently does both research and instructional development in engineering education. Jim has taught courses on the development of reflective teaching practices, and has presented workshops on learning how to learn and developing metacognitive awareness. He has published and presented on engineering design, engineering pedagogies, and instructional development topics.

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Abstract

This Lessons Learned paper describes the way in which our teaching and learning office conducts mid-term course assessments, using a variation on the Small-Group Instructional Diagnosis (SGID) and a custom-made database system. This paper details how our workflow and database are tailored for our disciplinary and institutional culture.

At the University of Washington's Office for the Advancement of Engineering Teaching & Learning (ET&L), we focus our efforts primarily on sustained, individual consultation relationships with educators, and SGID-style formative course assessments are central to these relationships. Our end goal is student–educator partnerships around learning, where both parties take conscious ownership over their respective capacities and responsibilities for successful learning. Accordingly, we conduct SGIDs in a way that fosters responsive, reciprocal student–educator communication around teaching and learning.

Introduction

Small-Group Instructional Diagnosis (SGID) is a longstanding method for informing course improvements [1], [2] that is especially effective when integrated with instructional consultation [3]. We introduced a standard SGID formative assessment process to engineering faculty in 2005. Up to that time, the only experience that the majority of faculty members had with course or teaching assessments were the end-of-quarter course student ratings of instruction (SRIs) that were mandated by the university. The university's SRI consists of a set of quantifiable Likert scale questions and four qualitative open-ended questions. The university's Office of Educational Assessment machine-processes the Likert-scale questions and produced a report for each faculty member that included means and relative rankings of the course scores. The reports generally made sense to faculty members; however, they often viewed the results as being too general to be formatively actionable, especially when there were multiple aspects of the course that did not score well.

The students' responses to the open-ended questions, on the other hand, were not processed at all by the Office of Educational Assessment. The results were simply given back to the faculty members as stacks of scribbled-on questionnaires. Although the questionnaires often contained useful information, they were also rife with contradictory, confusing, and illegible feedback. Now that our university has an online option for SRIs, the legibility problem has been mitigated, but the confusion and contradictions remain endemic to the process. In general, the engineering faculty attitude we most encounter regarding the mandated SRI is that they are unfortunate, unfair, and flawed summative judgements of their teaching and courses. They are not viewed as having much, if any, formative use.

With the introduction of our SGID process, we were able to not only provide actionable results from students' feedback, but we also produced data sets that could be triangulated with the mandated SRI data, making the end-of-quarter SRI data more formatively useful. The ET&L SGID process is streamlined to take little class time and utilizes a database for efficient, robust analysis and reporting. These characteristics make for a good fit for our local engineering

educator client population. In our review of the literature on SGIDs, we have been unable to find any references to SGID processes that utilize a database system like ours.

ET&L's SGID Process

Collecting student feedback: The beginning of our small-group instructional diagnosis (SGID) workflow is a streamlined, more consensus-focused version of the process described by Clark and Redmond in 1982 [1]. In our process, the instructional consultant arranges for 20–25 minutes of in-class time, during which we introduce the purpose and process to the students, facilitate small group formation, and have students respond to two questions: "What is helping you learn in this course?" and "What changes could be made that would assist you in learning?" Discussions in groups of about five students each and then as a full class are facilitated to yield group and full-class consensus feedback. Each group records their consensus feedback and the number of students in the group on a provided form, which we collect at the end of the in-class session. The purpose of the full-class discussion is to get details and clarification on the group-consensus feedback, as well as get a sense of which comments the full class agrees on.

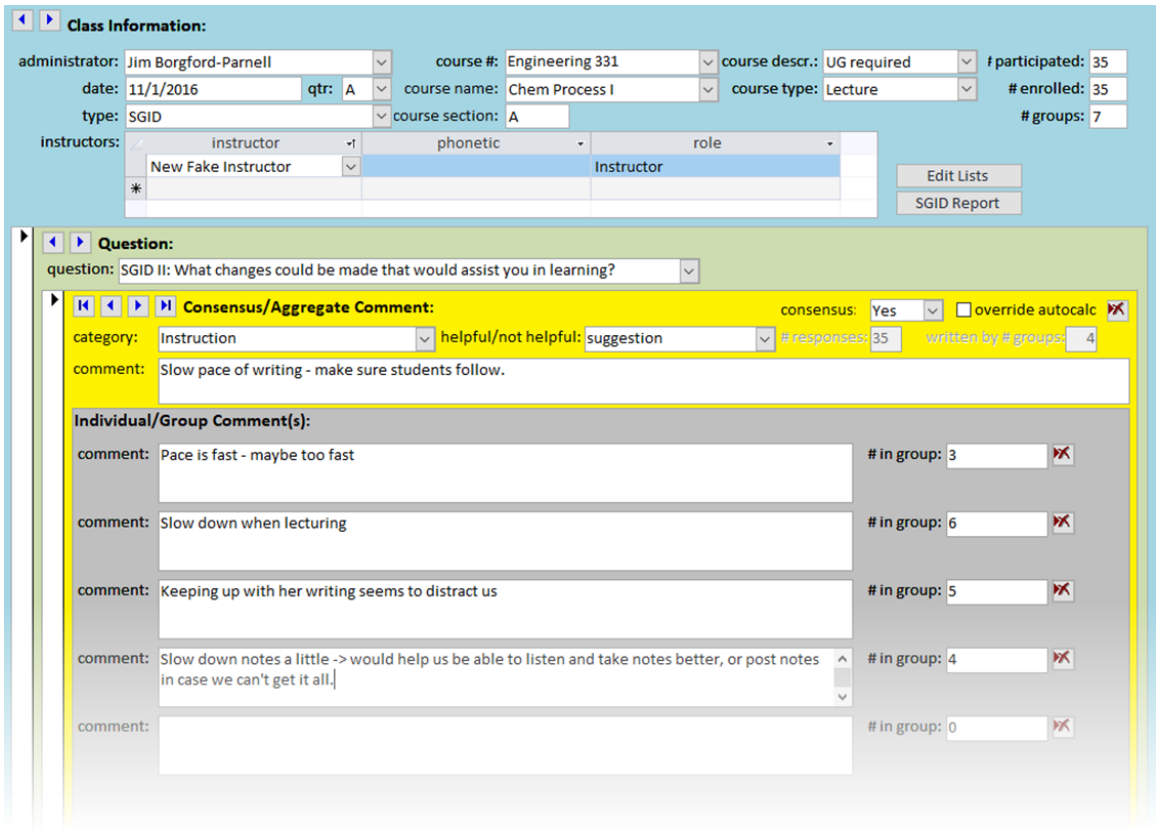


Figure 1: Database interface for transcribing, categorizing, labeling, and grouping feedback items.

Processing and analyzing student feedback: Processing, analysis, reporting, and debriefing of the feedback data are what sets our workflow apart. We enter the feedback into a custom-developed Access database, categorizing and grouping it as we do so (Figure 1). Over more than a dozen years analyzing engineering student feedback, we have refined a set of sixteen codes that we use in our analysis (Table 1). In addition to the category codes, feedback items are also labeled as to whether students designated them as helpful, not helpful, or a suggested change.

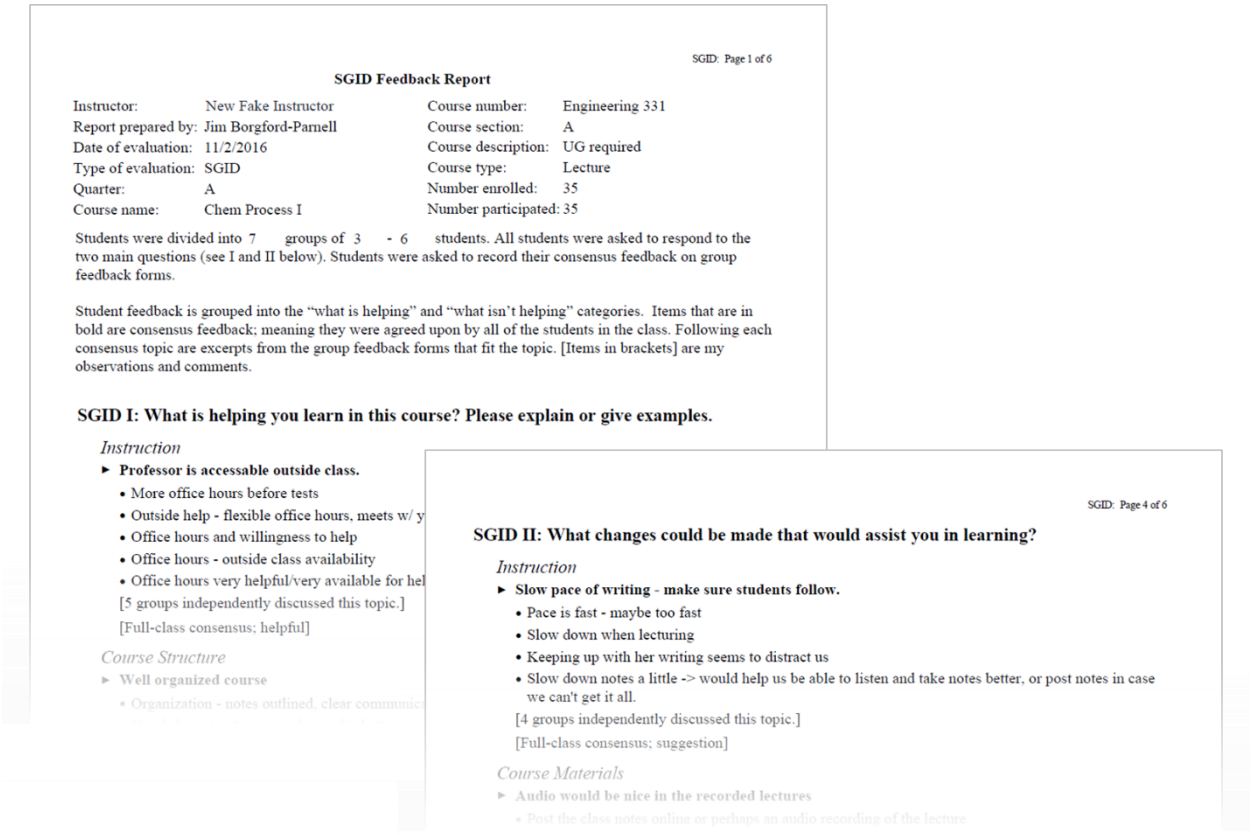
Two types of consensus feedback are gathered in the SGID process: small-group consensus items and full-class consensus items. Both types of feedback are categorized with the same codes. The full-class items become the major groupings in our analysis, and the small-group

Table 1: Category codes and definitions for qualitative student feedback

Codes	**Definitions**
Course structure	Information regarding the sequence, flow, alignment, organization, or scheduling of course activities or content. Example student comment: "Assignments on a topic should follow the lecture on that topic".
Evaluation/Feedback	Information regarding grading, tests, quizzes, evaluation criteria, credit, or quality/quantity of feedback on student work, learning progress, or performance.
Course materials	Information regarding quantity or quality of instructional supplies or tools that students use, including course handouts, slides, overheads, course website, videos, textbooks, or readings. Example student comment: "the syllabus [as a document] was unclear and lacked important information".
Instruction	Information regarding the pedagogy or practices of the instructor, i.e., what the instructor does in class, labs, office hours, lecturing, presenting, explaining, demonstrating, and questioning. (Note: this includes the use of humor or encouragement as a pedagogical tool/strategy.)
Learning activities	Information regarding things the students are assigned or tasked, such as in-class exercises, homework, lab assignments, group work, reading, writing, involvement on discussion boards, presenting, or participating.
Instructor characteristics	Information regarding instructor's nature or personality, such as knowledge, friendliness, sense of humor, flexibility, etc., but not teaching style.
Learning/Cognition	Information regarding whether or not learning was happening, level of challenge, progress toward learning objectives, clarity of learning objectives, etc.
General	Information that is not specific to any of the other codes, such as comments about the course overall. Example student comment: "This course was great/terrible."
TA	Any information regarding the TA, unless the TA was acting as the instructor, in which case all codes regarding "instructor" will apply. (Note: in cases where the professor requested the assessment and the TA acted as instructor for part of the evaluation period, this code would be used for any TA-related student feedback.)
Course Content/Topics	Information regarding the quantity, quality, or relevance of topics or ideas covered, or suggestions for additional content. Example student content: "More real-world problems."
Class Environment	The psychological and affective atmosphere of the course, such as friendliness, comfort level, level of stress.
Classmates	Information regarding classmates/peers, such as their abilities to work in groups, behavior in class (e.g., excessive talking or asking off-topic questions), helpfulness, and language proficiency.
Program Curriculum	Information regarding the programmatic curricula, such as the course's placement in the curriculum, pre-requisite courses, its relation to other courses, conflicts with other courses (e.g., due to scheduling, workload, due dates, etc.).
Feedback to Instructor	Information regarding opportunities to provide input on the course or teaching, as well as the instructor's responsiveness to that feedback. Example student comments: "instructor gathered too much feedback" and "nice that she collected and responded to feedback before the end of the quarter".
Guests	Information regarding the guest speakers, project advisors, project evaluators, or other visitors.
Facilities/Equipment	Information regarding the classroom space, physical infrastructure, technology, building, location, availability, or accessibility.

items either group under a related major grouping, or they are entered as additional groups of items (with no associated full-class item). Categorizing and grouping the feedback enables us to compute summary statistics that provide a prioritized overview of the feedback. All of the written, group consensus feedback is transcribed verbatim into the database in this way.

Report generation: The database generates reports that preserve the richness of the qualitative feedback while also tailoring to our engineering educator clients. Many engineering faculty members are unaccustomed to making sense of large sets of qualitative data, so our analysis and reporting make it easy for them to quickly identify and comprehend the most prominent themes in the feedback. As seen in Figure 2, several types of information are readily discerned from our reports: (a) Issues that the entire class agreed upon; (b) the number of individual groups that discussed particular issues; (c) the range of ways that student groups focused on particular issues; and (d) the general tone of students' comments.



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SGID Feedback Report

Instructor:	New Fake Instructor	Course number:	Engineering 331
Report prepared by:	Jim Borgford-Parnell	Course section:	A
Date of evaluation:	11/2/2016	Course description:	UG required
Type of evaluation:	SGID	Course type:	Lecture
Quarter:	A	Number enrolled:	35
Course name:	Chem Process I	Number participated:	35

Students were divided into 7 groups of 3 - 6 students. All students were asked to respond to the two main questions (see I and II below). Students were asked to record their consensus feedback on group feedback forms.

Student feedback is grouped into the "what is helping" and "what isn't helping" categories. Items that are in bold are consensus feedback; meaning they were agreed upon by all of the students in the class. Following each consensus topic are excerpts from the group feedback forms that fit the topic. [Items in brackets] are my observations and comments.

SGID I: What is helping you learn in this course? Please explain or give examples.

Instruction

- **Professor is accessable outside class.**
  - More office hours before tests
  - Outside help - flexible office hours, meets w/ y
  - Office hours and willingness to help
  - Office hours - outside class availability
  - Office hours very helpful/very available for hel

  [5 groups independently discussed this topic.]

  [Full-class consensus; helpful]

Course Structure

- **Well organized course**
  - Organization - notes outlined, clear communic

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SGID II: What changes could be made that would assist you in learning?

Instruction

- **Slow pace of writing - make sure students follow.**
  - Pace is fast - maybe too fast
  - Slow down when lecturing
  - Keeping up with her writing seems to distract us
  - Slow down notes a little -> would help us be able to listen and take notes better, or post notes in case we can't get it all.

  [4 groups independently discussed this topic.]

  [Full-class consensus; suggestion]

Course Materials

- **Audio would be nice in the recorded lectures**
  - Post the class notes online or perhaps an audio recording of the lecture

Figure 2: Pages excerpted from a sample SGID report, as automatically produced by our database. Feedback items are grouped by theme and ordered by question (SGID I, II) and frequency. Full-class consensus items are presented in bold, with triangular bullets. Group consensus items are transcribed verbatim, grouped by theme, and presented with circular bullets. Each report ends with a quantitative summary, as shown in Figure 3.

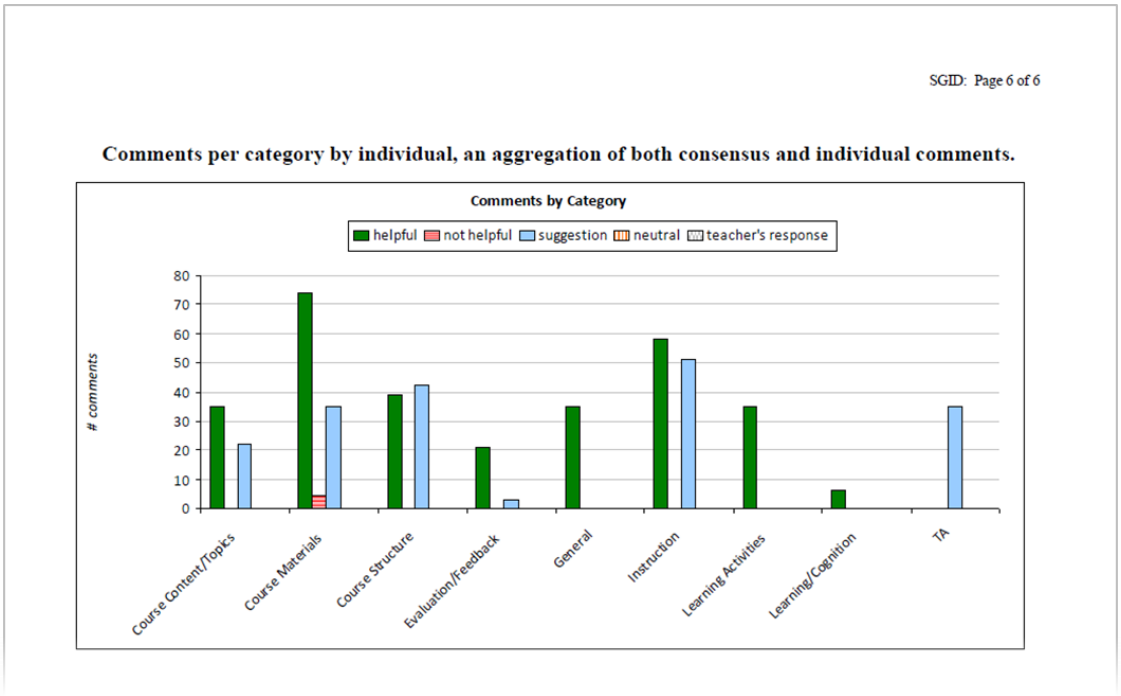

Figure 3: Bar chart showing distribution of feedback items across categories (horizontal axis) and labels (bar fill), as appearing at the end of each SGID report.

We include a bar graph at the end of each report that shows all the code categories identified in that data set and the numbers of student comments in each category (Figure 3). The bar graph also provides a quick visual indication of students' attitudes toward the course and/or the instructor. By scanning the bar chart it is often possible to get a sense of whether the students generally hold positive or negative attitudes toward the course or the instructor.

For the substantial number of returning clients who have us do SGIDs in subsequent offerings of the same course, the database enables us to provide longitudinal reporting that tracks shifting trends in feedback across multiple terms. Our longitudinal reports help our clients identify whether and how changes they made, that were based on student feedback, may be impacting students in subsequent course offerings. The longitudinal reports also help faculty members identify issues they may have initially dismissed as trivial or minor when seen in a single report, but often change that impression when seen in a longitudinal report as a persistent issue.

Although categorizing and grouping feedback takes some time, report production is entirely automated. Additional efficiency comes from the database's support for multiple simultaneous users, giving us the flexibility to divide and delegate analysis of large-course feedback. (We regularly serve courses with enrollments near or exceeding 100.) Table 2 provides an idea of the scale of our recent SGID work. Our faculty development office consists of two consultants and one half-time graduate assistant. The graduate assistant aids with approximately one third of the SGIDs.

Table 2: SGID stats for 2016/2017 academic year (fall, winter, and spring quarters). Days are business days.

Avg. #/quarter SGIDs conducted	Avg. time/quarter from collection & processing data to report production	Avg. time/quarter from report to completed debrief	Avg. total enrollment/quarter in courses in which SGIDs were conducted
57.3	0.61 days	3.35 days	1,999 students

SGID debriefing: With approximately ten weeks in every quarter at our institution, we prioritize rapid turnaround between collecting SGID data and debriefing with the educator. We begin each debrief with a reminder that the student feedback presented in our report is only one set of data, and that data should be triangulated with everything else the educator knows about the course, especially the results of learning assessments. A key element of debriefing is helping the faculty member formulate a plan for responding to the feedback. At minimum, we encourage them to acknowledge and appreciate the feedback (i.e., to close the loop with students). Almost without exception, there are changes the faculty member can make right away to try to improve student learning, as well as changes that can inform future offerings of the course. There are also cases where it makes the most sense to ask students to make a change—e.g., prepare a notes page to use in an exam, instead of an open-book exam. In either case, the feedback data is never the only basis for making changes, and the instructional consultant's expertise is obviously critical in informing teaching decisions. It is by no means a given that SGIDs result in more work for the faculty member. In the final analysis, we conjecture that many changes made in service of improved learning save both faculty and students time and grief.

Discussion

SGIDs are certainly not the only option available to faculty developers for gathering actionable student feedback, and they are not the only service we offer and discuss with our clients. For instance, in their *Handbook for College Teachers*, Angelo and Cross discuss many classroom assessment techniques that can help improve learning [5]. There are also methods such as the Quick Classroom Diagnostic [6], proposed as alternatives to a traditional SGID. Online and paper-based questionnaires are additional alternatives. However, particularly with our highly efficient, database-enhanced workflow, we are able to offer a large number of faculty, students, and other stakeholders a wide range of benefits, despite our office's modest staffing. We close this paper by discussing how different stakeholder groups benefit from SGIDs, the way we offer them.

Impact on faculty

There are well-documented educator benefits of SGIDs that are not unique to our method [1]–[3], but they are worth noting here. In general, SGIDs may:

- Transform the negative assumptions faculty members often develop regarding the usefulness of student feedback;
- enable faculty members to conceptualize faculty development as a continuous improvement process that fits within their busy academic lives;
- reinforce the notion that courses are designed entities and students are users and stakeholders, and therefore, important sources of feedback;

- help faculty members to begin to view their students as legitimate partners in course refinement;
- open up new avenues for building rapport with their students;
- provide an opportunity for faculty members to experience evidence-based teaching;
- provide the local, actionable data that grounds the adaptation and adoption of research-based promising practices; and
- help faculty members to begin to identify teaching and teaching development as an enjoyable, or at least not onerous, professional responsibility.

Our database-enhanced workflow enables our small office to offer SGIDs with some additional benefits for our clients, such as:

- The efficiency of our process allows us to scale up the number of SGIDs we can handle in a three-week, mid-quarter window. Therefore, we can more easily schedule around our clients' time constraints. To date, no one has been turned away;
- the level of detail and comprehensiveness in our reports, in combination with the structure from grouping/coding, makes our reports easily understood and action items more easily identified. The quantitative summary stats are especially good for engineering faculty members;
- the database allows for the development of longitudinal analysis and reporting; and
- the fast turnaround on our reports (less than a working day, on average) provides our clients with more opportunity to make appropriate adjustments to their courses or teaching during the quarter.

Although our recent service assessment data is not precise enough to speak to the specific benefits listed above, our surveys of client faculty indicate positive regard for SGIDs. Many of our clients report that they recommend us to their departmental colleagues. Accordingly, despite minimal advertisement of our services, we continue to experience steady growth in SGID service demand.

Impact on students

In general, students may accrue many benefits from professors who utilize SGIDs, such as:

- The small group and whole class discussions help students develop a more calibrated understanding of how differently or similarly other students experience a course;
- the mid-quarter timing of the SGID allows students to experience actual improvements that stem from their feedback, thereby, they begin to see themselves as having some responsibility to improve the success of their' and their classmates' learning;
- by experiencing their professors closing the loop on their feedback, students begin to understand that their professors care about their success. and
- by experiencing the SGID process student may begin to change their jaded attitudes toward SRIs.

The efficiency of the SGID process we use, enables each of the benefits described above. Moreover, the large volume of SGIDs we can handle means that many of the students in our

college experience the process multiple times each year, and often multiple times each quarter. We notice that those experienced students are generally more engaged in the consensus discussions and their feedback becomes increasingly more reasonable and articulate. At the end of each quarter, a segment of our clients ask us to come into their classes and conduct a last-class interview (LCI). The LCI is a short full-class interview in which we ask students if the improvements that resulted from their mid-quarter feedback was helpful. To date, 98% of over 8,200 students in 269 engineering courses that we did LCIs in reported improvements in teaching that they related to their SGID feedback.

Impact on other stakeholders

While faculty and students are the focal beneficiaries of our SGID service, we close by briefly describing three other stakeholder groups who have indicated interest in our SGID method: academic leadership and administrators, faculty developers, and education researchers in engineering.

A department chair expressed their appreciation for the assessment reports that their junior faculty have chosen to include in their promotion and tenure materials. (We often hear of faculty electing to do so.) Especially the longitudinal reports provide a much more detailed record of a faculty member's teaching and its development over time, compared with course evaluations. At a university with heavy emphasis on research, we are happy to facilitate promotion and tenure committees engaging in substantive evaluations and discussions of teaching and learning. More recently, at the request of department chairs, we have begun using our SGID process, with minimal adaptation, to conduct assessments of entire degree programs.

Finally, we are also looking into the possibility of conducting analyses on the large and growing volume of SGID data we have. Given our office's service focus, our primary interest is how large-scale analyses of past SGIDs can inform the way we work with faculty. For instance, if we found that, across departments, lab courses tend to have challenges related to grading and feedback, we might target services on these issues. On the other hand, if a particular department's high-enrollment courses consistently garner positive feedback about student engagement, perhaps we collaborate with their faculty to produce some focused instructional development materials or even host a relevant panel or workshop.

Analyses of our SGID data could also play a role in research efforts about teaching, learning, and faculty development. We have already imagined a host of research questions that we might be able to explore. For example, we could investigate hypotheses on gender's relationship with SGID feedback. Analyzed with other data, we might explore how department characteristics relate to differential participation rates in our services. Our office places paramount value on the sustained, confidential, collaborative relationships we have with our clients, so we would only pursue research that would not threaten these relationships, as well as attend to more general human subjects concerns, of course.

Conclusion

We believe the success of our SGID method can be attributed to its alignment with our context. In our experience, engineering faculty like interpreting data for themselves but are very busy

with substantial research obligations, so they appreciate that our reports both offer a comprehensive transcription of student feedback but with grouping and ordering to facilitate skimming and prioritization of concerns. They also tend to be quantitatively minded, so they appreciate the inclusion of summary statistics with visual representations. With only about ten weeks in a quarter, our analyzing feedback in less than a business day enables clients to close the loop promptly and maximize the impact of course improvements. Despite our modest staffing, our efficiency also allows us to reach a large number of faculty and students each quarter, which we hope contributes to a shift in culture where both faculty and students are more engaged in and intentional about their decisions around teaching and learning. We welcome faculty developers interested in adapting our method and tools for their local contexts to contact us.

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