Student Evaluations of Teaching: Dental and Dental Hygiene Students' and Faculty Members' Perspectives

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Abstract: The aim of this study was to explore dental and dental hygiene students' and faculty members' perceptions of student evaluations of teaching (SET) and determine whether dental vs. dental hygiene student, beginning vs. advanced student, and faculty vs. student responses differed. Perceived benefits, challenges, and suggestions for conducting SETs optimally were also assessed. Survey data were collected from 329 dental students (D1: 108; D2: 91; D3&4: 130) and 68 dental hygiene students (DH2: 26; DH3: 19; DH4: 23) (overall response rates 76%/92%) and 56 dental and eight dental hygiene faculty members (response rates 41%/100%). Faculty respondents were more positive about SETs than students (five-point scale with 1=disagree: 3.85 vs. 3.39; p<0.001), with seniors being the least positive (mean 2.42). Respondents agreed that all students should complete SETs (3.87 vs. 3.61; p=0.068), with faculty agreeing more strongly than students that all courses should be evaluated (4.32/4.04; p=0.046). Students agreed more strongly than faculty that SETs should occur during regular class time (3.97/3.44; p<0.001) and are too long (3.47/3.09; p=0.010) and that results should be shared with students (4.03/3.57; p=0.002). Open-ended responses showed that students perceived more benefits of SETs for faculty members than for students and that the most frequently mentioned problem was that SETs do not result in changes. Faculty members were generally more positive than students (especially seniors) about SETs. These findings suggest that, according to these respondents, SETs should be completed by all students for all courses, be short, provide opportunities for open-ended comments, and be administered in class to improve response rate. In addition, SET results and how SETs are used to improve courses should be shared with students.

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Student evaluations of teaching (SETs) have been a part of higher education activities in the U.S. since the 1920s[1] when they were first introduced in several major universities.[2] However, it was not until the 1970s that SETs became more widely accepted and not merely voluntary evaluations.[3] In 1987, Marsh suggested that the purpose of SETs was to provide feedback to instructors about their teaching, feedback to the administration for personnel decisions, information for students when selecting courses and instructors, and data for research on teaching.[4] In 2005, Yao and Grady argued that the two main purposes of SETs were to improve the quality of teaching and to collect information about instructors for potential use in hiring, promotion, and tenure decisions.[5]

SETs are used by most dental schools in the U.S. according to Jahangiri et al.[6] In their overview of research concerning the assessment of teaching effectiveness, these authors found that 29 (81%) of the 36 U.S. dental schools whose data were analyzed had used student evaluations. Research in academic settings in general have stressed the benefits of SETs by describing the ways they are used by students, faculty members,[7] and administration.[8] Other researchers have focused on identifying problems of SETs, ranging from methodological concerns such as low response rates[9] and subjectivity of answer scales[10] to content-related considerations such as when SETs are not used to actually improve teaching and course development.[11]

Researchers have also investigated how SETs should be conducted and which aspects should be evaluated. Frick et al. suggested, for example, that the quality of teaching and of learning should be evaluated.[12] Questions related to how SETs should be formulated and administered have focused on such topics as the usefulness of open-ended versus

closed-ended questions[13,14] and online versus paper surveys.[15-18] The outcomes of these studies mostly discuss the benefits and problems associated with conducting SETs in different ways. For example, Youssef showed the benefits of including open-ended student reflections in addition to closed-ended questions for improving courses,[14] and Morrison reported that web-based SETs resulted in lower response rates and lower overall ratings but had the benefit of more detailed comments.[18] In response to the question of when SETs should be collected, studies have analyzed whether retrospective SETs such as exit interviews or immediate SETs tied to a specific course were more reliable[6] and whether SETs should be provided in class or later in an out-of-class setting.[19]

Given this wide range of research in various educational settings plus the importance of SETs for formative purposes such as continuous improvement of courses as well as for summative purposes such as evaluation of faculty members' teaching performance,[4,5] it is surprising that relatively little research so far has focused on how dental and dental hygiene students and faculty members evaluate SETs. The aims of this study were to explore dental and dental hygiene students' and faculty members' perceptions of the value of SETs and their thoughts concerning who should evaluate which courses, when, and how. We also sought to gain a better understanding of whether dental vs. dental hygiene students, upper vs. lower class students, and faculty vs. students differed in their responses. Since no research had thus far analyzed dental and dental hygiene students' and faculty members' perceptions of benefits and problems of SETs and their thoughts concerning how SETs should be conducted in a better way, our study also assessed these groups' perceptions of benefits and challenges and their suggestions for optimally conducting SETs.

Methods

This study was determined to be exempt from oversight by the Institutional Review Board for the Behavioral and Health Sciences at the University of Michigan (HUM #00080592). Given that comparisons of average responses of dental vs. dental hygiene students and of faculty vs. students were of interest, an a priori power analysis was conducted with the G3.1.3. Power Analysis Program (www.psycho. uni-duesseldorf.de/abteilungen/aap/gpower3/) to compute the sample size needed when conducting an independent sample t-test to test whether the means of the groups of interest were significantly different. Assuming a two-sided hypothesis, an alpha error probability of 0.05, a medium effect size of 0.50 on a five-point scale, and a power of 0.80, the results showed that a sample size of 64 respondents was required for each group.

A convenience sample of dental and dental hygiene students and faculty members at the University of Michigan School of Dentistry was used. Students in all years of the four-year predoctoral dental program and all years of the three-year baccalaureate dental hygiene program (after completing at least one year of 30 credits at a different college) were invited to take the survey. This invitation was made at the end of regularly scheduled classes after the PI had informed them about the purpose of the study and asked them to participate in this research. All 120 full-time dental faculty members and all eight full-time dental hygiene faculty members were also invited to take the survey. For the faculty, paper and pencil surveys were first distributed during a meeting for full-time clinical and tenure-track faculty members. In addition, the academic dean sent a recruitment email to all full-time dental and dental hygiene faculty members, informing them about the study and asking them to use a web-link to connect to the web-based survey if they had not yet responded to the paper and pencil survey.

Before this research study was conducted, SETs at the school were collected with an online system, and random invitations to provide SETs for each course were sent to about 50% of each dental and dental hygiene class during the last week of classes in each term. The students' grades were not released until they completed all their assigned course evaluations. The web-based SETs consisted of about ten closed-ended questions with opportunities for open comments. Our experiences with these SETs informed the development of the survey used in this study. Additional information concerning which questions should be included was gained from a literature review that gave a comprehensive picture of aspects relevant when conducting SETs.

The student survey consisted of three parts. Part 1 asked students to provide information such as gender, program, and program year. Part 2 consisted of 17 Likert-style rating scale items concerned with various aspects of SETs. Response options were 1=disagree strongly, 2=disagree, 3=neutral, 4=agree, and 5=agree strongly. An additional question asked students if they would prefer paper and pencil or web-based SETs. Part 3 consisted of four open-ended

questions concerning benefits and problems of SETs, the ideal way to implement SETs, and any other thoughts the students had concerning SETs. After the survey was drafted, a pilot study was conducted with one dental and nine predental students. These students were asked to respond to the pilot survey and indicate which questions were unclear and which were missing. Based on their feedback, the final version of the survey was prepared.

The faculty survey also consisted of three parts with Part 1 again asking questions about respondents' characteristics, including gender, whether they taught in the dental or dental hygiene program, and whether their teaching was in the classroom, the clinic, or both settings. Part 2 consisted of 20 Likert-style items. These items included 13 of the 17 questions on the student survey that applied to faculty members. The faculty survey included seven additional items about issues of interest to faculty members only. The faculty members also reported whether they preferred paper and pencil or web-based surveys. Part 3 of the faculty survey consisted of open-ended questions concerning benefits and problems of SETs, the ideal way of implementing SETs, and any other thoughts about SETs. The faculty survey was shared with two survey researchers who provided feedback on its design. In addition, one faculty member was asked to review the content of the questions to ensure the pilot-tested student questions were also relevant for faculty members. Their feedback was used to finalize the survey.

The paper and pencil responses were entered into an SPSS file (Version 21). The web-based responses were downloaded from the UM Lessons website (lessons.ummu.umich.edu/2k/index.html) as an Excel file that was then imported into SPSS. Descriptive statistics such as frequencies and percentages were computed to provide an overview of the respondents' characteristics. Means, standard deviations, and ranges were provided for answers to questions about the value of SETs and who should do what, when, and how. The following inferential statistics were used to compare the average responses of different groups of participants. Univariate analyses of variance were computed to analyze whether the means of student responses in Years 1 to 4 of the dental curriculum differed significantly and whether the means of student responses in Years 2 to 4 of the dental hygiene curriculum differed significantly. The dental and dental hygiene student responses could not be analyzed in one univariate analysis of variance because the dental program consists of four years and the dental hygiene program of three years. Independent sample t-tests were used to compare the average responses of dental vs. dental hygiene students and of faculty members vs. students. A p-value <0.05 was used to determine the significance of the findings.

Responses to the four open-ended questions were transcribed and coded by two of the four authors. In Step 1, major themes in responses to each of the four questions were identified. Once the two reviewers had agreed on the major categories, in Step 2 the single items in each category were coded in a way so that mutually exclusive subcategories were identified that captured all the responses provided. In Step 3, a discussion between the two authors was used to resolve differences in coding.

Results

Data were collected from a total of 397 students and 64 faculty members. The 329 responding dental students (response rate 76%) were distributed across the four years (D1: N=108; D2: N=91; D3: N=80; D4: N=50). The 68 responding dental hygiene students (response rate 92%) were distributed across the three years (DH2: N=26; DH3: N=19; DH4: N=23). Among the responding students, all of the dental hygiene students and 97% of the dental students responded to the anonymous paper survey during classes. An additional 11 senior dental students who were on external rotation when their classmates took the survey received a recruitment email with a web-link to a web-based version of the survey and responded online.

Among the faculty respondents, 56 (response rate 41%) were dental faculty members, and eight (response rate 100%) were full-time dental hygiene faculty members. Of these respondents, 24 returned the paper surveys to the investigators at the end of the faculty meeting. An additional 40 faculty members responded to the recruitment email and completed the web-based survey.

The sample sizes of the major subgroups of respondents (dental vs. dental hygiene students and faculty vs. students) were sufficient according to the a priori power analysis. However, the number of students in the three dental hygiene classes and the number of senior dental students were smaller than 64 and only allowed detecting large effects when, for example, comparing responses among the three cohorts of dental hygiene students.

Concerning the respondents' characteristics, slightly more than half of the dental students were male (55%), and the majority of the dental hygiene students were female (94%) (Table 1). These proportions were consistent with the actual gender distribution of students in the dental and dental hygiene programs. Among the faculty respondents, 23% of the dental faculty and 38% of the dental hygiene faculty reported they taught only classroom-based classes. One dental hygiene and seven dental faculty members taught in clinics, while 64% of the dental and 50% of the dental hygiene faculty members reported being engaged in both classroom and clinical teaching. All dental hygiene faculty members were female, and 64% of the dental faculty member respondents were male.

Our first objective was to explore the dental and dental hygiene students' and faculty members' perceptions of the value of SETs and who should evaluate which courses, when, and how. Dental vs.

dental hygiene students did not differ in their average responses to 16 of the 17 questions (Table 2). The only difference found was that the dental hygiene students were on average less negative than the dental students in response to the question "I like to do SETs" (on the five-point scale with 1=disagree strongly: dental students 2.61 vs. hygiene students 2.98; p<0.05). The two groups of students did not differ significantly in their average responses to any of the other statements. Both groups responded on average neutral/slightly positive to the statement about whether SETs are a useful tool to improve courses (3.34 vs. 3.62; n.s.).

When the responses of the D1, D2, D3, and D4 students and the DH2, DH3, and DH4 students were compared separately, the data showed that, for each of the four statements concerning the usefulness of SETs, the D1 students were on average most positive and D4 students were on average most negative in their responses. A similar pattern emerged with the

Table 1. Student and faculty characteristics by program and type of survey taken, by number and percentage of total respondents to each item

Student Characteristic	Dental Students N=329	Dental Hygiene Students N=68	Total N=397
Year			
Year 1	108/108 (100%)	–	108 (27%)
Year 2	91/104 (92%)	26/26 (100%)	117 (29%)
Year 3	80/113 (71%)	19/20 (95%)	99 (25%)
Year 4	50/108 (46%)	23/28 (82%)	73 (18%)
Total	329/433 (76%)	68/74 (92%)	397 (100%)
Gender			
Male	181 (55%)	4 (6%)	185 (47%)
Female	148 (45%)	64 (94%)	212 (53%)
Type of survey			
Paper and pencil	318 (97%)	68 (100%)	386 (97%)
Web-based	11 (3%)	0	11 (3%)
Faculty Characteristic	Dental Faculty N=56	Dental Hygiene Faculty N=8	Total N=64
Teaching locale			
Classroom	13 (23%)	3 (38%)	16 (25%)
Clinic	7 (13%)	1 (13%)	8 (13%)
Both	36 (64%)	4 (50%)	40 (63%)
Total	56/120 (41%)	8/8 (100%)	64/128 (50%)
Gender			
Male	36 (64%)	0	36 (56%)
Female	20 (36%)	8 (100%)	28 (44%)
Type of survey			
Paper and pencil	24 (43%)	0	24 (37%)
Web-based	32 (57%)	8 (100%)	40 (63%)

Note: Faculty respondents were 56 dental faculty members out of 120 and all eight dental hygiene faculty members.

Table 2. Dental (D) and dental hygiene (DH) students' responses concerning value and administration of student evaluations of teaching (SETs), by mean in each program year and combined mean (standard deviation/range)

Value/Administration of SETs	D1/ N/A	D2/ DH2	D3/ DH3	D4/ DH4	All D/ All DH
Value of SETs					
SETs are a useful tool to improve courses.	3.82	3.27	3.34	2.42***	3.34 (1.10/1-5)
	–	4.08	3.74	3.00***	3.62 (1.08/1-5)
Faculty members use SETs to improve their courses.	3.55	2.69	2.89	2.12***	2.93 (1.11/1-5)
	–	3.73	3.05	2.61**	3.16 (1.17/1-5)
SETs affect how the course is being taught.	3.47	2.77	3.03	2.50***	3.02 (1.25/1-5)
	–	3.69	3.37	2.59***	3.24 (1.06/1-5)
I like to do SETs.	3.04	2.44	2.41	2.33***	2.61 (1.25/1-5)
	–	3.32	3.59	2.17***	2.98* (1.15/1-5)
Who should do evaluations?					
SETs should be completed by all students in a class.	3.82	3.34	3.59	3.63*	3.60 (1.11/1-5)
	–	4.08	4.11	2.87***	3.67 (1.19/1-5)
What should be evaluated?					
All courses should be evaluated, not just new courses.	4.24	4.01	4.01	3.72*	4.04 (1.10/1-5)
	–	3.88	4.26	3.95	4.01 (1.09/1-5)
Courses taught for more than 3 years should not be evaluated each term.	2.23	2.16	2.34	2.38	2.26 (1.24/1-5)
	–	3.04	1.74	1.95**	2.31 (1.45/1-5)
When should SETs be done?					
SETs should happen before the midterms.	2.84	2.71	2.91	3.12	2.87 (1.33/1-5)
	–	3.65	2.79	2.68*	3.09 (1.32/1-5)
All courses should be evaluated at the end of the term.	4.08	3.95	3.68	3.76*	3.90 (1.03/1-5)
	–	4.08	4.32	3.96	4.10 (0.98/1-5)
SETs should occur during regular class time.	4.05	3.99	3.87	3.78	3.95 (1.04/1-5)
	–	4.35	3.68	4.09	4.07 (1.03/1-5)
How should SETs be done?					
Instructor should leave the room when students evaluate the course.	4.07	3.92	3.96	3.88	3.98 (1.03/1-5)
	–	3.92	4.11	3.78	3.93 (1.27/1-5)
Waiting to give course credit until SETs are submitted is not a good practice.	3.56	3.98	4.10	3.54**	3.80 (1.21/1-5)
	–	3.81	3.42	3.61	3.63 (1.42/1-5)
Students should get a reward for filling out SETs.	3.50	3.49	3.53	3.16	3.45 (1.24/1-5)
	–	3.60	3.00	3.39	3.36 (1.43/1-5)
SETs should be short (no more than 5-6 questions).	3.75	4.02	4.13	4.02*	3.96 (0.92/1-5)
	–	3.85	3.58	4.30	3.93 (1.01/1-5)
Most SETs are long and take too much time.	2.91	3.63	4.00	3.82***	3.51 (1.15/1-5)
	–	3.04	2.79	3.91**	3.26 (1.17/1-5)
SETs should allow for open-ended feedback.	4.25	4.30	4.11	4.06	4.20 (0.82/1-5)
	–	3.96	4.39	4.26	4.18 (0. 91/1-5)
The results of SETs should be shared with students.	4.03	4.11	3.99	4.22	4.07 (0.98/1-5)
	–	3.81	3.89	3.87	3.85 (1.16/1-5)

Note: Text of survey statements referred to "course evaluations," but "SET" is used in this table to allow abbreviation of statement text. Response options to all statements were 1=disagree strongly, 2=disagree, 3=neutral, 4=agree, 5=agree strongly. The significance of the main effect "Year of dental education" is indicated in the cell of the average response of the D4 students. The significance of the main effect "Year of dental hygiene education" is indicated in the cell of the average response of the DHyg4 students. The significance of the difference between responses of the dental vs. dental hygiene students is indicated in the cell of the average responses of all dental vs. all dental hygiene students.

*p≤0.05; **p≤0.01; ***p≤0.001

dental hygiene students: the beginning cohort had on average the most positive responses to three of the four items, while the DH4 respondents responded most negatively to all four items. In response to the question of who should do the SETs, the dental and dental hygiene students agreed on average that SETs should be completed by all students in the class (3.60 vs. 3.67; n.s.). Again, both dental and dental hygiene students in the youngest cohorts responded on average most positively to this item.

When the students were asked what should be evaluated, the dental and dental hygiene groups

agreed on average that all courses should be evaluated, not just new courses (4.04 vs. 4.01; n.s.). However, the two groups disagreed on average with the statement that courses taught for more than three years should not be evaluated each term (2.26 vs. 2.31; n.s.). On the question about when SETs should be done, the two groups agreed on average that all courses should be evaluated at the end of the term (3.90 vs. 4.10; n.s.) and during regular class time (3.95 vs. 4.07; n.s.). The statement that SETs should happen before the midterms was, on average, not as positively evaluated. Concerning how SETs should be done, the dental and dental hygiene students agreed that the instructor should leave the room when students evaluate the course (3.98 vs. 3.93; n.s.) and

that waiting to give course credit until evaluations are submitted is not a good practice (3.80 vs. 3.63; n.s.). The dental and dental hygiene students slightly agreed on average that SETs are long and take too much time (3.51 vs. 3.26; n.s.). Both groups of students on average wanted SETs to allow for open-ended feedback (4.20 vs. 4.18; n.s.), and they agreed on average that the results of SETs should be shared with all students (4.07 vs. 3.85; n.s.).

When student and faculty responses were compared (Table 3), the data showed the faculty members evaluated SETs on average as a more useful tool to improve courses than did the students (3.85 vs. 3.39; p<0.001). The faculty members also agreed on average more strongly than the students that faculty

Table 3. Students' and faculty members' responses concerning value of student evaluations of teaching (SETs) and their administration, by mean (SD) of each group

Value/Administration of SETs	Students	Faculty	p-value
Value of SETs			
SETs are a useful tool to improve courses.	3.39 (1.094)	3.85 (1.009)	<0.001
Faculty members use SETs to improve their courses.	2.97 (1.120)	3.73 (0.890)	<0.001
SETs affect how the course is being taught.	3.06 (1.227)	4.21 (0.953)	<0.001
Students: I like to do SETs.			
Faculty: Students like to do SETs.	2.67 (1.240)	3.20 (1.135)	0.183
Who should do evaluations?			
SETs should be completed by all students in a class.	3.61 (1.123)	3.87 (1.057)	0.068
What should be evaluated?			
All courses should be evaluated, not just new courses.	4.04 (1.096)	4.32 (0.831)	0.046
Courses taught for more than 3 years should not be evaluated each term.	2.27 (1.274)	2.20 (1.223)	0.682
When should SETs be done?			
SETs should happen before the midterms.	2.91 (1.335)	2.81 (1.106)	0.502
All courses should be evaluated at the end of the term.	3.94 (1.027)	3.85 (1.087)	0.523
SETs should occur during regular class time.	3.97 (1.034)	3.44 (1.118)	<0.001
How should SETs be done?			
Waiting to give course credit until evaluations are submitted is not a good practice.	3.78 (1.251)	3.51 (1.156)	0.087
SETs should be short (not more than 5-6 questions).	3.95 (0.937)	3.72 (1.067)	0.053
Most SETs are long and take too much time.	3.47 (1.155)	3.09 (1.153)	0.010
SETs should allow for open-ended feedback.	4.20 (0.837)	4.10 (1.050)	0.350
The results of SETs should be shared with students.	4.03 (1.016)	3.57 (1.187)	0.002
Items asked only in faculty survey			
I use my student evaluations to improve my teaching.	–	4.21 (0.960)	
I like that students evaluate instructors.	–	4.08 (1.088)	
I like that my teaching is evaluated by students.	–	4.25 (0.902)	
The results of SETs should be shared with my department chair.	–	3.85 (1.093)	
The results of SETs should only be shared for promotion activities.	–	2.32 (1.133)	
Clinical instructors should be evaluated at the end of each term.	–	3.95 (1.007)	
Questions should be made specific for the type of teaching done.	–	4.32 (0.812)	

Note: Text of survey statements referred to "course evaluations," but "SET" is used in this table to allow abbreviation of statement text. Response options to all statements were 1=disagree strongly, 2=disagree, 3=neutral, 4=agree, 5=agree strongly.

members use SETs to improve their courses (3.73 vs. 2.97; p<0.001) and that SETs affect how courses are being taught (4.21 vs. 3.06; p<0.001). However, the faculty and student respondents only slightly agreed on average that all students in a class should complete SETs (3.87 vs. 3.61; p=0.068) and that SETs should occur at the end of the term (3.85 vs. 3.94; p=0.523). These faculty members reported believing on average more strongly than the students that all courses should be evaluated and not just new courses (4.32 vs. 4.04; p=0.046), while the students agreed on average more strongly than the faculty members that SETs should occur during regular class time (3.97 vs. 3.44; p<0.001). In addition, the students agreed on average more strongly than the faculty members that SETs are long and take too much time (3.47 vs. 3.09; p=0.01) and that the results of SETs should be shared with the students (4.03 vs. 3.57; p=0.002).

Table 3 also provides an overview of the faculty members' thoughts concerning faculty-specific issues. Overall, these faculty members agreed on average positively that they liked that students evaluate instructors (mean 4.08) and that their teaching is evaluated by students (mean 4.25). They also agreed on average that they use their SETs to improve their teaching (mean 4.21) and that the results of the SETs should be shared with their department chair (mean 3.85), though they slightly disagreed on average that SETs should be used for more than just promotion activities (mean 2.32). They on average strongly agreed that SETs should be made specific for the type of teaching (mean 4.32) and agreed on average that clinical instructors should be evaluated at the end of the term (mean 3.95).

In addition to the closed-ended questions, the subjects also had an opportunity to respond to four open-ended questions concerning their perceived benefits, problems, and ideal implementation of SETs and additional considerations/suggestions. Table 4 provides an overview of the open-ended

Table 4. Number of open-ended responses concerning benefits of student evaluations of teaching (SETs) by respondent type

Benefit	Dental Students N=329	Dental Hygiene Students N=68	Faculty N=64	Total N=461
Faculty benefits of SETs				
Help faculty improve courses and curriculum.	97	16	11	124
Help faculty know how they are doing.	46	9	13	68
Help faculty improve their teaching ability.	21	12	10	43
Help faculty see student perspective.	19	10	2	31
Help faculty create a standard for their class.	0	1	2	3
Get rid of bad professors.	2	0	0	2
Help advance professors' careers.	1	0	0	1
Total	186	48	38	272
Student benefits of SETs				
Allow students to express their suggestions and feedback.	51	10	2	63
Help students voice concerns anonymously.	36	2	2	40
Allow improvements for future students.	15	2	0	17
Improve students' experience.	4	1	1	6
Ensure students are taught more effectively.	3	0	0	3
Total	109	15	5	129
Teaching benefits in general				
Make classes more effective.	3	0	0	3
Improve learning environment.	2	1	0	3
Help improve class conditions.	1	0	0	1
Allows class to be more fair.	1	0	0	1
Total	7	1	0	8
No/very few benefits				
No benefits.	5	7	32	44
Very few benefits.	0	0	2	2
Total	5	7	34	46
Overall number of responses	307	71	77	455

responses concerning the benefits of SETs by respondent type. By far the most benefits of SETs were reported as faculty-related benefits. The majority of all three respondent groups reported SET benefits for faculty. Of the 272 responses concerning the benefits of SETs for faculty members, 152 dental students provided one response and 17 provided two responses, 46 dental hygiene students provided one response and one provided two responses, and 34 faculty members provided one response and two provided two responses. However, the three groups differed in how frequently they reported SET benefits for students. While about a third of the dental students saw student benefits (with 16 reporting two benefits), less than a quarter of the dental hygiene students (with two reporting two benefits) and only 8% of the faculty members reported student-related benefits. In addition, it is noteworthy that while the majority of faculty respondents (53%) did not see a benefit of SETs, only 2% of the dental students and 10% of the dental hygiene students did not perceive any benefits. Of the 307 dental student and 71 dental hygiene student responses, 61%/68% respectively focused on faculty benefits, 36%/21% on student benefits, and 2%/1% on general benefits,

while 2%/10% reported seeing no SET benefits. A total of 44% of the faculty respondents reported that they saw no benefits of SETs, while 49% addressed faculty benefits and 6% focused on student benefits.

Although overall slightly more problems (N=462) than benefits (N=409) of SETs were reported (Table 5), no faculty-related problems were described. The majority of the problems (N=320) were either methodological concerns ("SETs are too long/too time-consuming" N=96; "SETs have bad timing/finals week" N=63) or concerned the lack of usefulness of SETs ("SETs do not result in changes" N=103). In addition to the 320 general problems, 142 problems were related to student-related issues such as "Students don't take SETs seriously" (N=40), "Students don't give meaningful answers/write anything" (N=33), and "Responses are based on problem with professor or biased opinion" (N=32). Again, the percentages of faculty members, dental students, and dental hygiene students who provided open-ended answers related to problems of SETs were quite different. While overall only 37 of the 64 faculty members provided a response (58%), 96% of the 68 dental hygiene students responded to this question, and the dental students provided more than

Table 5. Number of open-ended responses concerning problems with student evaluations of teaching (SETs) by respondent type

Problem	Dental Students N=329	Dental Hygiene Students N=68	Faculty N=64	Total N=461
SET problems related to students				
Students don't take them seriously.	33	5	2	40
Students don't give meaningful answers/write anything.	23	4	6	33
Responses are based on problem with professor or biased opinion.	19	8	5	32
Only students who do well or badly respond.	12	1	6	19
Students don't do them.	9	1	3	13
Students don't read the questions.	3	1	1	5
Total	99	20	23	142
Other problems with SETs				
SETs do not result in changes.	84	17	2	103
SETs are too long/time-consuming.	79	15	2	96
SETs have bad timing/finals week.	57	4	2	63
SETs should not be required.	15	0	3	18
Don't help current students in course.	10	1	2	13
Bad questions/too vague.	7	3	2	12
Opposing feedback.	3	2	0	5
May not be anonymous.	3	1	1	5
Not standardized.	2	1	0	3
Too many SETs.	1	1	0	2
Total	261	45	14	320
Overall number of responses	360	65	37	462

one answer per student (N=360 answers from 329 students). Also, 36% of dental student responses, 31% of dental hygiene student responses, and 62% of faculty responses focused on student-related problems, while 73%, 69%, and 38%, respectively, addressed general problems of SETs.

Table 6 provides an overview of the open-ended responses to the question of how SETs should be ideally done. Of the 461 respondents, 352 (76%) provided at least one response (dental students: N=152 one response, N=17 two responses; dental hygiene students: N=46 one response, N=1 two responses; faculty members: N=34 one response, N=2 two responses) concerning SET benefits. Of the 461 respondents, 413 (89.6%) provided at least one response (dental students: N=152 one response, N=17 two responses; dental hygiene students: N=46 one response, N=1 two responses; faculty members: N=34 one response, N=2 two responses) concerning problems. However, even more responses (N=601) were received in response to the question about how SETs should be ideally done (dental students: N=252 one response, N=100 two responses; dental hygiene students: N=50 one response, N=16 two responses; faculty: N=43 one response, N=22 two responses). Responses to this question were concerned with how the SETs should be administered, how they should be constructed, where they should be done, when they should be administered, and what should happen with the findings.

Table 6. Number of open-ended responses concerning the ideal way to implement student evaluations of teaching (SETs) by respondent type

Ideal Concerning	Dental Students	Dental Hygiene Students	Faculty	Total
Submission: SETs should be				
Submitted online.	86	16	12	114
Be paper and pencil evaluations.	18	5	2	25
Done with clickers.	1	0	0	1
Administration: SETs should				
Be short (1-5 questions).	40	6	8	54
Allow open-ended answers.	22	1	2	25
Result in extra credit.	19	1	5	25
Be tailored to class.	7	0	6	13
Be discussion-based.	7	1	1	9
Be anonymous.	3	3	3	9
Administration: SETs should be done				
In class.	80	18	4	102
Not in class.	5	0	1	6
Timing: SETs should be done				
At the end of the term.	47	7	4	58
After the midterm.	23	2	1	26
After midterm and at end of term.	12	3	3	18
At any time in the semester.	1	1	0	2
After each exam.	1	0	0	1
Follow-up: students should				
Hear about results.	34	6	7	47
Meet with professor for discussion.	3	0	0	3
SETs should				
Not be required.	30	4	0	34
Be required.	4	3	5	12
No preference.	3	4	2	9
Current system is adequate.	3	1	1	5
Administration should read them.	3	0	0	3
Total number of responses	452	82	67	601

These open-ended responses were largely consistent with responses to the closed-ended question. For example, the majority of respondents suggested SETs should be administered online (N=114), while only 25 preferred paper and pencil SETs. This finding is consistent with the response to the closed-ended question about whether respondents preferred paper or online surveys or did not have a preference (not reported in tables). On that question, 59% preferred online SETs, while only 16% wanted paper and pencil SETs and 26% had no preference. In addition, 54 respondents indicated that SETs should be short, 25 that they should allow open-ended answers, and 25 that they should result in extra credit. The average closed-ended responses also showed support for these ways of implementing SETs. The vast majority of responses concerning where SETs should be done indicated they should be done in class (N=102), with only six respondents wanting them done outside of class. Finally, 58 respondents wanted SETs done at the end of the term and only 26 after the midterm, while 47 respondents wanted information about the results provided to students and 34 did not want SETs to be required.

Discussion

In 2007, a review of the literature reported that over 2,000 studies had been conducted about SETs in various types of educational settings in the U.S. up to that time.[20] Our search for studies about the use of SETs in U.S. dental schools or dental hygiene programs identified only one so far. This study by Jahangiri et al. analyzed how the use of teaching assessments by students, peers, and faculty could be triangulated to achieve a more comprehensive evaluation of teaching effectiveness.[6] However, the focus of that study was not to concretely assess students' and faculty members' overall evaluations of SETs and their thoughts concerning who should evaluate what, when, and how. The objectives of our study were to explore these specific questions and to also identify dental and dental hygiene students' and faculty members' perceived benefits, problems, and suggestions for optimizing SETs.

Overall, faculty members in our study evaluated SETs more positively than did the students. However, both the dental and dental hygiene students differed in their responses based on their year of program. Students in earlier years were significantly more positive than students in the senior classes.

While other research reported that students tended to think SETs had no or only little effect on teachers' performance[21] and that faculty and administrators did not take them seriously,[22] we found that students in younger cohorts did not have such a negative response to SETs. In addition, the positive responses of faculty members in our study contradicts others' findings that instructors did not consider SETs to be helpful for improving their teaching efforts[23] and that only very few faculty members reported making changes as a result of their SETs.[24]

In response to the specific questions of who should evaluate what, when, and how, our results contribute to a better understanding of both students' and faculty members' opinions. Faculty and students in our study agreed that all students in a class and not just a subsample should be asked to respond to SETs and that all courses and not just new courses should be evaluated consistently. The faculty members agreed even more strongly that all courses should be evaluated than did the students. While both faculty and students preferred to have SETs at the end of the term, both groups were less favorable towards SETs before the midterms. This finding is interesting because it may not consider the research finding that instructors who collect midterm feedback and then discuss it tend to have higher evaluations at the end of term as well as higher final exam scores.[25] However, the faculty respondents in our study were less positive about giving up class time to conduct SETs during regular class time than were the students.

This finding is related to the question of whether SETs should be conducted as paper and pencil or web-based evaluations. While only 10% of the respondents in our study wanted paper and pencil SETs, 51% preferred web-based SETs, and 39% had no preference. This finding is consistent with the results from other studies that showed students and faculty generally considered online evaluations more positively than paper evaluations.[26,27] Prior research also found that SETs did not change as a function of how they were done.[27,28] There are benefits as well as problems related with conducting SETs online. One major benefit is that students have been found to be more likely to provide more open-ended and often more useful comments when they responded to web-based SETs than to paper SETs.[26,27,29] However, a relatively lower response rate to web-based SETs can be a significant problem,[26,28] which could be improved if reminder emails were sent from instructors along with messages in online class discussions.[30]

The information provided in our study by both students and faculty members in response to the open-ended questions was not only quite useful but provided, on the whole, further evidence for responses to the closed-ended questions. The students' responses concerning the benefits of SETs showed there was a large number who believed SETs were quite helpful for faculty members. However, the fact that half of the faculty members did not see a benefit of SETs deserves attention. While this finding is unfortunately consistent with other studies that showed faculty members did not consider SETs as helpful for improving their teaching[23] and that only a few faculty members actually made changes in response to SETs,[24] it is nevertheless important to consider how faculty perspectives concerning the value of SETs can be changed. Requiring explicit information in a syllabus about which changes had been made based on student feedback from the previous term could be one way to challenge faculty members to seriously consider SETs and potentially even see the benefit of SETs for improving their teaching. A lack of resulting changes was the most frequently cited issue when students responded to the question about problems with SETs. In addition, students frequently commented that SETs are too long and should not occur during finals week. These reported problems were then considered when students made suggestions about how SETs should be ideally structured. The majority of their open-ended responses requested web-based SETs that are short and allow for comments. Students wanted to have time in class to complete SETs and preferred for them to be administered at the end of term.

This study had several limitations. First, the data were collected in only one dental school and one dental hygiene program. While the numbers of responses were sufficient to test whether certain subgroups differed in their perspectives (based on results of the a priori power analysis), it would be interesting to further explore the generalizability of these findings by analyzing how students and faculty members in other cultural settings would respond to these questions. A second limitation concerns the faculty response rate. While sufficient numbers of surveys were collected to satisfy the needed sample size determined by the a priori power analysis, one might argue that a response rate of 50% of the faculty members may not allow generalizing the findings to all faculty members in this school. However, Hardigan et al.'s review of response rates to web-based (11%) vs. mailed surveys (21%) showed that the 50% response rate achieved in our study was higher than one might expect.[31]

The third limitation is that this study focused only on SETs. Considering how students and faculty members would respond to questions concerning faculty peer and self-evaluations[6] would be quite interesting. An additional limitation might be that the survey was piloted with nine predental students and one dental student and not with dental and dental hygiene students. However, we asked predental students to respond to the pilot survey for two reasons. Given that there were only 74 hygiene students in our school at the time, we did not want to reduce the number of potential respondents by asking some of them to respond to the pilot survey. Also, we did not want to have information about the survey known before we actually administered it. One final limitation of the study is that the survey questions were implicitly focused on classroom-based teaching. Questions about SETs in clinical teaching should be included in future studies.

Based on these findings, our school revised the way SETs are collected. In the past, we used an online system, invited a randomly selected ~50% of each class to provide evaluations of each course, and held grades until all assigned course evaluations were completed. Each survey consisted of about ten questions with opportunities for open comments. With the implementation of our new curriculum and the introduction of new and varied instructional methods, this list of core questions was inadequate. The new SET method is also online but allows no more than five course-specific closed-ended questions. It includes open-ended questions, is voluntary, and allows students to respond during a two-week period at the end of term and before final exams to reduce stress during finals week. The results are shared with the faculty member's department chair and the Curriculum Committee. Student-led curriculum evaluation committees for each dental class also review and analyze the SET data each semester and provide recommendations to the Curriculum Committee. Finally, our course syllabus template has been modified to include a statement of how course evaluations have been used to modify the course. We implemented these changes in response to the results of this study and are now able to communicate the SET results to all stakeholders and show that student feedback is valued and used to improve the curriculum. At the current time, we are reflecting on how to engage faculty members more successfully in making SETs a valuable component of their teaching efforts.

Conclusion

This study found that these students and faculty members saw value in SETs, preferred to have all students respond at the end of term to all courses, and preferred short, web-based, and in-class evaluations. However, group differences were found. While the dental and dental hygiene students did not differ in their responses overall, students in earlier cohorts were significantly more positive than students in senior year cohorts. Faculty members were more positive than students regarding evaluations and the impact evaluations have on improving courses, while the students agreed more strongly than the faculty members that there should be open-ended questions and the results should be released to students. These findings led to recommendations about optimizing ways to conduct SETs. SETs should be web-based and short, allow for open-ended feedback, be administered for all classes, and have specific questions relevant for those classes. In addition to SETs of classroom-based teaching, student evaluations of clinical teaching should happen at the end of each term. Concrete changes based on previous SETs should be demonstrated to students.

Acknowledgments

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