# Adoption of Web-Enabled Student Evaluation of Teaching (WESET)

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**Abstract**—The "student voice" movement, which advocates for the critical importance of seeking and applying student input into educational decisions such as curriculum development and teaching methods, has been gaining momentum. We examine "student voice" through the vehicle of "Student Evaluation of Teaching (SET)" in the context of higher education. We treat Web-Enabled Student Evaluation of Teaching (WESET) in higher educational institutions as an innovation and apply Diffusion of Innovation theory to study its adoption. We study WESET rates of adoption by analyzing data from 45,934 anonymous student feedbacks of 427 teachers by 1102 students over a period of five years covering both undergraduate and graduate programs at an Indian university. Data from 589 courses in three distinct academic disciplines were collected and analyzed. The adoption rate of the students is primarily attributed to three factors: (a) the guarantee that the system will maintain anonymity, (b) expectation that student feedback will result in positive changes, and (c) ease of use as WESET was integrated into an existing system already used by students. Student evaluations for the same courses significantly improved over each subsequent semester, suggesting that faculty had incorporate student feedback into their curriculum and teaching methods.

**Keywords**—Teacher evaluation, Student feedbacks, Innovation Diffusion, Educational Innovation

## 1 Introduction

The student voice movement began several decades ago when the value of analyzing students' perspectives on their learning experiences was recognized [1]–[3]. A number of benefits stemming from student voice have been identified including an increase in student appreciation of their experiences in a particular course and corresponding expression of that appreciation; increased opportunities for students to participate in civic and democratic practices; and expanded social interaction. This, in turn facilitates the use of multiple forms of media, and technology by them [4].

[5], [6]sees students as data sources, as active participants, as co-researchers and researchers. He considers these types of student engagement to be associated with the notion of the "student voice" and identifies associated advantages. When students are

seen as co-researchers, for example, they tend to display more initiative and assume more leadership roles.

Another facet of student voice, teacher evaluations, may offer benefits to faculty and course structure, as well. Supporters of student voice argue that allowing students to freely express their opinions regarding teaching processes results in improvements in teaching and course effectiveness [7], [8]. The structure of student voice effort and the nature of teacher-student relations often become a greater force in determining how and in what manner it will lead to better learning outcomes. [9]

The innovative aspect of WESET as a channel for student voice offers great promise, particularly if students understand its attributes. [10], in his theory of perceived attributes, notes that "the perceived attributes of an innovation are one important explanation of the rate of adoption of an innovation." [10] states that the manner in which an innovation is perceived is based five factors: relative advantage, compatibility, complexity, trialability, and observability. This research study considers WESET adoption rates in light of these factors.

## 2 Literature Review

SET is steadily taking precedence in faculty evaluation systems all over the world. This tool influences decisions regarding faculty tenure, promotion and salary. However, the effectiveness of systems for evaluating teaching effectiveness is debatable. For instance, factors such as student perceptions of the teacher, individual student characteristics and the physical environment of the learning institution can influence the manner in which evaluations are made. In addition, students' ratings are often influenced by the charisma of the teacher. A study on student evaluations of teaching, conducted by the American Association of University Professors (AAUP) Committee on Teaching, Research and Publication, revealed that such factors as students' gender bias and emotions (such as fear of a particular teacher) also influence SET results. Hence, SET cannot be considered as a tool that flawlessly reflects actual teacher effectiveness.

[11] touched on a related concern, noting that the concept of teachers and students working together has the potential to be detrimental for teachers. When this arrangement empowers students to voice in support or opposition to the teaching style, course, etc., this can hamper teacher morale if students, who often do not know what constitutes effective teaching practice, may evaluate them incorrectly. However, [12] findings counter this, suggesting that cooperative teacher-student relationships help in the establishment of a supportive teaching-learning environment between the learners and the instructors.

According to [13], student voice serves as an important tool for assessing learning outcomes. They suggest that students do have the capability to make reflections upon the quality of learning, and thus considering what they say is imperative in designing a course. [5] research supports this, indicating that student feedback provides insight and understanding that are not considered by teachers.

More recently, [14]indicated that student voice, as expressed in teacher evaluations, helps in the development of successful course curriculum, regardless of whether the traditional paper and pen method or a technology-based approach is used. However, [15] suggested the potential usefulness of implementing technology into student voice efforts, including Student Ratings of Teaching Effectiveness. Along these lines, [16] found that often students feel more confident and at ease when they provide their evaluations through anonymous digital methods.

Even though SET has been implemented in many institutions, a separate but related issue is whether the student feedback is taken into account while designing the course curriculum [17]–[20].

Regardless of how SET is administered, validity and usefulness of SET depends upon a number of external and internal factors such as content and coverage of items in the system, scientifically sound and practically feasible measurement instruments and processes.

Although the value of technology-based approaches to SET has not yet be thoroughly investigated, technology's value has been well established in other aspects of education. Through the use of technology-based tools in classroom, students feel encouraged to take active part in accessing information circulated by their instructors or study materials. Thus, it is undeniable that rapid development of technology has encouraged the adoption of innovative tools like social media and internet for promoting collaboration and facilitating better sharing of information in the academic setting. This has resulted in enhancing student engagement in learning processes and encouraging better learning [21]–[23].

A specialized study on developed countries suggests that Anglo-American universities rely entirely upon SET to assess teaching quality. This is because students are believed to be the best judge to access the quality of education in their institution throughout a course. Particularly in the United States, SET is considered as a determining factor in decisions regarding conditions of employment, salary and promotion of faculty members in academic institutions [24]. In comparison to these, the scenario is different in India. Although there is significant growth in higher secondary education and number of student enrollment in India, student evaluation of teaching effectiveness and course curriculum have not been fully recognized [25]. Availability of an innovative web-enabled student evaluations (WESET) system could contribute significantly to implementation of student evaluations in India.

According to [10], "rate of adoption is the relative speed with which an innovation is adopted by members of a social system. It is generally measured as the number of individuals who adopt a new idea in a specified period." As noted, [10] identified five primary characteristics as having a primary influence on the adoption of an innovation like WESET: Relative advantage, compatibility, complexity, trialability and observability.

[10] defines relative advantage as the "degree to which an innovation is perceived as being better than the idea it supersedes." Thus, in the case of WESET, the degree to which students perceive web-enabled technology to be a better approach than using paper-pencil method would be a significant factor in its acceptance and adoption. Perceived compatibility of an innovation has a positive influence on the adoption of

that innovation. Thus, the degree to which potential-adopter students consider WESET to be consistent with their usual beliefs and values about student feedback process would influence adoption. The idea of complexity was formulated from an "ease of use" perspective in this study. If potential-adopters find WESET difficult to use, there would be resistance to its adoption and usage. Regarding trialability, if potential-adopter students could try the WESET before fully committing to it, their apprehension of that innovation would significantly decrease. Finally, if potential-adopter students can observe the benefits of the WESET innovation, they will easily adopt it.

The relative value of SET may continue to be debated for some time. Increasing student participation and improving the quality of student input could provide valuable data to this ongoing debate. WESET, as a technological innovation, offers the potential to provide this increase in participation and quality.

## 3 Method

This research study was conducted in an Indian university that has implemented a Web-Enabled Student Evaluation of Teaching (WESET) process (Table 1).

**Table 1.** Summary Statistics

| | **Engineering (ENG)** | **Sciences (SCI)** | **Business (BUS)** | **Totals** |
|---|---|---|---|---|
| **Faculty** | 250 | 80 | 97 | 427 |
| **Students** | 742 | 98 | 262 | 1102 |
| **Courses** | 319 | 119 | 151 | 589 |
| **Feedbacks** | 33,134 | 3,163 | 9,637 | 45,934 |

The goal of the research study was to answer these questions:

1. Is WESET, a technology-based SET, a viable platform for student adoption?
2. Are there differences in its adoption rates as measured by Percentage Student Feedback (PSR)
   (i) By discipline (ENG, SCI, BUS)
   (ii) By academic level (UG, PG) (within UG – first semester vs. last semester)
   (iii) By type of course (Core, Elective, Lab, Soft skills)?
3. Is there improvement in the Teaching Effectiveness Index (TEI) in courses that are taught by the same faculty in the following year that indicates that student feedback is considered and leads to improvement?

Towards this goal, we analyzed the WESET adoption patterns. Our study covered both under-graduate (UG) and post-graduate (PG) programs across 3 disciplines – Engineering (ENG), Sciences (SCI) and Business (BUS). For every discipline, entire WESET history data from two logical units of students (UG and PG) were considered and followed from the first semester to the last semester of their academic program (Table 2).

**Table 2.** Semesters per discipline

| | ENG | SCI | BUS |
|---|---|---|---|
| **UG** | 8 | 6 | 6 |
| **PG** | 6 | 4 | 4 |

In each academic discipline, we considered only a single cohort of students in its entirety as they progressed through the semesters into graduation. For example, UG ENG is an eight-semester program, and only the data of students who joined in 2011 and graduated in 2015 were included for the study. New students who later transferred into the program were not part of this study. We used semester as the basis for comparisons since feedback was given at the end of every semester. The feedback questionnaire included 19 Likert scale questions along with 3 open-ended questions that include both course and teacher elements. The university uses varying weights for the answer choices in calculating the Teacher Effectiveness Index (TEI).

Although this paper focuses on adoption of WESET as one particular vehicle for student voice, it was administered within a broader context that offered several options for student feedback. Students actively participated in the teaching-learning process through multiple channels (Figure 1) including individual anonymous feedback (WESET), active participation in decision-making by class coordinators, and group input for specific topics from student committees. Every class had two elected student councilors, who held leadership roles in the class. They collected feedback from the class, and actively participated in all class committee meetings along with faculty and administrators. Independent student committees responsible for both administrative and academic aspects provided input to administrative heads. The university policy encouraged student voice as they considered it valuable to sustain the high quality of education.

## 4 Discussion

Prior to WESET students were using a paper-based system and the analysis of the written responses tended to be a tedious task with no timely feedback to teachers. Many students hesitated to offer feedback due to apprehension about the confidentiality of their identity, even though the administrators gave them full assurance. Also, students were often rushed to give feedback in a classroom session and not given enough time to reflect before giving their responses.

### 4.1 Innovation diffusion process for WESET

The steps and timeline for introducing and integrating WESET is shown in Table 3. WESET was implemented as an end-of-semester feedback process where students were given a fixed time period of several days at the end of the course to give their anonymous feedback. Detailed and summary versions of anonymous student feedback were provided only to the concerned faculty and to the appropriate department head. WESET has a simple and intuitive web-based interface and no training is needed for

students. Once a student logs in, they see their enrolled list of courses and can provide feedback for each course. Faculty members were persuaded to participate by informing them about the potential benefits for improving teaching style and for help in reflection on their teaching practices

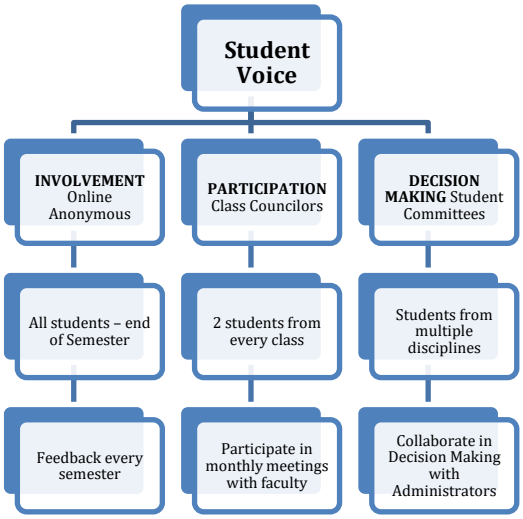


**Fig. 1.** Multiple Channels for Student Voice

**Table 3.** WESET: Innovation – Decision process adoption timeline

| | |
|---|---|
| **Knowledge 2010** | Introduction of WESET<br>Informational circulars, town hall meetings to create awareness about WESET<br>Hands on demo on how it works - Easy to use web-based interface<br>Online help developed<br>Students who were class councilors and committee heads participated in the test drive WESET system with guest logins and see how the entire process works. |
| **Persuasion Early 2011** | WESET has many advantages than using paper-pencil method in that it allows students more convenience of using it anytime and anywhere without any time pressures.<br>It is very much compatible with the traditional method like similar set of questions as before and complete anonymity of the feedback<br>It has very easy to use web interface with features like saving the responses, manage multiple courses and<br>Many students were convinced of WESET's usefulness when they saw their peers using it. |
| **Decision Early 2011** | Academic council mandate to shift from paper-pencil method to WESET<br>Engineering chosen to be early adopter |
| **Implementation Late 2011** | Circular sent to all students every semester towards end of course to use WESET<br>Faculty given training in using WESET feedback |

| | |
|---|---|
| | Recognize best teachers based on feedback, most improves, and some individual areas (group of q) |
| **Confirmation Early 2012** | Regular monitoring of student feedback by course, by department, by discipline<br>Feedback sought from both faculty and students for improvements in the process and on how to improve the % of student responses<br>Academic council mandate to start using WESET for other disciplines like Business and Sciences. |

The Engineering Department (ENG) was the early adopter, having started using WESET in 2011. Historically, ENG has been an early adopter of other home-grown technology initiatives such as using learning management systems (LMS) for course content and grading; hence, ENG faculty were very comfortable with technology. The WESET pilot with ENG helped fine-tune and stabilize the system to the university processes. After a successful year-long pilot by ENG, the university's academic council mandated WESET as a university wide initiative for all disciplines. Informational circulars as well as training were provided for faculty in each discipline to demonstrate WESET as well as to seek suggestions for further customization.

Although individual faculty members cannot see other teacher's individual ratings, they can compare their own rating with the average rating for other faculty in their disciplines. Students are asked to provide feedback for every course via "Alert" reminders sent by WESET. In addition, each class coordinator provided information to the students, and educated them on the benefits of WESET for course improvements while emphasizing that the feedback is anonymous. During implementation, a centralized support team was available to provide assistance to students and ensure that WESET was always available.

### 4.2 Diffusion of WESET by discipline

Figure 2 shows the PSR provided by the students based on engineering (ENG), Business (BUS) and Science (SCI) disciplines across their entire college years. PSR in all disciplines was over 92% showing a high adoption rate.

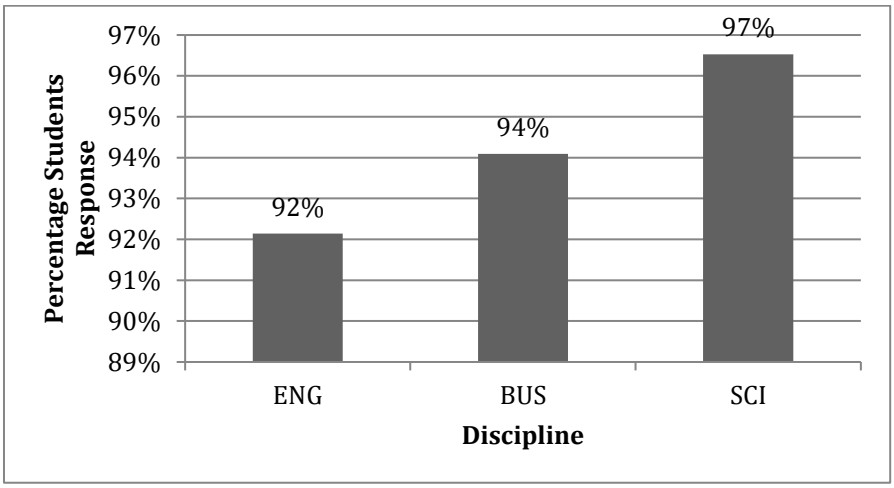


**Fig. 2.** PSR by discipline

### 4.3 Diffusion of WESET by academic level

Figure 3 shows the PSR for the UG students compared to the PG students in the same discipline. In all cases, the PSR in the last semester is higher than in the first semester.

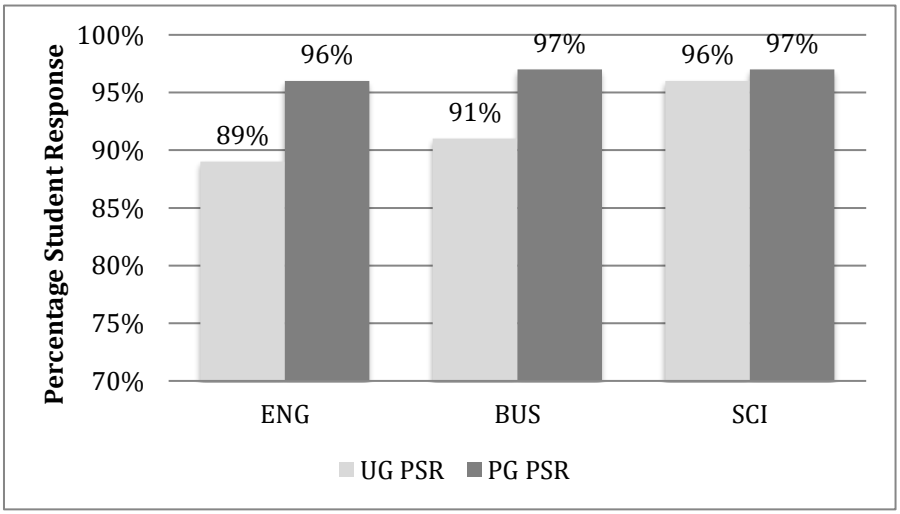


**Fig. 3.** PSR by UG & PG programs

An independent-samples t-test was conducted to compare the PSR between UG and PG (Table 4). The classification by UG and PG was done across the disciplines. For ENG, there is a statistically significantly higher PSR in PG (M=95.57) when compared

to the PSR in UG (M=88.71), p=0.00. There is no significant difference in PSR between UG and PG in BUS and SCI disciplines.

**Table 4.** Mean PSR across UG and PG programs

| | | Mean | p value | Inference |
|---|---|---|---|---|
| ENG | UG | 88.71 | 0.00 | PG > UG |
| | PG | 95.57 | | |
| BUS | UG | 96.70 | 0.08 | UG = PG |
| | PG | 94.67 | | |
| SCI | UG | 96.38 | 0.40 | PG = UG |
| | PG | 96.69 | | |

### 4.4 Diffusion of PSR between first semester and last semester

Figure 4 shows the PSR for the same set of students in their first semester as freshmen compared to the last semester for the six groups. In all cases, the PSR in the last semester is higher than in the first semester.

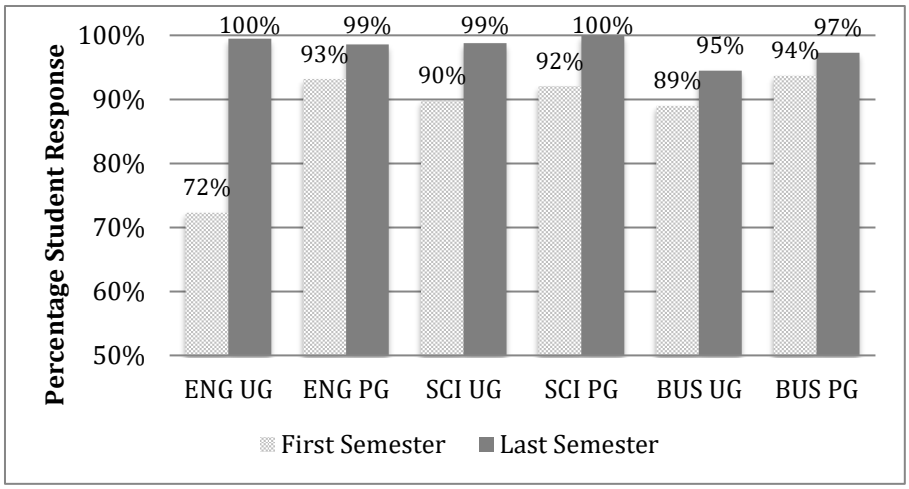


**Fig. 4.** PSR First semester & last semester across the six groups

A one-way ANOVA was conducted to compare the PSR for each semester within the academic level, UG and PG. We conducted the ANOVA across three disciplines, ENG, SCI and BUS. There was statistically significant difference between groups as determined by one-way ANOVA ($p<0.05$) across the discipline (Table 5). A Tukey post-hoc test reveals statistically significant difference in PSR between semesters in each academic level. Similarly, we observed a statistically significant difference between PSR in first semester and last semester in all the three disciplines. In all cases, the increase in PSR between the first and the last semester was significant.

The table shows that in all three disciplines and in both the UG and PG programs, there was significant improvement in PSR from the first semester to the last semester.

The last column shows that in all disciplines, the first significant increase in PSR was recorded either in the second or third semester.

**Table 5.** Anova: Improvement in PSR from first Semester to last semester

| Discipline | F | Sig | Tukey posthoc (first significant increase from S1) |
|---|---|---|---|
| ENG UG | 57.173 | 0.00 | S1<S3(0.04) |
| ENG PG | 10.495 | 0.00 | S1<S3 (0.00) |
| SCI UG | 37.667 | 0.00 | S1<S2 (0.00) |
| SCI PG | 18.774 | 0.00 | S1<S2 (0.00) |
| BUS UG | 11.475 | 0.00 | S1<S2 (0.00) |
| BUS PG | 25.378 | 0.00 | S1<S3 (0.00) |

### 4.5 Deeper analysis of UG ENG

We further analyzed the UG ENG course data as it has the largest set of PSR and includes two cohorts each of Computer Science, Electronics, Mechanical and Electrical Engineering with the largest number of students, faculty and courses. 30146 student feedback from 541 UG ENG students were tracked over a period of eight semesters. Though the students provided feedback on many questions, only the overall TEI rating for a given course along with PSR were used for analysis. We found that student adoption of WESET increased over the first several semesters and then flattened out with a small drop in the final semester. Though the PSR decreased slightly in the final semester, the TEI was maintained or increased. The courses that did not include project work in the final year continued to maintain the PSR.

In UG ENG group, the post hoc test showed a significant improvement (p=0.00) (Table 4) in PSR between the first (M=72.3) and last semester (M=99.5). The change in PSR for the UG ENG was significant between S1 and S3 and then between S3 and S4. Changes from S4 onwards were not significant, indicating that the maximum adoption possible had been achieved. Some final semester courses - notably those involving semester-long projects or industry internships -- showed a dip in the PSR., while maintaining the TEI. Since courses without significant projects in the last semester did not show a drop in PSR, we attribute the decrease to the project-oriented nature of these courses rather than because students no longer saw value in providing feedback at the end of their last semester.

**Table 6.** Anova Post hoc Tukey test: Detailed Analysis for UG ENG

| ANOVA (ENG UG) | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Sem*** | ***S1*** | ***S2*** | ***S3*** | ***S4*** | ***S5*** | ***S6*** | ***S7*** |
| S1 | | 0.64 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| S2 | 0.636 | | 0.796 | 0.00 | 0.00 | 0.00 | 0.00 |
| S3 | 0.043 | 0.796 | | 0.00 | 0.00 | 0.00 | 0.00 |
| S4 | 0.00 | 0.00 | 0.00 | | 0.981 | 1 | 0.977 |
| S5 | 0.00 | 0.00 | 0.00 | 0.981 | | 0.998 | 1 |
| S6 | 0.00 | 0.00 | 0.00 | 1 | 0.998 | | 0.997 |
| S7 | 0.00 | 0.00 | 0.00 | 0.977 | 1 | 0.997 | |

### 4.6 Diffusion of WESET by course type

The PSR across different types of courses such as Core, Lab and Soft skills showed similar diffusion of PSR suggesting that the PSR was unaffected by the type of course (Figure 5, 6, 7).

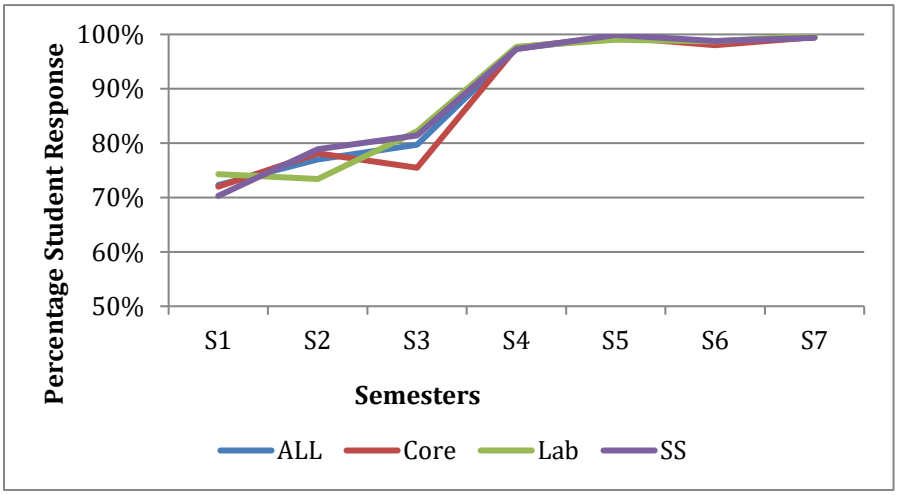


**Fig. 5.** PSR by Course type (UG ENG)

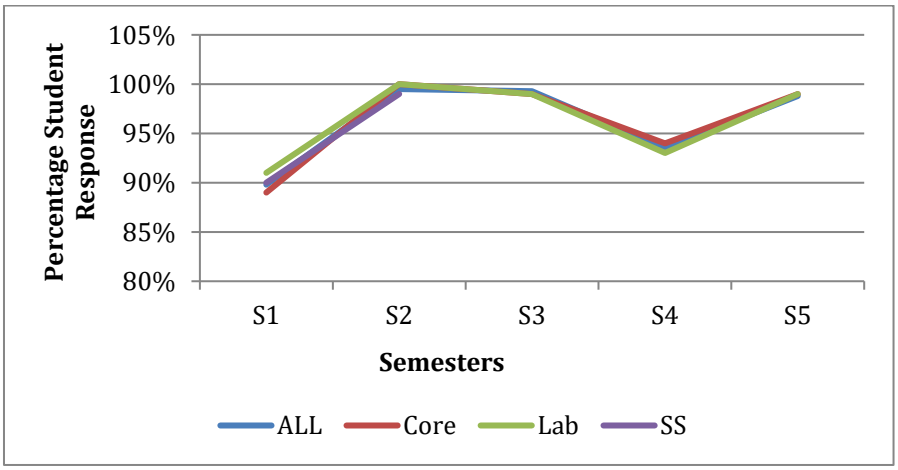


**Fig. 6.** PSR by Course Type (UG SCI)

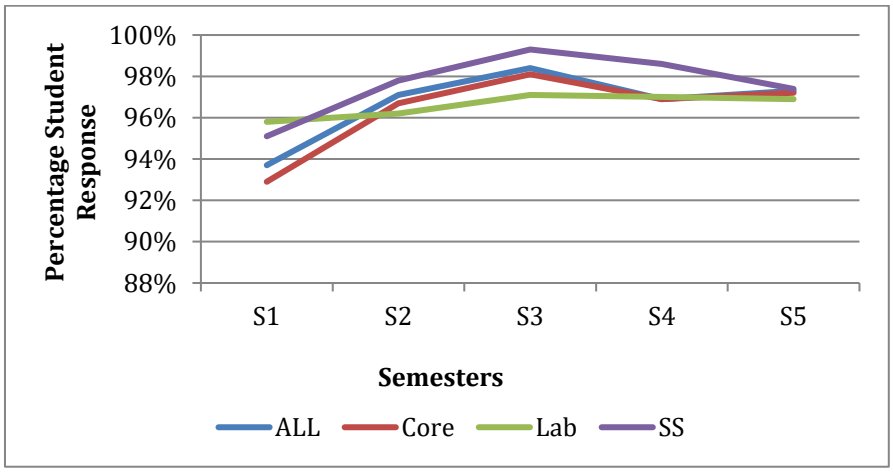


**Fig. 7.** PSR by Course Type (UG BUS)

### 4.7 TEI by academic level - UG & PG

An independent-samples t-test was conducted to compare the TEI score between the academic level, UG and PG (Table 7). For ENG, there was a statistically significantly higher TEI score in PG (M=95.57) when compared to the TEI score in UG (M=88.71), p=0.00. Similarly, BUS and SCI discipline have a higher TEI score in PG when compared to the TEI score in UG. One possible explanation may be that generally senior teachers with more experience teach the higher academic requirements of the PG programs.

**Table 7.** Mean TEI across UG and PG programs]

| | | Mean | p value | Inference |
|---|---|---|---|---|
| ENG | UG | 87.61 | 0.00 | PG > UG |
| | PG | 89.51 | | |
| BUS | UG | 90.05 | 0.00 | PG > UG |
| | PG | 92.10 | | |
| SCI | UG | 88.89 | 0.00 | PG > UG |
| | PG | 94.24 | | |

### 4.8 TEI improvement in courses

A course-wise analysis was conducted as a separate study to understand if the university administration and the faculty were incorporating TEI. 68 courses taught between 2013 and 2015 that had been repeated at least a second time during that period and taught by the same teacher were analyzed. The TEI for these courses was broadly divided into two groups: those with TEI in the 50-75% range those with TEI in the 75.1-100% range. Our analysis shows that a number of courses with TEI in the 75.1-100%

range had increased each year suggesting that faculty members and administrators were incorporating student feedback to improve teaching outcomes (Figure 8).

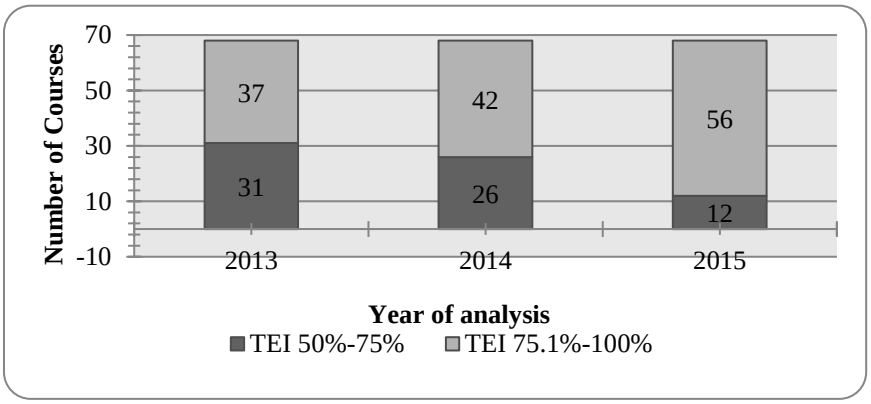


**Fig. 8.** TEI Improvement (2013, 2014, 2015)]

### 4.9 Cultural and educational shifts

WESET was implemented after consultations, modifications and enforced as a university driven policy. There was a remarkable change culture shift in some of the teachers as they were no longer the sole decision makers. As specific feedback from a larger percentage of students was discussed at the committee level, and teachers had to acknowledge issues raised by students, understand that students are an active part of learning and work with the democratic process, thus changing the teaching practice

As the students saw their concerns being addressed, they used multiple channels, class committees, direct and anonymous feedback to provide inputs into curriculum, teaching and learning processes.

## 5 Conclusion

In this paper we argue that digitally-enabled student voice is an innovative concept and its diffusion in higher educational institutions warrants detailed study. The data and inferences derived from analyzing WESET rates of adoption are consistent with prior innovation diffusion research work.

For a technology-based educational innovation such as WESET to be fully adopted, one has to focus both on students as well as faculty. Addressing the complexity associated with implementing WESET, boosting motivation of the students and faculty with incentives to adopt this innovation are the key factors that will make WESET a credible and authentic representation of student voice.

Our large-scale study that included students' entire program of study from first semester through graduation, in three different disciplines, shows that WESET achieved good adoption across all disciplines. ENG was the first to adopt and thus

helped to improve the system, and other disciplines followed within a couple of years. PSR increased across disciplines from the first semester to that last, with the first significant improvements achieved in the second or third semester. PSR improvement was similar across the various types of courses.

The positive effect of university policy regarding the WESET process improved the quality of learning and teaching style. Important factors include the system's ease of use, the anonymity of feedback which put to rest the student fears, and the fact that university administrators did not penalize faculty members for negative feedback. Increases in positive student feedback from one year to the next were in itself motivational for the faculty.

Our data agrees with other researchers that teaching practices can be improved with student voice [26]–[29]. Student evaluations from 68 courses that were taught each year by the same faculty showed that the overall TEI increased each time the course was offered, suggesting that teachers were incorporating feedback to improve the teaching process. Teachers in interviews said that WESET was useful and helped improve teaching practices. Our TEI did not find rating bias based on the type of course, unlike [30]finding that elective courses receive higher ratings than general courses.

Though across disciplines the first semester TEI scores were slightly lower than later semesters, these were not significant; this is in contrast to earlier paper-based findings that students who had experience gave higher feedback than freshmen [31, 32, 33]. However, in all cases the TEI for PG scores were significantly higher than UG scores. A possible explanation may be that generally the more experienced and qualified faculty members teach the PG programs. Traditionally, the Indian education culture has teachers as power centers. There is an inherent understanding of the power differences between faculty and students that can inhibit student voice. Before WESET, the teaching style and student engagement varied greatly depending on the teacher personality and preferences. WESET changed the equation and over the years resulted in a listening culture in the teachers. Providing multiple avenues to solicit both individual and collective expressions from students, such as anonymous feedback for sensitive issues, leadership and partnership opportunities, resulted in more students including the reticent ones expressing some form of student voice.

# 6 Acknowledgements

## 6.1 Statements

1. Not open data
2. Yes, anonymized data with permission and approval by ethics committee
3. No Conflict of Interest.

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