Characterizing the Alignment in Faculty and Student Beliefs

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Abstract

This research paper investigates faculty members' actions in a classroom setting in light of their personal beliefs about teaching and learning, and their relationships to student beliefs. The research question is: to what extent is alignment between faculty and student beliefs about teaching and learning related to faculty pedagogical activities and actions? Very little prior work integrates student-side and instructor-side preferences and actions, and this paper extends our understanding of this alignment. We expect that a clearer understanding of the alignment between faculty and students may help explain student academic performance. This paper focuses on characterizing the alignment, while our future research explores its relationship to student outcomes.

Our data analysis reveals the following key insights about our research question. Faculty-student learning styles misalignment is largest along the active-reflective dimension of the ILS. In turn, faculty who are more misaligned with their students (in the ILS sense) tend to lecture more. In our data, faculty learning preferences and teaching preferences do not appear to be strongly correlated. Results suggest that faculty who are more instructor focused than average tend to use active and collaborative learning activities, and formative evaluation to a lesser extent. Conversely, faculty who are more student focused than average use lecture as a teaching tool to a lesser extent.

Introduction

Faculty choices about how they teach in undergraduate engineering courses have important impacts on student learning. Past research has found that faculty's implicit beliefs and thoughts influence their behavior in class [1]–[3]. The strategies and actions faculty adopt to teach in class, it has been shown, depend on whether they view teaching as knowledge transmission or learning facilitation[3]. Moreover, extensive research over recent decades indicates that active, collaborative, cooperative, and other 'non-lecture' teaching approaches can lead to measureable gains in student achievement and satisfaction.

Past research also talks about how faculty's learning preferences influence their teaching decisions. Willcoxson[4] states that faculty tend to heavily draw inspiration from their time as students in developing their teaching styles. The author also states that the faculty use "... the good, and occasionally the bad ..." (referring to their own experiences as learners) in the process. Many faculty have limited engagement with teaching-related professional development activities, and as a result they rely upon past role models and intuition to shape their teaching approach and activities. While many faculty attempt to modify their teaching methods as per their personal learning preferences, they are generally not successful in the absence of structured guidance about how to do so. As a result, we became curious about the role of faculty *learning preferences* on their *teaching decisions,* especially in engineering classrooms.

This paper is one part of a broader study of faculty and student attitudes about teaching and learning, and how the local departmental culture helps shape these attitudes. Here, we consider the degree of alignment between faculty teaching philosophy and student learning preferences, with the goal of understanding this alignment within the context of the actual approaches faculty report using in their classrooms. Our research question for this paper is: to what extent does faculty-student alignment on issues of teaching and learning correlate to faculty use of specific pedagogical practices? Our working hypothesis, tested below, is that faculty background and past experiences as learners shape their teaching practices, meaning that faculty-student alignment along the *learning* dimension helps us understand teaching decisions.

Literature Relevant to this Research

Measures of learning preferences

A wide range of instruments to characterize learning preferences has been proposed in the past few decades, all of them draw both praise and criticism (Gardner, Kolb, and others). The Felder-Solomon index of learning styles (ILS) captures learning preferences[5] on four subscales, and each of the subscales represents one learning dimension: Sensing-Intuitive, Visual-Verbal, Active-Reflective and Sequential-Global. The ILS has been used widely in studying the effects of learning styles on various outcomes. Zywno and Waalen[6] used the ILS in a study exploring how differences in learning styles affected learning outcomes when students received hypermedia instruction in electrical engineering. In another instance, the ILS was used in a study by Paterson[7] regarding environmental engineering undergraduate students' response towards the introduction of internet based learning tools. The ILS has also been criticized on both its underlying philosophy[8] and its psychometrics[9] (although other works suggests the psychometrics are acceptable[10]). We use the ILS as a mechanism of comparison, rather than as an absolute measure, of learning preferences across student and faculty populations, and as such we believe the ILS is sufficiently valid and reliable for this purpose.

Measures of teaching beliefs

The approaches to teaching inventory (ATI) is a phenomenographic construct that matches faculty's intentions (information transmission / conceptual change) with their teaching focus (teacher focused / student focus) to measure the teaching beliefs of the faculty. This scale, developed was developed by Trigwell and Prosser[11], consists of two subscales – the Instruction Transmission/Teacher-focused (ITTF) subscale and the Conceptual Change/Student-focused subscale. As a typical application, Gibbs and Coffey[12] used the ATI to measure the effectiveness of an international university's teacher training program, where the faculty used the ATI to describe their approaches to teaching before and after the training program. However, Meyer and Eley[13] have expressed concerns about the lack of psychrometric backing in the development of the ATI, and opine that the instrument "does not represent a functionally useful range of approaches to teaching." Nonetheless, several studies vouch for the validity and reliability of the ATI as an instrument, while acknowledging that its usage needs certain conditions to be met. Prosser and Trigwell[14] states that the ATI must be viewed as a contextual or relational construct and cannot per se, be used to classify faculty as *'teacher focused'* or *'student focused'*. However, it may definitely be used to compare different faculty members in the same context – such as, in our study, where we compare among faculty from the same department in the same university. In fact, a similar study was conductetd using ATI by the same authors Trigwell, Prosser, and Waterhouse[15] where the relation between teachers approach to teaching and the students' approaches to learning were studied.

Methods

Sampling frames and data sample

The sampling frame for this study was all undergraduate students and teaching faculty in an engineering major at a large Midwestern university characterized as having high research activity. The student sampling frame included all active (i.e., enrolled) undergraduate students in the major (about 1,400 students), while the faculty sampling frame included all faculty members regardless of the nature of their appointment (about 75 faculty, including tenured/tenure-track as well as continuing lecturers and those with similar faculty titles, but excluding post-docs, research scientists, and others without a teaching role). The participants in the study, volunteers from within each sampling frame, consisted of n_s = 296 undergraduate students and n_f = 21 faculty who completed the study instruments (described below) and consented to participate in the study.

Study Instruments

We used a variety of survey instruments for each of the two populations in this study. Student participants completed the 44-item ILS (which has a full scale of +/-11 on each ILS dimension; only integer scores are allowed) as well as a variety of non-cognitive inventories including the 10-item Big Five, the short (8-item) grit survey, and two sub-scales of the MSLQ totaling about 15 items. The faculty participants completed the ILS, the 16-item ATI, and a pedagogical inventory (PI) designed to probe their use of specific pedagogical approaches in the classroom. Although non-cognitive data from the students was available, they were not utilized in the current study.

The PI includes 19 items with a five-point Likert scale indicating frequency of use of each specific item. Examples include active learning, clickers, collaborative projects, 'traditional' lecturing, and many others. These 19 items were further categorized into four bins – Active learning activities, Collaborative learning activities, Formative assessment, and Lecturing. These four bins each represent broad themes around pedagogical approaches and together help us understand activities within each faculty member's classroom. We arrive at an average score for each of these bins, based on the extent of self-reported usage of each pedagogical approach.

The exact reason for this categorization is explained in the following paragraphs. Bonwell and Eison[16] define active learning as that which "involves students in doing things and thinking about the things they are doing," and learning that takes place when students "… engage in such higher-order thinking tasks as analysis, synthesis, and evaluation." The authors, after an extensive review of the literature, conclude that strategies that promote active learning favorably influence students' attitude and learning. Further, Prince[17] particularly examines if active learning strategies are effective in an engineering setting, and concludes that there is evidence that active learning promotes better student engagement, and also helps increase retention of the content discussed in the class. In the same study, the author examines the role of collaborative learning and cooperative learning. Although the author chooses to distinguish between collaborative learning and cooperative learning, he states right at the outset that collaborative learning encompasses cooperative learning. He defines collaborative learning as "a structured form of group work where students pursue common goals while being assessed individually." Dillenbourg[18] provides a more scrupulous definition as "a situation in which particular forms of interaction among people are expected to occur, which would trigger learning mechanisms, but there is no guarantee that the expected interactions will actually occur." This second definition exactly points out why we distinguish collaborative learning from active learning. Analogous to Dillenbourg's definition, collaborative learning may create *a situation in which active learning may occur, but there is no guarantee that active learning will actually occur*. That is, collaborative learning may still occur without actually triggering active learning mechanisms. In order to capture these situations, we have chosen to categorize collaborative learning as a pedagogical approach distinguishably different from active learning. That said, there is a possibility of collaborative learning techniques helping students perform better merely due to pooled knowledge and experience, without providing the same benefits as the usage of active learning strategies. As an example, Gokhale[19] found that while solving problems that require critical thinking skills, students performed significantly better in a collaborative setting that in an individual setting.

The PI considers formative learning as another pedagogical approach. Boston[20] defines formative assessment as "…diagnostic use of assessment to provide feedback to teachers and students over the course of instruction…" An extensive literature review by Black and Wiliam[21] reiterates past findings that conclude that formative assessment does improve learning.

The last pedagogical approach accounted by the PI is the extent of use of lecture as a tool in the classroom.

Data analysis

The survey instruments were scored according to their authors' recommendations, resulting in a set of scores for each student or faculty participant. Because all students and all faculty completed the ILS, an alignment scores was calculated for each faculty-student pair as follows. Using publicly-available historical teaching schedules along with student transcript information, we identified pairs of faculty and students who shared at least one class together. That is, a faculty-student 'pair' indicates that a student in the dataset was enrolled in a class that was taught by one of the faculty members in the dataset. Across the entire dataset, 417 such pairs exist; this number seems low considering the student sample size but is not terribly unexpected because some of the faculty participants teach mostly graduate-level courses with very small undergraduate enrollment. From these 417 faculty-student pairs, an ILS alignment score was calculated across each of the four ILS dimensions (for a total of 417 x 4 = 1668 alignment scores). ILS alignment is bounded on the interval [-22,22] and must take an integer value, and alignment is calculated as (faculty score) – (student score) for each ILS dimension. These alignment scores were then used in conjunction with other data (such as the ATI and PI) to make inferences and illuminate trends. All data analysis was performed in R, including basic descriptive and inferential statistics.

Qualitative data and analysis
As part of the larger research project, we also collected interview data from 12 faculty during Fall 2015 and Spring 2016. Each interview had duration of about 60 minutes, with the interview questions themselves focusing on faculty perceptions of the departmental culture and their relationships with undergraduate students. These interviews were audio recorded, with the audio files transcribed into documents suitable for analysis. The transcripts were coded for themes and the usual processes for resolving coding differences across researchers were followed. These data provide texture and depth to the quantitative results presented next.

Results

Quantitative analysis

ILS Dimension	Faculty μ	Faculty σ	Students μ	Students σ
Active-Reflective	+2.76	3.15	-1.16	4.67
Sensory-Intuitive	+1.47	5.09	-2.16	4.90
Visual-Verbal	-5.63	4.47	-6.13	3.89
Sequential-Global	-0.60	4.12	-1.34	4.18

Table 1: Descriptive statistics of Faculty and student ILS score distributions along the four dimensions of the ILS.

Table 1 shows the descriptive statistics of the faculty and students' ILS mismatch scores. On the active-reflective dimension of the ILS, the faculty are found to be more reflective than active, while the students were more active than reflective. The students showed more variability in their learning preferences on the ILS active-reflective dimension. The sensory-intuitive dimension showed that the faculty were more intuitive than sensory, while the students were more sensory than intuitive, with a comparatively lower spread. The visual-verbal dimension shows a different story in the sense that both the distributions are centered on the visual side. It is a well-documented observation that engineers tend to be more on the visual side than on the verbal side[22, 23]. Finally, on the sequential-global dimension, the faculty show an almost neutral preference, while the students showed a stronger preference for sequential learning. The sequential-global dimension shows the least mismatch while the active-reflective dimension shows the highest.

Figure 1 shows the ILS results for the 417 faculty-student pairs in the dataset, with the histograms corresponding to the raw ILS scores and the colored line representing the distribution of ILS mismatch scores.

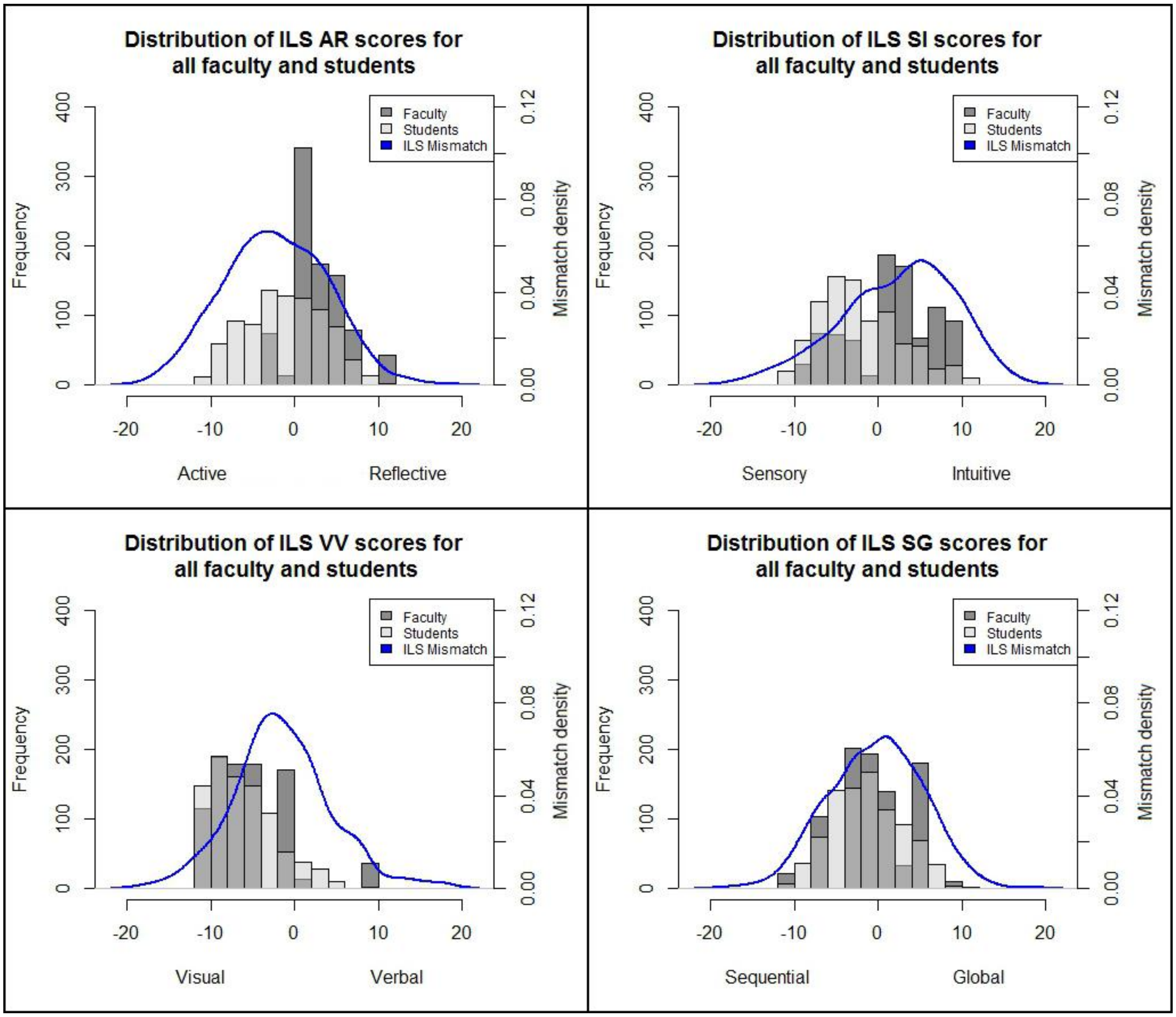

Figure 1: Faculty and student ILS score distributions along the four dimensions of the ILS. The mismatch in faculty-student scores is superimposed as a density plot

The mismatch scores are calculated as *(faculty score) – (student score)*. On the active-reflective dimension, the mismatch curve reaches highest density on the active side. This follows from the fact that the students in our sample have a stronger learning preference on the active side than the preference faculty have on the reflective side. The density curve for mismatch on the sensory-intuitive dimension narrates a different story in the sense that the density peaks on the intuitive side. This indicates that the faculty's preference for intuitive learning is stronger than the students' preference for sensory learning. The visual-verbal and the sequential-global mismatch densities are centered more neutrally with a greater kurtosis. The higher kurtosis indicates that the variability in mismatch is comparatively lesser, and the centricity implies that there are fewer instances of strong preferences towards either ends of the learning dimension.

Here, we note that on the active-reflective and the sensory-intuitive scales, the faculty and students not only have differing preferences, but also have strongly differing preferences.

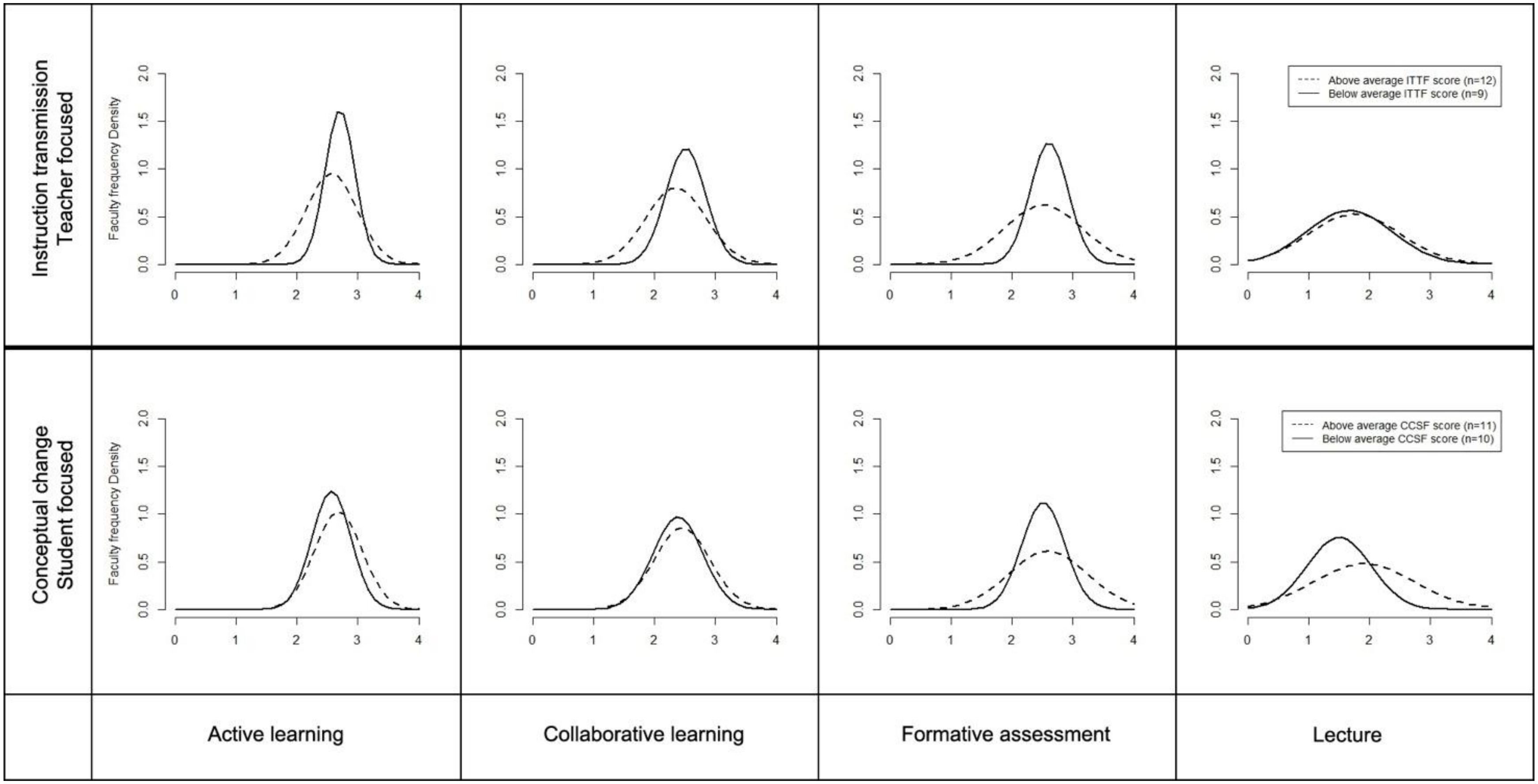

Figure 2: PI scores are compared for faculty with above and below average IITF score in the top row. The bottom row shows a similar comparison for faculty with above and below average CCSF score.

Figure 2 compiles information about the ATI and PI responses of faculty, and the eight subfigures capture the relationships between faculty attitudes and beliefs about teaching (the ATI) with their self-reported actual pedagogical practices in their classrooms (the PI).

On the ATI scale, the average ITTF (a measure of teacher focus) score of the faculty on the five-point continuous scale in our sample was 3.08. 12 out of the 21 faculty scored above average on the ITTF subscale, and 9 scored below average.

	Group 1 μ	Group 1 σ	Group 2 μ	Group 2 σ	p-value
Active learning	2.63	0.40	2.87	0.18	< 0.001
Collaborative learning	2.39	0.46	2.57	0.21	< 0.001
Formative assessment	2.59	0.64	2.74	0.23	< 0.001
Lecture	1.72	0.66	1.67	0.78	0.2793

Table 2: Descriptive statistics and p-values from the t-test between faculty above and below the average ITTF score.

Faculty with above average ITTF scores were categorized into Group 1, and those with below average ITTF scores were categorized into Group 2. Table 2 shows the mean values, standard deviations and the corresponding p-values for the t-test testing the null hypothesis that the average scores for the two groups are the same. We observed that faculty with above and below average ITTF scores have significantly different scores for the implementation of active learning, collaborative learning, and formative assessment scales. On the lecture scale though, a comparison of means of scores showed no significant difference in means for faculty with above average and below average ITTF scores.

	Group 3 μ	Group 3 σ	Group 4 μ	Group 4 σ	p-value
Active learning	2.74	0.36	2.74	0.32	0.9067
Collaborative learning	2.46	0.43	2.49	0.33	0.3538
Formative assessment	2.66	0.63	2.66	0.32	0.9983
Lecture	1.90	0.80	1.46	0.50	< 0.001

Table 3: Descriptive statistics and p-values from the t-test between faculty above and below the average CCSF score.

On the adjacent scale of the ATI, the mean CCSF (a measure of student focus) score was found to be 2.89. Faculty with above average ITTF scores were categorized into Group 3, and those with below average ITTF scores were categorized into Group 4. Table 2 shows the mean values, standard deviations and the corresponding p-values for the t-test testing the null hypothesis that the average scores for the two groups are the same. An above average or a below average score on the CCSF subscale showed no significant difference in the active learning, collaborative learning, and formative assessment scores. However, a comparison of means for faculty with above and below average CCSF scores revealed a significant difference on the lecture scale.

In our study, for the study relating the ATI and the PI instruments, the sample size is $n_f = 21$. Nevertheless, we obtained significance at $p < 0.001$ levels. This is may be due to the fact that the ITTF and the CCSF scores are tightly distributed in our sample. Further, it is to be recalled that the subscales of the ATI emerge from Factor analysis and involves taking the mean of numerical responses to 8 questions. This process contributes towards reducing the spread of the data, which may be demonstrated by the central limit theorem in statistics. While the sample size is a cause for caution in accepting the results at face value, we believe the strong p-values (< 0.001 in all conclusions reported), combined with the nearly normal spread of the values in our sample, provides confidence to retain faith in the results.

Qualitative analysis

We reviewed faculty interview transcripts for evidence related to faculty-student misalignment or other faculty perceptions around teaching and learning. Transcripts from our limited sample of faculty reveal two common themes relevant to this discussion: (i) that this program is ‘traditional’ in structure, expectations, and practices, and (ii) an acknowledgment of a broad misalignment between faculty and students in terms of how students can be taught, given their perceived level of preparation.

<u>Theme 1: tradition.</u> Faculty express their view of the program as traditional in a number of different ways, including around pedagogy and student outcomes. One faculty commented on this program as “…[a] traditional school, as in very much focused on doing things the old way.” Here, ‘old’ is interpreted as ‘old-fashioned’, meaning that faculty use tools and approaches that are decades old, rather than modern. Two other faculty comments, taken together, shed light on this tradition in terms of student outcomes. One faculty commented about how the program feels oriented toward the kind of applied activities for which the program is well known: “Compared to [the school I graduated from], it [this program] is a bit more, the word that comes to mind is ‘industrial’. I think that’s something.” And another faculty described student outcomes in a similar light: “Another thing that I think, and again, this relates to this notion of traditional, we think of our students as ideal employees for companies like Ford, GM, these types of places.” These faculty are implying that they view the undergraduate program as being focused on preparing students for the workforce (in relatively tradition engineering companies and roles), and using ‘old’ methods to support student preparation.

<u>Theme 2: faculty-student alignment.</u> The faculty generally seem to believe that today’s students have had a different set of experiences in the prior academic and personal lives that may translate into differences in preferences about teaching and learning. For instance, one faculty member reported that “…maybe 30 years ago, students who came in had different experiences as they came. For example, when we utter the word ‘piston’, students don’t even know what they are

talking about." Another faculty member expressed a lack of understanding of students' strengths, while acknowledging that such strengths exist: "On the positive side, the students would probably have a lot better…other skills that we are not capitalizing on because we don't know what they are." Moreover, a number of faculty cast this student preparation (that may very well be oriented around a different set of strengths) in terms of a deficit model, such as: "We are more thinking about the outcomes as to, okay, they [the students] don't have those skills." The quotes capture the broad sentiment among faculty that there does exist a disconnect, distance, or outright misunderstanding between faculty and students when it comes to skills, outcomes, and learning. This observation of differences and a perception gap is not new and has been reported in a variety of contexts including digital tools and social media[24], and flipped classroom arrangements[25].

Taken together, this preliminary qualitative analysis of faculty interview transcripts suggests that faculty do indeed recognize and acknowledge differences between them and their students. Although faculty do not explicitly articulate these differences in terms of the language of the ILS or ATI, they nonetheless do detect differences. This notion of 'traditionality' seems important here, in that it suggests that a traditional, lecture-oriented pedagogy has been the status quo in the department. While this situation is changing via hiring of pedagogically-progressive faculty, there remains—as the ATI shows—a broad swath of faculty reliant on quite traditional pedagogical practices.

Finally, it is worth noting that faculty employing lecture-based pedagogies may not be loyal to such pedagogies because of their belief that they are the best approach to teaching. It is entirely possible—perhaps probable—that many faculty want to adopt more active pedagogies but have significant difficulty enacting that change within the context of the competing demands on their time. This institution, like many/most others, has a center for teaching and learning whose mission is to support pedagogical training and transformation within the faculty. However, for faculty, professional development is not always their top priority, and this may help explain the slow adoption and/or low penetration of progressive pedagogies into the mainstream of teaching in the department. The change literature is replete with descriptions of these phenomena[26]–[28].

Discussion

Our study found no clear correlations across all three scales at hand. Information about any two scales among teaching preferences, learning preferences and classroom activities seems to be insufficient to draw a generalizable conclusion about the third. However, certain characteristics among faculty may be used to understand certain other preferences/actions.

Correlations across measurement scales

First, faculty self-report frequent lecturing, regardless of their ATI profile. Student-centered faculty were not more likely to lecture less, as compared to instructor-centered faculty. We suspect several reasons for this. As elicited in the faculty interviews, the norms in the department around 'tradition' are consistent with a lecture-based pedagogy. This department has very high enrollment and therefore large class sizes, and many faculty—even pedagogically progressive ones—may default to a more lecture-based approach when faced with class sizes exceeding 100 students. This situation relates to faculty professional development, because active learning and other research-based approaches certainly can be useful in large-enrollment courses[29]. This general trend is also likely correlated to faculty motivation for pedagogical change, which is known to be consistent with various other elements of faculty responsibility but in tension with many faculty rewards and incentive structures[30].

In this study, faculty who are more instructor-focused according to the ATI generally report using active, research-based pedagogies less frequently—a conclusion that is not surprising (Figure 2). However, faculty who are less student-focused according to the ATI are not less likely to use active pedagogies. Because the instructor-focused and student-focused subscales of the ATI measure two different constructs, we would not necessarily expect that these two faculty groups share similar pedagogical approaches.

Our data also reveal a correlation between ILS alignment score and pedagogical choices, with a higher A-R or S-G misalignment corresponding to a more lecture-centric teaching approach. Faculty with higher mismatch on the S-I and V-V dimensions tended to use more of the research-based pedagogies including active and collaborative learning.

Are ILS results a proxy for expertise in this case?

In reflecting on these results, one cannot help but wonder why the ILS misalignment between faculty and students is so dramatic across several ILS dimensions—more dramatic than has been previously reported[31]. This observation is intriguing, and acknowledging all the caveats around our limited sample size, we put forward a tentative hypothesis that certainly requires more investigation. We wonder if many of the ILS dimensions may map onto expertise variables, in the follow sense. The ILS questions probe different dimensions of learning, but we cannot help thinking that (faculty) participants may have contextualized 'learning' to be 'learning engineering'—a domain in which they are already an expert. Knowing the previously-reported differences between novice and expert problem solvers[32], [33] or designers[34], [35], it seems possible that faculty, when thinking about learning within their domain of expertise, will generally demonstrate expert tendencies: being more reflective and global, for instance. For students, this contextualization may have also occurred, but they are novices in both the 'learning' domain as well as the 'learning engineering' domain. As such, their learning preferences might reflect their current status as novices: being more active and sequential, for instance.

While this hypothesis may help explain the significant observed misalignment in learning style, it does not reveal anything about faculty flexibility in pedagogical choices. While there is some evidence that faculty teach in a manner consistent with their own cognitive style[31], [36], there is also the possibility that faculty detect such a misalignment and attempt to flexibly adjust their pedagogical approach and/or learning activities to better align with student preferences. The 'mismatch' studies of recent decades[37], [38] examine how faculty-student alignment in cognitive style may or may not support positive student learning outcomes. The self-report data from the PI used in this study is not granular enough to allow us to comment on this question with any accuracy, but we have another study underway to examine exactly this issue of attitudes about teaching and learning (as measured by the ATI) compared with actual in-class pedagogical practices.

Interpretation and synthesis of scores across measurement scales
Firstly, the results convey to us that the teaching activities in the classroom are not a simple sum of the faculty's preferences in learning and teaching. There is a more complex interplay, with the students' learning preferences entering the picture. The faculty recognize that the students' learning preferences may be quite different from their own learning preferences, and they may attempt adjust their teaching activities accordingly. Some prior work suggests that faculty's perception of their task (teaching) plays an important role on their thoughts, and subsequently their actions[1].

Our study also deduces that faculty whose teaching beliefs favor instruction transfer to a higher extent were not voracious practitioners of innovative teaching techniques such as Active learning, as expected. These faculty may hold old-fashioned notions about teaching and may believe their job to be[3], "…the accurate and clear presentation of the subject matter to the student…" They scored lower on the collaborative learning as well as formative assessment scales.

We also examined the faculty who share high mismatch scores with students (as measured by the ILS) separately to unearth shared teaching beliefs as measured by the ATI, if any. We found in our study that, faculty who had an above average mismatch with students on the ILS A-R dimension showed an even distribution in the ATI ITTF (teacher-focused) scale: 52% were more teacher focused than average, and 48% were less teacher focused than average. The distribution on the ATI CCSF (student-focused) subscale was almost identical. This suggests that the mismatch in A-R score is not correlated to the teaching beliefs the faculty possess. Moreover, this suggests that even if faculty recognize that the A-R mismatch exists (and based upon our qualitative results, it is not clear that they would articulate it as such), they do not see using more student-focused teaching practices (i.e., using more active learning) as a potential means to span that mismatch. This again focuses on faculty professional development and suggests that perhaps using the vocabulary of the ILS and ATI with faculty will provide a common language to talk about these perceived mismatches.

Conclusion

Having a highly information transmission/teacher focused teaching philosophy hinders faculty from employing innovative teaching tools. However, this does not imply that a low conceptual change/student focus also translates to using these tools to a lower extent. The teacher focus of faculty members is to be measured independent of their student focus. Further, mismatch in faculty and student learning preferences in our study caused faculty to employ methods to combat / cope. While many faculty may not explicitly recognize a lack of similarity in learning preferences in the classroom, we believe the faculty do sense this implicitly. The methods employed differ based on the type of mismatch. Mismatch on the Active-Reflective dimension caused faculty to utilize innovative teaching techniques such as Active learning, Collaborative learning, and formative assessment, while the mismatch on the Sequential-Global dimension caused faculty to lecture more. Mismatch on the Sensory-Intuitive and the Visual-Verbal dimensions caused faculty to use both lecture and non-lecture activities to a higher extent. Our study argues that mismatch in learning preferences between faculty and students is not necessarily detrimental in the classroom environment. It further argues that mismatch on certain dimensions of learning may in fact, make the classroom more interesting and involving for the students.

Acknowledgments
This material is based upon work supported by the National Science Foundation under Grant No. EEC-1519412. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

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