Operationalizing "Substantive Faculty Interaction" for online courses: identifying high impact teaching practices

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Cover Page Footnote

Operationalizing "Substantive Faculty Interaction" for Online Courses: Identifying High-Impact Teaching Practices

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Abstract

To operationalize the concept of "substantive faculty interaction," researchers at Regis University used exploratory and confirmatory factor analysis to determine what online asynchronous teaching practices have the highest impact on students' perception of faculty-to-student engagement. Working from the tenets of engaged Ignatian pedagogy, they built a three-component model that accounts for 70% of the variance of good facilitation. The components consisted of high-touch design and high-tech teaching practices. The high-touch component accounted for the most significant percentage of the variance, and the six teaching practices that comprise this component are recommended to become requirements for online teachers. They include: (1) Actively engaging in discussion boards (load of 0.8000), (2) Getting to know faculty (0.7851), (3) Present multiple times per week (0.7752), (4) Soliciting feedback (0.7424), (5) Individual feedback on assignments (0.6991) and (6) posting weekly announcements (0.6735). Universities now have an operationalized definition of "substantive faculty interaction" that has been statistically validated.

Introduction

The Amended Federal Higher Education Act of 1965 distinguishes between online ("distance") courses and correspondence classes. Online classes must "support regular and substantive interaction between the students and the instructor."[1] The code distinguishes this from correspondence courses in which "interaction between the instructor and the student is limited, is not regular and substantive, and is primarily initiated by the student."[2] Building from the federal regulation, The Higher Learning Commission (HLC), an independent corporation founded in 1895 as one of six regional institutional accreditors in the United States, has defined the difference between an online correspondence course and a traditional online course as "substantive faculty interaction." However, HLC does not provide an operational definition of "substantive faculty interaction" and has left this task to each institution.[3]

In the 1990s, in an attempt to crystalize the core qualities of a Jesuit education, Jesuit educators under the leadership of Father Kolvenbach developed the Ignatian pedagogical paradigm, rooted in the spirituality and educational philosophy of St. Ignatius of Loyola. Their conclusion: learning must be holistic, including spiritual, intellectual, emotional, and physical growth. Developed from the foundation of the Spiritual Exercises and the formation process, Ignatian pedagogy emphasized an engaging process of teaching and learning based on three critical pillars: experience, reflection, and action.[4]

Most Jesuit-sponsored schools have adopted this process (and sometimes redeveloped it); however, most have maintained the three core principles above. This was always the idea with the drafting team that the schools would adopt and apply these in their context. For example, some have added a few more pillars, including context, experience, reflection, action, and evaluation.[5]

Key to the development of this process was the role of the teacher, that they were not a sage on stage where the teacher impacts knowledge, often through lecturing and one-direction information sharing.[6] Instead, they envisioned the teacher as a facilitator and a co-learner with the students. Their call is to create an engaged learning community that focuses on the holistic development of the student and facilitator. Additionally, a good facilitator in Ignatian pedagogy would possess several core qualities and skills, including empathy and respect for the learner and the context, being an active listener, and employing creativity and flexibility to adapt to the needs of an inclusive learning community.[7] Above all, the facilitator leads the learning community with reflectiveness, always drawing the community into a holistic approach that recognizes the interconnectedness of the learner's spiritual, intellectual, emotional, and physical well-being and seeks to foster growth in all these areas.[8]

In any learning environment, online or in person, adequately applied Ignatian pedagogy helps create opportunities for learners to connect and build a sense of community. This can be done through virtual group activities, discussions, or online collaborations. It encourages active engagement in fostering community by designing interactive activities that engage learners with the material, such as simulations, role-playing exercises, or case studies. It encourages learners to think creatively and develop ideas and solutions through open-ended activities or projects. Plus, a personalized learning experience offers one-on-one support, such as virtual office hours, individualized feedback, or tailored resources. Being sensitive to the context also means encouraging diversity and inclusiveness in the online community by creating a safe space for all learners to share their perspectives.

Finally, learning is only complete by providing reflections and activities that encourage holistic growth and connect learners to their humanity.[9] This might be through spiritual or other human dignity-affirming reflective activities that apply knowledge to knowing oneself and serving humanity. This is the overarching focus supported by Pope Francis' seminal encyclical, *Laudato Si?*, with implications for engaged higher education design and instruction.[10]

The Higher Education Commission, accrediting bodies, and Jesuit pedagogy advocate substantive faculty engagement in the learning process, whether in an online or face-to-face classroom setup. The result of having or lacking substantive faculty interaction in online courses has implications for holistic learning, as exemplified in Jesuit pedagogy, but in more practical matters, for university accreditation and financial aid, as demanded by the Higher Education Commission. This is particularly true for online programs.

Clark demonstrates this fact when explaining what happened to Saint Mary-of-the-Woods College and Western Governors University.[11] Owing to an alleged lack of substantive faculty interaction, many of Saint Mary-of-the-Woods College's classes were reclassified as correspondence courses upon inspection by the US Department of Education (DOE) after an audit in 2012. This resulted in the school being sued to repay over $42.4 million it had received in financial aid and a threat of losing its accreditation.[12] A similar fate befell Western Governors University, which was called on to repay over $700 million in financial aid owing to a lack of substantive faculty interaction in their online course.[13] Luckily, both cases were adjudicated through the courts and dropped by the DOE. However, by the willingness to take such actions, the federal government had indicated that simply offering a course online or through the Internet is not enough to distinguish between correspondence courses and an online class.

The biggest driver of the difference between online learning and correspondence learning hinges on the concept of "substantive faculty interaction." However, there is no clear definition of what this concept looks like in online classes. To operationalize this concept for holistic learning and to reduce the risk of legal liabilities discussed above, the authors of this article based at a mid-size private nonprofit university that offers in-person and online classes sought to use empirical research to create an operationalized definition of substantive faculty interaction that could be evaluated and measured within online classes. To accomplish this, a study was conducted using exploratory factor analysis and confirmatory factor analysis to determine what teaching practices or

methods impact faculty-to-student engagement most.

Building from a Community of Inquiry (COI) framework, they suggested that faculty-to-student engagement is composed of multiple components, including (1) high touch, (2) high tech, and (3) design. A secondary research interest in this study was to determine if faculty-to-student engagement is a single component unto itself or if it comprises multiple components, as theorized by Edmunds, Gicheva, Thrift, and Hull.[14]

Theoretical Framework

Teaching Presence

There is growing consensus on the importance of teaching presence in learning environments, especially for online asynchronous classes. Teaching presence, however, is only as successful as the student's perception of the teacher's engagement. To that end, this research aims to identify what teacher engagement activities students find the most engaging in an online learning environment. Thus, what students perceive as substantive faculty interaction.

Although there are no specific and all-encompassing agreements of facilitator engagements in instructional literature, teaching presence speaks to the role of the facilitator in helping students understand the course material. For some, teaching presence focuses on the amount of direct teacher instruction,[15] while others argue the focus ought to be on the quality of teacher interactions.[16] Project COMPASS identifies important faculty actions, such as reminding students of deadlines, responding quickly to students, and inviting questions and feedback. Garrison et al. emphasize the importance of structured, intentional teacher interaction.[17]

Teaching Presence Multiple Components?

Building from the framework of COI, we would expect teacher presence to be composed of course

design and faculty-to-student engagement. Furthermore, COMPASS suggests that faculty-to-student engagement can be high-touch and high-tech.[18] Examples of high touch include posting and replying to discussion board posts and specific comments on student assignments. Examples of high-tech engagements would be creating a video explaining a topic or hosting video office hours. From this, we draw the research question, "Does empirical research support the theory that faculty-to-student engagement is comprised of multiple components, including high touch and high technology?" Furthermore, because our goal is to operationalize (in a method that can be evaluated) substantive faculty-to-student interaction, we seek to further determine what online teaching practices have the highest impact on students' perception of faculty-to-student engagement in an online course.

Statistical Framework

Factor Analysis – What is it?

"Factor analysis is a hybrid of social and statistical science" and is a common statistical tool used to identify factors.[19] A factor is a broad notion that cannot be measured with one question. We seek to determine what faculty-to-student engagement methods students value most in an online class. In this case, "faculty-to-student engagement" would be the factor we are examining. But multiple variables (called items) can make up this factor. For example, posting on the discussion board could be one item, and making announcement posts could be another item within this factor. All of these items work together to create the factor. Additionally, factor analysis can help us better identify if a factor has multiple components.

For example, COMPASS researchers theorized that faculty engagement has components (1) high touch and (2) high tech, and (3) course design, and each of these components has practices (items).[20] A visual representation of this theory is presented in Figure 1.
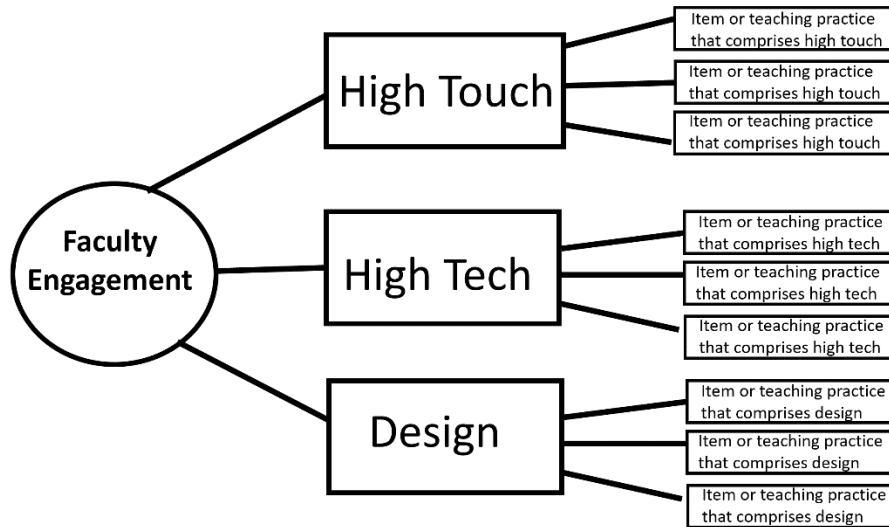
Figure 1: Theoretical model showing Faculty Engagement comprising three components.

Through factor analysis, we can use statistics to test the validity of this theory. If high touch teaching practices load into one factor, design practices load into another, and high-tech teaching practices load into a third factor, then that would provide empirical evidence that the theory is valid and that there are multiple components to teaching, and high-touch and high tech are separate components. However, if both high-tech and high-touch items load into one factor, that would be evidence against the theory.

Another key benefit of factor analysis is using statistical methods to narrow the focus to a small set of variables that can represent or achieve the broader goal or factor.[21] Thus, one of the goals is data reduction, which means it can identify the factor and determine the highest impact items. To do this, we use statistics to determine the magnitude or importance of the item as it relates to the factor. This is called the factor load.

Why Data Reduction Matters (Faculty Workloads)

As faculty, our workloads are increasing, and there is always a request to do more. Thus, we must determine what project, outcomes, and methods will provide the most significant return on our investment of time and input.

Through factor analysis, we can determine what methods have the best return and see where the point of diminishing return is. For example, through factor analysis, we find that faculty being actively engaged in the discussion board(s) and regularly posting and replying to students throughout the week has the same effect on faculty-to-student engagement as all of the following three items put together:

- Faculty encourage one-on-one conversations with students. This can be accomplished through office hours or phone calls.
- At the beginning of the course, faculty provide an opportunity to have students self-introduce.
- Faculty provide video/audio feedback on assignments to students.

Thus, rather than doing all three bulleted activities above, faculty can focus on higher-impact engagement methods (based on item load) and achieve the same engagement level.

Factor Analysis vs. Survey Alone

Factor Analysis has allowed survey data to become useable.[22] To better understand this, we can consider opportunity costs. If you ask a survey question that says would you like to have a bowling alley in your town, almost everyone will say yes even if they (individually) never plan to go to the bowling alley. They simply want the option available, and there is no cost to them or their yes

answer. Thus, survey data often overestimates how important something is (when used in this context).

However, those considering the cost can use factor analysis and the resulting load values to rank items and determine the most impactful items. Thus, survey data can be turned into measures that can be objectively evaluated.

Research Questions

Owing to the ability to determine if factors have multiple components and potential for data reduction, factor analysis was deemed the most appropriate method for this research project and the best path forward for addressing our research questions (RQ).

RQ 1: What online teaching practices have the highest impact on Regis University students' perception of faculty-to-student engagement in an online course?

RQ 2: Does empirical research support the theory that faculty-to-student engagement comprises multiple components, including high touch and high technology?

Methods

Description of the Survey/Measures

Over the course of four months, eight meetings (between one and two hours each) were conducted with six volunteers who acted as representatives from departments and fields such as The Center of Teaching Excellence, Instructional Design, and faculty representatives from different academic disciplines. During these meetings, all individuals reviewed current literature and shared experiences to create a list of items (practices) they thought would meet faculty-to-student engagement in an online course.[23]

Next, their list of items was shared with fifteen university members from departments such as Disability, Diversity and Inclusion, Education, Faculty Governance, Advising, Tutoring, and the Provost. It was also shared with another group that was comprised of twelve online faculty members not associated with the previous work.

The list was updated multiple times based on feedback from these members.

This list aimed to determine the methods that were statistically deemed the most engaging and demanded by students and to create recommendations for faculty teaching requirements. Thus, it was essential to ensure that each item listed could be assessed within a course. Therefore, the list was used to evaluate two online classes to ensure that each item could be concretely identified and measured in an online course.

Based on these steps, we had a solid list expressing what we (faculty and university officials) felt online faculty-to-student engagement was. However, the next and most crucial step was to see if students agreed. To incorporate the students' voices, it was decided to present each item in the list as a question on an online student survey.

Questions based on each item of the list were created on a four-point Likert scale ranging from "Strongly Engaging" to "Not Engaging At All." "Since they have no neutral point, even-numbered Likert scales force the respondent to commit to a certain position."[24] After the creation of the draft survey was agreed upon, six students were given copies of the questions to pretest the instrument. The final survey had a total of six demographic questions and a total of thirty-one items. All engagement questions are listed in the Appendix in Column 1 of the table. Notably, the demographic questions were limited and optional to avoid student identification and allow for anonymous results.

Data Collection

Once the final draft of the survey was approved, an online version was created, which utilized the Qualtrics survey platform. An announcement was posted in all online classes running that term. The announcement consisted of a greeting and link to the survey and asked students to volunteer their time to help us. Students were able to access the survey by computer or mobile phone. Three follow-up reminders were posted in the online classes, and an email reminder was sent to each student's school email.

Data Cleaning and Sample

After closing the survey, data was screened to determine appropriateness for inclusion. Those surveys that needed to be completed or were completed in less time (under two minutes) were excluded. Thus, our final dataset was comprised of 465 completed surveys.

Notably, the demographic questions were limited and optional to avoid student identification and allow for anonymous results. Of our participating students, 63% were female, 34% male, and 3% preferred not to say. Graduate students made up the majority of participants at 57%. Undergraduate responses were 42%, and a handful of students selected that they would prefer not to answer the question. Additionally, we asked, "how many hours per week do you work outside of the home (in a paid position)." Most students self-identified as working forty or more hours per week (64.6%). While those that worked between zero and ten hours per week made up 6.5% of the respondents, a twenty to thirty-hour workweek was reported by 8.4%, and 10.6% selected that they would prefer not to answer.

Analysis

For our analysis, cross-validation using exploratory and confirmatory factor analysis was conducted. This is in accordance with the strongest factor analysis research standards established.[25]

The dataset was split into two samples. Each result was assigned a random number using the Microsoft Excel random number generator to accomplish this. Next, the survey results were ranked according to their random numbers and divided into two data sets. This resulted in the first 200 completes (Data Set One) comprising the first sample and the remaining 265 (Data Set Two) completes comprising the second.

Data Set One was treated with an exploratory factor analysis (EFA). In accordance with standard factor analysis procedures, items were removed based on low factor loadings (below 0.6) and poor contribution to the overall explained variance. The model that was created using Data Set One and

EFA was then imposed on Data Set Two using confirmatory factor analysis (CFA) to repeat results and cross-validate the model. The EFA included a principal component factor (PCF) analysis that utilized Varimax rotation. This allowed us to estimate the factor loadings. The CFA used a latent factor structure (regressed onto manifest variables) in order to determine loadings and gauged the closeness of factor structure and fit for the data. Model fit was compared to commonly accepted standards and thresholds of less than 0.08 for SRMR, more than 0.95 for TLI, greater than 0.9 for CFI,[26] and less than 0.08 for RMSEA.[27]

Results

First, alpha for each item was determined, and alpha for the scale indicated a 6.8% margin of error. Random error is 5%, and ours is less than two percentage points above random. This in indicative of strong results.

EFA with Data Set One

To evaluate the data, the initial EFA was run with no constraints. It found a ten-factor solution. The standard procedure based on Kaiser Criterion suggests that those factors with eigenvalues of one or higher should be retained.[28] Our data showed three factors that met this standard, so we moved forward with three factors.

Next, EFA was run with a three-factor constraint. The results are presented in Appendix A - Table 1. We must remind readers that these are the results before factors with low loads were removed. However, we present this data because some may wish to identify one of their own teaching methods and see how it loaded (if the load was high or low). Thus, make all data available to inform practice.

The next steps followed the process of item reduction. This is the systematic removal of questions based on the following (this list is in order of importance): (1) Low Factor Loadings of items below 0.6. (2) Multiple factor load without at least a 0.2 difference, and (3) low variance contributing factors. In this process, a three-factor model was found. The items within each factor were evaluated and presented in Table 1.

Table 1. Factor Loadings

Item	Factor 1	Factor 2	Factor 3
Factor 1: High Touch Faculty Presence			
Faculty provide individualized feedback on student assignments.	0.6991		
Learners have an opportunity to get to know their faculty through written postings, to include an introduction.	0.7851		
Faculty are present in the course multiple times per week (discussions/announcements/emails).	0.7752		
Faculty provide opportunities to solicit feedback from their students about their learning and on the course for the improvement of the course.	0.7424		
Faculty are actively engaged in the discussion board(s) and regularly post and reply to students throughout the week.	0.8000		
Faculty post a weekly announcement.	0.6735		
Factor 2: Cognitive Presence (Design)			
Course provides activities for learners to develop higher-order thinking and problem-solving skills, such as critical reflection and analysis.		0.8269	
Learners are encouraged to share resources and inject knowledge from diverse sources of information in their course interactions. (Example: find a resource and post it for others to see)		0.8317	
The course learning activities help students understand fundamental concepts, and build skills useful outside of the course.		0.8175	
Course provides activities that emulate authentic (real world) applications of the discipline, such as experiential learning, case studies, and problem-based activities.		0.7384	
Factor 3: High Tech Faculty Presence			
Faculty hold an all student meeting through Zoom.			0.6598
Faculty posts a general video about the content.			0.8938
Faculty make and post their own videos about the content.			0.9290
Alpha	0.8939	0.8705	0.8324
Portion of the Variance (total .7020)	0.2848	0.2323	0.1848

The final model explained 70.2% of the overall variance, and this result exceeds the 60% cutoff benchmark.[29]

Of note, the authors would like to stress that the heading "high tech" is meant to imply that these items may have a higher technology or training need. For example, to host Zoom meetings, faculty must have a Zoom subscription (or one be added through the LMS). Additionally, faculty will need equipment such as a camera and microphone.

CFA with Random Sample 2

To validate the results of the EFA, confirmatory factor analysis was imposed on Data Set Two by using the same structure found through EFA. The overall model fit was strong χ^2=133.57, with a p-value of 0.000. For SRMR, the goal is less than 0.08, and this was surpassed with 0.055. TLI is considered acceptable at 0.95 or more, and we accomplished this with 0.953. CFI has a goal of 0.9 or greater and this was surpassed with a 0.962.[30] For the RMSEA result, we look for a number that is less than 0.08, which was accomplished with a 0.069.

Table 2. CFA Goodness of fit tests using the model created by EFA

Confirmatory Goodness of Fit Tests	Benchmark	Result	Pass / fail
SRMR	Less than 0.08	0.055	Pass
TLI	Greater than 0.95	0.953	Pass
CFI	Greater than 0.9	0.962	Pass
RMSEA	Less than 0.08	0.069	Pass

Thus, all confirmatory tests were passed with this model. Reliability statistics are all provided in Table 2. Factor loadings were all strong (0.5948 to 0.9496), and reliability measures for each factor were also strong, with Cronbach's alphas ranging from 0.8991 to 0.9082, suggesting strong internal consistency.

There was some variance in the factor loadings for each factor, as some loadings were as low as 0.6991 and as high as 0.8042. However, most of the factors had stable and consistent factor loadings. Each of the factor's reliability was strong. In sum, the results of the random sample CFA replication cross-validates the EFA results.

Discussion

Empirical Support That Faculty Engagement Is Two Components (High Tech and High Touch)

Through this research, we found a three-factor model. Through evaluation of the items within the factors, it is clear that Factor 2 was best categorized as "active learning," "course design," or "cognitive presence," depending upon your theoretical framework. It was expected that active learning might develop into its own factor. We did not exclude these questions from the analysis to guard against our biases.

The other two factors clearly deal with faculty engagement, with Factor 1 referencing presence or "high touch" and the Factor 3 being "high tech" presence. These results support Edmunds, Gicheva, Thrift, and Hull when distinguishing between these two forms of faculty presence.[31]

And thus, our *Research Question 2*—"Does empirical research support the theory that faculty-to-student engagement is multiple components including high touch and high technology"—is addressed, and the answer is yes. When comparing items in Factor 1 and Factor 3, it is clear that high-touch items loaded in Factor 1 and high-tech methods loaded in Factor 3.

Another contribution of this research is that we can statistically show which components (high touch or high tech) significantly impact faculty-to-student engagement. Since Factor 1, comprised of high-touch items, accounted for 28.5% of the variance, and Factor 3, high tech, accounted for 18.5% of the variance, we can confidently say that high touch provides more impact.

Research Question 1 Surprises

Next, we evaluate RQ 1: What online teaching practices have the highest impact on students' perception of faculty-to-student engagement in an online course? As with anyone, we did not come to this research without our own biases. As a result, we found some results surprising because they went against our preconceived notions. For example, we expected students to strongly prefer faculty video introductions. However, this variable had a low load level, and written introductions from faculty had a high load. We had expected the opposite, yet our expectations did not match the data results.

Similar surprises were demonstrated by the variable of faculty providing video/audio feedback on student assignments. Researchers had expected students to show a strong preference for this practice. However, students showed a low desire for this practice, with more disliking it than liking it.

We caution that just because students dislike a practice does not mean it should not be used. For example, it is commonly accepted that students dislike group work.[32] Yet when there are vital learning or pedagogical reasons to use this method, the student's preference to avoid group work should not prevent group projects from being assigned when it is in their educational interest to do so.

Research Question 1 - Application of the Research

This study aimed to demonstrate through statistical methods what faculty engagement methods were most important to students and had the most significant impact on showing substantive faculty interaction in online courses.

Because many teaching institutions now employ an affiliate model where online classes are designed by someone different from the teaching faculty, items in the course design factor were excluded from our measure. Thus, we moved forward with Factors 1 and 3 (high touch and high tech). Because our method allowed us to determine what components (high touch vs. high tech) account for the most variance (have the most significant impact), we suggest those items in Factor 1 (high touch) should be considered in teaching requirements because they have the most significant impact. Those items in Factor 3 (high tech) are nice to have in an online class, but owing to lower impact and technology support needs, they may not be needed as a requirement.

Through this research, universities, and faculty now have a statistically backed checklist of six high-touch teaching practices.

Table 3. Factor 1 High Touch Faculty Presence

Code	Factor 1: High Touch Faculty Presence Items that were suggested to be required of all online faculty	Factor Loads
Item 1	Faculty are actively engaged in the discussion board(s) and regularly post and reply to students throughout the week.	0.8000
Item 2	Learners have an opportunity to get to know their faculty through written postings, to include an introduction.	0.7851
Item 3	Faculty are present in the course multiple times per week (discussions/announcements/emails).	0.7752
Item 4	Faculty provide opportunities to solicit feedback from their students about their learning and on the course for the improvement of the course.	0.7424
Item 5	Faculty provide individualized feedback on student assignments.	0.6991
Item 6	Faculty post a weekly announcement.	0.6735

Item 1 & 3: "Faculty are actively engaged in the discussion board(s) and regularly post and reply to students throughout the week" & "Faculty are present in the course multiple times per week (discussions/announcements/emails)"

With factor loads of 0.8000 and 0.7752, respectively, these two items were the first and third highest loading items in the faculty high touch engagement category. They both speak to faculty being present throughout the week (multiple times per week).

Sometimes faculty will mistakenly believe that logging in and monitoring an online course is enough. Even if the faculty do this daily, the student will not feel the faculty's presence unless they leave evidence that the student can view. From the student perspective, the faculty may "feel" absent even if that faculty is logging in multiple times per day. This disconnect in course experience must be ever present in the faculty's mind. Indeed, it is a critical practice that can help mitigate this disconnect.

One way to accomplish this is to plan communication from the student's perspective. Faculty can automate announcement releases and schedule them for days that the faculty may not post on the discussion board. From the student's perspective, seeing the announcement is evidence of the faculty being present. For example, faculty may schedule announcements to auto-release on Monday, Wednesday, and Saturday. They may also post replies to students on the discussion board on Tuesday and Thursday. Using this method, the faculty shows presence (from the student's perspective) five days a week. But, the faculty may not have logged into the class on Monday because they were busy with other work. Yet, this was planned for and designed with the student's perspective in mind, and because the student saw a new announcement posted, the student "felt" the faculty was present.

Again, this research aimed to show through empirical research what engagement methods are valued by students. This method was found valuable and should be practiced in online classes.

Item 2: "Learners have an opportunity to get to know their faculty through written postings, to include an introduction"

Through the second highest factor loading of 0.7851, this item was indicated to be the second most important aspect to students. At its very heart, this item speaks to two essential components: (1) Relationship with Faculty and (2) Expertise of Faculty. "Faculty-student communication creates a sense of online community that is initiated through emails, introductions, faculty and student biographies, and photos."[33] Sitzman and Lener back this notion through their research when they sought to explore students' perceptions of online faculty.[34] They identified that students sought faculty with presence in the classroom who are experts in their field and show compassion in their interactions. Often the first act of faculty presence, shown in an online class, is that of an introduction post. This post is often the faculty member's first opportunity to share their background (thus demonstrating their expertise in the field) and to communicate clearly and compassionately (encouraging students to reach out when they need help).

Research and guidelines have been created that provide best practices for writing faculty introduction posts for online classes.[35] Our goal is not to repost those guidelines here but to show, through our empirical results, that this practice is valuable and should be used in online classes.

Item 4: "Faculty provide opportunities to solicit feedback from their students about their learning and on the course for the improvement of the course"

With a factor load of 0.6991, this item demonstrates its importance to students. As researchers and practitioners, we would like to express a proper framing of this item. Some may dismiss this outright, citing that students "don't know what they need to know." While we admit and value the faculty as the expert in the classroom regarding the content, we also acknowledge and affirm the student as an expert on what methods they find the easiest to understand and if assignments or lectures are designed in a way that helps them understand concepts. So, this question is not intended to look past the faculty's expertise but to engage the

student in helping to share what they need from the faculty to understand the content better.

Item 5: "Faculty provide individualized feedback on student assignments"

Regarding Item 5, it is interesting to note that those items that spoke to presence and relationship were found to be more important to students (owing to the higher factor loads). Yet, individualized feedback is also essential, and a load of 0.6991 demonstrates this. The role of student feedback on assignments, topics, and coursework has been studied extensively, and there are multiple methods, theories, and practices. We suggest Padgett, Moffitt, & Grieve as a resource.[36] Our goal is not to provide ideas related to how this is accomplished, only to show through empirical methods that students value this topic and should be practiced by online faculty.

Item 6: "Faculty post a weekly announcement"

This item had a factor load of 0.6735. While posting announcements to show presence was already covered when we reviewed items 1 & 3, it is crucial to recognize that this item loaded in addition to the others. It is quite possible that students recognize the different roles that announcements and discussion board posts play in an online course and see these as separate items with separate functions instead of simply different ways to show presence. Therefore, faculty should be utilizing both discussion board posts and announcements.

Conclusion, Limitations, and Future Research

Using exploratory and confirmatory factor analysis, this paper provides empirical evidence that faculty-to-student engagement comprises two components: high touch and high-tech methods. We have also identified six items or practices students find most important in faculty-to-student engagement in an online class. These items can be used to create a checklist or course evaluation rubric. Additionally, these six items can provide a measurable definition of Substantive Faculty Interaction as it relates to accrediting bodies (such as HLC) that seek to distinguish online courses from correspondence courses.

As with any research project, some limitations must be considered. First, we used the commonly accepted empirical methods of factor analysis. Yet, factor analysis can only be as good as the data input. Though we used literature, expert, and student feedback on the survey instrument, it is possible that engaging practices were left out of the questionnaire. Thus, they would not have been part of the data input. Part of this is the context of the study at Regis University, a Jesuit institution where most programs at the university have been developed with a particular focus on faculty as facilitators and with the expectations to observe a significant number of Ignatian pedagogical grounding. This may already be impacting how most facilitators engage with students and how they view their roles. Although we did not test for this, we assume it may have influenced their responses.
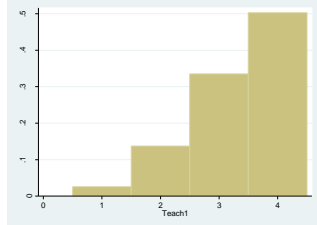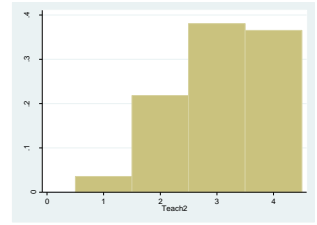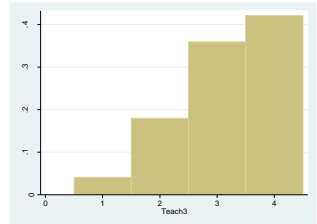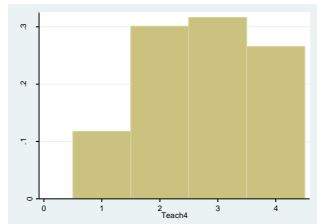
Second, the community of inquiry model does recognize the role that student-to-student engagement (or social presence) plays within a course. This research purposely avoided this topic because we only sought to explore items within faculty control. Faculty behaviors are within faculty control; however, student behavior is not. Even with a well-designed group project, a student may demonstrate negative behaviors that ruin the experience for other students. Thus, we limited our exploration to exclude this topic. However, future research may determine if student-to-student interactions are a component within a similar factor model.

Unfortunately, we must acknowledge a missed opportunity and a question for future research. Items 1 and 3 speak to faculty being present and posting "multiple days per week." Yet, we did not seek the opportunity to define this term in a measurable way based on student feedback. When reviewing results, we did conduct informal surveys of students and found that most students thought four to five days per week was the desired amount. But, this method was so crude that we hesitated to share it. We only did it to satisfy our curiosity. Yet we ultimately include it here in the spirit of transparency. Using this method, students did feel that twice a week was too few, and six and seven times a week (though some did desire six) were not required.

Finally, it is important to note that this work was created at Regis University, a private Catholic Jesuit institution. As articulated above, Regis subscribes to the Jesuit pedagogy paradigm that supports holistic learning in the community. The university also subscribes to engagement guidelines offered by the Higher Education Commission, the accrediting body, and other learning frameworks supported by the US Department of Education. Programs and courses are designed with these guidelines to offer students a holistic online or in-person education. However, while the six items represent faculty engagement for online asynchronous courses found in reviewing courses at Regis, each student population and body may differ. Therefore, it is suggested that each school undertake a similar evaluation to determine the practices most impactful to its students. To improve asynchronous online education, the authors would offer to aid other schools that wish to embark on such a project for themselves. And finally, researchers acknowledge that this model focuses on what is best for students and needs to address if these are effective for faculty or the impact of such methods on faculty.[37] ʜᴊᴇ

Appendix: Factors/Loads/ Graphs of student responses before removing any variables

	Factors/Load/Graph With no factor yet removed				
Question	Variable Code (Alpha)	Factor 1	Factor 2	Factor 3	Graph of student responses 1=Not Engaging at All, 4=highly Engaging
Faculty provide individualized feedback on student assignments.	Teach1 0.9283	0.7126			
Learners have an opportunity to get to know their faculty through written postings, to include an introduction.	Teach2 0.9294	0.8185			
Course offers access to a variety of content formats and resources that facilitate communication and collaboration, deliver content, and support learning and engagement. (Examples: videos, audio recordings, Zoom session, simulations, games-most would be non-text based)	Teach3 0.9277	0.5475			
Learners have an opportunity to get to know the faculty in a personal way. This can be accomplished by faculty posting an introductory video or podcast or welcome phone call.	Teach4 0.9274	0.5408			

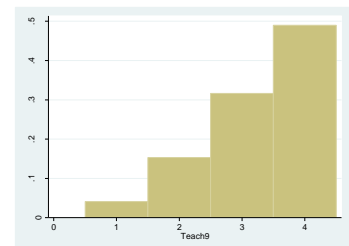|			
Faculty are present in the course multiple times per week (discussions/announcements/emails).	Teach5 0.9272	0.7772	
Faculty provide opportunities to solicit feedback from their students about their learning and on the course for the improvement of the course.	Teach6 0.9279	0.6817	
Faculty encourage one-on-one conversation with student. This can be accomplished through office hours or phone calls.	Teach7 0.9280	0.5459	
Faculty are actively engaged in the discussion board(s) and regularly post and reply to students throughout the week.	Teach8 0.9281	0.7390	
Faculty post a weekly announcement.	Teach9 0.9288	0.6521	
Course provides activities that emulate authentic (real world) applications of the discipline, such as experiential learning, case studies, and problem-based activities.	Active4 0.9277	0.6728	
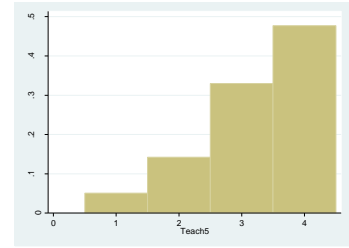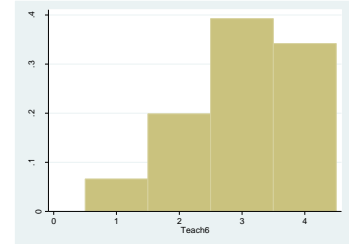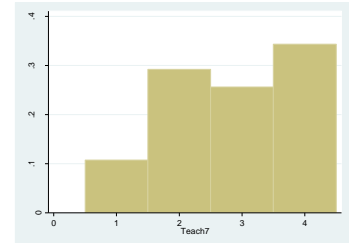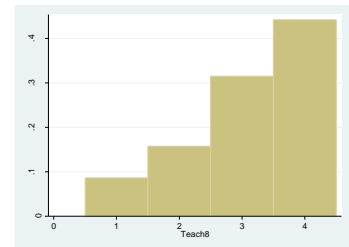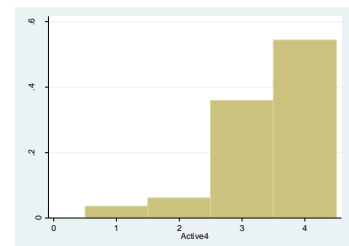
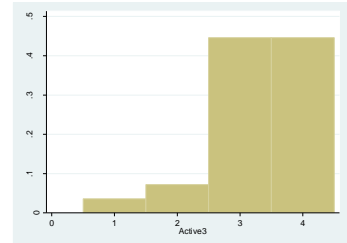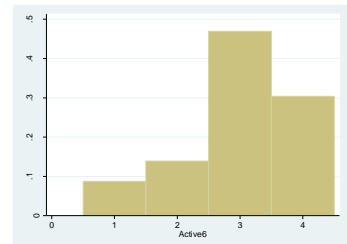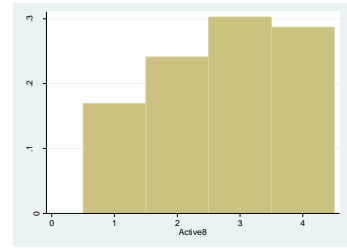|			
Course provides activities for learners to develop higher-order thinking and problem-solving skills, such as critical reflection and analysis.	Active1 0.9289	0.709	
Learners are encouraged to share resources and inject knowledge from diverse sources of information in their course interactions. (Example: find a resource and post it for others to see)	Active2 0.9299	0.7883	
The course learning activities help students understand fundamental concepts, and build skills useful outside of the course.	Active3 0.9293	0.7480	
Course requires students to engage with those outside the classroom. (Examples: interviewing appropriate individuals or touring a facility)	Active5 0.9300	0.5354	
Learning activity introduces a controversial (and discipline appropriate) topic that allows students to debate actions/systems/or situations.	Active6 0.9288	0.7517	
Students are introduced to new software or resources and asked to utilize if for a project or assignment. Examples include introducing students to video software and having them make a promotional video, introducing student to discipline specific software (like project management,	Active7 0.9303	0.5480	
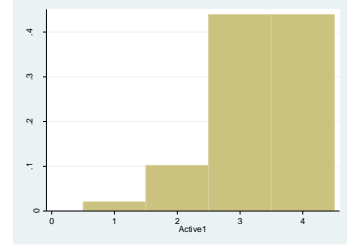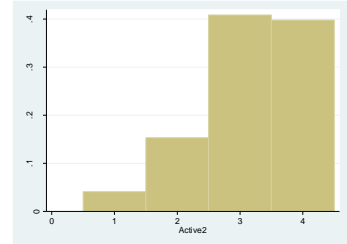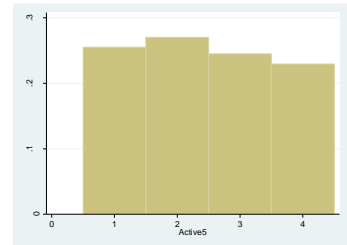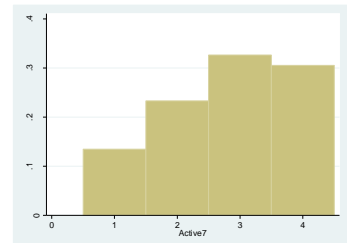
QuickBooks) and having them utilize software.

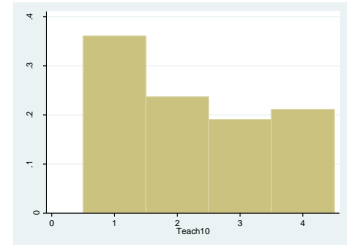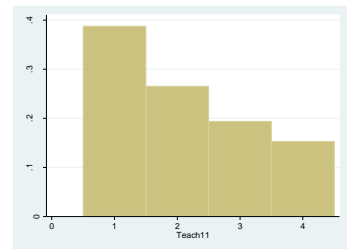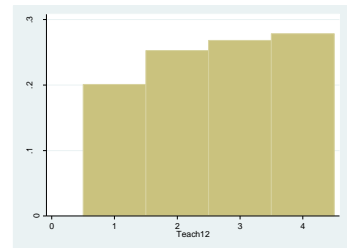|			
Course content provides learners with the opportunity to engage in the outside community through field experiences, service learning, internships, clinical hours or other community-focused activities.	Active8 0.9290	0.4989	
Faculty hold an all student meeting through Zoom.	Teach10 0.9285	0.7472	
Faculty provide video/audio feedback on assignment to students.	Teach11 0.9294	0.7680	
Faculty posts a general video about the content.	Teach12 0.9306	0.8168	
Faculty make and post their own videos about the content.	Teach13 0.9310	0.8384	
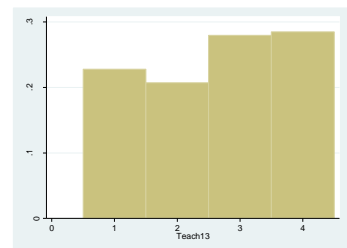
We must remind readers that these are the results *before* factors with low loads were removed. However, we present this data because some may wish to identify one of their own teaching methods and see how it loaded (if the load was high or low). Thus, we want to make all data available to inform practice. Those items with loads below 0.6 are considered low.

Endnotes

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