Impact of Faculty Behaviors on Student-Faculty Rapport: A Multi-Institutional Study

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Impact of Faculty Behaviors on Student-Faculty Rapport: A Multi-Institutional Study

Abstract

This research paper describes the findings from a multi-institutional exploratory study investigating student perceptions of positive rapport-building faculty behaviors. Numerous studies have identified that professors who can establish strong and positive rapport with their students have an immediate and beneficial impact on students' learning, attendance, engagement, motivation, and academic success, resulting in a positive long-term influence on retention. Building on previous work by Ozis and Winfree that ranked fifteen specific faculty behaviors fostering positive rapport at a single institution in the southwestern United States, this study includes perspectives from undergraduate and graduate engineering students across multiple institutions with different academic populations.

The objectives of this study are twofold: first, to identify the faculty behaviors that have a higher potential for positive influence on rapport, and second, to determine whether, or the extent to which, demographics (e.g., gender, age, GPA) affect students' perception of what constitutes positive student-faculty rapport.

This study reports on students' opinions across a diverse group of universities through a survey and recommends strategies for developing positive faculty-student rapport. Responses indicated that students value positive interpersonal behaviors such as respectfulness, understanding, kindness, and caring; professional behavior such as answering emails in a timely fashion; and beneficial pedagogical approaches such as conveying enthusiasm for the subject and providing relevant examples in class. The results of this work can be used broadly by faculty to enhance student learning and engagement through deliberate actions that develop positive rapport with students.

Introduction

Interactions between students and teachers in a classroom have the potential to positively or negatively impact the classroom environment [1]. Understanding the dynamics of student-faculty rapport is essential for creating a thriving learning environment. Ozis and Winfree [2] identified key faculty behaviors that foster positive rapport at a single southwestern state institution with a diverse group of college students including engineering and informatics. The professors' respect for students was consistently identified as a top priority across all analyzed respondent demographic categories, with first-year students valuing being known by name and female students appreciating office hours that were posted and consistently held.

This paper expands upon the work of Ozis and Winfree [2] in two distinct ways. First, this study includes multiple public and private institutions across the United States located in various geographical locations, each with unique academic populations. Second, this study surveyed students from different undergraduate academic years, and graduate students, as well as an assortment of engineering fields of study, including civil, environmental, transportation, chemical, biomolecular, and construction engineering and management.

Building on previous work, the objectives of this study were to:

- Identify faculty behaviors that have a higher potential for positive influence on rapport; and
- Determine whether, or the extent to which, demographics (e.g., region, type of institution, student's background, gender, status) affect students' perception of what constitutes positive student-faculty rapport.

This study has identified faculty behaviors and factors that help develop positive rapport in the classroom. The intent of using a multi-institutional approach is to develop recommendations that are current and applicable to a wide range of educational settings, ultimately contributing to improved learning outcomes and student retention across different educational settings.

Importance of Student-Faculty Rapport

Positive rapport between professors and students has been reported to improve student engagement, attendance, motivation, retention, and success within higher education settings [1] [3] [4]. In a seminal study, Lowman [5] presents interpersonal rapport as one of two dimensions required for teaching excellence, the other dimension being intellectual excitement. Some studies have related "rapport," the agreed mutual respect and empathy between a professor and learner, to student persistence in academic performance. Numerous studies, including some summarized by Sybing [6], have evaluated the varied types of interactions between faculty and students, including a focus on specific encounters such as dialogue during active or passive class sessions, demeanor evident during lecture-style classes, and attitudes during office hours. Further, the research questions presented in the literature posit complex psychological relationships and emerging themes that identify rapport as a valuable element towards sociocultural experiences necessary to support diverse learners in higher education settings. Sybing [6] offered an additional key theme, namely, identifying the essential role of the connection between a faculty and student as a primary mechanism for knowledge transfer. Sybing [6] concisely summarized the work by Chickering and Gamson [7] that named the student-faculty relationship as a collaborative process necessary for successful learning. The concept of naming the relationship as a process emphasizes the evolution that will take place as the learner matures and gains knowledge while the educator adapts towards refining and affirming the knowledge transfer.

While many studies highlight the beneficial effects of positive rapport, some literature emphasizes the detrimental impacts of negative rapport. The highly cited work of Seymour and Hewitt [8] documented the "chilly" environment in engineering classrooms, much of which was related to student-faculty interaction. Several studies through the 1990s and early 2000s evaluated the retention issues in engineering as related to interactions and experiences in the classroom [9] [10]. Most students reported the learning environment as a significant reason for leaving engineering disciplines [11]. Findings from Vogt's [12] research linked poor faculty interactions to low retention rates among engineering students. Additionally, the study concluded that negative experiences with faculty significantly impacted students' self-efficacy and confidence. The results of negative rapport are consistently shown to be severe and should be considered detrimental to classroom engagement and management and to student learning and retention.

The mutually beneficial relationship built by positive rapport in a classroom requires action from both the learner and the faculty. The sense of rapport can decrease over time if the instructor does not continue to engage in authentic behaviors that elicit a sense of rapport from their students [13]. Felder and Brent [14] described differences among learners that could affect the

potential for building rapport, namely, students' learning styles preferences (characteristic ways of taking in and processing information), approaches to learning (surface, deep, and strategic), and intellectual development levels (attitudes about the nature of knowledge and how it should be acquired and evaluated). As summarized extensively by Wankat and Oreovicz [15], the work of Aubrecht [16] shows student ratings directly capture student opinions on rapport. Concepts such as accessibility [13] [17], availability [13], and approachability [16], [18] [19] have been cited as characteristics important to students, particularly while completing end-of-semester course evaluations. Faculty behavior and approach to teaching also determine rapport [13] [20]. Wankat and Oreovicz [15] initialize the effort for building rapport with the motto "know my name" [21] and cite additional work performed by Daly et al. [22] that prioritizes the straight-forward task of knowing student names. The importance of positive interpersonal rapport in promoting teaching excellence is emphasized in the ASCE ExCEEd Teaching Workshop and is included as a component of the ASCE ExCEEd Model [23].

Although the literature extensively discusses the importance of rapport, outlines key behaviors, and identifies factors that matter, it fails to determine the most effective strategies for building positive rapport that account for student-specific factors, such as academic, logistical, and demographic variables. While most studies promote the value of rapport, they do not explicitly report detailed methodologies for how to effectively develop positive rapport [15] [24]. When methods are provided, they are often too general and lack specific guidance. Examples such as "complete a student information inventory form to collect a few basic traits about the student (hometown, major, etc.)" are excellent suggestions and are dispersed throughout the literature [25], but often do not clarify the types of details to solicit from students that are most effective for rapport building.

Building positive rapport creates personal connections and trust that results in a supportive classroom environment where students are willing to take intellectual risks and pursue their interests without fear of judgment. When students feel connected to their professors and peers, they recognize the value of the learning experiences, becoming more invested in their education to improve their lives and achieve their personal and professional goals. Professors who build rapport can tailor relevant and meaningful lessons to empower students to take an active role in their learning, reinforcing the impact and importance of their contributions. Identifying rapport-building strategies is crucial for both students and professors as they navigate the cross-cultural context of teaching and learning in college classrooms. In this context, faculty, who are content experts, could be supported by investing their energy into effective ways to establish and build the collaborative process of mutual, positive rapport. This paper provides faculty with strategies to develop positive relationships that can enhance student engagement and success.

Methods

The goals of this study were to identify faculty behaviors that have a positive influence on rapport and to determine whether, or the extent to which, demographics affect students' perceptions of what constitutes positive rapport. To address these goals, the authors developed a survey asking undergraduate and graduate students from nine different higher education institutions to provide feedback on faculty behaviors that constitute positive rapport.

In the first part of the survey, students were provided an open-ended question requesting three descriptors of a professor who left a positive influence or impression on them. The open-ended question was followed by a section comprising 21 faculty behaviors that were evaluated on a 5-

point Likert scale ranging from “Strongly Disagree” to “Strongly Agree.” Survey choices included the fifteen behaviors identified by Ozis and Winfree [2], together with six additional behaviors that reflected positive mentoring qualities, going beyond the fundamental behaviors typically associated with building positive rapport. The second part of the survey included questions related to the institution, year, gender identity, age, GPA, and other characteristics (e.g., being a first-generation college student, commuter, student-athlete, part-time student, or underrepresented group). Survey components are shown in Appendix A, were administered through Qualtrics, and distributed with the York University of Pennsylvania IRB approval (IRB# 24FA016).

The voluntary survey was administered by the study authors and faculty at their institutions. In most cases, the authors distributed the survey to students in classes they were teaching in the Fall 2024 semester. Several faculty awarded minimal extra credit for completing the survey, others posted the link as an announcement or assignment with no extra credit, and three faculty distributed the survey to all students in the program. Three hundred forty-two responses were received. Although it is possible that some respondents may have completed the survey multiple times, the authors thought that would be unlikely given the timing, with the survey being administered in the last two weeks of the semester. Survey responses were gathered and analyzed as described below.

Descriptor analysis

The survey asked respondents to “Think of a professor(s) who has or had a positive influence in your life or education. Provide (3) words or phrases that describe this person's interaction with you, or your observations of their interaction with others, that left an impression on you.” 967 total response items were received including 44 individual faculty names which were removed, yielding 923 usable responses. These responses were sorted and classified as follows:

- Descriptors were alphabetized.
- To simplify the analysis, some descriptors were reworded. For example, “Inspiring” and “Inspirational” were both classified as “Inspirational”.
    - 5% (44 descriptors) provided a unique word or phrase that seemed to be an appropriate fit with one of the 92 descriptors already in use. In these cases, the response was reclassified using one of the other descriptors, while maintaining the original intent. For example, “it’s ok to advocate for yourself” was replaced with “encouraging” and “cool and talkative” was replaced with “approachable”.
    - Some unique descriptors (e.g., “Gruff”) had no equivalent descriptor, so these were kept as given.
- A few respondents put multiple responses in each response box, yielding more than 3 descriptors, but only the first descriptor in each box was retained for the purposes of this study (e.g., “supportive and helpful” was classified as “supportive”).
- The descriptors were organized into four categories, classified as follows:
    - Personality traits (typically inherent to the personality, e.g., honest)
    - Supportive traits (external way they treat others)
    - Motivational traits (ways of motivating students)
    - Professional traits (professional/learned traits)
- Finally, the number of instances of each descriptor was counted. Results are described later in this paper.

The four categories listed above agreed closely with categories identified by Lowman [5], namely, Intellectual Excitement (IE), Interpersonal Rapport (IR), Commitment to Teaching (CT), or a General Positive Descriptor (PD), as follows:

- Personality traits -- General Positive Descriptors, Commitment to Teaching
- Supportive traits -- Interpersonal Rapport
- Motivational traits -- Intellectual Excitement
- Professional traits -- Intellectual Excitement

Although the survey specifically asked for behaviors that contributed to positive rapport, it is also likely that a professor who was identified as "Engaging" or "Inspiring" (Motivational traits) or "Effective" or "Knowledgeable" (Professional traits) could have a positive influence on a student's life or education.

Multiple choice and response demographic analysis

The survey had a section to collect demographic information. This included the student's institution, year of study, age (by bracket), GPA (by bracket), and gender. Students were also asked to identify other unique characteristics such as being a commuter, a first-generation student, a part-time student, a student athlete, or if they identify as an underrepresented individual. The authors used these responses as the controlling categorical variables.

Student responses to the faculty behavior Likert-scale questions (prefaced by "It's important to me that my professors...") were analyzed as a whole with no categorical reduction, as well as based on six categorical variables: institution, year of study, gender identity, age, GPA, and personal demographics. This approach enabled the grouping of students into subsamples defined by each of these variables for more detailed analysis. For the purpose of analysis, Likert scale responses are assumed not just to be ordinal data, but also to be interval in nature. For each set of responses in these categories, we calculated a mean importance score from a weighted average using the following equation:

$$Mean\ importance\ score = \frac{(N_{SA} \times 5.0)\ +\ (N_A \times 4.0)\ +\ (N_{NAD} \times 3.0)\ +\ (N_D \times 2.0)\ +\ (N_{SD} \times 1.0)}{N_{SA}\ +\ N_A\ +\ N_{NAD}\ +\ N_D\ +\ N_{SD}}$$

Here, the number of participants who responded with a "strongly agree" (SA) to the faculty behavior Likert-scale question was multiplied by five, the number of participants who responded with a "somewhat agree" (A) was multiplied by four, the number of "neither agree nor disagree" (NAD) responses was multiplied by three, the number of "somewhat disagree" (D) responses by two, and finally the number of "strongly disagree" (SD) responses was multiplied by one. These products were then summed and divided by the total number of responses to that question. This process yields a score that reflects a weighted average.

Overall ranking, without regard for the categorical responses, was determined through the process of bootstrapping. For each question, the integer third of all responses were randomly selected (with replacement) and the mean importance score was calculated. This random sample and mean calculation was repeated 1000 times. The mean and the standard deviation for each question set of assessed mean importance scores were found. This process is a common approach to estimating metrics of the population from the sample at hand [26].

For each of the categorical variables (institution, year of study, gender identity, age, GPA, personal demographics), we binned the responses by the categorical variable of interest. For example, responses were sorted by the seven institutions. Likert-scale responses were counted and a mean importance score was calculated for each institution. Next, the mean and standard deviation across the institutions was calculated, where that mean reflects the score unbiased by the number of responses from each institution, given that each institution has equal weight in this average.

Once the equally weighted average for each faculty behavior Likert scale question was calculated, we identified the per question noise across all faculty behaviors with a mean and standard deviation of the standard deviations within each categorical variable. A threshold of the mean plus one standard deviation was used to identify the faculty behaviors where there was statistically significant disagreement of the importance of that faculty behavior. Under the assumption that the "most" important behaviors will receive the highest importance score, we selected the top three behaviors for further inspection. Further, we used the mean plus one standard deviation of the standard deviations across the categories for each question and categorical variable to identify the behaviors where there was the lowest agreement (highest variance in categorical mean) and offer a reflection on those as well.

Results

The survey considered in this analysis generated 342 responses. Tables 1 through 7 describe the number of responses from each of the seven institutions represented in this study, the respondents' year of study, gender, age, GPA, and other factors. The responses were generally distributed among the types of institutions. Undergraduate students (first through fifth year) made up the majority of respondents (96%) with the remaining 4% identifying as graduate students. The percent of the survey population identifying as a woman (40.8%) exceeded the national average (33.4%) in civil engineering programs [27]. Fifty-eight percent of the student respondents list their age as 21 or older. Eighty-two percent of the respondents self-reported a GPA of 3.0 or higher. Finally, nearly one third of the students reported being a commuter, as defined by not living on or near campus, 22% being first generation college students, 2% being part time students, 16% being from an underrepresented group, and 15% being student athletes. The remaining 35% did not identify with any of those characteristics. As students could identify in more than one category, these percentages do not sum to 100%. In summary, the student population represented diverse institutions, backgrounds, and characteristics, underscoring applicability of the study findings across a broad range of engineering programs.

Table 1. Response proportion of the responses by university attended.

University	% of responses
Carnegie Mellon University	25.4%
University of Minnesota Duluth	19.5%
University of the Pacific	15.1%
Cal Poly Pomona	12.7%
New York University	9.5%
York College of Pennsylvania	9.5%
U.S. Coast Guard Academy	3.9%
University of Pittsburgh Johnstown	3.0%
University of Tennessee Knoxville	1.5%

Table 2. Response proportion of the responses by university funding type.

Category	% of responses
Public	59.5%
Private	40.5%

Table 3. Response proportion of the responses by respondent age.

Age	% of responses
Less than 21	42.3%
21 – 25	51.8%
Greater than 25	5.9%

Table 4. Response proportion of the responses by respondent grade point average (GPA).

GPA	% of responses
Less than 2.5	4.4%
2.6 - 3.0	13.9%
3.0 - 3.5	32.8%
Greater than 3.5	48.8%

Table 5. Response proportion of the responses by respondent year of study.

Year of study	% of responses
First Year	22.0%
Second Year	11.0%
Third Year	27.8%
Fourth Year	35.3%
Graduate	3.9%

Table 6. Response proportion of the responses by self-identified category. Note that students could select more than one category, so the responses do not sum to 100%.

Self-identified category	% of responses
Commuter	31.9%
First generation student	21.6%
Part time student	1.5%
Identify as an underrepresented individual	15.5%
Student athlete	14.6%
None of the Above	35.7%

Table 7. Response proportion of the responses by respondent gender.

Gender	% of responses
Man	55.7%
Woman	41.4%
Non-binary / non-conforming	1.2%
Prefer to self-describe	0.9%
Prefer not to say	0.6%
Transgender	0.3%

Summary of descriptor analysis

As described previously, 923 response items were characterized by 92 descriptors and classified into one of four categories, as shown in Appendix B. The frequency of occurrence of each descriptor was quantified. Twenty-five items that were cited 10 or more times are summarized in Table 8. These responses account for 76% of the descriptors. Supportive traits that relate to empathy, namely, “understanding”, “kind”, “caring”, were cited most frequently, followed by “helpful”. Motivational traits, namely, “passionate,” “fun/funny,” and “enthusiastic” were also considered important. “Knowledge/expertise” was the only professional trait ranked among the list shown. Among the results shown in Table 8, supportive traits account for 65%, motivational traits account for 24%, and personality and professional traits account for approximately 5% each.

The descriptors were analyzed for the draft of this paper (775 descriptors) and compared to responses after the additional 148 descriptors were included. In both cases, the seven descriptors shown at the top of Table 8 - “understanding” through “fun/funny” remained in the same position. The next fourteen descriptors - “enthusiastic” through “considerate” - remained among the top twenty one traits, although the order changed. The consistency in these observations supports the importance of these traits in building positive rapport.

Summary of response analysis

Figure 1 depicts a bar graph with mean and standard deviation of all faculty behavior items for all responses our survey received using the Likert scale from highest to the lowest. When professors “are respectful" received the highest equally-weighted (eq-weighted) average among all items listed, scoring 4.70 ± 0.07 (ranking #1). This was closely followed by when professors "use relevant class examples," which had an average of 4.65 ± 0.07 (ranking #2), and “keep up with email” with 4.564 ± 0.07 (ranking #3). When professors “are enthusiastic” with an eq-weighted average of 4.58 ± 0.07 (ranking #4), and closely followed by when professors “show grace and understanding” with 4.58 ± 0.08 (ranking #5) (Figure 1).

On the other hand, among all respondents regardless of how the data were sliced, the least ranked item was "when professors stay late after class," with an eq-weighted average of 3.48 ± 0.09. In addition to this item, the bottom five behaviors also included when professors “arrive early to class”, “learn something about me”, “use inclusive language” and “reward comments and questions with praise” (Figure 1).

The overall analysis of the quantitative data showed that, when ranking all faculty behaviors by equally weighted means, the top five behaviors and the bottom five behaviors were clearly

identifiable across the entire group of respondents, regardless of demographic factors i.e. categorical variables in our study (Figure 2).

Table 8. Descriptors identified 10 or more times.

Trait	Frequency	Category	Lowman's linkage
Understanding	78	Supportive traits (IR)	IR
Kind	56	Supportive traits (IR)	IR
Caring	50	Supportive traits (IR)	IR
Helpful	48	Supportive traits (IR)	IR
Passionate	39	Motivational traits (IE)	IE
Knowledgeable/Expertise	37	Professional traits (IE)	IE
Fun/funny	36	Motivational traits (IE)	IE
Enthusiastic	31	Motivational traits (IE)	IE
Friendly	31	Supportive traits (IR)	IR
Encouraging	30	Supportive traits (IR)	IR
Engaging	27	Motivational traits (IE)	IE
Approachable	26	Supportive traits (IR)	IR
Supportive	26	Supportive traits (IR)	IR
Positive/happy	24	Supportive traits (IR)	IR
Patient	20	Supportive traits (IR)	IR
Respectful	20	Personality traits	PD/IR
Thoughtful	19	Supportive traits (IR)	IR
Honest	17	Personality traits	PD
Clear	15	Motivational traits (IE)	IE
Mentor/wants best for student	15	Supportive traits (IR)	IR
Considerate	13	Supportive traits (IR)	IR
Inspirational	11	Motivational traits (IE)	IE
Available	10	Supportive traits (IR)	IR
Empathetic	10	Supportive traits (IR)	IR
Organized	10	Motivational traits (IE)	IE

The data from responses to the Likert-scale questions were analyzed against six categorical variables, including institution, year of study, gender identity, age, GPA, and personal descriptors as described above. The analyses presented below are twofold: first, we report the top three behaviors ranked by respondents sliced by each categorical variable; second, we examine the data through high variance analysis. The top three substantial variations within groups for each categorical variable revealed the preferences most favored by each sub-demographic group. This is shown in Table 9.

By Institution:

When data is compared by institution, “use relevant class examples” had the highest equally weighted average of 4.70 ± 0.21, followed by “are respectful" 4.67 ± 0.17, and “keep up with email” 4.66 ± 0.21. On the other hand, the least ranked item was "when professors stay late after class," with an eq-weighted average of 3.51 ± 0.38.When analyzing the responses by institution

depending on the high variance, three highest standard deviation values were observed for items including “stay late after class”, “use inclusive language” and “share their professional history and experience”. Respondents from the University of Tennessee Knoxville indicated a higher preference for their professors to stay late after class (eq weighted average of 4.20). Students from New York University indicated the strongest agreement towards “use inclusive language” (eq weighted average of 4.16).

Additionally, the item "when professors share their professional history and experience" was highly ranked by students from the University of Tennessee, Knoxville, with 100% of them strongly agreeing.

By year of study

When data is analyzed by the year of study, the top three behaviors were when professors “are respectful” with 4.63 ± 0.11, “use relevant class examples” with 4.61 ± 0.16, followed by “keep up with email” with 4.58 ± 0.11. These behaviors consistently mattered a lot to the students.

When data is analyzed by the year of study according to the high variance, fourth-year students seemed to care the most about "when professors stay late after class" compared to other years (± 0.29), and graduate students seemed to care the least about this behavior indicating a mean score of 2.83. When professors “share their professional history and experience” matters most to the graduate students with a mean score of 4.42 (± 0.31). This closer look into the data revealed that third year students care most about when professors “arrive early to class” as compared to other years of study (± 0.26).

By gender identity

When considering gender identity, when professors “use relevant class examples” ranked as the top behavior with an eq-weighted average of 4.36 ± 0.94, followed by “are enthusiastic” with 4.32 ± 0.85, and followed by "keep up with email" at 4.28 ± 0.86. The lowest ranked item was when professors “stay late after class," with an eq-weighted average of 2.82 ± 0.86.

High variance analysis indicated that "when professors arrive early to class" (± 1.22) mattered most to men, with an eq-weighted average of 5.00, and least to individuals who “prefer to self describe/woman”. When professors "are respectful" (± 1.16) mattered most to Transgender/ non-binary/ non-conforming students, self describing woman, and woman transgender individuals, all groups with an eq-weighted average of 5.0. "When professors use inclusive language" (± 1.40) mattered most to “prefer to self describe/woman” and woman transgender individuals, with an eq-weighted average of 5.0.

By age

When data was analyzed by age, the highest-ranking behavior remained consistent, with when professors “are respectful" receiving an eq-weighted average of 4.63 ± 0.05. The second highest-ranked behavior was "using relevant class examples," with an average of 4.56 ± 0.06. "When professors keep up with email" was also among the top three behaviors, with an eq-weighted average of 4.54 ± 0.08. Notably, "It is important to me that professors show grace or understanding" was highly valued, with an average of 4.51 ± 0.09.

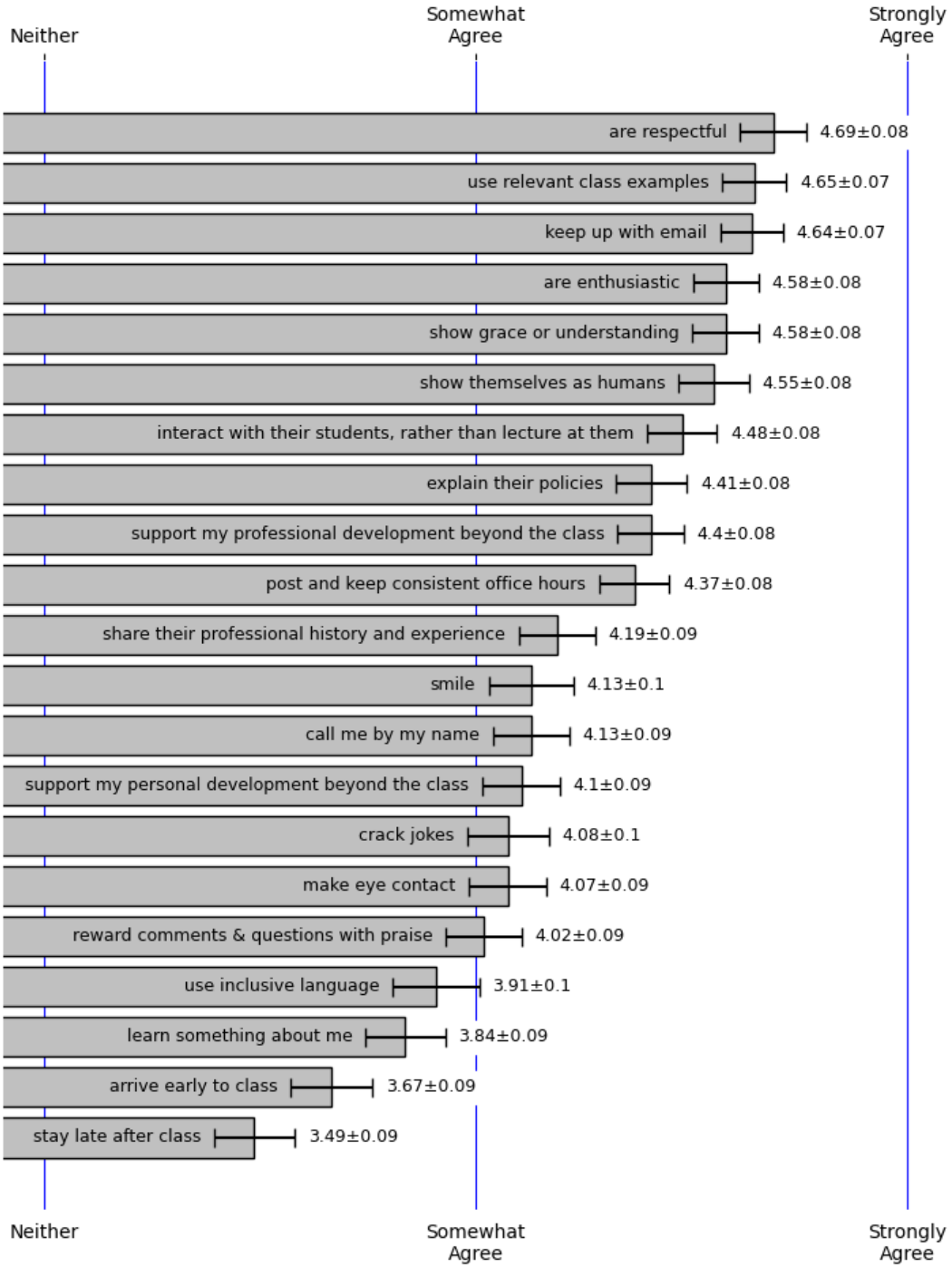

Figure 1: The ranking of importance for behaviors that establish positive rapport (highest ranking when professors are "respectful" and lowest "stay late after class"). Reflected is the mean as the gray bars, and the standard deviation as black whiskers, and labeled as mean ± standard deviation.

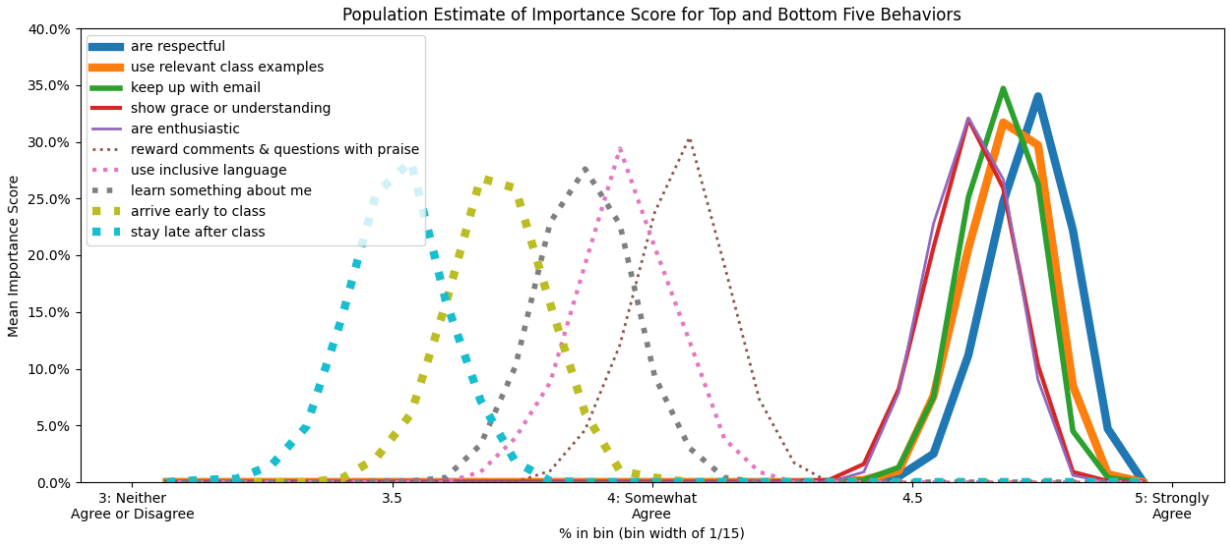

Figure 2: Population Estimate of Importance Score for Top and Bottom Five Behaviors. Shown here are the distributions (in bin sizes of 0.067 on importance score) of the population estimates resultant of the bootstrap analysis. One can see that the top five behaviors have a very similar distribution and mean, while the bottom five behaviors exhibit significantly more differentiation between the distribution estimates. No “Somewhat Disagree” or “Strongly Disagree” means were found in the bootstrapping process.

Variance analysis revealed that "learn something about me" had a significant standard deviation of 0.19, indicating that this behavior mattered more to students over 25. As students' age increased, the importance of "when professors learn something about me" and "share their professional history and experience" (± 0.25) became more significant for establishing positive rapport. When professors “arrive early to class” with (± 0.15) seemed to be highly valued by students between ages 21-25 with a mean score of 3.70.

By GPA:

When analyzing data by GPA, when professors “are respectful" was again the highest-ranked behavior, with an eq-weighted average of 4.62 ± 0.02. This was followed by when professors "keep up with email" with 4.55 ± 0.12 and "show grace and understanding," with an average of 4.52 ± 0.12.

High variation was observed for when professors “arrive early to class” (± 0.32), “stay late after class” (± 0.20) and “share their professional history and experience” (± 0.28) were all mattered most consistently to students who reported a GPA > 2.5 and < 3.0.

By Descriptors:

When considering personal descriptors, when professors “are respectful" was again the highest-ranked behavior, with an eq-weighted average of 4.78 ± 0.13. This was followed by "when professors use relevant class examples" with a 4.72 ± 0.06 and "when professors keep up with email" at 4.69 ± 0.08.

Variance analysis revealed that "rewarding comments and questions with praise" (± 0.36) was most significant to part-time students, with an average rating of 4.80. Additionally, "professors making eye contact" (± 0.27) was highly valued by part-time students, with an average rating of

4.60. Finally, "professors sharing their professional history and experience" (± 0.23) was also crucial for part-time students, receiving an average rating of 4.80.

Discussion

The first objective of this study was to identify faculty behaviors that have a higher potential for positive influence on rapport. From the analysis of responses to the open-ended question and the Likert-scale questions, it is clear that positive interpersonal behaviors such as respectfulness, understanding, kindness, and caring; professional behaviors such as answering emails in a timely fashion; and beneficial pedagogical approaches such as conveying enthusiasm for the subject and providing relevant examples in class are important for developing and maintaining positive rapport with students. Such supportive or motivational traits can be demonstrated in a variety of ways that are authentic to each faculty member's own personality. Some examples are provided below, from the authors' own experiences:

- Approachable: Tell stories about your own struggles and/or failures as an undergraduate student serves both to humanize you in the eyes of your students and provide a concrete, memorable, and cautionary tale to help them avoid common mistakes.
- Caring: Incorporate flexibility into the class policy as a way for the students to have flexibility on any given day, with minimal or no impact on their grade and learning experience. For example, distribute two or three passes for late submittals at the start of the semester with clear guidance as to how to use them. The intent of the late pass is not for emergencies but instead for days when there was a personal, social, or other event when students may need to modify their schedule. The pass gives students some flexibility, but holds them accountable for completing their work.
- Caring: Conduct a survey before your course begins to identify students' interests. Returning to the survey results throughout the semester and asking students questions about their interests helps to establish a supportive atmosphere.
- Clear: Include different statements in your syllabi to guide the class on building an enjoyable and productive learning environment. An inclusion or inclusive statement (everyone's voice is important and we are a team), a statement of what is expected from the instructor (instructor enthusiastically will guide the ship and support everyone until the end of the semester), and a statement of what is expected from each student (get ready to practice a lot and to challenge yourself; you are not alone; little steps will take you really far; be present and try your best; and if something doesn't work be ready to try it again) are building blocks to developing an enjoyable and productive learning environment.
- Considerate: Use "please" and "thank you" in oral and written communication to model professional behavior and demonstrate your respect for students
- Encouraging: Have an anonymous interactive check-in activity at the start of each week, during exam season, or at any time that the instructor perceives a change in the energy in the classroom dynamics, will allow instructors to learn how students are feeling when they are coming to class. This outreach sends the message that the professor cares about the students. Depending on the situation, the professor can provide campus resources available to support students' wellbeing or if any student has identified themselves by asking for further support, the professor can direct the student to a specific resource.

Table 9. Mean Importance Score of "It's important to me that my professors" Questions (μ ± σ). The scores of each question were calculated though bootstrapping. Questions where the mean is with in the top three for that category, indicating high importance, are indicated in bold-underline. Those where the standard deviation is within the top three, indicating a diverse range in responses between labels in that category, are indicated in bold-italic.

Questions	Overall	Institution	Study Year	Gender	Age	GPA	Desc
call me by my name	4.12±0.09	4.07±0.25	4.03±0.19	3.72±1.04	4.05±0.09	4.04±0.08	4.15±0.21
learn something about me	3.83±0.09	3.79±0.31	3.76±0.22	3.37±0.51	***3.83±0.19***	3.77±0.10	3.86±0.05
use relevant class examples	**4.65±0.08**	**4.70±0.21**	**4.61±0.16**	**4.36±0.94**	**4.56±0.06**	4.51±0.15	**4.72±0.06**
arrive early to class	3.67±0.09	3.61±0.21	***3.49±0.26***	***3.23±1.22***	***3.55±0.15***	***3.52±0.32***	3.75±0.15
stay late after class	3.49±0.09	3.51±0.38	***3.30±0.29***	***2.82±0.89***	3.38±0.12	***3.45±0.20***	3.38±0.17
explain their policies	4.41±0.09	4.35±0.19	4.36±0.12	4.08±0.84	4.34±0.03	4.28±0.11	4.48±0.19
post and keep consistent office hours	4.36±0.08	4.30±0.28	4.34±0.14	4.06±1.13	4.25±0.14	4.34±0.07	4.42±0.15
keep up with email	**4.64±0.07**	**4.66±0.21**	**4.58±0.11**	**4.28±0.86**	**4.54±0.08**	**4.55±0.12**	**4.69±0.08**
interact with students, rather than lecture	4.47±0.08	4.41±0.19	4.37±0.11	4.10±1.01	4.39±0.09	4.43±0.09	4.55±0.19
reward comments/questions with praise	±4.02±0.09	3.97±0.31	3.96±0.18	3.98±0.89	4.00±0.14	3.96±0.07	***4.19±0.36***
are enthusiastic	4.58±0.07	4.58±0.15	4.49±0.08	**4.32±0.85**	4.48±0.09	4.50±0.10	4.66±0.22
crack jokes	4.07±0.09	4.11±0.28	3.95±0.17	3.61±0.79	3.96±0.10	4.01±0.18	4.12±0.09
make eye contact	4.07±0.09	4.08±0.24	4.01±0.14	3.37±0.87	4.05±0.10	4.06±0.10	***4.18±0.28***
are respectful	**4.69±0.07**	**4.67±0.17**	**4.63±0.11**	***4.07±1.16***	**4.63±0.05**	**4.62±0.02**	**4.78±0.13**
smile	4.13±0.10	4.11±0.22	3.95±0.21	3.52±1.13	4.00±0.12	4.05±0.12	4.13±0.17
use inclusive language	3.91±0.10	3.74±0.38	3.78±0.14	***3.49±1.40***	3.88±0.11	3.83±0.14	3.96±0.21
show grace or understanding	4.58±0.08	4.51±0.15	4.49±0.14	4.04±1.15	4.51±0.09	**4.52±0.12**	4.67±0.21
support professional development beyond class	4.41±0.08	4.38±0.16	4.32±0.13	4.00±0.91	4.31±0.12	4.37±0.07	4.49±0.07
support personal development beyond class	4.10±0.09	4.02±0.20	3.96±0.17	3.48±1.13	3.97±0.12	4.07±0.18	4.11±0.07
share their professional history and experience	4.19±0.09	4.27±0.33	***4.14±0.31***	3.77±0.78	***4.19±0.25***	***4.06±0.28***	***4.41±0.23***
show themselves as humans	4.55±0.08	4.57±0.20	4.51±0.17	4.16±0.94	4.50±0.01	4.46±0.12	4.65±0.21

- Kindness: Give students a stretch break in the middle of class so they can catch up, stretch, check their phones, talk to a neighbor, or just take a break, then return their focus to learning once the break is over [28].
- Knowledgeable/Expertise: Use relevant current or breaking news in the classroom to help students build connections of course topics to real life examples. This practice can be enhanced further by showing students how the skills acquired in the classroom can be used to improve or support the community's education and development, right away or once they graduate. For example, breaking news about a disaster-flooding, fires, etc- that has caused immense damage can be used to help students find focused motivation and energy to concentrate on their learning, and keep in mind the importance of their new skills that are applicable to making a difference in their communities.
- Passionate: Convey enthusiasm for the subject and for the students by greeting the students, playing music before class, bringing relevant demonstrations or videos, sharing your own personal knowledge and experiences, and encouraging students. Conveying passion and enthusiasm engages students in the class.
- Respectful: Maintain consistent office hours, listen to students' questions, and treat students as "junior engineers." These are examples of respectful behavior that help to establish expectations of a professional environment in and out of the classroom.
- Supportive and Encouraging: Avoid basing most of the course grade on high-stakes deliverables such as exams. Grading should be broken down into different types of experiences, including some that allow students to learn from mistakes. For example, allowing students to rewrite papers, or redo practice problems, etc., and regrading the work, increases students' grades while giving them an opportunity to reflect on instructor's feedback and review technical material needed to get a higher grade.
- Understanding: Adjust a deadline to accommodate students who have multiple assignments due at the same time. Allow students to earn extra credit for submitting the work by the original deadline. Students who need the deadline extension have more time to complete the assignment, but those who complete the work on time are recognized/rewarded for on-time submission.

The analysis of the Likert-scale responses across various categorical variables reveals a consistent pattern in student preferences for professor behaviors (Figure 3). Notably, "when professors are respectful" emerged as the most impactful behavior for establishing positive rapport, regardless of the category analyzed. This finding underscores the universal importance of respect in the student-professor relationship.

The consistency of the top five behaviors across all categories highlights key aspects that students value in their interactions with professors (Figure 3). These behaviors include being respectful, using relevant class examples, keeping up with email, demonstrating enthusiasm, and showing grace or understanding. The emphasis on these behaviors suggests that students appreciate professors who are not only professional and organized but also approachable and empathetic. When professors "are respectful" was the top ranked behavior four out of the six categorical variables namely by year of study, Age, GPA, and descriptors.

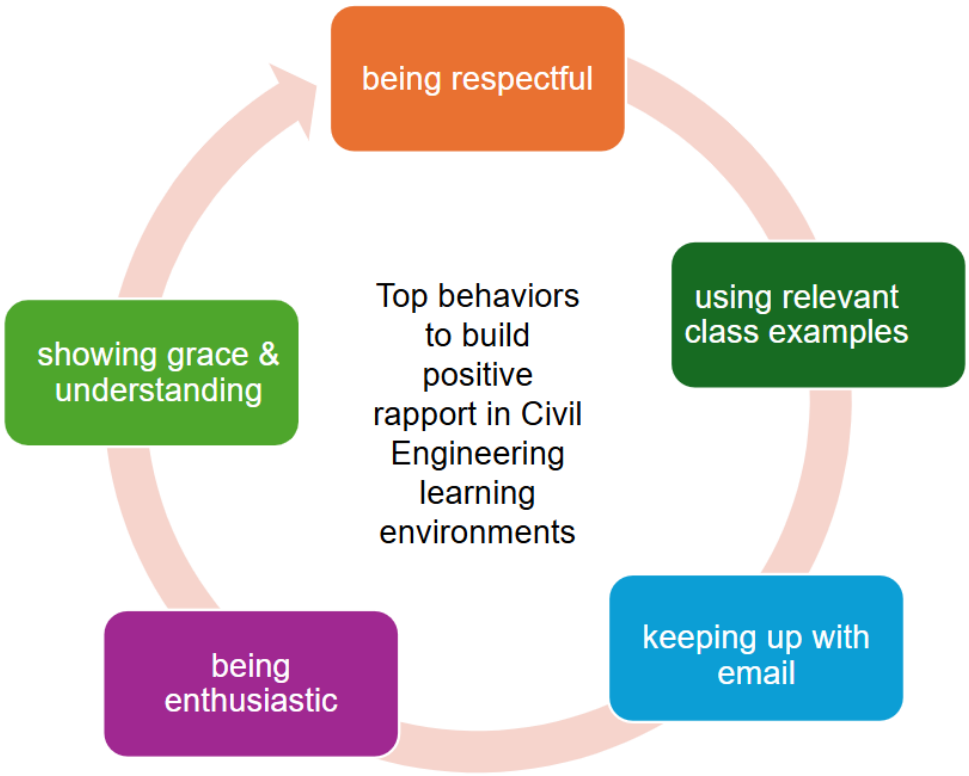

Figure 3: Top rated behaviors exhibited by civil engineering professors to establish positive rapport with students.

Interestingly, the importance of being respectful and using inclusive language was particularly pronounced when analyzed by gender identity, indicating that students from diverse gender backgrounds place a higher value on inclusivity and respect. While students over 25 years of age valued professors learning something about them and sharing their professional history more, students aged 21-25 highly valued professors arriving early to class. While upper level undergraduate students, and students with a GPA between 2.5 and 3.0 highly valued professors staying late after class or arriving early to class, graduate students prioritize professors sharing their professional history. Students with a GPA between 2.5 and 3.0 consistently showed high variations for their preferences for faculty behaviors. Among the groups who showed variation towards some faculty behaviors were also part-time students, this non-traditional student group highly valued when professors are rewarding comments with praise, making eye contact, and sharing their professional history as compared to other students.

Behaviors such as staying late after class, arriving early, and learning something personal about the students consistently ranked lower than others. This finding suggests that while students value certain professional and interpersonal behaviors, they may not prioritize additional time commitments or personal engagement to the same extent.

Conclusion

As part of a course and lesson design, faculty should consider rapport-building strategies as an essential part of the process. Such strategies should be authentic to the instructor but they should consider the needs and perspectives of the learners. Strategies used to establish positive rapport should be intentionally selected and their effectiveness should be assessed by asking for students' feedback.

Results of this study highlight useful and effective rapport-building behaviors that professors can adopt, emphasizing the universal importance of respect and understanding. Demographics such as gender identity, age, and year of study influence students' opinions of rapport-building actions and behaviors. However, regardless of student differences, the core five behaviors, being respectful, using relevant class examples, keeping up with email, being enthusiastic, and showing grace or understanding remain crucial for fostering a supportive and engaging learning environment in today's higher education classrooms.

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Appendix A: Survey Introduction and Questions

You are being invited to participate in this multi-institutional research study on the impact of faculty behaviors on student-faculty rapport.* The purpose of this study is to obtain some information about students' perceptions of their relationship with professors. We hope to use this information to improve the relationship between professors and engineering students. In addition, we will share the aggregate results in presentations and/or publications. This questionnaire will take approximately ten minutes to complete. This survey is anonymous. Please give us your honest opinion. Participating in this survey is voluntary. We greatly appreciate your assistance with this study. The York College of Pennsylvania IRB has reviewed this research project and found it to be exempt under Exemption 2 (45r CFR 46.401(d)). If you have questions or concerns, please contact the authors. Thank you!

*Merriam-Webster defines "rapport" as: "a relationship characterized by agreement, mutual understanding, or empathy that makes communication possible or easy." (https://www.merriam-webster.com/dictionary/rapport) (“Rapport Definition & Meaning”, n.d.).

Consent: By submitting this survey, I affirm that I am completing this survey, for the first time, to the best of my understanding. I also agree that the information may be used in the research project described above. Please indicate Yes or No.

Think of a professor(s) who has or had a positive influence in your life or education. Provide (3) words or phrases that describe this person's interaction with you, or your observations of their interaction with others, that left an impression on you.

It’s important to me that my professors … (rate each strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, or strongly agree)

Call me by my name.

Learn something about me.

Use relevant class examples.

Arrive early to class.

Stay late after class.

Explain their policies.

Post and keep consistent office hours.

Keep up with email.

Interact with their students, rather than lecture at them.

Reward comments/questions with praise.

Are enthusiastic.

Crack jokes.

Make eye contact.

Are respectful.

Smile.

Use inclusive language.

Show grace or understanding.

Support my professional development beyond the class.

Support my personal development beyond the class.

Share their professional history and experience.

Show themselves as humans.

Please select your institution.

Please indicate your year of study.

Please indicate your gender identity.

Please indicate your age.

Please indicate your overall GPA.

Please choose any options that describe you. (Commuter (i.e. do not live on or near campus), Identify as an underrepresented individual, First generation student, Part time student, Student athlete)

Appendix B: Descriptor Summary: Descriptors classified by category

Personality Traits	Supportive Traits (IR)	Motivational Traits (IE)	Professional Traits (IE)
Adaptable	Accommodating	Challenging	Creative
Appreciated	Approachable	Clear	Demos / examples
Calm	Attentive	Command of the	Effective
Charming	Available	classroom	Knowledgeable /
Confident	Caring	Communication	expertise
Dedicated	Compassionate	Curious	Mastery grading
Driven	Connection	Demanding	Practical
Eccentric	Considerate	Energetic	Professional
Focused	Constructive	Engaging	Rigorous
Genuine	Empathetic	Enthusiastic	
Grounded	Encouraging	Firm	
Gruff	Fair	Fun / funny	
Honest	Feedback	High expectations	
Humble	Flexible	Informative	
Respectful	Friendly	Insightful	
Sensible	Generous	Inspirational	
Stern / strict	Gives advice	Intentional	
Strong	Go above and beyond	Interactive	
Wise	Helpful	Interesting	
	Inclusive	Leader	
	Invested	Motivating	
	Kind	Organized	
	Listens	Outgoing	
	Mentor / wants best	Passionate	
	for student	Thorough	
	Nice		
	Nonjudgmental		
	Open		
	Patient		
	Perceptive		
	Personable		
	Personal		
	Positive / happy		
	Present		
	Receptive		
	Relatable		
	Resourceful		
	Responsive		
	Supportive		
	Thoughtful		
	Understanding		
	Welcoming		