



Faculty-student rapport, student engagement, and approaches to collegiate learning: exploring a mediational model

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Abstract

Students value a close, supportive relationship with their professors, which has been shown to enhance their learning in higher education. However, more needs to be known about how quality faculty-student relationships shape students' engagement and approaches to learning in higher education. In a diverse sample of 966 undergraduates from two different institutions of higher education, the current study explored the relationship between faculty-student rapport, student engagement, and deep and surface approaches to learning. Faculty-student rapport was positively correlated with student engagement ($r = .50$) and deep learning ($r = .30$), and negatively correlated with surface learning ($r = -.21$). Student engagement was positively correlated with deep learning ($r = .70$) and negatively with surface learning ($r = -.32$). Using multilevel modelling with students nested within classrooms, engagement was shown to mediate the effects of rapport on greater levels of deep learning ($\beta = .31$) and lower levels of surface learning ($\beta = -.12$). Although results held up across a range of demographic characteristics, some differences were noted for rapport-building among Asian American students and engagement across men versus women. These results have important implications for how faculty can engage students in the learning process by developing close, supportive relationships with their students and by extending their relationship with their students outside the classroom.

Keywords Faculty-student rapport · Student engagement in the classroom · Deep learning · Surface learning · Higher education educational processes

Research in higher education has sought to identify the factors in college classrooms that allow students to thrive and achieve successful learning outcomes. Specifically, the relationship between professors and their students in the classroom has been consistently linked to students' learning outcomes (Anderson & Carta-Falsa, 2002; Dingel & Puntì, 2023). Faculty-student relationships have been associated with several other variables that ultimately lead to better student learning outcomes, including academic engagement and student approaches to learning course material (Estepp & Roberts, 2015; Leslie, 2019). These findings suggest a

mediational model whereby better faculty-student relationships lead to greater engagement by students in the classroom, which ultimately leads to students processing and learning course material at a deeper level. The current study tested this mediational model with a large sample of undergraduate students at two different institutions of higher education. Past research has focused on different aspects of the professor-student relationship linked to student engagement, including professor use of humor, immediacy, working alliance, and rapport (Estepp & Roberts, 2015; Richmond et al., 2015; Rogers, 2015; St-Amand et al., 2023; Wilson & Ryan, 2013). In the current research, we focused on professor-student rapport as the lens through which to examine the quality of the relationship formed between faculty and students over the course of a semester.

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Background

Faculty-student rapport and student engagement

Faculty-student rapport refers to the emotional relationship formed between professors and their students (Estep & Roberts, 2013; Wilson & Ryan, 2013). This relationship assists students in feeling comfortable with their teachers/professors and enhancing their motivation level and learning outcomes (Thakur et al., 2019). In other words, rapport is how well students feel connected with their professors, how much they like them, and how much they perceive their professors understand their feelings and ideas. Faculty characteristics such as flexibility, consideration, compassion, fairness, open communication, creation of an interesting class, approachability, and receptivity to student feedback all have been proposed as critical to the development of faculty-student rapport (Thakur et al., 2019). Importantly, research has shown that no matter how well they teach their subject matter, student engagement and learning outcomes are compromised if faculty do not establish rapport with their students (Thakur et al., 2019).

Indeed, across numerous studies, better faculty-student rapport was associated with greater student engagement and, in some cases, academic performance. For example, Wilson and Ryan (2013) found that among students in Psychology courses, greater rapport, operationalized as students perceiving a course as enjoyable and their faculty member as approachable, was associated with higher motivation, fewer absences, greater understanding of course content, and ultimately higher course grades. Interestingly, these associations only were evident for the six-item student engagement subscale of the Professor-Student Rapport scale (PSRS); perceptions of the faculty member, the other subscale, showed nonsignificant associations with the student outcomes. These findings suggested that student outcomes may be more dependent on a faculty member creating a welcoming and dynamic classroom environment, as opposed to students simply liking the faculty member (Wilson & Ryan, 2013).

Estep and Roberts (2013) utilized the full 34-item PSRS and found that, among students in an agricultural and life sciences program, higher rapport was associated with greater expectations for success in the course and a desire for course content that was challenging. Richmond et al. (2015) and Demir et al. (2019) also used the full PSRS, but with students in psychology courses. Richmond et al. (2015) found that rapport was positively correlated with all four dimensions of student engagement: emotional connections to the course, faculty/classmate interaction, listening and study skill deployment, and academic performance. Similarly, Demir et al. (2019) reported that higher rapport

was associated with more positive perceptions of the course, amount of content learned, and fewer absences. On the other hand, Schriver and Harr Kulynych (2021) did not find a relation between rapport and student effort, attendance, or grade earned. Rapport was associated with self-reported increased learning, interest, and motivation, however (Schriver & Harr Kulynych, 2021). Taken together, these findings suggest a largely robust relationship between faculty-student rapport and a host of engagement variables, although rapport may be more closely associated with affective, rather than behavioral engagement.

Recent research has operationalized faculty-student rapport differently and yet has shown a similar positive association between rapport and engagement. For example, among Dutch higher education students, perceptions of a faculty member's integrity, emotional attachment to faculty members, and a lack of conflict predicted dedication to and vigor about one's studies and engrossment in the material (Snijders et al., 2020). A study of Chinese college students, which utilized a much briefer measure of faculty-student rapport, not only showed that it was positively associated with engagement, but also elucidated potential mechanisms of this rapport-engagement relation: higher self-efficacy, hope, resilience, and optimism (Wu et al., 2023). Finally, a relation between rapport and engagement was evident in the context of an experimental study of online courses. Specifically, Almusharraf (2022) trained an instructor to deliberately integrate a high level of rapport-building in one course but not another. Student surveys confirmed greater rapport in the rapport-building course; further, ratings from independent observers of the class sessions showed markedly higher student engagement in the rapport-building course (Almusharraf, 2022). Encouragingly, these findings suggest that differences in student engagement can be readily observed in response to rapport-building practices, and that faculty can even be coached on how to implement these strategies more often in their teaching.

The current study sought to not only replicate previous research by examining potential links between rapport and student engagement, but also to extend the literature by investigating whether engagement mediated the association between rapport and student approaches to learning (i.e., deep versus surface learning). Below, we explore research that has examined associations between faculty-student rapport, student engagement, and different learning approaches in higher education.

Learning approaches in higher education

A wealth of previous research has examined approaches students utilize when tackling their studies in higher education. Although numerous approaches have been identified,

the bulk of this research has converged on two primary approaches: deep and surface learning (Baeten et al., 2010; Biggs et al., 2001; Entwistle & McCune, 2004; Entwistle & Ramsden, 1983; Marton, 1976). These two approaches are characterized by differing motivations and strategies used by students in their studying behavior. In deep learning, the student is motivated by an intrinsic interest in the learning; correspondingly, their learning strategy is to find meaning in the material they are studying, often by connecting what they are learning to previously acquired knowledge and to their own personal experiences and interests (Baeten et al., 2010; Song et al., 2021). By contrast, in surface learning, the student is motivated by a fear of failure; hence, their learning strategy emphasizes primarily rote memorization in order to pass the course and move on to other subjects (Baeten et al., 2010). Although students may utilize a mix of these approaches across their different classes, these approaches have important implications for student success in higher education. Specifically, deep as opposed to surface learning has been associated with higher academic achievement in terms of Grade Point Average (GPA) and accordingly with better graduation rates (Song et al., 2021). Hence, it is critical to understand what factors are associated with the adoption of these different learning approaches.

In a critical review article synthesizing previous research, Baeten et al. (2011) identified characteristics of the individual learner as well as contextual factors that predict the utilization of these different learning approaches. Regarding individual learner factors, older students who show more advanced cognitive development (i.e., students able to think from multiple perspectives using relativistic perspectives and who are committed to their values) were more likely to adopt a deep approach to learning; interestingly, intelligence per se (measured in terms of IQ scores) was not a predictor of learning approaches (Diseth, 2002; Furnham et al., 2008). Additionally, personality characteristics, such as openness to new experience, predicted deep approaches to learning whereas neuroticism predicted surface approaches, which is consistent with the idea that fear and anxiety often drive surface learning. Finally, students who showed greater self-confidence and higher self-efficacy are more likely to adopt a deep as opposed to surface approach.

Importantly, individual characteristics are not the only, or even primary, predictors of students' learning approaches. Rather, contextual factors have been shown to be critical in predicting learning approaches. For example, students' perception of excessive workload is one of the strongest predictors of surface learning. Also, subject matter can predict different learning approaches, where social science and humanities courses tend to be more closely associated with deep learning and natural science courses with surface learning (Baeten et al., 2011; Eley, 1992). Of particular

relevance to the current study is research that has explored links between teacher characteristics and teaching styles and student approaches to learning. We turn now to a brief review of that literature.

Faculty-student rapport and learning approaches

It is important to note that we could not locate research that has specifically linked faculty-student rapport to student learning approaches. Hence, a significant contribution of the current study is to examine that link in particular. However, we were able to locate studies that have examined aspects of the faculty-student relationship that are related to rapport and that predict student learning approaches. First, in an early study, Eley (1992) demonstrated that teaching support, described as "the teaching experience was felt to give general support and encouragement for the students' learning" (p. 237), was associated with a deep approach to learning and the absence of support with a surface approach. This finding held up across various subject matters (including accounting, biochemistry, English literature, and political science classes) and Eley was able to show that students actually changed their learning approach from one class to another, in accord with the level of support they experienced from the teacher from one class to another. More recently, studies have examined links between students' classroom experiences, including their perception of their teachers' interpersonal qualities, and approaches to learning (Lizzio et al., 2002; Wang & Zhang, 2019). Lizzio et al. demonstrated that a dimension of the Classroom Experiences Questionnaire (CEQ; Ramsden, 1991) called "good teaching" was the strongest predictor of greater deep learning approaches and lesser surface learning approaches in a large sample of college students across the disciplines of commerce, humanities, and science. Good teaching comprised a range of behaviors including providing clear and useful explanations and helpful feedback but also included the teacher being heavily involved with their students and seeking students' input and opinion about the learning process, which seems related to the development of a strong faculty-student rapport. Wang and Zhang (2019) similarly found that student-centered teaching, which includes elements of the teacher facilitating and coaching their students' learning, was linked with greater deep and lesser surface learning approaches.

Although the above mentioned studies suggest links between a positive, supportive teaching environment and students adopting a deeper approach to learning, there is a clear gap in the research literature examining the affective qualities of the faculty-student relationship and student learning approaches. We sought to fill this gap in the current study by examining the relation between faculty-student

rapport and student learning approaches. We hypothesized that a stronger faculty-student rapport would be associated with deeper learning approaches whereas a weaker faculty-student rapport would be associated with surface learning approaches. Moreover, we speculated that students' level of engagement in the classroom may *mediate* the relationship between rapport and learning approaches, given that better faculty-student rapport is associated with more student engagement and that more student engagement has been shown to be associated with greater use of deep approaches and lesser use of surface approaches to learning. We turn next to a brief review of the literature linking student engagement to student learning approaches.

Student engagement and learning approaches

A number of studies have examined the relationship between student engagement and approaches to learning. Floyd et al. (2009) demonstrated that students' reports of greater cognitive engagement on the Handelsman et al.'s (2005) measure of student engagement was associated with greater deep learning to a moderate degree ($r=0.39$), but was only slightly related to lesser adoption of surface learning approaches ($r=-0.07$, ns). More recently, a few research studies have examined whether enhancing student engagement in particularly challenging classroom environments may increase deep learning and decrease surface learning. The first of these studies focused on a large introductory level, microbiology class taken largely by pre-health science majors (Bull et al., 2020). The authors noted that students are often disengaged in this large, lecture-style class and that the depth of their learning is thus compromised. To enhance engagement, the authors had students work in small groups to create a digital PowerPoint poster presentation. These presentations were the result of the students having examined topics such as: "Microbes in the News", "Interview with a Local Scientist", or "Microbial Topic of Your Choice" (p. 3). Students found this assignment quite engaging and results of the study showed that students' surface learning approach dropped from a pre to post-test administered at the beginning and end of the semester at the same time as their deep learning approach increased, supporting the idea that students' enhanced level of engagement is associated with their adoption of a deep approach to learning. In a similar vein, Beauchamp & Monk (2022) examined a method for enhancing student engagement in an online nutritional science class administered asynchronously during the pandemic. Reasoning that the online, asynchronous nature of this class would likely suppress student engagement, the authors created a series of optional assignments in which students were encouraged to engage with each other through an online discussion board. A large percentage of

the students participated in these online assignments and reported a positive experience in doing so. Moreover, students' reports of utilizing a deep learning approach were positively correlated with their feeling engaged in the course, their positive perceptions of the optional assignments, and their sense of the online assignments stimulating new ideas for them in the class. Higher surface learning scores were inversely related to students' perceptions of the online assignments as helpful in stimulating new ideas and with them having a positive experience engaging in the online group discussions (Beauchamp & Monk, 2022).

Although greater student engagement has been shown to be related to a deeper approach to learning, previous studies have not explored engagement as a possible mediator between faculty-student rapport and learning approaches. We speculated that students who perceive a warmer, more supportive relationship with their professors will be motivated to engage more fully in their courses. In turn, higher levels of engagement should be associated with deeper learning, as shown in previous studies, and with lower levels of surface learning.

The current study

The current study sought to build on previous research that has examined faculty-student rapport, student engagement, and deep and surface learning approaches. From our review of the literature, ours is the first study to explicitly link these constructs together. Based on our review of the literature, we proposed the following hypotheses:

1. Greater faculty-student rapport is associated with greater student engagement in the course.
2. Greater faculty-student rapport is associated with greater utilization of deep approaches and lesser utilization of surface approaches to learning
3. Greater student engagement is associated with greater utilization of deep approaches and lesser utilization of surface approaches to learning.
4. Student engagement would partially, or fully, mediate the relationship between faculty-student rapport and student approaches to learning.

Method

Participants

Participants were drawn from a large, metropolitan university in the mid-Atlantic region of the United States and a smaller liberal arts college. Ultimately, 966 students

participated in this study; 703 (72.8%) from the large metropolitan university, and 263 (27.2%) from the small liberal arts college. Of the student participants, 699 (72.9%) identified as female, 230 (24%) identified as male, and 25 (2.5%) identified as non-binary or genderqueer [five students (0.5%) preferred not to answer]. Regarding race and ethnicity, 594 (62.1%) participants identified as White/Caucasian, 154 (16.1%) as Black/African American, 62 (6.5%) as Asian/Asian American, 47 (4.9%) as Latinx/Hispanic, and 4 (0.4%) as Native American. Additionally, 84 (8.7%) students who identified as “other” or more than one ethnicity, and 11 (1.2%) preferred not to respond. The mean age of student participants was 20.69 ($SD=3.34$) with 96.8% of the students between 18 and 25 years of age.

Class standing was distributed relatively evenly with 212 (22.1%) first-year students, 220 (23.0%) sophomores, 289 (30.2%) juniors, and 197 (20.6%) seniors. There were also 40 (4.2%) students who were fifth year or beyond. Family income was estimated by participants as follows: 219 (23.0%) in the \$100,000-\$200,000, 211 (22.1%) \$50,000-\$100,000, 125 (13.1%) \$25,000-\$50,000, and 70 (7.3%) less than \$25,000 [217 (22.7%) preferred to not answer the question].

Procedure

Participants were chosen through purposive sampling over the course of three semesters. The research team emailed full-time faculty requesting permission for, and assistance with recruiting participants from their classes for the study. We chose one specific course for each faculty member, aiming to achieve a balance of courses by size, level, and disciplinary distribution. Faculty who consented to participate either shared their rosters with the research team or the research team obtained the rosters from the Registrar.

The research team then contacted students of consenting faculty directly via e-mail to explain the study and to request their participation. A link to an online self-report survey on the Qualtrics platform was sent to the students who volunteered to participate. At the end of the survey, participants either had the option to (1) enter a raffle (not linked to the survey responses) for a \$25 Amazon gift card, or (2) to receive extra credit if the faculty member agreed (in which case students reached out to the researchers directly to confirm they completed the survey). All procedures for the study were fully approved by the Institutional Review Boards (IRB) at both institutions and APA ethical guidelines for conducting research were followed in this study.

Measures

Professor-student rapport

Students' reports of their relationship with their professor were assessed using the Professor Student Rapport Scale (PSRS), developed by Wilson et al. (2010). The scale includes 34 items aimed at measuring students' rapport with their professor. Items are rated on a five-point scale from 1 “*strongly disagree*” to 5 “*strongly agree*” (i.e., *my professor is disrespectful*). This measure has been widely used in previous research on rapport between students and their professors and has been shown to be internally consistent and predictive of students' learning, self-reported grades, and overall satisfaction with the course (Wilson & Ryan, 2013; Wilson et al., 2010). The PSRS was highly reliable in this study ($\alpha=0.93$).

Student engagement

We measured students' overall level engagement with the course material using the Student Course Engagement Questionnaire (Handelsman, et al., 2005). This instrument includes 23 items designed to measure student engagement across four interrelated domains: (1) skills engagement, (2) participation engagement, (3) emotional engagement, and (4) performance engagement. A sample item was “Putting forth effort to make this course interesting to me”. Items are rated on a Likert scale from 1 to 5 with 1 being “*not at all characteristic of me*” to 5 being “*very characteristic of me*.” Because the four domains were strongly correlated with each other in this study (correlations ranging from 0.42 to 0.58) we focused on an overall score for engagement, which proved to be highly reliable in this study ($\alpha=0.92$).

Student approaches to learning

The Revised Two-Factor Study Process Questionnaire (Biggs et al., 2001) was used in this study to gauge students' approaches to learning. The 20-item self-report questionnaire focused on two approaches to learning: surface and deep learning. Each approach was measured on a 5-point Likert scale with 1 being “*never or only rarely true of me*” to 5 being “*always or almost always true of me*”. A sample item from a deep approach to learning subscale was “*I find that at times studying gives me a feeling of deep personal satisfaction*”, whereas a sample item from the surface approach subscale was “*I learn some things by rote, going over and over them until I know them by heart even if I do not understand them*”. Previous research has established that these approaches predict students' mastery of course content over time and persistence in higher education, with

the deep approach leading to higher grade point averages and higher graduation rates. Both subscales were reliable in the current study (Deeping Learning: $\alpha=0.80$; Surface Learning: $\alpha=0.84$).

Results

Plan of analysis

Given that students were nested within classrooms, we utilized multilevel modeling, exploring both within and between-subjects effects. In this case, within-subjects effects referred to how an individual student perceived the level of rapport with their professor and how that rapport was associated with their engagement and learning in the course. Between-subjects effects referred to average levels of each variable across students in different classrooms and hence captured a more contextualized understanding of how faculty-student rapport affected all students within a given course. We tested all sequential mediational path models in this study using *Mplus*, version 8.4 (Muthén & Muthén, 1998–2017). *Mplus* is a versatile program that allows the testing of path models with a multilevel modeling approach.

To assess goodness-of-fit for models tested in this study, we focused on the following fit indices: Root Mean Square Error of Approximation (RMSEA, Steiger, 1990), the Comparative Fit Index (CFI; Bentler & Bonett, 1980), the chi-square statistic, and the Standardized Root Mean Residual (SRMR). Goodness-of-fit is generally indicated by a CFI value above 0.90, SRMR value below 0.08, and RMSEA value below 0.08. In complex models, the chi-square statistic is often still significant (indicating a lack of perfect fit) but is considered an imprecise measure of goodness-of-fit (Hu & Bentler, 1999). We used multigroup analysis to assess the validity and stability of results (i.e., if the effects were the same across institutions, gender, and race/ethnicity).

Preliminary analyses

We first explored demographic differences in the study variables. Table 1 displays differences in mean levels of rapport, engagement, deep, and surface learning by site (large regional university vs. small liberal arts college), gender, ethnicity, year in school, and discipline area of the course (e.g., natural science). Although few differences emerged, a few patterns were of note. First, students at the liberal arts college consistently reported greater rapport with their

Table 1 Sociodemographic differences in the study variables

	Rapport	Engagement	DL	SL
a. Site of Data Collection				
Large Regional Univ. ($N=696$)	4.42 (.66) ^A	3.66 (.66) ^A	2.98 (.77) ^A	2.68 (.71) ^A
Small Lib. Arts. Coll. ($N=293$)	4.52 (.49) ^B	3.91 (.69) ^B	3.19 (.73) ^B	2.43 (.70) ^B
b. Gender				
Man ($N=230$)	4.39 (.62) ^A	3.62 (.68) ^A	3.03 (.78) ^A	2.69 (.75) ^A
Woman ($N=699$)	4.47 (.60) ^A	3.76 (.63) ^B	3.04 (.75) ^A	2.59 (.70) ^A
Third Gender/Non-Bin. ($N=25$)	4.26 (.98) ^A	3.54 (.87) ^{AB}	2.80 (.85) ^A	2.55 (.78) ^A
c. Ethnicity				
White ($N=594$)	4.49 (.57) ^A	3.77 (.63) ^A	3.02 (.76) ^A	2.59 (.71) ^A
African American ($N=154$)	4.44 (.57) ^{AB}	3.66 (.65) ^A	3.05 (.82) ^A	2.66 (.70) ^A
Asian-American ($N=62$)	4.24 (.70) ^B	3.58 (.71) ^A	2.94 (.78) ^A	2.77 (.71) ^A
Latinx ($N=47$)	4.40 (.80) ^{AB}	3.58 (.71) ^A	3.07 (.67) ^A	2.59 (.77) ^A
Other ($N=88$)	4.32 (.77) ^{AB}	3.61 (.75) ^A	2.99 (.76) ^A	2.56 (.76) ^A
d. Year in School				
Freshmen ($N=212$)	4.36 (.66) ^A	3.71 (.65) ^A	3.02 (.75) ^A	2.65 (.73) ^A
Sophomore ($N=220$)	4.49 (.55) ^A	3.71 (.66) ^A	3.00 (.80) ^A	2.58 (.66) ^A
Junior ($N=289$)	4.47 (.62) ^A	3.77 (.67) ^A	3.08 (.79) ^A	2.58 (.73) ^A
Senior ($N=197$)	4.45 (.62) ^A	3.68 (.64) ^A	2.98 (.71) ^A	2.66 (.71) ^A
Senior+ ($N=40$)	4.43 (.71) ^A	3.74 (.60) ^A	2.53 (.67) ^A	3.13 (.61) ^A
e. Subject Area of Classroom				
Humanities ($N=165$)	4.53 (.53) ^A	3.78 (.62) ^A	3.06 (.72) ^A	2.55 (.73) ^A
Social Sciences ($N=462$)	4.48 (.57) ^{AB}	3.60 (.64) ^A	3.00 (.78) ^A	2.65 (.69) ^A
Natural Sciences ($N=210$)	4.36 (.61) ^B	3.60 (.64) ^A	2.98 (.77) ^A	2.59 (.76) ^A
Health Professions ($N=35$)	4.45 (.82) ^{AB}	3.86 (.69) ^A	3.13 (.75) ^A	2.36 (.64) ^A
Fine Arts ($N=60$)	4.53 (.55) ^{AB}	3.80 (.66) ^A	3.23 (.66) ^A	2.66 (.72) ^A

Groups with differing superscript indicate significant differences, using Tukey HSD posthoc analyses ($p < .05$)

DL, Deep Learning; SL, Surface Learning

Table 2 Bivariate correlations between faculty-student rapport, student engagement in the classroom, and deep versus surface approaches to learning

	Student engagement	Deep learning	Surface learning
Faculty-student rapport	.50***	.33**	-.21**
Student engagement		.70***	-.32**
Deep learning			-.25**

** $p < .01$; *** $p < .001$

faculty members, greater engagement in the classroom, and greater utilization of deep versus surface approaches to learning. Moreover, women reported greater engagement in their courses than men; and White students reported better rapport with their faculty compared to students identifying as Asian or Asian American. Finally, students taking humanities courses reported greater rapport with their professors compared to students in natural science courses. Below we describe how we examined whether path models were invariant across these demographic characteristics.

Table 2 presents zero-order correlations between student reports of rapport with their faculty member, their level of engagement in the classroom, and their surface versus deep approach to learning. As shown in the table, rapport was associated with greater levels of engagement and with a deep approach to learning. In contrast, rapport was inversely correlated with utilizing a surface approach. Similarly, level of engagement was associated with more deep learning and less surface learning. While these results

supported the primary hypotheses of the study, we needed to employ path analysis to determine whether engagement served as a mediator linking rapport to different approaches to learning.

Path analyses

Figure 1 displays results of the within-subjects path analysis examining links between faculty-student rapport, student engagement in the classroom, and deep versus surface approaches to learning. As seen in the figure, the path from rapport to engagement was significant, as were the paths from engagement to deep and surface learning, respectively. Once these indirect paths were accounted for, the direct paths from rapport to deep and surface learning were no longer significant, suggesting that the mediated pathway through engagement best accounted for the effects of faculty-student rapport on students' approaches to learning in the course. Indeed, a mediational model without direct effects fit the data very well: $\chi^2(4, N=960)=3.12, p=0.54$; CFI=1.00, RMSEA=0.000, SRMR=0.018.

Table 3 presents significant tests for all direct and indirect paths illustrated in Fig. 1. The within-subjects tests repeat what was displayed in the figure. The between-subjects effect showed one additional, significant indirect pathway from faculty-student rapport to deep learning through engagement. This between-subjects effect suggested that the average level of rapport in a given classroom was associated

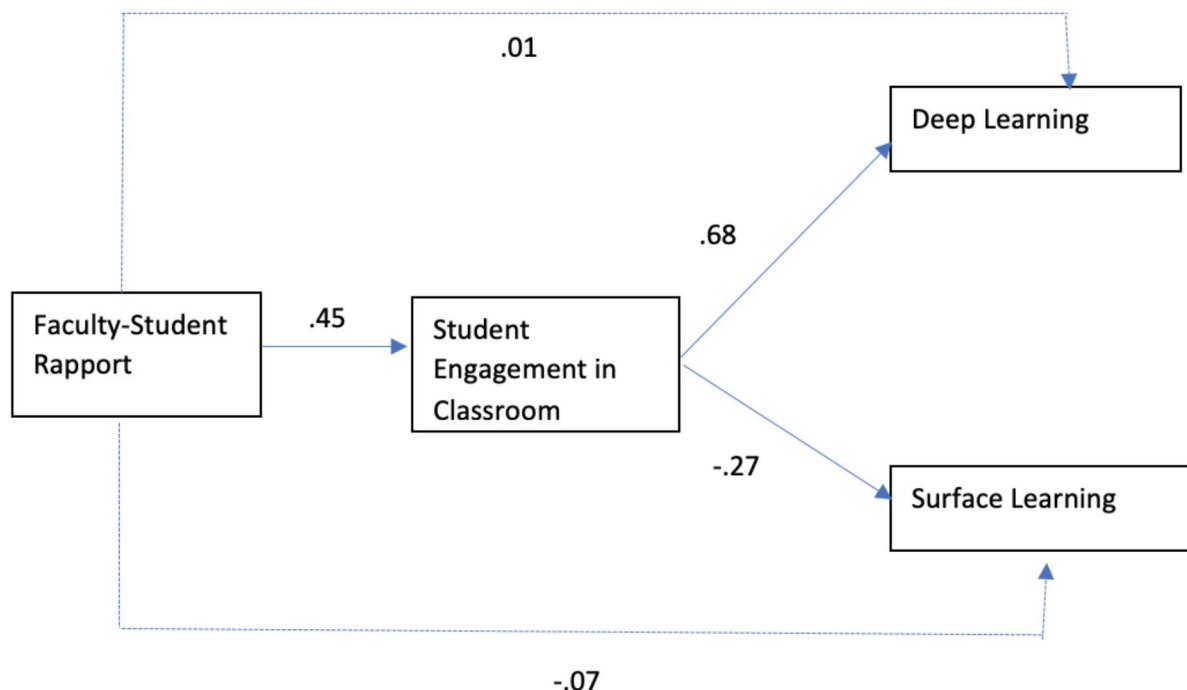


Fig. 1 The mediating role of student engagement in the classroom on the link between faculty-student rapport and deep versus surface learning (within-subjects analysis). Note All solid lines are significant at $p < .001$

Table 3 Standardized estimates of direct and indirect effects

Pathway	Estimate (β)	Standard Error (<i>SE</i>)	<i>p</i>
a. Within Subjects Effects			
Rapport-> DL (direct)	.005	.025	.826
Rapport-> SL (direct)	-.068	.037	.069
Rapport-> Engage-> DL	.310	.023	.0001
Rapport-> Engage-> SL	-.120	.019	.0001
b. Between Subjects Effects			
Rapport-> DL (direct)	-.181	.391	.644
Rapport-> SL (direct)	.037	.600	.951
Rapport-> Engage-> DL	.819	.338	.015
Rapport-> Engage-> SL	-.532	.452	.239

Bolded paths were significant at the $p < .05$ level

Rapport=Faculty-Student Rapport, Engage=Student Engagement in the Classroom, DL=Deep Learning, SL=Surface Learning

with how engaged the students were in the course overall and, in turn, their overall level of deep learning. This overall effect across classrooms reinforced the findings from the within-subjects analyses showing that an individual student's engagement and deep learning were associated with their perception of rapport with their faculty member.

To examine potential demographic differences in our sample, we first constrained the model to be equal across sites of data collection. These constraints did not result in a significant decrement in overall model fit $\chi^2(5, N=960)=5.00, p=0.42$; CFI=1.00, RMSEA=0.000 CI [0.000; 0.063], SRMR=0.043). This was also true when we constrained the model to be equal across student gender $\chi^2(5, N=960)=6.60, p=0.25$; CFI=0.998, RMSEA=0.026 CI [0.000; 0.073], SRMR=0.058) and across White vs. non-White students $\chi^2(5, N=960)=10.33, p=0.07$; CFI=0.988, RMSEA=0.068 CI [0.000; 0.127], SRMR=0.076) (we had too few participants in each racial/ethnic group to make meaningful comparisons across all groups). These results provided confidence that in spite of some demographic differences in our dataset, the paths from faculty-student rapport to deep learning through student engagement largely were robust in the overall sample.

Discussion

The current study investigated the relation between faculty-student rapport and student engagement and their association with deep and surface learning. It was hypothesized that better faculty-student rapport would be linked to great student engagement and, in turn, more deep learning and less surface learning. As predicted, there was a significant positive correlation between faculty-student rapport and student engagement. This finding, which was consistent with much of the previous research (Demir et al., 2019;

Estep & Roberts, 2013; Richmond et al., 2015; Snijders et al., 2020; Wilson & Ryan, 2013; Wu et al., 2023), suggests that students who have a stronger bond with their professor are motivated to engage more actively in their classes, by participating in class discussions, volunteering for in-class demonstrations, and perhaps by seeking out professors during office hours. In addition, faculty-student rapport was positively correlated with deep learning, also consistent with past research exploring similar types of relations (Lizzio et al., 2002; Wang & Zhang, 2019). In addition to these correlational results, our path analysis suggested that student engagement significantly and fully mediated the relation between rapport and the outcomes of deep and surface learning. Specifically, these results suggested that when students felt a closer bond with their professors, they demonstrated more active engagement in a course, and that higher engagement was associated with a deeper, more personally meaningful comprehension of course material and less of a focus on grade conscious academic behavior.

Although our results demonstrated that student engagement mediated the effects of faculty-student rapport on learning outcomes across a wide range of students in different university and classroom settings, we did find some sociodemographic differences worth noting. First, we found that students reported greater rapport with their professors in humanities courses compared with natural science courses. These results were consistent with past research on gender differences and different levels of rapport across disciplines within higher education (Kim & Sax, 2009, 2014). It is possible that natural science professors emphasize the transmission of information, without emphasizing the faculty-student relationship to the same extent as faculty in the humanities do, where student engagement is critical for the success of the course experience. These differences have been noted in prior research, where natural science faculty tend to use a more faculty-centric teaching approach compared with faculty in the humanities or social sciences, who emphasize student-focused teaching strategies to a greater extent (Trigwell et al., 2005).

In terms of gender differences, we found that women reported greater engagement in their classes than men. Although this difference may be an artifact of the current study, it is possible that women and men are socialized differently by members of their social network (i.e., attachment figures, parents, teachers, and peers), which has a subsequent impact on how they ultimately engage in collegiate academic settings. In this context, younger boys and girls develop a sense of what is deemed appropriate and inappropriate for their gender, model and imitate according to those with whom they identify, and respond to the environment through vicarious learning and feedback (Endendijk et al., 2018). Moreover, Baker (2006) reported that teachers

perceive their relationship to their female students to be warmer and less conflictual than to their male students. Therefore, women may feel more emboldened and secure to engage more not only in the classroom, but also with their professor. We also found that students at the liberal arts college reported greater engagement in their course. These results are likely explained by the selective nature of this college as opposed to a large, regional state university.

Regarding racial and ethnic differences, White students reported having better rapport with their faculty as compared with Asian and Asian American students. Since part of faculty-student rapport measures student engagement with the professor, Asian students' lower ratings of rapport and engagement may be a reflection of Asian cultural values of discreteness (Shea & Yeh, 2008) and deference to authority (Chien, 2016; Kim et al., 2001). The salience of a hierarchical relationship between faculty and student may hinder Asian or Asian American students from engaging more frequently and directly with their professors, behaviors that are valued and encouraged in western cultures. Importantly, Asian students often face the "model minority" stereotype, which posits that Asians are a well-adjusted and academically competent minority within the United States. However, Asian students may not be receiving the faculty support that they require for optimal academic and/or psychosocial development. Current research highlights that a sense of belonging is one of the most important factors that impact college student's success (Pedler et al., 2021; Strayhorn, 2012). Unfortunately, some research has indicated that Asian students have a lower sense of belonging in higher education institutions (Cress & Ikeda, 2003; Wells & Horn, 2015). These results suggest that it may be particularly important for faculty to deliberately reach out to Asian and Asian American students. Helping these students to feel included in the classroom experience, and helping them to feel a greater sense of belonging to the college/university may ultimately encourage deeper learning of their course material.

Implications

Findings from the current study offer some tentative suggestions on how to improve academic outcomes within higher education. If faculty-student rapport is critical to students adopting a deep approach to learning, where they emphasize the intrinsic value of the material rather than the grade earned, then it seems important to help faculty develop greater rapport with their students. One approach to bolster rapport in the classroom would be to elicit feedback from students. Trigwell et al. (1999) stressed the importance of professors eliciting the opinion of students and incorporating the feedback into their teaching style. Specifically,

faculty might consider administering an anonymous mid-semester course evaluation inquiring about how students' experiences in the classroom might be improved and their level of comfort seeking help from the instructor outside the classroom. Faculty could use this feedback to gauge the level of rapport they have with students and how they might address any perceived roadblocks identified by students.

Another way faculty can enhance rapport is by engaging students in activities outside the classroom, such as off campus trips, where students can observe or learn about course concepts in a more applied setting. Raposa et al. (2020) revealed that experiences like these were among the most significant factors leading students to perceive that they had a close relationship with their faculty member and could approach them for guidance. When students have opportunities to relate with faculty in informal settings, it may help to diminish the power differential in faculty-student relationships. (For example, one of the co-authors of this paper regularly takes undergraduate students from an abnormal psychology course off campus to visit a local psychiatric hospital; the hospital is within walking distance of his campus, thereby allowing the faculty member to interact with students more informally. On course evaluations, the students invariably remark on how much they enjoyed the field trip and that it allowed them to get to know their professor in a more personal way. Another co-author has taken students from an abnormal psychology course off campus to a local museum exhibit on mental health, noting similar benefits around the possibilities for informal interaction.)

In addition to faculty enacting behaviors that foster rapport, it also is important for students to find ways to enhance their sense of rapport with their professors. For example, students could make an effort to introduce themselves to their professors, to share personal experiences during class discussions, and to attend professors' office hours. Given the power differential between students and faculty, faculty should consider explicitly encouraging this type of student engagement, since students may be reluctant to connect with faculty unless they are experiencing a problem in the course.

Limitations and future research

The current study included a number of methodological strengths, including a large sample ($N=966$) across two very different academic settings, which was heterogeneous in terms of race, ethnicity, gender, and socioeconomic status. However, despite these strengths, results must be interpreted in the context of the following limitations. First, the current study relied solely on student self-report to measure rapport, engagement, and learning approaches. Although

many previous studies have relied on self-report to measure these constructs as well, objective data assessment may have strengthened the significance of the current findings. For example, some studies have used observational assessment strategies to evaluate students' level of engagement in the classroom (Almusharraf, 2022). Future studies might also consider observational measures of faculty-student rapport to provide a more nuanced understanding of behaviors faculty engage in that lead to a greater sense of rapport in the classroom. Furthermore, the current study only examined faculty-student dynamics in two specific geographic regions (i.e., Mid-Atlantic and Northeastern regions of the U.S.). Therefore, the generalizability of the findings from this study to communities in other regions of the U.S. as well as to countries outside the United States should be made cautiously. Moreover, the sample used in this study was heavily skewed towards female participants (over 70% of participants were female). We attribute this lack of balance to the nature of the university from which the majority of the data were drawn, a regional state university with a history of being a teacher preparatory school (the student population at this campus is currently approximately 60% female). This imbalance limits our ability to generalize the results of this study to male students and we did note some gender difference in students' level of engagement. Future studies may examine gender as well as race/ethnicity as variables that could moderate the effects of faculty-student rapport on student engagement and learning approaches. Finally, as ours is the first study to specifically link rapport to deep and surface approaches to learning, these results should be replicated in future studies, using diverse samples within the United States and in other countries.

Conclusions

Despite these limitations, our study makes an important contribution to understanding the value and importance of the faculty-student relationship in higher education. Student-faculty rapport is one critical component of successful engagement with course material. Moreover, students who are motivated to engage in their courses learn material at a deeper level, preparing them to internalize information without the presence of external incentives. We believe this approach to learning is critical for students' ultimate success in their chosen professions, as the workplace offers far fewer external incentives for learning and mastery. To be successful in the workplace, students must utilize a "deep approach", valuing the mastery of their craft for its own reward.

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Data availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript. The study was approved by the IRB at the two universities at which data were collected and all ethical standards were adhered to in the treatment of human participants, as laid down in the 1965 Helsinki Declaration. Informed consent was obtained from all individual participants included in the study.

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