Evaluating the impact of malleable factors on percent time lecturing in gateway chemistry, mathematics, and physics courses

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**Supplementary Table 1.** Survey items.

|  |  |  |
| --- | --- | --- |
| **Factor** | **Item Text** | **Item Choices and Codinga** |
| ***Dependent variable*** | | |
| LECTURE | During a typical week, what proportion of time during regular class meetings (i.e., lecture sections) do students spend doing the following? | 1. Working individually {Dropdown: 0-100, intervals of 5} 2. Working in small groups {Dropdown: 0-100, intervals of 5} 3. Participating in whole class discussion {Dropdown: 0-100, intervals of 5} 4. Listening to the instructor lecture or solve problems {Dropdown:   0-100, intervals of 5} (**LECTURE**) |
| ***Department characteristics*** | | |
| Discipline | [Embedded data based on stratified sampling strategy] | Chemistry (**CHEM**), Mathematics (**MATH**), Physics (**PHYS**)  [MATH is reference] |
| Highest degree awarded | [Embedded data based on stratified sampling strategy] | **ASSOC**, **BACH**, **GRAD**  [ASSOC is reference] |
| ***Department appointment expectations*** | | |
| LOAD | What is your typical teaching load (i.e., how many course sections do you teach) during a single term? | {Dropdown: 1} (**0**)  {Dropdown: 2} (**1**)  {Dropdown: 3} (**2**)  {Dropdown: 4} (**3**)  {Dropdown: 5+} (**4**) |
| Tenure status | What is your tenure status at this institution? | Tenured (**TENURED**); On tenure track, but not tenured (**TENURETRACK**); Not on tenure track, but this institution has a tenure system (**NOTTENURETRACK**); No tenure system at this institution (**NOTTENURETRACK**)  [NOTTENURETRACK is reference] |
| SET | What is the role of student evaluations of teaching (SET) in evaluating teaching performance in decisions of review, promotion, or tenure? | SET is the only measure used to evaluate teaching performance (1); SET are used and given more weight as compared to other measures (2); SET are used and given equal weight as compared to other measures (3); SET are used and given less weight compared to other measures (4); SET are not used to evaluate teaching performance (5)  [Reverse coded with ‘SET are not used to evaluate teaching performance’ as reference (**0**) and increasing count of one thereafter for item choices] |
| APT | How much does the overall assessment of teaching performance matter in decision of review, promotion, or tenure for someone in your role? | It is not considered (1); Somewhat influential (2); Influential (3);  Very influential (4)  [‘It is not considered’ coded as reference (**0**) with increasing count of one thereafter for item choices] |
| ***Classroom contextual*** | | |
| SIZE | What was the approximate enrollment in a typical lecture section? | {Text entry}  [Numerical responses were binned into six size categories: 2-19, 20-29, 30-39, 40-59, 60-99, 100+ and grand-mean-centered at the 30-39 bin as reference (**0**) For responses given as ranges, the average of the range was taken.] |
| ROOM | Which of the following best describes the set-up in your classroom? | Classroom with fixed seats (**0**); Classroom that accommodates group work (**1**); Other {Text entry}  [All written responses were adjudicated as either 0 or 1] |
| DECISION | What are the primary decision makers for the following?   * Instructional methods you use | Myself (**0**); myself and others (**1**); One or more other people (**1**);  Does not apply (**0**) |
| ***Personal factors*** | | |
| RBIS | Have you ever been a student in a course taught using RBIS? | Yes (**1**), no (**0**), I don’t know (**0**) |
| SOTL | Do you conduct STEM education research and/or participate in the scholarship of teaching and learning? | Yes (**1**), no (**0**), I don’t know (**0**) |
| TFC | How many academic courses focused on learning how to teach have you taken at the undergraduate, graduate, and postdoctoral levels? | {Dropdown: 0} (**0**)  {Dropdown: 1, 2, 3, 4+} (**1**) |
| WKSP | Have you ever participated in any of the following types of teaching-related professional development?   * Half-day workshop(s) * Full-day or longer workshop(s) * Attending a teaching-focused conference | No, yes  [Coded as (**1**) if ‘yes’ to any of the three items, or (**0**) if ‘no’ to all three items] |
| NFE | Have you ever participated in any of the following types of teaching-related professional development?   * New faculty experience at my institution * New faculty workshop external to my institution | No, yes  [Coded as (**1**) if ‘yes’ to either item, or (**0**) if ‘no’ to both items] |
| ***Teacher thinking*** | | |
| GROWTH | Average of three items on a six-point Likert scale from 1 to 6 that describe fixed mindset (Dweck et al., 1995) | Strongly disagree (1); Disagree (2); Slightly disagree (3); Slightly agree (4); Agree (5); Strongly agree (6)  [Items were reverse coded, centered at the middle of the scale, and the average value was used] |
| SATISFACTION | How satisfied are you with your students’ learning in your course? | Very dissatisfied (1); Dissatisfied (2); Neither dissatisfied or satisfied (3); Satisfied (4); Very satisfied (5)  [Values were centered at the middle of the scale] |

aCurly brackets indicate item dropdown or text entry. Parentheses with non-bolded values indicate non-numerical values assigned to item choices. Parentheses with bolded values indicate item codes. Brackets indicate item coding information.

References

Dweck, C. S., Chiu, C.-y., & Hong, Y.-y. (1995). Implicit theories and their role in judgments and reactions: A word from two perspectives. *Psychological Inquiry, 6*(4), 267-285. https://doi.org/10.1207/s15327965pli0604\_1

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**Supplementary Table 2.** Descriptive statistics for level 1 variables (instructors; *n* = 2,382).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *M* | SD | Min | Max |
| Percent lecturing | 56.17 | 24.95 | 0 | 100 |
| Chemistry | 0.33 | 0.47 | 0 | 1 |
| Physics | 0.34 | 0.47 | 0 | 1 |
| Bachelor program | 0.34 | 0.47 | 0 | 1 |
| Graduate program | 0.40 | 0.49 | 0 | 1 |
| Class size | 0.44 | 1.62 | –2 | 3 |
| Classroom setup | 0.52 | 0.50 | 0 | 1 |
| Decision making | 0.13 | 0.34 | 0 | 1 |
| Teaching load | 1.88 | 1.17 | 0 | 4 |
| Tenured faculty | 0.54 | 0.50 | 0 | 1 |
| Tenure-track faculty | 0.17 | 0.37 | 0 | 1 |
| Student evaluation of teaching | 2.26 | 0.99 | 0 | 4 |
| Assessment of teaching performance | 2.03 | 0.89 | 0 | 3 |
| RBIS use as a student | 0.15 | 0.35 | 0 | 1 |
| Scholarship of teaching and learning | 0.39 | 0.49 | 0 | 1 |
| Teaching-focused coursework | 0.47 | 0.50 | 0 | 1 |
| Teaching-related workshops | 0.91 | 0.29 | 0 | 1 |
| Teaching-related new faculty experiences | 0.21 | 0.41 | 0 | 1 |
| Growth mindset | 1.23 | 1.13 | –2.5 | 2.5 |
| Satisfaction with student learning | 0.65 | 0.83 | –2 | 2 |

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Supplementary Table 3. Descriptive statistics for level 2 variables (department; *n* = 1,405).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *M* | SD | Min | Max |
| Chemistry | 0.33 | 0.47 | 0 | 1 |
| Physics | 0.32 | 0.47 | 0 | 1 |
| Bachelor program | 0.35 | 0.48 | 0 | 1 |
| Graduate program | 0.33 | 0.47 | 0 | 1 |

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Supplementary Table 4. Correlations among the variables at level 1 (instructors; *n* = 2,382).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | 1 | 2 | 3 | 4 | 5 |
| 1. Percent lecturing | 1.00 |  |  |  |  |
| 2. Class size | 0.18\*\*\* | 1.00 |  |  |  |
| 3. Classroom setup | –0.30\*\*\* | –0.49\*\*\* | 1.00 |  |  |
| 4. Decision making | –0.06\*\* | 0.12\*\*\* | –0.04 | 1.00 |  |
| 5. Teaching load | –0.07\*\*\* | –0.35\*\*\* | 0.18\*\*\* | –0.09\*\*\* | 1.00 |
| 6. Tenured faculty | 0.03 | –0.02 | 0.02 | 0.01 | –0.08\*\*\* |
| 7. Tenure-track faculty | –0.05\* | 0.00 | –0.03 | 0.00 | –0.02 |
| 8. Student evaluation of teaching | 0.04\* | 0.15\*\*\* | –0.13\*\*\* | 0.00 | –0.14\*\*\* |
| 9. Assessment of teaching performance | –0.07\*\*\* | –0.09\*\*\* | 0.10\*\*\* | –0.02 | 0.12\*\*\* |
| 10. RBIS use as a student | –0.14\*\*\* | –0.03 | 0.07\*\* | –0.03 | 0.07\*\*\* |
| 11. Scholarship of teaching and learning | –0.22\*\*\* | 0.07\*\*\* | 0.03 | 0.05\* | 0.02 |
| 12. Teaching-focused coursework | –0.15\*\*\* | –0.11\*\*\* | 0.08\*\*\* | 0.00 | 0.16\*\*\* |
| 13. Teaching-related workshops | –0.19\*\*\* | –0.09\*\*\* | 0.09\*\*\* | 0.00 | 0.10\*\*\* |
| 14. Teaching-related new faculty experiences | –0.16\*\*\* | –0.06\*\* | 0.05\* | 0.02 | –0.02 |
| 15. Growth mindset | –0.21\*\*\* | 0.01 | 0.08\*\*\* | 0.00 | 0.00\*\*\* |
| 16. Satisfaction with student learning | –0.14\*\*\* | –0.14\*\*\* | 0.12\*\*\* | –0.02 | 0.00\*\*\* |

*Note*. \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

**Supplementary Table 4 (cont.).**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | 6 | 7 | 8 | 9 | 10 |
| 1. Percent lecturing |  |  |  |  |  |
| 2. Class size |  |  |  |  |  |
| 3. Classroom setup |  |  |  |  |  |
| 4. Decision making |  |  |  |  |  |
| 5. Teaching load |  |  |  |  |  |
| 6. Tenured faculty | 1.00 |  |  |  |  |
| 7. Tenure-track faculty | –0.49\*\*\* | 1.00 |  |  |  |
| 8. Student evaluation of teaching | 0.00 | 0.03 | 1.00 |  |  |
| 9. Assessment of teaching performance | 0.08\*\*\* | 0.08\*\*\* | 0.06\*\* | 1.00 |  |
| 10. RBIS use as a student | –0.13\*\*\* | 0.11\*\*\* | –0.02 | 0.04 | 1.00 |
| 11. Scholarship of teaching and learning | 0.02\*\*\* | 0.04 | 0.00 | 0.09\*\*\* | 0.10\*\*\* |
| 12. Teaching-focused coursework | –0.20 | 0.10 | –0.07\*\*\* | 0.02 | 0.21\*\*\* |
| 13. Teaching-related workshops | 0.03 | –0.01 | –0.06\*\* | 0.09\*\*\* | 0.08\*\*\* |
| 14. Teaching-related new faculty experiences | 0.06\*\*\* | 0.10\*\*\* | –0.01 | 0.11\*\*\* | 0.02 |
| 15. Growth mindset | –0.08\*\*\* | 0.09\*\*\* | –0.02 | 0.06\*\* | 0.12\*\*\* |
| 16. Satisfaction with student learning | –0.03 | –0.03 | –0.03 | 0.06\*\* | 0.04\* |

*Note*. \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

**Supplementary Table 4 (cont.).**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | 11 | 12 | 14 | 15 | 16 |
| 1. Percent lecturing |  |  |  |  |  |
| 2. Class size |  |  |  |  |  |
| 3. Classroom setup |  |  |  |  |  |
| 4. Decision making |  |  |  |  |  |
| 5. Teaching load |  |  |  |  |  |
| 6. Tenured faculty |  |  |  |  |  |
| 7. Tenure-track faculty |  |  |  |  |  |
| 8. Student evaluation of teaching |  |  |  |  |  |
| 9. Assessment of teaching performance |  |  |  |  |  |
| 10. RBIS use as a student |  |  |  |  |  |
| 11. Scholarship of teaching and learning | 1.00 |  |  |  |  |
| 12. Teaching-focused coursework | 0.08\*\*\* | 1.00 |  |  |  |
| 13. Teaching-related workshops | 0.15\*\*\* | 0.16\*\*\* | 1.00 |  |  |
| 14. Teaching-related new faculty experiences | 0.11\*\*\* | 0.07\*\*\* | 0.13\*\*\* | 1.00 |  |
| 15. Growth mindset | 0.12\*\*\* | 0.06\*\* | 0.08\*\*\* | 0.06\*\*\* | 1.00 |
| 16. Satisfaction with student learning | –0.02 | 0.04 | 0.04 | 0.02 | 0.06\*\* |

*Note*. \* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001.

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Supplementary Table 5. Correlations among the variables at level 2 (department; *n* = 1,405).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | 1 | 2 | 3 | 4 |
| 1. Chemistry | 1.00 |  |  |  |
| 2. Physics | –0.49\*\*\* | 1.00 |  |  |
| 3. Bachelor program | –0.03 | 0.08\*\* | 1.00 |  |
| 4. Graduate program | –0.01 | –0.02 | –0.51\*\*\* | 1.00 |

*Note*. \**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

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Supplementary Table 6. Variance inflation factors (VIF) on the standardized model.

|  |  |
| --- | --- |
| Variable | VIF |
| Chemistry | 1.63 |
| Physics | 1.51 |
| Bachelor program | 1.81 |
| Graduate program | 2.42 |
| Class size | 2.72 |
| Classroom setup | 1.34 |
| Decision making | 1.02 |
| Teaching load | 1.28 |
| Tenured faculty | 1.50 |
| Tenure-track faculty | 1.45 |
| Student evaluation of teaching | 1.06 |
| Assessment of teaching performance | 1.14 |
| RBIS use as a student | 1.08 |
| Scholarship of teaching and learning | 1.09 |
| Teaching-focused coursework | 1.17 |
| Teaching-related workshops | 1.08 |
| Teaching-related new faculty experiences | 1.09 |
| Growth mindset | 1.05 |
| Satisfaction with student learning | 1.03 |