Supplementary Document 1: Student Metacognition, Affect and Study Habits (SMASH) survey

Note: You will be awarded points for completion of these questions. However, the answers you provide will NOT impact your grade in this course.

1. After taking this assessment, what score (out of a possible 100) do you anticipate earning?

2. After taking this assessment, I am confident that my score prediction (Q1) is accurate.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

3. The concepts on this assessment were difficult for me.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

4. The concepts in this course have been difficult for me.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

5. I use different study strategies for concepts that I find to be more difficult.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

6. The strategy/strategies I used to prepare for this assessment worked well, and I will use it/them again next time.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

7. I used the provided learning objectives (and study guide/preparation questions) to focus my studying for this assessment.
 1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

8. I thoroughly completed all pre-class assignments prior to the class session on that topic.

1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

 9. I asked questions and sought answers with this material as we were addressing it.

1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

 10. I practiced the material regularly during the instruction of this unit.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

11. I started studying _____ days before the assessment.
a less than 24 hours before the assessment
b 1-2 days before the assessment
c 2-3 days before the assessment
d 3-4 days before the assessment
e more than 4 days before the assessment

12. I frequently assess my own knowledge of the material.

1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

13. I sought help outside of class time (e.g. student-led science help sessions, faculty-led help sessions, office hours, etc.) on the material for this assessment
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

14. I sought help outside of class ___ times regarding material for this assessment. (Fill in a number)

15. Talking to my instructor about course material outside of class was important when preparing for this assessment
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

16. I studied for this assessment by myself.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

17. I studied for this assessment with classmates with peers.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

18. Talking to my classmates about course material outside of class was important when preparing for this assessment.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

19. I am motivated to learn this material.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree

5- strongly disagree

20. I am confident in my ability to learn this material.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

21. I created a distraction-free environment for my studying.
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

Open Responses

22. Please list the strategies you used to prepare for this assessment (e.g. taking additional notes; reviewing notes; practice problems; discussion with faculty; discussion with peers; drawing; listening to lectures; watching animations; reading the text; other online resources; flashcards, etc.).

23. What was the most helpful strategy you used to learn the material for this assessment?

24. What was the most helpful classroom activity/strategy for learning the material on this assessment?

25. In comparison to my preparation for the last assessment, I changed my study habits in hopes of improving my performance
1- strongly agree
2- somewhat agree
3- neither agree nor disagree
4- somewhat disagree
5- strongly disagree

Supplementary Document 2: Post Assessment Writing, Reflection and Planning (WRaP)

Items. The exam wrapper was assigned following the release of exam scores.

1. Were you surprised by your earned score? Yes/No

2. Explain your response to the question "Were you surprised by your earned score?"

3. Did you earn the score that you hoped to on this assessment?

4. Explain your response to the question "Did you earn the score that you hoped to on this assessment?"

5. I plan to adjust my study habits in preparation for the next exam
   - 1- strongly agree
   - 2- somewhat agree
   - 3- neither agree nor disagree
   - 4- somewhat disagree
   - 5- strongly disagree

6. If you indicated you plan to modify your study habits, do you feel that you have the ability to modify your study habits?
   - 1- strongly agree
   - 2- somewhat agree
   - 3- neither agree nor disagree
   - 4- somewhat disagree
   - 5- strongly disagree

7. Review the items that you answered incorrectly. Do you notice any patterns in your missed points? Explain.

8. Make corrections to all the missed items. Provide the correct answer, and *explain why this answer is correct.*

Supplementary Document 3: Methods and Results

The possibility of random response

  While we did not conduct statistical measures to determine if our data showed evidence of random response, there are two lines of reasoning that argue against a preponderance of random response in our dataset. First, examination of individual student responses demonstrate logical associations in the magnitude of agreement between items that would not occur if respondent was selecting responses at random. For example, when a respondent reports a high level of agreement to the inventory item asking about the importance of talking to the instructor outside of class, one could expect a high level of agreement to the item asking if the respondent sought help outside of class time (although this may not be true in all circumstances). The Spearman's rho pairwise nonparametric correlations and factor structure from PAF conducted on student responses are well-aligned with the investigators' a priori hypotheses about how these items are logically related further lending support to the "true" nature of the provided student responses.

SMASH Supplemental Methods: Factor Analysis and Regression Details

Factor analysis and regression were performed to assess the structure and predictive power of SMASH. Factor analysis allowed us to examine how SMASH items were associated, and how well SMASH fit with existing theories of metacognition. Regression analysis allowed us to predict final exam scores and thus assess diagnostic utility. Since both factor analysis and regression analysis involve testing assumptions and several subjective decisions, this supplement provides additional technical details of those analyses for the interested reader.

Factor Analysis

Exploratory factor analysis involves a fair amount of assumptions and decisions and requires awareness of the methodological literature, which does not always correspond with defaults in software packages or common practice (Preacher & MacCallum, 2003). Below, we evaluate SMASH data for these assumptions and describe why we decided to use a linear factor analysis, extracted 4 factors via principal axis, and rotated using varimax rotation.

Testing assumptions

Factor analysis assumes that each observed variable is a linear combination of latent unobserved factors. Unlike ANOVA, however, there is no requirement of homogeneity of variances—each observed variable is allowed to have a unique variance component which differ from the unique variance component of other observed variables (Rencher & Christensen, 2012, p. 437). Several other assumptions do apply, however: large sample size, continuous data, linearity, no outliers, no extreme multicollinearity, a low percentage of missing data, and factorability of the correlation matrix (Beavers et al., 2013).

Sample size

A variety of guidelines for factor analysis sample size have been found, but ultimately the adequacy of the sample size is dependent on the strength of the factors (see Beavers et al., 2013 for a review). When factors have 4 or more items that load at 0.7 or higher, even samples of size 100 can be considered adequate. In our final factor analysis (see Figure 2 and Table 2), our sample size was 174, with Systematic Study Habits consisting of 7 factors ranging in absolute strength from 0.42 to 0.67; Perceived Social Learning consisting of 3 factors ranging from 0.57 to 0.90; Perceived Difficulty consisting of 3 factors ranging from 0.57 to 0.86; and Help Seeking consisting of 2 factors with strengths 0.80 and 0.81. Although the low number of strong items loading onto Help Seeking is a concern, overall we found that these factors have strongly-loading items relative to a sample size of 174.

Continuous data and linearity

All items (except for Question 14, "I sought help out outside of class _____ times regarding the material for this assessment") were five-point Likert-type items. Linear factor analysis of ordinal variables such as these, therefore, violates the assumptions of continuous data and linear relationships. A psychometrically preferred approach would be to calculate polychoric correlations, which assume that the observed Likert responses were generated from an unobserved multivariate normal distributions, and to use those as the basis of the factor analysis (Flora, LaBrish, & Chalmers, 2012). However, we decided against bringing in this additional statistical machinery and its accompanying assumptions for this initial exploratory analysis of the SMASH instrument. Although technically inferior, a linear factor analysis of Pearson correlations for Likert-type items is conventional and often gives relatively similar results (Flora et al., 2012); we also wanted to avoid the interpretation difficulties of polychoric correlations for presenting to college science teachers. In further research with SMASH we will

explore polychoric correlations when more rigorously investigating SMASH's psychometric properties.

Outliers

Only one item displayed any evidence of outliers: item 14, the non-Likert-type help seeking item (Figure SM1). Two participants said they sought help 8 times, and one said 24 times. These three values were excluded (treated as a missing value); however the results with and without these extreme values were quite similar.
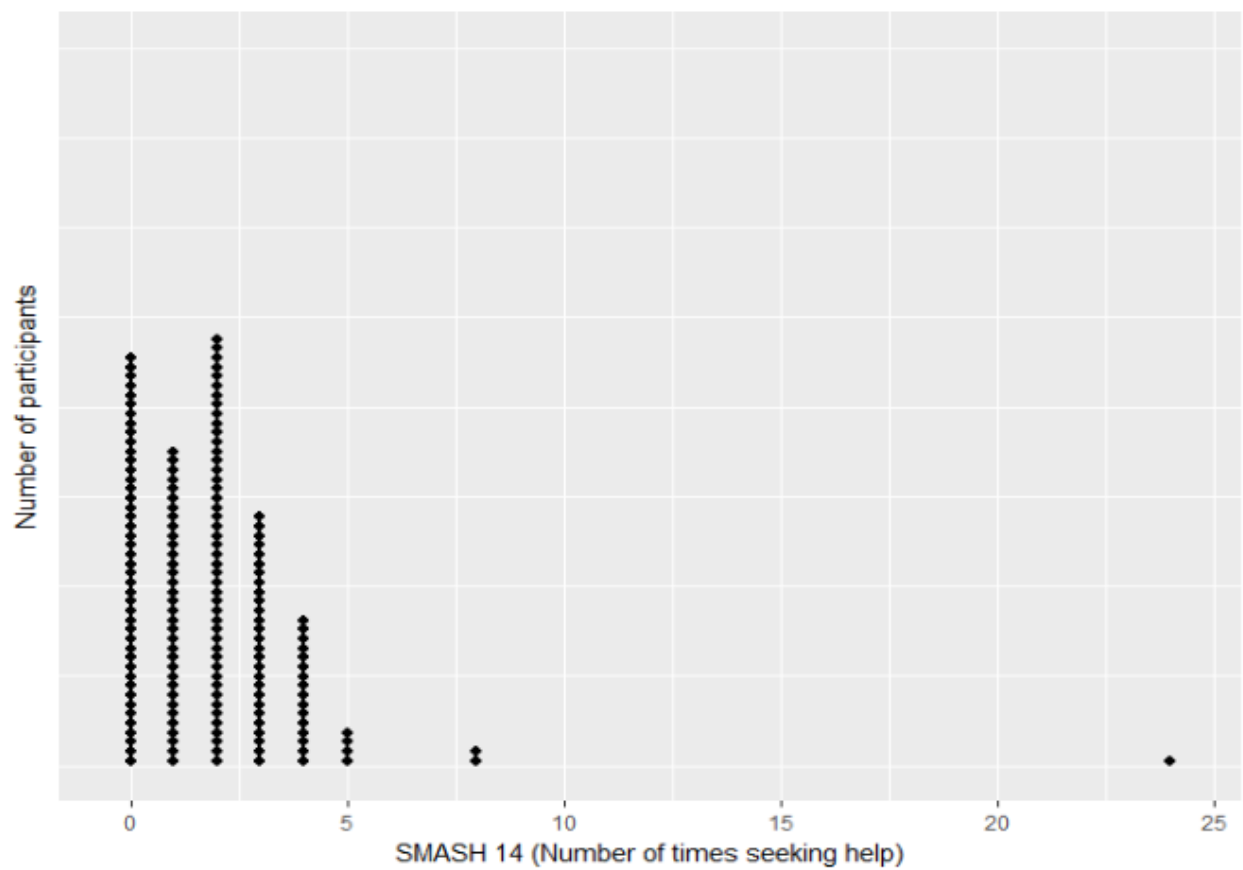

Figure SM1. Responses to SMASH 14, an item that displayed evidence of outliers.

Missing data. The percentage of missing data was quite small: 0.2% of cells and 5 participants. Therefore, we were not concerned about missing data biasing the results of either the factor analysis or the regressions.

Factorability of the correlation matrix. Factor analysis is an analysis of the correlation matrix, and two tests are typically recommended (e.g., Beavers et al., 2013): evaluating the Kaiser, Meyer, Olkin (KMO) measure of factoring adequacy, and computing Bartlett's test.

The KMO measure evaluates the shared variance of the items to evaluate whether factor extraction is sensible. The KMO or the SMASH data was 0.71, which is in the "middling" range (0.70 to 0.79), where 0.00 to 0.49 is considered too low for factor analysis (Kaiser, 1974). Though higher KMO measures are considered "meritorious" (0.80 to 0.89) or "marvelous" (0.90 to 1.00), the KMO for our data indicated acceptable levels of shared variance for factor analysis. Similarly, Bartlett's Test for Sphericity tests whether there are sufficient correlations among the items to justify factor analysis. The test was highly significant for SMASH, $\chi^2(153) = 892$, $p < 0.001$, indicating enough correlations between the items for factor analysis.

Factor analysis decisions

Factor analysis involves at least three major decisions: type of extraction, number of factors, and method of rotation. Although the common default process in many factor analysis software is to use principal components extraction, determine the number of factors by the Kaiser criterion, and use varimax rotation, this approach often misses the mark (Preacher & MacCallum, 2003). We describe our approach to these crucial decisions below.

Type of extraction. Since our focus was on explaining shared variance between items, and not pure prediction, we opted for a true factor analysis extraction method that focused on the common variance. Principal components attempts to explain all the variance of the factors and is more well-suited to prediction than for our more explanatory purpose (Preacher & MacCallum, 2003). Also, our data were not plausibly normal since nearly all were Likert-type items. Therefore maximum likelihood estimation is not preferred, since it assumes multivariate

normality, and we instead opted for principal axis extraction (Beavers et al., 2013).

Number of factors. The traditional Kaiser criterion for determining the number of factors based on whether eigenvalues are greater than one has been shown to perform quite poorly in simulations (Preacher & MacCallum, 2003). Instead, Cattel's scree test, which analyzes the decreases in variance for different numbers of factors, and parallel analysis, which compares the number of factors with randomly simulated factors as a measure of the improvement over randomness, are currently recommended.

Parallel Analysis Scree Plots

Figure SM2. Parallel analysis scree plot of the SMASH data.
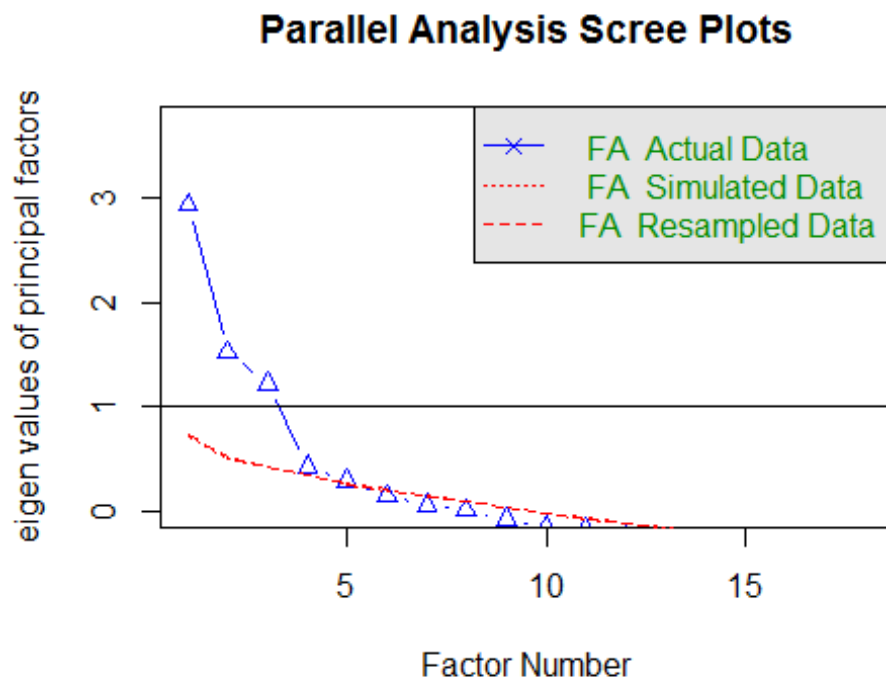
Figure SM2 shows the parallel analysis scree plot of the SMASH data using principal axis extraction. This shows the eigenvalues (variance explained) by each of the unrotated factors. Cattel's scree test is to look for the point at which the graph starts to level off—i.e., where is there no longer a substantial drop in variance between factors. When factors are no longer

explaining much more, they may be simply capturing random variation and not have explanatory power. In Figure SM2, it seems clear that there is a substantial drop at factor 4, followed by a gradual decline in subsequent factors.

Figure SM2 also shows parallel analysis via the dotted and dashed lines, that show the amount of variance that this number of factors would explain of random data. In order to be meaningful, the factors should be able to explain more of the variance of the real data than of the random data, so the number of factors is however many factors are explaining more than randomness. Parallel analysis suggests 5 factors, since the fifth factor is slightly above the randomness curve. However, we noted that the fifth factor was only barely above the randomness line, and chose to extract four factors given the fact that the parallel analysis scree plot was still quite consistent with the idea of four factors and the supposed fifth factor barely explained any more variance on real compared to random data.

Rotation. Although varimax rotation is commonly used in factor analysis, this approach has been criticized due to the assumption of *orthogonality*, that the factors are in fact uncorrelated. *Oblique* rotations, which allow the factors to correlate, are often recommended instead (e.g., Preacher & MacCallum, 2003). We tried an oblique rotation, promax, but found that the correlations between factors was so small that we decided to present the simpler and more familiar varimax rotation for reasons of parsimony.

Regression analysis

We produced some of the diagnostic plots recommended by Fox (2008) to test the robustness of our linear regression.

Our first attempt at fitting the model revealed two problematic cases. Linear regression is very

sensitive to extreme values so these are of concern in interpreting results. These two cases are

revealed in the Normal Q-Q plot (Figure SM3), which shows the degree to which residual error

follows a normal distribution, which is one of the assumptions of linear regression inferential

procedures. Two cases with quite large residuals appear to deviate from normality dramatically.

These same two cases are also problematic when viewed from an influence perspective (Figure

SM4). This plot shows the size of the residual versus its leverage. Observations towards the

lower left exert large influence as measured by Cook's distance. Although the two points do not

have much leverage, they have high enough residuals that they are approaching the danger zone

of high influence. An examination of the distribution of course grade reveals the problem: two

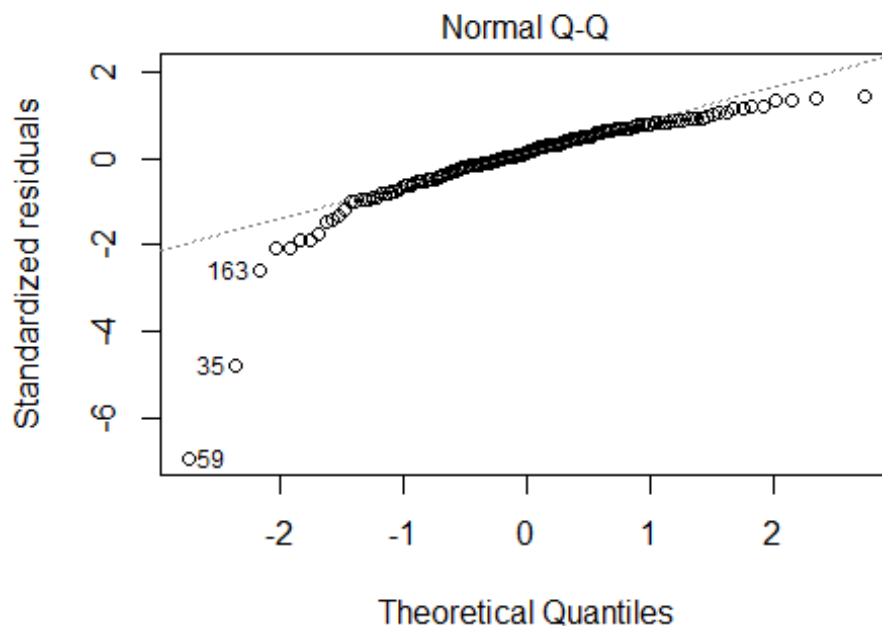students who have extremely low course grades (Figure SM5).

Figure SM3. Normal quantile-quantile plot of residuals from original regression including all
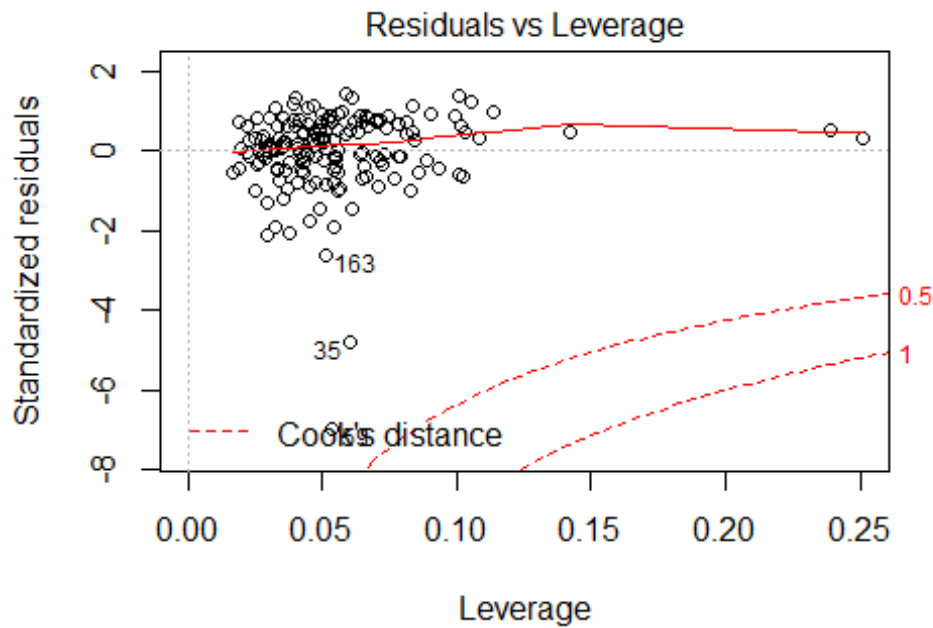
complete cases.

Figure SM4. Residuals vs. leverage plot of original regression including all complete cases.
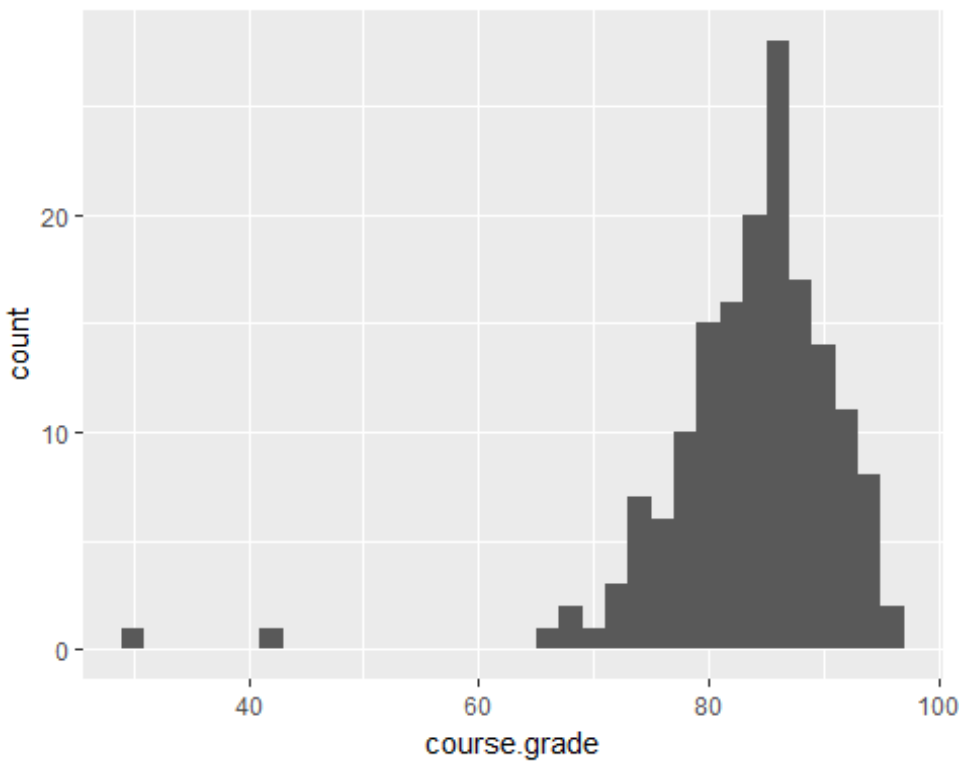

Figure SM5. Distribution of course grade of original data set.

The regression was rerun excluding these two cases, and the diagnostic plots were then generated and evaluated. Figure SM6 displays the residuals vs fitted values. This plot ideally should show equal dispersion of residuals across the entire range of values, consistent with the linear regression assumptions of linearity and homoscedasticity. There appears to be somewhat more dispersion among higher values than lower values, but overall the assumption of homoscedasticity does not seem to be seriously violated.
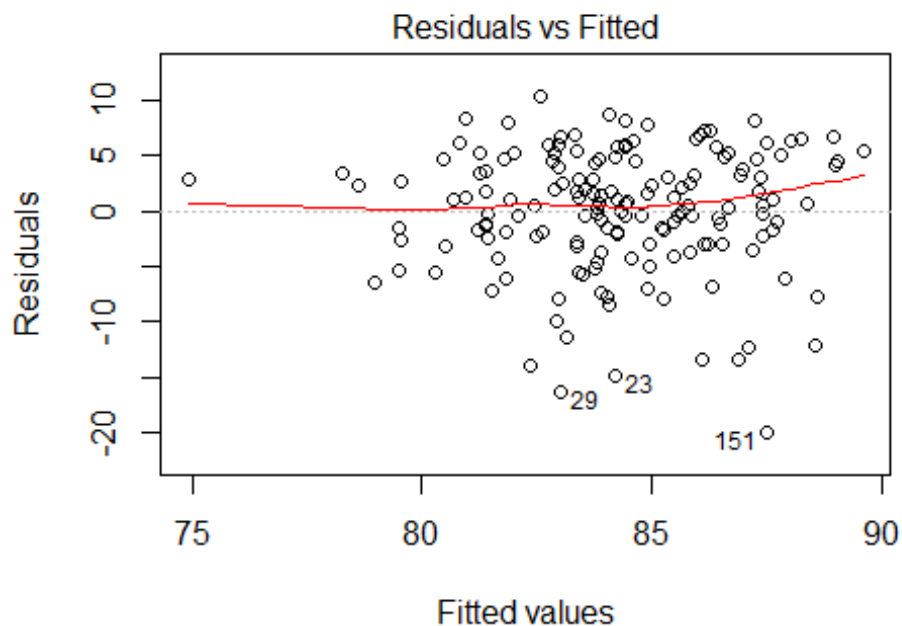
Figure SM6. Residuals versus fitted values of regression excluding two outliers.

Figure SM7 shows the Normal Q-Q plot for the final regression. Ideally, the points should all lie on the dotted line as consistent with the normality of residuals, assumed by linear regression inference. However, the picture does not appear to full show this. In fact, there appears to be a negative skew at play. However, the central observations are close to the line, and the standard errors of slopes should not be seriously biased with a sample size of 174 due to the central limit theorem.
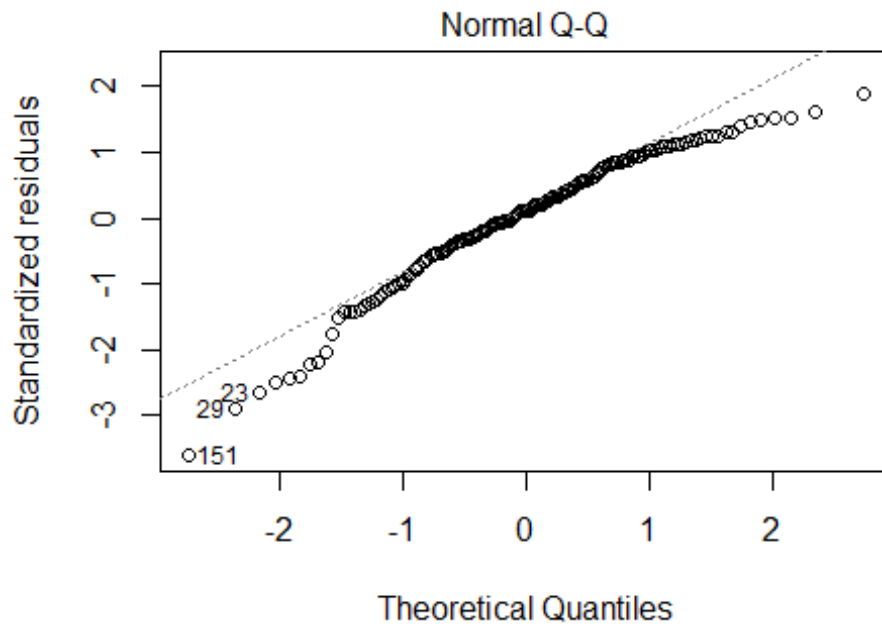
Figure SM7. Normal Q-Q plot of regression excluding two outliers.

Finally, Figure SM8 shows the residuals vs. leverage plot. We see that there are fewer points that appear to have a combination of large residuals and leverage that can unduly influence the placement of the regression line.

Residuals vs Leverage
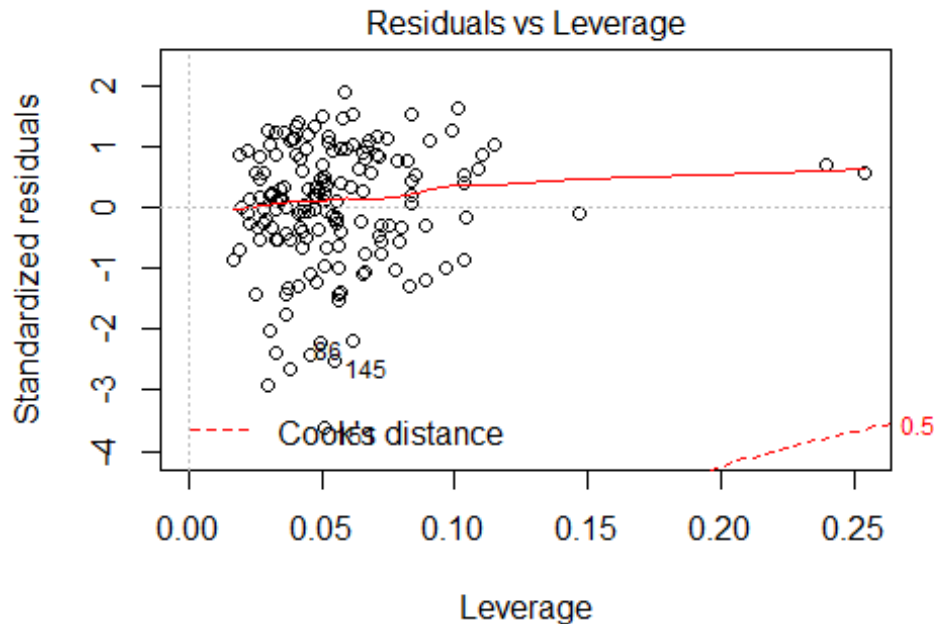
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Supplementary Table 1
Spearman's rho pairwise correlations for all quantitative SMASH items
Pairs are ordered from highly significant correlations to non-significant correlations.
Color corresponds to factor resulting from PAF (Blue: Study Habits; Orange: Social Learning; Red: Perceived Difficulty; Purple: Help Seeking).

Variable	by Variable	Spearman's rho	p
SMASH 14 - sought help	SMASH 13 - sought help agree	0.7031	0.0000
SMASH 18 - talking to classmates important	SMASH 17 - studied with classmates	0.6974	0.0000
SMASH 4 - difficult course	SMASH 3 - difficult assessment	0.6465	0.0000
SMASH 17 - studied with classmates	SMASH 16 - studied by myself	-0.4993	0.0000
SMASH 20 - confident in ability to learn	SMASH 4 - difficult course	-0.4786	0.0000
SMASH 12 - assess own knowledge	SMASH 10 - practiced material	0.4280	0.0000
SMASH 12 - assess own knowledge	SMASH 6 - study strategies worked well	0.3940	0.0000
SMASH 11- started studying	SMASH 10 - practiced material	-0.3914	0.0000
SMASH 18 - talking to classmates important	SMASH 16 - studied by myself	-0.3922	0.0000
SMASH 12 - assess own knowledge	SMASH 9 - asked questions	0.3538	0.0000
SMASH 10 - practiced material	SMASH 9 - asked questions	0.3528	0.0000
SMASH 20 - confident in ability to learn	SMASH 19 - motivated to learn material	0.3511	0.0000
SMASH 20 - confident in ability to learn	SMASH 3 - difficult assessment	-0.3483	0.0000
SMASH 6 - study strategies worked well	SMASH 3 - difficult assessment	-0.3215	0.0000
SMASH 9 - asked questions	SMASH 6 - study strategies worked well	0.3162	0.0000
SMASH 13 - sought help agree	SMASH 9 - asked questions	0.3084	0.0000
SMASH 7 - used learning objectives	SMASH 6 - study strategies worked well	0.2930	0.0001

SMASH 21 - distraction free	SMASH 16 - studied by myself	0.2879	0.0001
SMASH 11- started studying	SMASH 5 - study strategies for difficult concepts	-0.2845	0.0001
SMASH 6 - study strategies worked well	SMASH 4 - difficult course	-0.2753	0.0002
SMASH 6 - study strategies worked well	SMASH 2 - confident anticipated score	0.2749	0.0002
SMASH 10 - practiced material	SMASH 6 - study strategies worked well	0.2739	0.0002
SMASH 15 - talking to instructor	SMASH 14 - sought help	0.3660	0.0004
SMASH 19 - motivated to learn material	SMASH 5 - study strategies for difficult concepts	0.2612	0.0005
SMASH 20 - confident in ability to learn	SMASH 12 - assess own knowledge	0.2608	0.0005
SMASH 10 - practiced material	SMASH 5 - study strategies for difficult concepts	0.2596	0.0005
SMASH 21 - distraction free	SMASH 6 - study strategies worked well	0.2591	0.0005
SMASH 21 - distraction free	SMASH 10 - practiced material	0.2587	0.0005
SMASH 12 - assess own knowledge	SMASH 3 - difficult assessment	-0.2550	0.0006
SMASH 8 - completed prep	SMASH 7 - used learning objectives	0.2541	0.0007
SMASH 12 - assess own knowledge	SMASH 11- started studying	-0.2531	0.0007
SMASH 13 - sought help agree	SMASH 11- started studying	-0.2484	0.0009
SMASH 20 - confident in ability to learn	SMASH 2 - confident anticipated score	0.2471	0.0009
SMASH 19 - motivated to learn material	SMASH 10 - practiced material	0.2432	0.0011
SMASH 11- started studying	SMASH 6 - study strategies worked well	-0.2421	0.0012
SMASH 17 - studied with classmates	SMASH 6 - study strategies worked well	0.2421	0.0012
SMASH 10 - practiced material	SMASH 8 - completed prep	0.2394	0.0014

SMASH 18 - talking to classmates important	SMASH 14 - sought help	0.2397	0.0014
SMASH 12 - assess own knowledge	SMASH 5 - study strategies for difficult concepts	0.2297	0.0022
SMASH 16 - studied by myself	SMASH 14 - sought help	-0.2288	0.0023
SMASH 17 - studied with classmates	SMASH 14 - sought help	0.2253	0.0027
SMASH 14 - sought help	SMASH 11- started studying	-0.2243	0.0028
SMASH 14 - sought help	SMASH 9 - asked questions	0.2234	0.0029
SMASH 19 - motivated to learn material	SMASH 12 - assess own knowledge	0.2232	0.0029
SMASH 7 - used learning objectives	SMASH 5 - study strategies for difficult concepts	0.2217	0.0031
SMASH 18 - talking to classmates important	SMASH 7 - used learning objectives	0.2191	0.0036
SMASH 11- started studying	SMASH 8 - completed prep	-0.2115	0.0048
SMASH 13 - sought help agree	SMASH 6 - study strategies worked well	0.2080	0.0056
SMASH 20 - confident in ability to learn	SMASH 6 - study strategies worked well	0.2073	0.0058
SMASH 6 - study strategies worked well	SMASH 5 - study strategies for difficult concepts	0.2069	0.0059
SMASH 12 - assess own knowledge	SMASH 4 - difficult course	-0.2060	0.0061
SMASH 8 - completed prep	SMASH 6 - study strategies worked well	0.2038	0.0067
SMASH 3 - difficult assessment	SMASH 2 - confident anticipated score	-0.2010	0.0075
SMASH 18 - talking to classmates important	SMASH 6 - study strategies worked well	0.1998	0.0080
SMASH 19 - motivated to learn material	SMASH 11: started studying	-0.1978	0.0085
SMASH 21 - distraction free	SMASH 18 - talking to classmates important	-0.1958	0.0094
SMASH 17 - studied with classmates	SMASH 7 - used learning objectives	0.1952	0.0096

SMASH 21 - distraction free	SMASH 11: started studying	-0.1946	0.0096
SMASH 21 - distraction free	SMASH 17 - studied with classmates	-0.1938	0.0102
SMASH 13 - sought help agree	SMASH 7 - used learning objectives	0.1893	0.0118
SMASH 17 - studied with classmates	SMASH 13 - sought help agree	0.1879	0.0128
SMASH 21 - distraction free	SMASH 9 - asked questions	0.1866	0.0131
SMASH 18 - talking to classmates important	SMASH 13 - sought help agree	0.1831	0.0153
SMASH 11- started studying	SMASH 9 - asked questions	-0.1782	0.0179
SMASH 9 - asked questions	SMASH 4 - difficult course	-0.1761	0.0194
SMASH 14 - sought help	SMASH 7 - used learning objectives	0.1747	0.0204
SMASH 9 - asked questions	SMASH 7 - used learning objectives	0.1715	0.0229
SMASH 7 - used learning objectives	SMASH 2 - confident anticipated score	0.1701	0.0240
SMASH 19 - motivated to learn material	SMASH 9 - asked questions	0.1681	0.0257
SMASH 21 - distraction free	SMASH 12 - assess own knowledge	0.1639	0.0297
SMASH 18 - talking to classmates important	SMASH 8 - completed prep	0.1639	0.0302
SMASH 18 - talking to classmates important	SMASH 15 - talking to instructor	0.2200	0.0361
SMASH 19 - motivated to learn material	SMASH 13 - sought help agree	0.1581	0.0362
SMASH 15 - talking to instructor	SMASH 13 - sought help agree	0.2147	0.0410
SMASH 21 - distraction free	SMASH 15 - talking to instructor	0.2113	0.0443
SMASH 9 - asked questions	SMASH 8 - completed prep	0.1503	0.0465
SMASH 8 - completed prep	SMASH 2 - confident anticipated score	0.1496	0.0476
SMASH 21 - distraction free	SMASH 19 - motivated to learn material	0.1491	0.0482
SMASH 9 - asked questions	SMASH 5 - study strategies for difficult concepts	0.1481	0.0498

SMASH 21 - distraction free	SMASH 5 - study strategies for difficult concepts	0.1479	0.0501
SMASH 10 - practiced material	SMASH 4 - difficult course	-0.1474	0.0509
SMASH 15 - talking to instructor	SMASH 5 - study strategies for difficult concepts	0.2030	0.0536
SMASH 10 - practiced material	SMASH 3 - difficult assessment	-0.1419	0.0603
SMASH 17 - studied with classmates	SMASH 9 - asked questions	0.1419	0.0611
SMASH 19 - motivated to learn material	SMASH 2 - confident anticipated score	0.1414	0.0613
SMASH 21 - distraction free	SMASH 13 - sought help agree	0.1391	0.0657
SMASH 10 - practiced material	SMASH 7 - used learning objectives	0.1377	0.0684
SMASH 20 - confident in ability to learn	SMASH 10 - practiced material	0.1364	0.0711
SMASH 19 - motivated to learn material	SMASH 8 - completed prep	0.1292	0.0876
SMASH 13 - sought help agree	SMASH 8 - completed prep	0.1290	0.0880
SMASH 19 - motivated to learn material	SMASH 14 - sought help	0.1283	0.0897
SMASH 20 - confident in ability to learn	SMASH 9 - asked questions	0.1272	0.0926
SMASH 17 - studied with classmates	SMASH 2 - confident anticipated score	0.1263	0.0957
SMASH 16 - studied by myself	SMASH 13 - sought help agree	-0.1260	0.0965
SMASH 19 - motivated to learn material	SMASH 4 - difficult course	-0.1242	0.1006
SMASH 14 - sought help	SMASH 6 - study strategies worked well	0.1232	0.1034
SMASH 13 - sought help agree	SMASH 2 - confident anticipated score	0.1231	0.1036
SMASH 4 - difficult course	SMASH 2 - confident anticipated score	-0.1206	0.1108
SMASH 5 - study strategies for difficult concepts	SMASH 4 - difficult course	-0.1198	0.1132

SMASH 16 - studied by myself	SMASH 2 - confident anticipated score	-0.1192	0.1163
SMASH 16 - studied by myself	SMASH 7 - used learning objectives	-0.1189	0.1172
SMASH 14 - sought help	SMASH 2 - confident anticipated score	0.1169	0.1222
SMASH 5 - study strategies for difficult concepts	SMASH 2 - confident anticipated score	0.1138	0.1328
SMASH 15 - talking to instructor	SMASH 10 - practiced material	0.1584	0.1337
SMASH 21 - distraction free	SMASH 20 - confident in ability to learn	0.1134	0.1341
SMASH 20 - confident in ability to learn	SMASH 5 - study strategies for difficult concepts	0.1121	0.1384
SMASH 18 - talking to classmates important	SMASH 9 - asked questions	0.1113	0.1426
SMASH 13 - sought help agree	SMASH 5 - study strategies for difficult concepts	0.1049	0.1659
SMASH 12 - assess own knowledge	SMASH 8 - completed prep	0.1045	0.1673
SMASH 8 - completed prep	SMASH 5 - study strategies for difficult concepts	0.1028	0.1746
SMASH 7 - used learning objectives	SMASH 4 - difficult course	-0.1025	0.1760
SMASH 21 - distraction free	SMASH 7 - used learning objectives	0.1010	0.1822
SMASH 18 - talking to classmates important	SMASH 4 - difficult course	-0.1009	0.1838
SMASH 19 - motivated to learn material	SMASH 7 - used learning objectives	0.0924	0.2225
SMASH 17 - studied with classmates	SMASH 4 - difficult course	-0.0924	0.2240
SMASH 11- started studying	SMASH 2 - confident anticipated score	-0.0916	0.2267
SMASH 17 - studied with classmates	SMASH 8 - completed prep	0.0901	0.2355
SMASH 20 - confident in ability to learn	SMASH 7 - used learning objectives	0.0885	0.2427
SMASH 16 - studied by myself	SMASH 4 - difficult course	0.0887	0.2432

SMASH 20 - confident in ability to learn	SMASH 13 - sought help agree	-0.0884	0.2432
SMASH 21 - distraction free	SMASH 8 - completed prep	0.0860	0.2567
SMASH 11- started studying	SMASH 7 - used learning objectives	-0.0855	0.2591
SMASH 13 - sought help agree	SMASH 10 - practiced material	0.0841	0.2670
SMASH 12 - assess own knowledge	SMASH 7 - used learning objectives	0.0831	0.2730
SMASH 9 - asked questions	SMASH 2 - confident anticipated score	0.0815	0.2821
SMASH 16 - studied by myself	SMASH 6 - study strategies worked well	-0.0795	0.2958
SMASH 18 - talking to classmates important	SMASH 2 - confident anticipated score	0.0778	0.3061
SMASH 14 - sought help	SMASH 3 - difficult assessment	0.0773	0.3080
SMASH 15 - talking to instructor	SMASH 11- started studying	-0.1063	0.3159
SMASH 15 - talking to instructor	SMASH 2 - confident anticipated score	-0.1052	0.3211
SMASH 20 - confident in ability to learn	SMASH 16 - studied by myself	-0.0712	0.3489
SMASH 16 - studied by myself	SMASH 12 - assess own knowledge	0.0706	0.3535
SMASH 8 - completed prep	SMASH 4 - difficult course	-0.0701	0.3550
SMASH 17 - studied with classmates	SMASH 15 - talking to instructor	0.0971	0.3596
SMASH 13 - sought help agree	SMASH 12 - assess own knowledge	0.0684	0.3672
SMASH 14 - sought help	SMASH 4 - difficult course	0.0675	0.3731
SMASH 19 - motivated to learn material	SMASH 15 - talking to instructor	0.0904	0.3940
SMASH 15 - talking to instructor	SMASH 8 - completed prep	0.0874	0.4098
SMASH 16 - studied by myself	SMASH 5 - study strategies for difficult concepts	0.0576	0.4493
SMASH 21 - distraction free	SMASH 2 - confident anticipated score	-0.0569	0.4533
SMASH 18 - talking to classmates	SMASH 10 - practiced material	0.0570	0.4539

important			
SMASH 16 - studied by myself	SMASH 15 - talking to instructor	-0.0767	0.4700
SMASH 14 - sought help	SMASH 8 - completed prep	0.0544	0.4736
SMASH 15 - talking to instructor	SMASH 6 - study strategies worked well	0.0738	0.4868
SMASH 13 - sought help agree	SMASH 4 - difficult course	0.0498	0.5118
SMASH 19 - motivated to learn material	SMASH 6 - study strategies worked well	0.0487	0.5211
SMASH 17 - studied with classmates	SMASH 3 - difficult assessment	-0.0483	0.5258
SMASH 16 - studied by myself	SMASH 10 - practiced material	0.0467	0.5392
SMASH 18 - talking to classmates important	SMASH 12 - assess own knowledge	0.0467	0.5394
SMASH 17 - studied with classmates	SMASH 12 - assess own knowledge	0.0435	0.5674
SMASH 9 - asked questions	SMASH 3 - difficult assessment	-0.0414	0.5854
SMASH 21 - distraction free	SMASH 14 - sought help	0.0392	0.6053
SMASH 20 - confident in ability to learn	SMASH 14 - sought help	-0.0386	0.6113
SMASH 16 - studied by myself	SMASH 9 - asked questions	-0.0369	0.6275
SMASH 18 - talking to classmates important	SMASH 5 - study strategies for difficult concepts	0.0368	0.6288
SMASH 8 - completed prep	SMASH 3 - difficult assessment	0.0366	0.6295
SMASH 16 - studied by myself	SMASH 3 - difficult assessment	0.0351	0.6447
SMASH 17 - studied with classmates	SMASH 10 - practiced material	0.0338	0.6570
SMASH 15 - talking to instructor	SMASH 3 - difficult assessment	0.0451	0.6713
SMASH 19 - motivated to learn material	SMASH 3 - difficult assessment	-0.0309	0.6835
SMASH 10 - practiced material	SMASH 2 - confident anticipated score	0.0293	0.6996
SMASH 17 - studied with classmates	SMASH 11: started studying	-0.0280	0.7133
SMASH 17 - studied with classmates	SMASH 5 - study strategies for	-0.0246	0.7462

	difficult concepts		
SMASH 12 - assess own knowledge	SMASH 2 - confident anticipated score	0.0217	0.7745
SMASH 19 - motivated to learn material	SMASH 17 - studied with classmates	-0.0211	0.7813
SMASH 15 - talking to instructor	SMASH 4 - difficult course	0.0281	0.7912
SMASH 19 - motivated to learn material	SMASH 18 - talking to classmates important	0.0180	0.8133
SMASH 21 - distraction free	SMASH 3 - difficult assessment	0.0178	0.8144
SMASH 16 - studied by myself	SMASH 8 - completed prep	-0.0179	0.8145
SMASH 13 - sought help agree	SMASH 3 - difficult assessment	0.0175	0.8181
SMASH 20 - confident in ability to learn	SMASH 18 - talking to classmates important	0.0170	0.8230
SMASH 14 - sought help	SMASH 5 - study strategies for difficult concepts	-0.0136	0.8577
SMASH 7 - used learning objectives	SMASH 3 - difficult assessment	-0.0128	0.8665
SMASH 19 - motivated to learn material	SMASH 16 - studied by myself	-0.0128	0.8668
SMASH 14 - sought help	SMASH 10 - practiced material	0.0115	0.8792
SMASH 18 - talking to classmates important	SMASH 11: started studying	-0.0090	0.9064
SMASH 15 - talking to instructor	SMASH 7 - used learning objectives	-0.0114	0.9143
SMASH 5 - study strategies for difficult concepts	SMASH 3 - difficult assessment	0.0063	0.9335
SMASH 18 - talking to classmates important	SMASH 3 - difficult assessment	-0.0057	0.9398
SMASH 20 - confident in ability to learn	SMASH 8 - completed prep	-0.0051	0.9467
SMASH 11- started studying	SMASH 4 - difficult course	-0.0050	0.9479
SMASH 16 - studied by myself	SMASH 11- started studying	-0.0049	0.9486
SMASH 20 - confident in ability to learn	SMASH 15 - talking to instructor	-0.0057	0.9570

SMASH 15 - talking to instructor	SMASH 12 - assess own knowledge	-0.0053	0.9602
SMASH 21 - distraction free	SMASH 4 - difficult course	-0.0032	0.9660
SMASH 15 - talking to instructor	SMASH 9 - asked questions	-0.0043	0.9679
SMASH 20 - confident in ability to learn	SMASH 17 - studied with classmates	0.0027	0.9721
SMASH 11- started studying	SMASH 3 - difficult assessment	0.0024	0.9745
SMASH 20 - confident in ability to learn	SMASH 11: started studying	0.0017	0.9817
SMASH 14 - sought help	SMASH 12 - assess own knowledge	-0.0006	0.9942