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EFFECT OF INDUCED LEVEL OF CONFIDENCE ON COLLEGE STUDENTS' PERFORMANCE ON A COGNITIVE TEST

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ABSTRACT

College students were divided into high confidence and low confidence groups by being told that they were taking a test designed to measure intelligence of Ivy League versus high school students. Test scores for the groups were compared. In addition, peer evaluations of participants' performance and academic confidence were examined. The results supported the hypotheses. Group assignment affected participants' academic confidence and academic performance, with self-ratings and peer-ratings nearly interchangeable. The findings are discussed in terms of the malleability of student confidence and its implications, and of the potential benefits of using peer evaluations.

INTRODUCTION

For decades, psychological and educational researchers have studied factors that influence academic performance in a variety of settings and occupations. One of the areas of performance that has witnessed extensive research is that of cognitive ability testing. Even though in recent years the validity and generalizability of intelligence tests have been subjected to doubts and criticism (e.g., Gould, 1996; Stott, Green, and Francis, 1983), in our society one's intelligence score is still presumed to be a powerful predictor of one's intellectual abilities.

Research suggests that academic performance in general is related to one's perceived self-efficacy. Taylor, Locke, Lee, and Gist (1984) demonstrated that academic staff members with higher self-efficacy produced more scientific material. Hill, Smith, and Mann (1987) showed that

self-efficacy affects computer performance. Vrugt, Langereis, and Hoogstraten (1997) employed the concept of academic self-efficacy, which refers to self-efficacy in the context of educational performance, and found that when intelligence was controlled, academic self-efficacy and strong personal goals were related to higher test scores. Similarly, Locke and Latham (1990) found that individuals with high self-efficacy tend to pursue more challenging goals than individuals with lower self-efficacy. Tuckman and Sexton (1992) suggest that students with higher self-efficacy are better at searching for new solutions and are more persistent at working on difficult tasks, whereas people with low self-efficacy give up more easily when dealing with difficult tasks and cannot concentrate on tasks as well. These patterns of behavior, if they continue, lead to the development of different levels of actual ability, which results in varying levels of achievement.

Vrugt et al. (1997) differentiated between self-efficacy and self-confidence. Whereas they viewed self-efficacy as pertaining to specific activities, which makes it more of an interaction between a person and a task, they considered self-confidence a personal characteristic. Self-confidence of a test taker is another factor that influences performance on intelligence tests (Lynch and Clark, 1985). Thus, since confidence generally has been regarded as a personality trait, academic self-confidence can be viewed as a separate and more specific term, which can be referred to in educational settings as a predictor of academic performance. The difference between academic self-confidence and general self-confidence is that the former can more easily be influenced by elements of the situation (e.g., surroundings, people, and recent success or failure) than the latter. Studies have found consistent and enduring evidence that academic self-confidence - confidence in one's academic abilities - is a significant predictor of academic performance (Haywood, 1992; Hunsley, 1939; Lantz, 1945). In addition, some studies suggest that confidence levels can be manipulated or situationally-induced. For example, Haywood (1992) described a case study in which a thirteen-year-old boy's scores on the Wechsler Intelligence Scale for Children - Revised rose 28 points in four months as a result of a significant change in motivational circumstances, which increased his self-confidence and engagement in mental work. The boy was exposed to a few hours of dynamic assessment, a program in which he was not allowed to fail and was given any help needed to succeed. As a result, his enthusiasm for and confidence in his mental abilities rose dramatically. This case study implied that it is possible to affect grades in school-aged children by altering their environment.

The Current Study

The present experiment explored the relationship between academic confidence and performance within a college setting using both self-ratings and peer-ratings. One goal of the experiment was to determine whether inducing higher or lower confidence about performance on a cognitive test would affect actual test performance. We anticipated that group assignment would predict academic self-confidence. Specifically, we predicted that participants who were told that the test they were about to take was designed for high school students across the nation would have higher confidence in their performance on the test than participants who were told that the tests they were about to take was designed for students at Ivy League universities. We expected mean academic self-confidence to be lower for the low confidence group - the group that thought that the test was designed for Ivy League students - than for the high confidence group.

In order to differentiate between induced and non-induced academic self-confidence, we planned a comparison assessing the effect of group assignment on measures of general self-confidence. We predicted that group assignment would be unrelated to general self-confidence (as opposed to specific, or situationally-induced, academic self-confidence). Consequently, we predicted that mean general self-confidence would not be significantly different for the high confidence and low confidence groups.

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Studies have shown that it is possible for one's level of self-confidence to be situationally induced, which in turn may affect performance. For example, Lantz (1945) found that boys who initially experienced failure at completing a puzzle later exhibited decreased self-confidence and a decreased number of correct responses on mental tasks. We predicted that participants in the low confidence group would demonstrate poorer academic performance than those in the high confidence group. Specifically, we predicted that the mean test score for the high confidence group would be higher than the mean test score for the low confidence group.

In order to test whether academic self-confidence and academic performance were directly related, we planned a correlation of the two measures. In line with past research findings, we predicted that there would be a significant positive relationship between academic self-confidence and academic performance.

Finally, this experiment measured evaluations of confidence and performance as rated by participants' peers, yielding a multi-trait multi-method matrix. We predicted that participants' peers would make similar predictions of the academic abilities of participants in the high and low confidence groups, since confidence levels in this experiment were situationally induced after group assignment, and peers were unaware of the group to which each participant was assigned. Thus, we predicted that mean peer evaluations of participants' performance levels in the high confidence and low confidence groups would not to be significantly different, since performance was expected to vary with group assignment. Based upon the assumption that self-reported measures of academic confidence and academic performance would be highly correlated with their peer-reported counterpart measures, the predictions stemming from the peer-reports are parallel to the predictions for the self-reports. Specifically, we predicted that peer evaluations of academic confidence and academic performance would correlate with the participants' self-assessments of academic confidence and academic performance, respectively, and that the results using the peer evaluations would mirror those obtained from the participants' self-report and performance data. More generally, we predicted that convergent and discriminant validity for confidence and performance would be evident by examining the matrix of correlations among the four measures employed (self-confidence, test performance, peer-confidence, peer-performance rating). In addition, since peer evaluations were expected to parallel those of the participants, we predicted that peer evaluations of performance and confidence would also exhibit a significant positive correlation.

METHOD

Participants

Thirty college students at a highly selective Northeastern liberal arts college participated voluntarily. The group consisted of 18 women and 12 men, ranging in ages from 18 to 22 years old (M = 20.3, SD = 1.1). The sample was ethnically diverse: 9 participants were African-American, 11 were Caucasian, and 10 were Hispanic.

Materials

Self-report measures. Each participant filled out two questionnaires. The eight items on the Self-Evaluation Questionnaire (Cronbach's alpha = .83; see Appendix 1 for a copy of the questionnaire) assessed participants' self-confidence specifically on the upcoming cognitive test (items 1-4) and in general (items 5-8). The items were measured on a scale from 1 (*high confidence*) through 4 (*low confidence*). These items were reverse-scored before data analysis, so that higher numbers reflected higher self-confidence, and averaged to produce two scaled scores, for academic self-confidence and general self-confidence, respectively. The cognitive test consisted of 15 items (Cronbach's alpha = .59 after dropping three unreliable items; see Appendix 2 for a copy of the test) that consisted of True/False and multiple-choice questions that measured logic and math skills, and the abilities to manipulate data, to interpret analogies, and to employ reasoning skills. Scores on this test were computed on a scale from 0 to 100, with the scores indicating the percentage of the items that were answered correctly.

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Peer-report measures. The Peer Confidence Questionnaire (Cronbach's alpha = .93; see Appendix 3 for a copy of the peer-report measures) contained eight items that asked the peers to assess the academic confidence of the participant. The items inquired about the participant's confidence in his or her abilities in various areas of academic performance, such as math and verbal ability. The items were measured on a scale from 1 (*high confidence*) through 4 (*low confidence*). Just as for the items on the Self-Evaluation Questionnaire, these items were reverse-scored before data analysis, so that higher numbers reflected higher confidence, and averaged to produce one scaled score for peer evaluation of academic confidence. The Peer Performance Questionnaire (Cronbach's alpha = .96) also contained eight items that largely mirrored those in the Peer Confidence Questionnaire, with the difference of context: they aimed to assess the participant's academic performance instead of his or her academic confidence. The items were measured on a scale from 1 (*high performance*) through 4 (*low performance*), were reverse-scored so that higher numbers reflected better performance, and were averaged to produce a scaled score for peer assessment of performance.

Procedure

Using random assignment, the participants were divided into high confidence and low confidence groups. High or low academic self-confidence was induced by informing the participants in the high confidence group that the test they were about to take was designed to measure the intelligence of high school students, whereas the participants in the low confidence

group were told that they were taking a test that was designed to measure the intelligence of students from Ivy League universities. According to the first hypothesis, this different information given to the participants should produce varying levels of situation-specific (i.e., academic) self-confidence in the two groups. Identical tests were administered to the two groups.

Each participant was tested individually, in his or her dorm room, with minimal distractions (i.e., music, phone, and TV turned off). First, participants were asked to fill out the Self-Evaluation Questionnaire. Afterward, they were given 10 minutes to complete the cognitive test. Upon completion of the test, participants were debriefed and asked to provide the names of two peers who knew them well enough to be able to provide some information about them. Finally, the participants were asked not to inform the peers about the experiment before the peers were contacted.

After we collected participants' data, we contacted by e-mail the first peer identified by the participant. Twenty-one peers from the same college were contacted by e-mail and asked to evaluate the participants' academic confidence and performance; of those, nine of the peers were asked to evaluate two participants because each had been listed as a first-choice evaluator by two participants. The group of peers consisted of twelve women and nine men.

We informed the peers of the nature of the study, and asked them to consent to participate. The peer questionnaires were attached to the e-mail and the peers were asked either to fill them out on-line and return them via e-mail or to fill out the questionnaires and return them to the experimenter in person. If the initially contacted peer did not reply within three days, we contacted the second peer listed with an identical e-mail message. Whether the peers chose to participate by e-mail or in person, they first filled out the consent form, and were then given (or had access to) the Peer Performance Questionnaire and the Peer Confidence Questionnaire. After the peer questionnaires were filled out, the peers were debriefed either in person or by e-mail.

RESULTS

Effect of Group Assignment on Confidence Levels

We performed two independent groups *t*-tests to compare specific and general levels of self-confidence in the high confidence and low confidence groups. As predicted, we found a significant difference in academic confidence levels in the high confidence (M = 3.15, SD = .64) and the low confidence (M = 2.47, SD = .67) groups, $t(28) = -2.86$, $p = .008$. There was no difference in general self-confidence levels between the high confidence (M = 3.29, SD = .57) and the low confidence (M = 2.95, SD = .46) groups, $t(28) = -1.75$, $p = .09$. The obtained results demonstrate that group assignment affected academic self-confidence, but did not affect general self-confidence.

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Effect of Group Assignment on Performance

We performed an independent groups *t*-test to compare the mean performance scores in the high confidence (*M* = 88.96, *SD* = 14.00) and low confidence (*M* = 80.03, *SD* = 6.98) groups. As predicted, the obtained difference was significant, $t(28) = 2.21$, $p = .04$. Participants in the low confidence group scored lower than participants in the high confidence group.

Relationship between Self-Confidence and Performance

As noted, group assignment affected participants' academic self-confidence and academic performance. The direct relationship between academic self-confidence and academic performance was addressed by a bivariate correlation between self-reported academic confidence and academic performance. The correlation was significant, $r(30) = .54$, $p = .002$, indicating that as academic self-confidence increased, academic performance also increased.

Comparison of Self-Report and Peer-Report Results

As a manipulation check, we compared peer evaluations of performance for participants from the high confidence and low confidence groups. The difference was not significant, $t(28) = 1.86$, $p = .095$, suggesting that the peers did not evaluate the performance of individuals in the high confidence and low confidence groups differently.

Table 1 presents the matrix of correlations for the variables employed in this study. As noted, academic confidence and test performance were significantly correlated, and the peer evaluations of academic confidence and academic performance were related to those two measures, $r\ (29) = .48$, $p = .007$ and $r\ (29) = .39$, $p = .032$, respectively, thus demonstrating convergent validity. Support for discriminant (heterotrait-heteromethod) validity was found in significant relationships between the measures of self-reported performance and peer-reported confidence, $r\ (29) = .43$, $p = .019$ and between the measures of self-reported confidence and peer-reported performance, $r\ (29) = .39$, $p = .033$. This pattern of results supported the final hypothesis. Predictions for the peer assessments were similar to the predictions for the participants' self-assessments, and reflected a positive relationship between peer confidence ratings and peer performance ratings.

Table 1: Correlation Matrix of Academic Confidence and Academic Performance Measures

	Self Measures		Peer Measures	
	Confidence	Performance	Confidence	Performance
Self Measures				
Confidence	.83 (2.19) (.73)			
Performance	.58**	.57 (81.75) (12.13)		

Peer Measures				
Confidence	.48**	.43*	.93 (2.12) (.74)	
Performance	.39**	.63***	.39*	.96 (2.37) (.75)

Note: Diagonal elements represent reliabilities. Means and standard deviations are listed below each reliability coefficient. $N = 30$.
***$p < .001$; **$p < .01$; * $p < .05$.

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DISCUSSION

Our primary hypotheses were supported by the experimental results. Assigning participants to high confidence and low confidence groups by exposing them to different information regarding the nature of the test caused them to have different levels of academic self-confidence, but not any significant differences in general self-confidence. Regardless of how self-confident participants really were, simply telling them that the test was difficult affected their confidence about performing well on the test, a finding with important implications for educational settings. This finding suggests how simple pre-test instructions can affect a student's academic self-confidence. Classroom teachers should thus make a conscious effort to ensure that they do not undermine students' academic self-confidence by what they say and do. Specifically, developing academic self-confidence should be emphasized in teacher training classes and workshops, given its ability to affect performance in school.

As predicted, higher academic performance scores were positively correlated with higher academic self-confidence. This result reaffirmed the existence of a direct relationship between student academic confidence and consequent academic performance. In addition, assigning participants to high confidence and low confidence groups also resulted in significantly different scores on the cognitive test, which suggests that academic performance is as susceptible to situational influences as is academic self-confidence. This again illustrates the important role that teachers play in creating a supportive (or destructive) atmosphere for classroom performance.

These findings conceptually replicate the work by Lovaglia, Lucas, Houser, Thye, and Markovsky (1998), who also created two conditions, which they defined as low-status and high-status, and compared test scores for the two groups. They also found that differences in the "status" of the participants produced a significant difference in test scores. Although the tests employed differed (an intelligence test for Lovaglia et al. [1998], and a logic test in the present study), the results pointed to the same conclusion: affecting the perceived status of the participants altered those participants' test scores. More generally, both studies demonstrate how easily academic performance can be undermined and manipulated by outside influences.

Given the similar pattern of correlations among the self-reports and peer-reports, peer reports may serve as an economical alternative to self-reports for sensitive academic performance assessments. With additional replications of the links between academic confidence and academic performance for both self-reported and peer-reported measures, academic advisors and counselors may detect academic problems more easily by adding peer-reported confidence assessments to the set of tools that can be used to diagnose potential academic performance problems, especially for individuals who are unaware of (or in denial about) their academic deficiencies.

This study confirmed results of several prior experiments that confidence in one's academic ability is highly susceptible to the influence of outside factors, even among participants who are thought to represent an elite fraction of the population, and extended those results by augmenting the self-report and performance measures with peer-reports of both academic confidence and academic performance. Considering the fact that the segment of population tested in this study is generally known to have higher levels of academic self-confidence, these results should generalize to other situations and settings, and may apply to an even greater degree, as students of lower socio-economic status or lower academic standing may have lower academic self-confidence in general, making them even more susceptible to attempts to boost their academic self-confidence.

Research on stereotype threat supports our observation that academic performance is affected by academic confidence. Although in the present study no stereotype thoughts were deliberately induced, the results of this study suggest that a simple suggestion that the test the participants were taking was designed for individuals who are thought of as more intellectually capable (i.e., Ivy League students) impaired their performance. Steele and Aronson's (1995) manipulation of susceptibility to stereotype threat was similar to our confidence manipulation, and obtained similar results. Overall, these findings add further evidence to the view that performance on a cognitive test is easily affected by external factors and should be assessed with extra care, taking into consideration the external factors, whether intentional or not, that might influence it.

Research on the effects of confidence on performance can be generalized to various situations that do not necessarily have to do with academic performance. For example, in two experiments, Stone, Lynch, Sjomeling, and Darley (1999) found that, among Black and White Princeton undergraduates who were all beginners in miniature golf, White males performed better when they were told that the game was measuring "the ability to think strategically," whereas Blacks performed better when they were told that the game measured "natural ability." Thus, students felt more confident when they were not reminded of the negative stereotypes about themselves. Future research on confidence and performance would benefit from assessing the effects of stereotype threat on confidence and, most importantly, determining how those effects can be minimized.

In addition, future research ought to address other ways in which confidence, whether in academics or in other domains, can be increased. For instance, if removing a race identification item on a questionnaire can improve performance (as in Steele and Aronson, 1995), then adding

certain information to a questionnaire or a set of instructions that precedes a standardized test may improve performance among groups that are at risk for exhibiting lower confidence, and thus impaired performance. For example, informing female students taking a math test that males and females are equally adept at a task might improve their confidence, and thus their performance (Spenser, Steele, and Quinn, 1999). However, doing so may be ethically problematic for tests on which real group differences do exist.

A few limitations of this study can be addressed by future research. For example, adding a control group would allow for an examination of how the groups would differ if one of the groups did not receive any type of instructions before taking the test, as receiving instructions might have altered both groups in some way. Also, instead of selecting a convenience sample of students from an elite liberal arts college, a more diverse sample (in terms of educational, geographical, and financial background) should be used. In addition, the small sample size employed had limited statistical power; using a larger number of participants would provide a stronger test of the hypotheses and more confidence in the generalizability of the findings. Also, using a within-subjects design by pre-testing the participants would improve the validity of these claims. (The present study did not employ such a method as the test was given as part of a class project conducted by the first author, and time limitations prevented a repeated-measures design.) Alternatively, it might be beneficial to conduct different studies with participants who are known *a priori* to perform well or poorly on a certain subject, and compare their performances after a situationally-induced manipulation of confidence.

Another limitation of this study concerned the process of peer selection. Although the peer selection method employed is likely to be biased in favor of peers who view the participants in a positive light, such peer biases should be equivalent across the two groups. However, such bias on the part of peers may have resulted in a ceiling effect, such that both sets of peers viewed the participants as highly capable. A better method of peer nomination or selection might remove this potential confound. Finally, a more reliable test would strengthen the validity claims of future studies; the low internal consistency of the test employed in this study implies that the group differences found may be due to chance nearly as often as to any real differences between the groups.

CONCLUSION

Since the results of this study have confirmed that both academic confidence and academic performance are vulnerable to situational influences, factors such as teachers' behavior, the manner in which tests and quizzes are presented to students, and overall classroom atmosphere should accommodate such students at risk through increased vigilance on the part of administrators to ensure that external factors (e.g., gender or racial identity salience) do not lessen students' academic self-confidence and, thus, their academic performance.

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APPENDIX 1: SELF-REPORT QUESTIONNAIRE

Self-Report: Specific (Academic) Confidence

1) Please rate how confident you are about doing well on this test.

Very confident
Somewhat confident
Not very confident
Not confident at all

2) Knowing that the average IQ score is 100 and 68% of people who take the IQ test get between 85 and 115, and 95% get between 70 and 130, what would you think your score will be?

130 and up
110-130
90-110
70-90

3) How do you think you will perform compared to students from your class?

Above average
Slightly above average
Average
Below average

4) How do you think you will perform compared to high school students?

Above average
Slightly above average
Average
Below average

Self-Report: General Confidence

5) How confident do you feel about your math abilities

I'm above average
I'm slightly above average
I'm average
I'm below average

6) How confident do you feel about your verbal abilities?

I'm above average
I'm slightly above average
I'm average
I'm below average

7) When you receive a high grade on a test/paper, do you usually

Think the grade was deserved, based on your intelligence?
Think the grade was fair, but high only because you studied more than usual
Think that part of the reason why you received such a high grade was because the professor likes you or because of some other external reason
Think you simply got lucky and really have nothing to do with the grade being so high.

8) Do you consider yourself a smart person?

Above average
Average
Below average
Not at all

APPENDIX 2: COGNITIVE ABILITY TEST

1) Julia runs faster than Diana and Maggie runs slower than Julia. It is impossible to tell whether Maggie runs faster than Diana.

True
False

2) Jeremy owes $64 to Jacob. Jeremy has only $28 but Jason gives him another $28. Therefore Jeremy can repay Jacob.

True
False

3) If there are more inhabitants in Los Angeles than there are hairs of any inhabitant, and if no inhabitant is totally bald, it necessarily follows that there must be at least two inhabitants with exactly the same number of hairs.

True
False

4) Boat is to water as airplane is to:

Sun
Ground
Water
Sky
Tree

5) John is twelve years old and is three times as old as his brother. How old will John be when he is twice as old as his brother?

14
16
18
20

6) The price of an article was cut %20 for a sale. By what percent must the item be increased to again sell the article at the original price?

15%
20%
25%
30%

7) Mary had a number of cookies. After eating one, she gave half the remainder to her sister. After eating another cookie, she gave half of what was left to her brother. Mary now had only five cookies left. How many cookies did she start with?

11
22
23
45

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8) Which one of the letters does not belong in the following series: A-D-G-I-J-M-P-S

D
I
J
M

9) "If all Fleeps are Sloops and all Sloops are Loopies, then all Fleeps are Definitely Loopies."

True
False

10) A rancher is building a fence by stringing wire between posts 20 feet apart. If the fence is 100 feet long the rancher should use 5 posts.

True
False

11) If you hold up your right hand in the mirror your image will be holding up its right hand.

True
False

12) Michael walks one block west from his house. Then he walks two blocks south and then one block east. He is now 2 blocks from his house.

True
False

13) If you rearrange the letters "MANGERY", you would have the name of a

Ocean
Country
State
City
Animal

14) Belt is to buckle as shoe is to:

Sock
Toe
Foot
Lace
Sole

15) Which of the five is least like other four?

stocking
dress
shoe
purse
hat

APPENDIX 3: PEER-REPORT MEASURES

Peer Confidence Questionnaire

1) Is [PEER] usually confident about his/her grades on tests?

Almost always
Most of the time
Sometimes
Never

2) Does [PEER] consider him/herself a smart person?

Above average
Average
Below average
Not at all

3) When [PEER] receives a high grade on a test/paper, does he/she

Think the grade was deserved, based on his/her intelligence?
Think the grade was fair, but high only because he/she studied more than usual
Think that part of the reason why he/she received such a high grade was because the professor likes him/her or because of some other external reason
Think he/she simply got lucky and really has nothing to do with the grade being so high.

4) If [PEER]'s IQ scores were compared to other college students, how likely is it that he/she will be confident about his/her performance on an IQ test?

Very likely
Somewhat likely
Somewhat unlikely
Very unlikely

5) Does [PEER] usually worry about his/her performance in school?

Never
Sometimes
Almost always
Always

6) How confident does [PEER] feel about his/her math abilities?

Above average
Slightly above average
Average
Below average

7) How confident does [PEER] feel about his/her verbal abilities?

Above average
Slightly above average
Average
Below average

8) What do you think [PEER] will expect on a test for which he/she did not study enough?

A-/B+
B/B-
C
D/F

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Peer Performance Questionnaire

1) How would you rate [PEER]'s intelligence compared with other students from his/her class?

Above average
Slightly above average
Average
Below average

2) Do you think [PEER]'s academic performance is

Above average
Slightly above average
Average
Below average

3) What is [PEER]'s GPA?

A range
B range
C range
D range

4) How would you rate [PEER]'s math ability?

Above average
Slightly above average
Average
Below average

5) How would you rate [PEER]'s verbal ability?

Above average
Slightly above average
Average
Below average

6) Do you think [PEER] is smart?

Yes, extremely
Yes
More or less
Not really

7) Does [PEER] find himself/herself challenged by the course load in Hamilton?

Not really
More or less
Yes
Yes, extremely

8) Knowing that the average IQ score is 100 and 68% of people who take the IQ test get between 85 and 115, and 95% get between 70 and 130, what would you think [PEER]'s score will be?

130 and up
110-130
90-110
70-90

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