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Learning to Learn Online: Using Locus of Control to Help Students Become Successful Online Learners

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In this study, approximately 600 online high school students were asked to take Rotter's locus of control questionnaire and then reflect on the results, with the goal of helping them think about their ability to regulate their learning in this new environment. In addition, it was hoped that the results could provide a diagnostic for teachers who wish to identify students who might be at risk of poor performance. In analyzing the results, we found that total scores were not useful and that gender had to be taken into account. In addition, factor analysis identified different factors that best described female and male responses, with some factors more important than others in terms of their relationship with final grades. The student reflections showed that they were thinking about the need for self-regulation in online learning. Finally, we offer some suggestions for others who would like to use the concept of locus of control to help students learn to learn online.

BACKGROUND

As online learning has grown, it has become increasingly clear to many of us working in the field that students not only need to learn a subject online but need to learn how to learn online. A key aspect of academic success is self-regulation, defined as a combination of initiative, intrinsic motivation, and personal responsibility (Zimmerman, 1990; Zimmer, Bonnet, & Kovach, 1996). The need for self-regulation is particularly important in online environments because of the distance between the students and their teachers and other students (Jonassen, Davidson, Collins, Campbell, & Haag, 1995). In the online setting, self-regulation therefore means being interested, engaged, well organized, having good time management skills, and the ability to persist in a course week after week when a teacher is not looking directly over your shoulder (Roblyer & Marshall, 2002).

While the consequences of a lack of self-regulation have been a focus of research for some time, particularly as it affects course engagement and course attrition (Roblyer & Davis, 2008; Roblyer, Davis, Mills, Marshall, & Pape, 2008), there has been much less discussion of how to foster it. The current research looks at the introduction of the concept of locus of control to online high school students both as a potential diagnostic for teachers and as a way to help students think about their own ability to self-regulate in the online environment. The study sample was approximately 800 students from 250 schools enrolled in one of twelve online courses offered by Pamoja Education, the provider of supplementary online courses for the International Baccalaureate, in Fall 2013.[1] IB offers advanced courses for students in their final two years of secondary education. The online courses cover a wide range of subjects, including economics, mathematics, psychology, film, Spanish, and Mandarin. Courses are asynchronous but paced, with between 20 and 25 students in a section. All students are expected to interact with fellow students on a weekly basis. The fact that 60 percent of these students had fallen behind with their online coursework at some point during the previous year suggested that a sizable proportion were having difficulty with managing the online environment (Lowes & Lam, 2013). Since those who fell behind were much less likely to perform well than those who stayed on schedule, the ability to stay on track was a major area of concern for Pamoja Education.

There have been several efforts to develop tools to help students identify their ability to do well in online courses. These instruments have generally been self-administered, made up of direct questions designed to address specific issues felt to be stumbling blocks to success, such as computer access and the availability of study time, as well as personal affective factors.

1 We would like to thank Pamoja Education for its interest in, and ongoing support for, this research, and the JOLR reviewers for their helpful comments and suggestions.

The best known is probably the ESPRI (Roblyer & Marshall, 2002), but many online course providers have developed their own instruments. However, most of these efforts suffer from one or more of the following problems. First, students may not be the best judges of their own abilities or be able to foresee the importance of external factors at the time they respond. Second, social desirability is likely to affect the answers to direct questions. And third, the results of such instruments, given before enrollment, may act as gatekeepers rather than learning tools and, as Roblyer and Davis (2008) found with the ESPRI, seem to better identify those likely to succeed than those likely to fail—yet it is those who are likely to fail who would be the key beneficiaries of such identification.

In analyzing the results of a pre-course (but post-enrollment) background survey given to all incoming students in the Pamoja Education courses, we found no statistically significant correlations between course completion and any of the variables that can be elicited through this type of survey, from computer and Internet access to time set aside to do the coursework in school to availability of such support staff as a site coordinators or other tutors ($p > .05$). The background survey was therefore not helpful as an early warning system that would enable us to identify those students most at risk for falling behind, not engaging in the course, not persisting, or not doing well (Lowes & Lam, 2013). This led us to search for another approach to identifying students who need help learning how to learn in online courses.

LOCUS OF CONTROL

Locus of control is based on a social learning theory that posits that individuals who feel that they can control their own environment are likely to adapt more easily to new situations than those who feel that they are controlled by forces outside of their control. Those who feel very much in control of what happens to them are said to have a high internal locus of control while those who feel what happens to them is controlled by outside forces are said to have a high external locus of control.

One of the earliest proponents of the concept, Julian Rotter, described locus of control as follows:

> When a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him. When an event is interpreted in this way by an individual, we have labeled this a belief in

> external control. If the person perceives that the event is contingent upon his own behavior or his own relatively permanent characteristics, we have termed this a belief in internal control. (Rotter, 1966, p. 1)

The relationship between locus of control and achievement is through behavior. Here is how Rotter described it:

> A series of studies provides strong support for the hypotheses that the individual who has a strong belief that he can control his own destiny is likely to (a) be more alert to those aspects of the environment which provide useful information for his future behavior; (b) take steps to improve his environmental condition; (c) place greater value on skill or achievement reinforcements and be generally more concerned with his ability, particularly his failures; and (d) be resistive to subtle attempts to influence him. (Rotter, 1966, p. 25)

Locus of control has been the subject of many studies since Rotter made the concept popular in the 1960s, particularly in education and health. In health, for example, Stein, Smith, and Wallston (1984) found that those with a high internal locus of control—those who believed that their own behavior controlled their health—had the greatest possibility of behaving in ways that would enhance their well-being. In education, most studies have found that more internal beliefs were associated with greater academic achievement. Nowicki and Strickland (1973) found that a high internal locus of control was significantly related to academic competence, social maturity, and "independent, striving, self-motivated" behavior (p. 154). Findley and Cooper (1983), in an extensive review of locus of control studies using a number of different instruments and populations of all ages, reported that they could assert with a high level of confidence that locus of control was related to academic achievement.

However, locus of control has also been shown to vary with age and by gender. For example, Mirowsky and Ross (2003) found that older adults have a lower sense of personal control than do young or middle-aged adults while Blanchard-Fields and Irion (1988) found that a belief that powerful others control one's life was positively related to taking charge of one's life in older adults but negatively related to this in younger adults. Gender also appears to affect the relationship between locus of control and achievement, so that analyzing the locus of control for an entire group may obscure patterns that only emerge when the genders are considered separately. Not only have many studies found that females have more external scores than

males (see, for example, Strickland & Haley, 1980; Fiori, Brown, Cortina, & Antonucci, 2006), but the divergence seems to have grown over the years (Sherman, Higgs, & Williams, 1997). In education, several studies have found that locus of control is more strongly linked to academic achievement for males than females (Nowicki & Strickland, 1973; Findley & Cooper, 1983), although Stipek and Weisz (1981) found this to be true only when using an instrument that was likely to be influenced by social desirability.

Finally, Rotter (1975) argued that locus of control will be more predictive in novel situations that are unstructured, unfamiliar, and ambiguous than in situations with which the individual has more experience. This is precisely the situation that students new to online learning are likely to face. In addition—and this was important in terms of how the concept is introduced to students—Nowicki and Strickland (1973) showed that a person's locus of control is not static but can shift over time with support and encouragement of appropriate behavior.[2]

THE INTERVENTION

This prior research suggested that the concept of locus of control could be useful for assessing students who are being asked to adjust to a new type of learning in an unfamiliar virtual environment. In addition, Rotter's I-E (Internal-External) locus of control instrument can be set up as an online quiz, and it seemed possible that quiz scores could not only be used as a diagnostic, identifying students who might need help learning to learn online, but could help students by providing them with an opportunity to reflect on their own approaches to learning in this new venue. As researchers working with Pamoja Education, we proposed that they introduce locus of control to incoming students by developing a small curriculum module that included the quiz and two follow-up reflection questions. These were then built into the second week of the course but did not count toward the course grade.

Rotter's instrument has 29 question pairs in a forced-choice format, with six of the items as fillers or distractors and each item contrasting an active or passive stance. For example, one question asks the respondent to choose between "What happens to me is my own doing" and "Sometimes I feel that I don't have enough control over the direction my life is taking" (see Appendix 1 for the full instrument). Each question is scored 0 for the internal choice and 1 for the external choice so the total score can range from 0 to 23 (Rotter, 1966). The items were developed to measure a person's belief about the nature of the world—what Rotter called a "generalized expectancy"—rather than their explicit preferences for internal or external control (p. 10).

2 There have been suggestions that internal/external locus of control may have cultural dimensions (Smith, Trompenaars, & Dugan, 1995). Since the culture of the students in this study could not be determined, we did not look at this, although it would be another fruitful avenue of research.

In addition, in designing the instrument Rotter worked to remove items that might be affected by social desirability, a problem he saw with earlier scales and particularly with items concerning academic achievement (Rotter, 1966, 1975).

The quiz results were returned to the students, at which point they were asked to respond to two reflection questions. The accompanying email and the narrative preceding the reflection questions stressed that the goal was insight not judgment:

> *It is important for you to know that there is no judgment implied in your score—the goal of the quiz is to help you gain some insight into yourself. The scores in this version of the scale range from 0 to 23. A score closer to 0 indicates a higher internal locus of control. A score closer to 23 indicates a higher external locus of control. People who develop an internal locus of control tend to believe that they are responsible for their own success. Those with an external locus of control tend to believe that external forces, such as luck, determine their outcomes.*
>
> *In some situations, it may be helpful to have a high external locus of control while in others it may be helpful to have a high internal locus of control. We think that for online learners, having a high internal locus of control is an advantage.*
>
> *It is also important for you to know that your locus of control is not fixed but learned—it can be changed and modified over time.*

The two reflection questions were:

1. Do you feel your score accurately reflects where you are on the continuum from external locus of control to internal locus of control? Why or why not?
2. Do you believe that having a high internal locus of control is an advantage for online learners? Why or why not?

The email stressed that the students' responses were confidential and that the scores were for them alone.

The research component of this effort therefore addressed two questions:

1. Was there a relationship between the students' locus of control scores and their end-of-term grades? If, as we hypothesized, students with lower (more internal) scores would have higher final grades and vice versa, then we could use the locus of control scores to identify students in need of additional support.
2. Would the relationship between locus of control scores and final grades differ by gender? This question was exploratory, since the existing literature on locus of control suggested that females were likely to have more external scores than males but at the same time analysis of the prior year's grades suggested that females were also likely to have higher grades. This seemed to contradict our hypothesis.

For the instructional component of this effort, we wanted to know if the students would seriously reflect on their scores and if they found this to be a useful exercise.

DATA SOURCES

Rotter's locus of control instrument, delivered electronically as a quiz, was sent to the 798 Pamoja Education students enrolled as of the second week of the 2013-2014 academic year. Not all students responded and not all students who responded stayed in the course, with most of those who dropped doing so within the grace period. As a result, by year-end we had both quiz scores and final grades for 499 students. The percentages of males and females in the matched sample closely matched the percentages in the total sample. Table 1 summarizes these numbers:

Table 1
Number and percent of students by gender

	Total with LoC scores		Total with grades		Total matched	
	N	%	*N*	%	*N*	%
Female	359	58%	384	56%	296	59%
Male	256	42%	305	44%	203	41%
Total	615	100%	689	100%	499	100%

RESULTS

An analysis of total locus of control scores

Locus of control scores

The mean locus of control score for the 615 students who responded was 11.01, with a range from 0 to 21, slightly lower than scores for the college-age students that have been the subject of most of the locus of control studies in education (Strickland & Haley, 1980).[3] The scores were normally distributed across the entire range, with a large percentage receiving middle-range scores (see Figure 1). As was found in other studies (Fiori, Brown, Cortina, & Antonucci, 2006; Sherman, Higgs, & Williams, 1997; Strickland & Haley, 1980), the mean score for females was 11.67, higher than the mean score for males of 10.41.

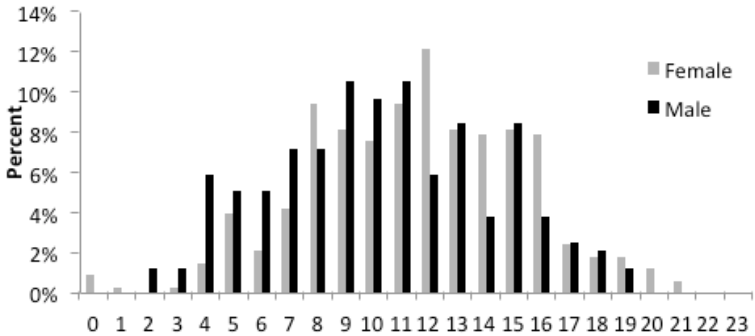

Figure 1. Histogram of locus of control scores by gender.

For our matched sample, the mean score for females was 11.48, with a range from 0 to 21, and the mean score for males was 10.24, with a range from 2 to 19. A one-way analysis of variance showed that with equal group variances ($p > .05$), females' total locus of control score was significantly higher than males' total score, $F(1, 497) = 12.371$, partial $\eta^2 = .024$, with an observed power of .939. This was our first confirmation that there are indeed differences between males and females in our group of students and that gender differences would need to be taken into consideration in the analysis.

3 It is interesting that scores seem to have become more external over the years. For example, mean scores of 8 were commonly found in the 1960s, increasing to about 12 in the 1970s (Strickland & Haley, 1980). These scores are therefore in line with later findings.

Course grades

Grades in IB courses range from 1 – 7, with 3 or lower considered failing, 4 – 5 considered passing but moderate, and 6 – 7 considered excellent. As shown in Figure 2, females tended to do better than males, confirming our prior findings that females tend to outperform males in these courses:

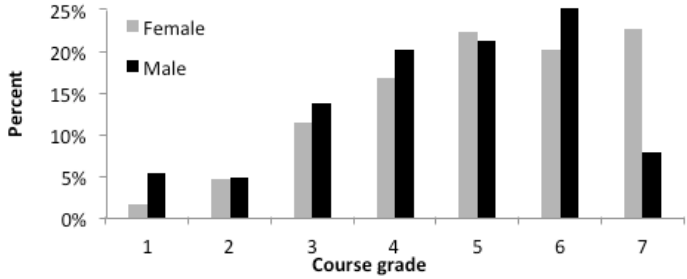

Figure 2. Histogram of course grades by gender.

As Table 2 shows, for our matched sample about 20 percent of the students received course grades of 3 or lower. However, a much higher percentage of females than males did well (6-7) and a much higher percentage of males than females did poorly (1-3):

Table 2
Course grades by percent and gender

Grades	All	Female	Male	All	Female	Male
1 – 3 (Failing)	20%	18%	24%	102	53	49
4 – 5 (Passing)	20%	39%	41%	200	116	84
6 – 7 (Excellent)	40%	43%	35%	197	127	70
Total	100%	100%	100%	499	296	203

The relationship between locus of control scores and course grades

The mean locus of control score for females was higher than the mean score for males for all course grades.[4] However, the mean locus of control scores for females decreased (became more internal) as their grades increased while the reverse was the case for males. This was the second indication that gender differences would be important in analyzing the locus of control scores for our group:

4 Since being in a different section (total number of sections = 39) only explained about 7 percent of the variability in final grades, the approach of multilevel analysis was not required.

Table 3
Mean locus of control scores by final grades and gender

Final grades	Female	Male	*N* for females	*N* for males
1 – 3 (Failing)	12.34	8.84	53	49
4 – 5 (Passing)	11.59	10.62	116	84
6 – 7 (Excellent)	11.03	10.76	127	70

Correlations range from -1 to +1. Since a student's locus of control score could range from 1 (lowest, internal) to 23 (highest, external) and grades were the reverse — from 1 (lowest performance) to 7 (highest performance) — a negative correlation would indicate either a low locus of control score and a high course grade or a high locus of control score and a low course grade. These were the hypothesized relationships. A correlation close to 0 would indicate no linear relationship and a positive correlation would indicate the reverse of our hypothesis.

As Table 4 shows, there was no statistically significant linear correlation between total locus of control scores and final grades for the entire group of students.

Table 4
Correlation between locus of control scores and final grades

	Final grade (*N* = 499)
Correlation	.006

However, when we looked at the results by gender, we found that the correlation was statistically significant for both genders—but while it was in the hypothesized direction for females, it was in the reverse direction for males. This was contrary to the findings of previous researchers but confirmed the findings in Table 3.

Table 5
Correlation between locus of control scores and final grades by gender

	Female (*N* = 296)	Male (*N* = 203)
Correlation	-.133*	.144*

Note: *$p < .05$.

REVISITING THE LINK BETWEEN LOCUS OF CONTROL SCORES AND COURSE GRADES

Locus of control: One factor or many?

Although the linear correlations were statistically significant for both genders, they were small. We suspected that this might be because using total scores obscures major differences among students, particularly those whose scores were in the middle range. For example, two students with a total score of 12 could have chosen the internal (or external) option for 12 entirely different items.

We found that this was indeed the case when we looked at the degree of agreement for each item on the quiz. As Table 6 shows, for 13 of the 23 items, approximately the same percentage of each gender made the same choice, but for 10 items there was a difference of 6 or more percentage points between males and females. For five of these items, more males made the internal choice and for five, more females did (for item-by-item analyses of results, see Table 1, Appendix 2). In other words, for five items, more females than males felt they could assert control while for five different items, males tended to think they could assert control while females did not.

Table 6
Internal/external items by gender

	# items
Males and females equally external	2
Males and females equally internal	7
Males and females evenly divided	4
Females more internal	5
Males more internal	5

These differences suggested that the total score approach to analyzing the quiz was obscuring gender differences and that we should look more closely at the individual items.

Although Rotter believed that locus of control should be seen as a single generalized expectancy, his descriptions suggest subtle differences between different aspects of internal and external control. Thus in his 1966 article, he wrote that those with an external locus of control believe that a person's life is controlled by such external forces as "luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him" while those with an internal locus of control believe that life is controlled by one's own choices and actions and one's own relatively permanent characteristics (Rotter, 1966, p. 1).

A number of subsequent researchers have argued for a multidimensional conception of locus of control, with most building on the distinction between permanent characteristics and personal action as internal and between fate and powerful others as external. For example, Reid and Ware (1973) found two factors—fatalism and social system control, each of which had an internal and external dimension—while Parkes (1985) also argued for two factors but called them personal control and socio-political control. For personal control, the internal view stressed hard work and ability and the external view emphasized fate or chance, while for socio-political control, the internal view is that individuals can affect events while the external view is that they cannot. Weiner (1985) argued that the degree of "controllability" was important (p. 549), so that there was a difference between something that is internal but uncontrollable (his example was math aptitude) or internal but controllable (through effort). In developing her own scale, Levenson (1981) kept one dimension of internality but distinguished two dimensions of externality, arguing that those who believe in powerful others might still believe in their ability to affect events while those who feel the world is controlled by chance or fate might not. Mirowsky and Ross (2003) focused on the internal aspect of locus of control and argued that perceptions of personal control over one's life must be distinguished from perceptions of the control that others have over your life. In an article revisiting his prior work, Rotter noted that there could be a theoretical distinction between passive and defensive externals (Rotter, 1975), with defensive externals being ambitious when put in competitive academic environments but avoiding competition otherwise. He also noted that he was not adverse to this type of factor analysis, particularly if a factor could be shown to have a significantly higher relationship to an outcome than the total score, but warned that whatever factors were found might be specific to the group being studied (Rotter, 1975).

All of these distinctions suggested that we needed to see if there were differences among the items, or groups of items, that would explain our results and also make them more useful to teachers and students. Confirmatory factor analysis (CFA) on our data set found that, as expected, the one-factor approach did not describe our data well.[5] This suggested that there was more than one underlying factor present. In order to determine the minimum number of factors, we turned to exploratory factor analysis (EFA).[6] The EFA returned at least five factors for females and four for males and provided excellent model fits for both genders separately.[7]

5 Here are the poor model fit indices for the one-factor model based on Rotter's single factor: $x^2(230) = 584.973$, $p < .001$, RMSEA (90% CI) = .052 (.047 - .057), CFI = .640, TLI = .604, SRMR = .057.

6 We used EFA with the oblique rotation on the assumption that the concepts contributing to locus of control are correlated (Rotter, 1966, 1975).

7 Here are the excellent EFA model fit indices for females with five factors, $x^2(148) = 163.326$, $p = .1840$ ($p > .05$), RMSEA (90% CI) = .018 (.000 - .032), CFI = .973, TLI = .954, SRMR = .032, and for males with four factors, $x^2(167) = 164.331$, $p = .5439$ ($p > .05$), RMSEA (90% CI) = .000 (.000 - .028), CFI = 1.000, TLI = 1.010, SRMR = .038. Note that solutions beyond five factors for females (e.g., a six-factor solution) also provided an excellent fit for the data, but the fit was not statistically better than the five-factor solution. For males, a three-factor model also provided an excellent fit for the data but the four-factor model was statistically better than the three-factor solution. Therefore, we chose the five-factor model for females and four-factor model for males.

The relationship between the different factors and course performance

To investigate the relationships between the different factors and course performance, we turned to ESEM for model building—a combination of EFA and structural equation modeling (SEM)—using Mplus 7.1 as the analytic software.[8] As shown in Figure 3, this basic ESEM model rests on the following assumptions:

- The students' responses to the locus of control quiz are measured by 23 question items (out of the 29 total), which show that there are five factors for females (shown as F1 – F5 in Figure 3) and four for males. The factors are correlated.
- Final grade is measured by the final course grade.
- The five factors for females (and four factors for males) help explain final grade.
- The model allows for measurement error (E).[9]

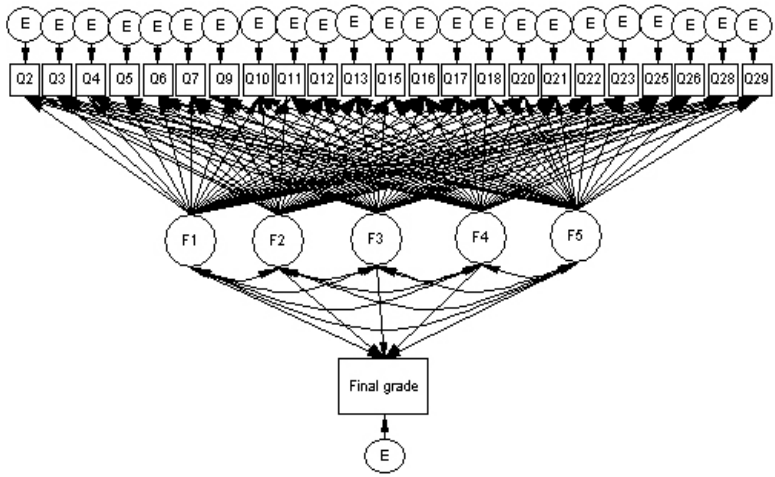

Figure 3. Conceptual model for the interrelations among locus of control factors and final course grades for females.

8 Our analysis was conducted with the WLSMV estimator since the outcome (course grade) was categorical and had a floor/ceiling effect.

9 EFA is one type of latent structure analysis. Unlike most regression, latent structure analysis does not assume that each data point is collected without error. Instead, it accounts for measurement errors in the observed variables (i.e., the 23 quiz items and the final grade), indicated by E in Figure 3.

The model illustrated in Figure 3 provides statistical confirmation that locus of control scores are explained by five factors for females and four factors for males.[10] As shown in Table 7, both models provide excellent fits:

Table 7
Model fit indices

	df	X^2	*p*	RMSEA	90% CI	CFI	TLI
F (5-factor)	166	186.28	.134	.017	.000 - .029	.970	.950
M (4-factor)	186	187.41	.457	.005	.000 - .024	.997	.995

We then examined the items in each factor in order to determine what they referred to—their content. In doing this, we found that we needed to combine categories used by previous researchers, including powerful others (a term used by Rotter and Levenson but encompassing Parke's sociopolitical control and Reid and Ware's social system control); school and achievement more generally (used by all researchers); chance or fate (used by all researchers); and social self-efficacy (used by Sherman, Higgs, and Williams). But we also found that it was helpful to include Weiner's degree of controllability or distance from the present to help explain the differences. Although the alignment was not perfect, we were able to describe the five factors for females and four for males (for which items belong to which factor, see Tables 2 and 3 in Appendix 2).

Females

With the final grade as the outcome, the model with five factors explained 35.1% of the variance in the final grade for females (i.e., $R^2 = .351$). As shown in Table 8, the size of the correlations ranged from small (F1 and F3) to medium (F4 and F5) to large (F2). F2 and F4 were highly statistically significant ($p < .01$), but only F2 was in the hypothesized direction.

Table 8
Standardized coefficients of the factors on final grade for females

	F1	F2	F3	F4	F5
Final grade	.174	-.587***	-.177	.394**	-.262

Note: $^{**}p < .01$, $^{***}p < .001$.

10 Two different models were tested for females and males separately, and both approaches provided excellent fits. The model discussed in this paper had the EFA results (five factors for females and four for males) as the explanatory variables and the final course grade as the outcome variable. The other model also had the EFA results as the explanatory variables but three grades (two progress check grades and one final grade), which together described a latent "grade" variable, as the outcome variable. We chose to discuss the model with one final course grade because this model is the most basic form and is informative for future studies that do not have progress check grades available.

In Table 9, the two factors that are statistically significant are highlighted in bold, and each factor is marked with the direction of its relationship to final grades (positive or negative). Negative relationships indicate factors that females feel are under their control while positive relationships indicate factors that they feel are less under their control or are more in the future.

Table 9
Factor descriptions for females

Factors	Description	Degree of controllability	# items
F1 (+)	Powerful others	Not controllable	6
F2 (-)	**Achievement (school-related)**	Controllable	6
F3 (-)	Achievement (general)	Controllable	4
F4 (+)	**Fate/chance**	Not controllable	7
F5 (-)	Social self-efficacy	Controllable	2

Here are examples of items included in each factor. They show that each item has an active/passive dimension, that some seem more controllable than others, and that the control may be near-term or in the future:

Powerful others (not controllable)

a. The average citizen can have an influence in government decisions.
b. This world is run by the few people in power, and there is not much the little guy can do about it.

Achievement (school-related) (controllable)

a. The idea that teachers are unfair to students is nonsense.
b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

Achievement (general) (controllable)

a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
b. Getting a good job depends mainly on being in the right place at the right time.

Fate or chance (not controllable)

a. Many of the unhappy things in people's lives are partly due to bad luck.
b. People's misfortunes result from the mistakes they make.

Social self-efficacy (controllable)

a. No matter how hard you try some people just don't like you.
b. People who can't get others to like them don't understand how to get along with others.

The fact that the relationship between School-related achievement (F2) and final grade is both strong and negative (-.587) suggests that females with lower (more internal) scores for this factor are more likely to have higher final grades and females with higher (more external) scores for this factor are more likely to have lower final grades. This is as hypothesized. On the other hand, the finding that the relationship between Fate/chance (F4) and final grades is strong and positive—that females with higher grades are likely to be external--was unexpected.

One explanation for the positive relationship between Fate/chance and final grades may lie in the distinction that Rotter made between defensive externals and true externals. Defensive externals are those who "still maintain striving behavior in clearly structured competitive situations but defensively account for failures by expressing external attitudes" (Rotter, 1966, p. 21; see also Levenson, 1981; Prociuk & Breen, 1975). In other words, although defensive externals have high external scores for some items relating to fate or chance, they nevertheless act internally when immediately necessary.

Males

With the final grade as the outcome, the model with four factors explained 45.5 percent of the variance in the final grade for males (i.e., R^2 = .455). As shown in Table 10, the size of the correlation ranges from small (F1) to medium (F4) to larger (F2 and F3). F2, F3, and F4 are statistically significant but only F3 is in the hypothesized direction:

Table 10
Standardized coefficients of the factors on final grade for males

	F1	F2	F3	F4
Final grade	.129	.513***	-.483***	.299*

Note: *$p < .05$, ***$p < .001$.

When we look at the content of each factor, we find that the male factors are similar to the female factors except that males lump together some items that the females separate. We also find that the direction of the relationship—positive or negative—is the same as the direction for females with the exception of F4, which combines items related to social self-efficacy and items relating to fate. These items are distinguished by having an "I" element, such as the following:

a. Many times I feel that I have little influence over the things that happen to me.

b. It is impossible for me to believe that chance or luck plays an important role in my life.

In Table 11, the statistically significant factors are again highlighted in bold and the direction of the relationship is shown with a plus or minus sign:

Table 11
Factor descriptions for males

Factors	Description	Degree of controllability	# items
F1 (+)	Powerful others	Not controllable	7
F2 (+)	**Fate/chance (non-specific)**	Not controllable	6
F3 (-)	**Achievement (school-related + general)**	Controllable	7
F4 (+)	**Fate/chance (includes social self-efficacy)**	Not controllable	5

For males, the relationship between Achievement (F3)—which combines the female's F2 and F3—and final grade was strong and negative (-.483), suggesting that males with lower (more internal) scores for this factor were more likely to have higher final grades and males with higher (more external) scores for this factor were more likely to have lower final grades. This is the same for females. In addition, the relationship between male's Fate/chance (F2) and changes in the final grade was positive for males as it was for females.

However, the relationship between the males' F4, which mixed items relating to social self-efficacy with items relating to fate or chance, and final grades was positive—more external scores were associated with higher grades—which was contrary to the relationship between the females' Social self-efficacy (F5) and their final grades. This suggests that another difference between males and females may be that males see aspects of social self-efficacy as relating to chance or fate, and therefore not controllable, while females feel that these are under their control. This is consistent with the argument made by Sherman, Higgs, and Williams (1997) that females focus more on interpersonal relationships than males.

SUMMARY

Our five factors for females and four for males fit this group very well. They show that the responses to the quiz explain a substantial amount of the variance in final grades—about 35 percent in the case of females and about 46 percent in the case of males. Our findings also suggest that if we want to use locus of control scores to identify those female students most at risk of not performing well in their courses, we need to focus on the two factors for females that are most significantly related to their outcomes—School-related achievement (F2) and Fate/chance (F4)—and look for those female

students who have higher (external) scores for the first and lower (internal) scores for the second. To identify those males most at risk of not performing well, we need to focus on the three factors for males that are most significantly related to their outcomes—Fate/chance (F2 and F4) and Achievement (F3)—and look for those male students who have lower (internal) scores for the first two and higher (external) scores for the second. For both males and females, this more nuanced approach should tell us more about the likelihood of their doing well or poorly in their courses than looking at total locus of control scores.

Tables 12 and 13 show the order of importance of the factors and the range of scores for each factor. The scores for each factor are different for males and females since the factors include different items depending on gender. In both cases, we need to recognize that this will identify most but not all of the students who are likely to succeed or be at risk because there are always a small number who are exceptions to the pattern.

Table 12

Factors by degree of importance in determining which females are at risk of not performing well

Factors	Description	Importance	Range	Look for…
F2 (-)	Achievement (school-related)	Very important	0-6	High scores
F4 (+)	Fate/chance	Very important	0-7	Low scores
F5 (-)	Social self-efficacy	Less important	0-2	High scores
F3 (-)	Achievement (general)	Not as important	0-4	High scores
F1 (+)	Powerful others	Not as important	0-6	Low scores

Table 13

Factors by degree of importance in determining which males are at risk of not performing well

Factors	Description	Importance	Range	Look for…
F2 (+)	Fate/chance (non-specific)	Very important	0-6	Low scores
F3 (-)	Achievement (school+general)	Very important	0-7	High scores
F4 (+)	Fate/chance (+social self-efficacy)	Important	0-5	Low scores
F1 (+)	Powerful others	Not as important	0-7	Low scores

THE REFLECTIONS

Using the locus of control quiz on its own would have made it an assessment that might have been useful to Pamoja Education as a course provider but would not have helped the students learn about learning online. It was therefore combined with prompts that were designed to help the students reflect on the quiz results as they applied to their online courses.

The first prompt asked the students if they felt their scores accurately reflected where they were on the continuum from external to internal locus of control, and if not, why or why not. Overall, 73 percent of the students agreed that their scores were accurate but this was much more likely to be those with highly internal scores (82 percent) than those with highly external scores (60 percent). This is perhaps not surprising for those with high internal scores since they had been told of the need for self-regulation in online learning, but it was more surprising for those with high external scores.

The degree of agreement can be seen from an analysis of their responses to the question that asked why or why not. As the scores moved from internal to external, the percentage of those who reported that factors beyond their control mattered more than factors within their control increased while the percentage of those who felt that individuals were responsible for their own actions or were shaped by a combination of personal agency and factors beyond their control decreased. Tables 14 and 15 show the contrast between those with highly internal and highly external scores:

Table 14
Responses of those with highly internal scores

Score	Personal control most important	Personal control and factors beyond control important	Factors beyond control most important
0	100%	0%	0%
1	100%	0%	0%
2	100%	0%	0%
3	100%	0%	0%
4	87%	13%	0%
5	90%	10%	0%
6	93%	7%	0%
7	89%	11%	0%

Table 15
Responses of those with highly external scores

Score	Personal control most important	Personal control and factors beyond control important	Factors beyond control most important
17	0%	22%	78%
18	0%	0%	100%
19	0%	33%	67%
20	0%	25%	75%
21	0%	0%	100%
22	0%	0%	0%
23	0%	0%	0%

Table 16 shows the shift in the mid-range scores:

Table 16
Responses of those with mid-range scores

Score	Personal control most important	Personal control and factors beyond control important	Factors beyond control most important
8	83%	83%	0%
9	82%	82%	0%
10	62%	62%	0%
11	21%	21%	5%
12	9%	9%	0%
13	3%	3%	3%
14	5%	5%	10%
15	12%	12%	16%
16	19%	62%	19%

Although those with scores on the internal end of the scale tended to agree with those scores, many tempered that agreement with thoughtful references to other factors. Here are three examples:

Indeed, I believe that my future is in my own hands and my actions are my responsibility. However there needs to be a balance between external force and internal force because not everything is in your control some things you just need to let go.

I have always believed in self-determination. Hard work will almost always get someone will they want to be. At the same time, one may know that they need to rely on themselves but not have the discipline to help themselves. Moreover, I do recognize that there are extreme external situations that can prevent even the most determined person in accomplishing their goals. Overall, however, my score does reflect my thinking.

I feel that my score accurately reflects where I am on the Internal/External gradient. While I generally believe that I can control my own life via my actions and efforts, I believe that, to some extent, my life's direction is influenced by outside forces.

This was even more the case with students who had scores in the middle range. They often referred to the balance between luck and hard work:

Yes. I believe that I have a balanced insight in internal/external locus control because sometimes. We as a human may try as hard as we can but still fail simply due to the fact that we weren't given the opportunity. Although on the other hand, sometimes when we try hard enough we can achieve what we want.

Yes, because I have never really believed that luck or chance governs what happens to me and I believe that if I work hard then I will do well. I also believe that sometimes you don't have a choice in some situations, and that is ok as long as you do the best you can under the circumstances.

Those with scores toward the external end tried to explain their results by referring to the role that luck or chance plays in life. Some were quite fatalistic:

I feel like many things that happen to me are out of my control to prevent. I think everything happens for a reason and you cannot secure your future. You can make plans but things don't always go the way you want them to go. For me it's all about luck.

I feel that there are many aspects of our lives that we are unable to control. Sometimes there are triggers for our emotions, and events that trigger strong emotions and opinions. To an extent people think that they have complete control over their lives, when in reality they do not.

I honestly believe that no matter how much preparation a student can take, something will always happen. The printer may break, you may not have had a good night's rest, the internet may crash, etc. Sometimes a student may prepare for everything and nothing bad will happen, but eventually your luck runs out because the universe is not predictable and sometimes accidents do happen.

Although there were fewer students who disagreed with their scores, they tended to be on the external end of the scale and to be quite adamant about their belief that they were misplaced:

I don't think this reflects me correctly because this doesn't determine how I view different situations. In reality I believe that I am responsible for my own success, NOT by luck.

My score does not reflect where I am on the continuum from external locus of control to internal locus of control. I believe I have a high internal locus of control because I believe I control my destiny. I believe that I am responsible for how I determine to go about learning. If I am not studying or taking learning seriously then that is my fault and no one else's.

Some argued with the quiz itself. These were particularly interesting because they articulated a potential problem with the dichotomy that is embedded in the Rotter scale:

I believe that my successes and failures are due to a combination of my actions and events and parameters I have no control over. My score was generated based on answers I gave to questions where I often did not agree with either of the options.

I feel my result was not entirely reliable as most of the questions were vague in detail and often had depended on their closer situational aspects.

Not really. I don't think a quiz can really tell what kind of control we have. I think many of us can have neither or both. Also the answers for the questions were very limited. I do not think this quiz could decide what kind of person we are. Personally, I like to think I have both.

In response to the follow-up question that asked the students if they felt that having an internal locus of control was an advantage for online learners, over 90 percent said it was—again, probably no surprise given the explanation we had given them for having the quiz. But their detailing of the reasons showed the extent to which they were thinking about what was needed to be a successful online learner:

I believe that a high internal locus of control can give one a good advantage in online learning because people who believe that their successes come from their actions and efforts will be able to motivate themselves more effectively and be proactive in their efforts.

I agree that having a high internal locus of control is an advantage for online learners because you're able to rely on yourself more and work independently to finish the weekly homework. You are also more responsible for your own success, so you have to learn how to manage your time wisely rather than doing everything last minute.

Yes I think having a high internal locus is an advantage because in an online course you simply cannot be too dependent on your teacher and much of the work is your own responsibility and you in fact are the one that needs to keep up with your homework and your progress instead of a teacher that will be chasing you around and therefore having a higher internal locus of control is good because generally this indicates you are more likely to look at what YOU can do better next time instead of thinking it is down to luck and I think on the long term this is beneficial for online learners.

IMPLICATIONS FOR PRACTICE

Introducing students to the concept of locus of control and then linking it to the ability to manage one's own learning in an unfamiliar environment seems a promising way to help students learn to learn online. Instruments like Rotter's, which indirectly assess a student's ability to self-regulate and are less easily manipulated than more direct questionnaires, also offer a promising approach.

This research leads us to a number of recommendations for those who are interested in giving a locus of control instrument to their students and using it both as a teaching tool and as a diagnostic for students at risk of not succeeding in their courses.

First, total scores will not sufficiently discriminate between those at risk and those not at risk. Factor analysis is necessary no matter what instrument is used. Even if our group of students is not representative of the general high school population--and the fact that they displayed the full range of scores and that their mean was close to that found in other studies makes it likely that they are--both the factors and the content of each factor are likely to differ slightly from group to group, so it is not sufficient to simply apply the factors proposed by an instrument's designer.

Second, where there are multiple factors, it is likely that some will be more directly related to course success than others—as academic success and belief in fate or chance were for our group of online students. We suspect that this will be the case for other groups of high school students, but we need additional studies to confirm this. In any case, it is the most salient factors that should be the focus when looking for students in need of support.

Third, gender differences are large enough that gender must always be taken into consideration.

Finally, there is still an issue regarding confidentiality: we assured the students that their scores were for them alone and suspect that this makes it more likely that they will both respond and do so honestly—but this means that the scores cannot be passed along as a basis for action. Those who want to use the results of these instruments as a diagnostic will need to work out how to identify students in need of support, possibly by looking at those who score within a range (very high, very low, etc.) on the relevant factors. In addition, students need to be told if, and how, their scores will be used.

Using the instrument as a diagnostic was only one part of this effort, however. We also wanted to make it useful to the students themselves. Students come to online courses with many unexplored assumptions about what online learning is like. It was important to give them an opportunity to reflect on what the results meant, not in general but in terms of online learning. Integrating the locus of control instrument as part of a small curricular intervention seems to have been a successful way to achieve that goal.

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APPENDIX I
ROTTER'S I-E LOCUS OF CONTROL ITEMS

(The six filler items are indicated by strike-outs.)

~~1. a. Children get into trouble because their parents punish them too much.~~
~~b. The trouble with most children nowadays is that their parents are too easy with them.~~

2. a. Many of the unhappy things in people's lives are partly due to bad luck.
b. People's misfortunes result from the mistakes they make.

3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
b. There will always be wars, no matter how hard people try to prevent them.

4. a. In the long run people get the respect they deserve in this world.
b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5. a. The idea that teachers are unfair to students is nonsense.
b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. a. Without the right breaks one cannot be an effective leader.
b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7. a. No matter how hard you try some people just don't like you.
b. People who can't get others to like them don't understand how to get along with others.

~~8. a. Heredity plays the major role in determining one's personality.~~
~~b. It is one's experiences in life which determine what they're like.~~

9. a. I have often found that what is going to happen will happen.
b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
b. Many times exam questions tend to be so unrelated to course work that studying in really useless.

11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
b. Getting a good job depends mainly on being in the right place at the right time.

12. a. The average citizen can have an influence in government decisions.
b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. a. When I make plans, I am almost certain that I can make them work.
b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

~~14. a. There are certain people who are just no good.~~
~~b. There is some good in everybody.~~

15. a. In my case getting what I want has little or nothing to do with luck.
b. Many times we might just as well decide what to do by flipping a coin.

16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
b. By taking an active part in political and social affairs the people can control world events.

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
b. There really is no such thing as "luck."

~~19. a. One should always be willing to admit mistakes.~~
~~b. It is usually best to cover up one's mistakes.~~

20. a. It is hard to know whether or not a person really likes you.
b. How many friends you have depends upon how nice a person you are.

21. a. In the long run the bad things that happen to us are balanced by the good ones.
b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. a. With enough effort we can wipe out political corruption.
b. It is difficult for people to have much control over the things politicians do in office.

23. a. Sometimes I can't understand how teachers arrive at the grades they give.
b. There is a direct connection between how hard I study and the grades I get.

~~24. a. A good leader expects people to decide for themselves what they should do.~~
~~b. A good leader makes it clear to everybody what their jobs are.~~

25. a. Many times I feel that I have little influence over the things that happen to me.
b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. a. People are lonely because they don't try to be friendly.
b. There's not much use in trying too hard to please people, if they like you, they like you.

~~27. a. There is too much emphasis on athletics in high school.~~
~~b. Team sports are an excellent way to build character.~~

28. a. What happens to me is my own doing.
b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. a. Most of the time I can't understand why politicians behave the way they do.
b. In the long run the people are responsible for bad government on a national as well as on a local level.

Score 1 point for each of the following external choices:

• 2a	• 11b	• 21a
• 3b	• 12b	• 22b
• 4b	• 13b	• 23a
• 5b	• 15b	• 25a
• 6a	• 16a	• 26b
• 7a	• 17a	• 28b
• 9a	• 18a	• 29a
• 10b	• 20a	

APPENDIX II
DETAILED ANALYSES OF QUIZ RESULTS

Table 1

Rotter's I-E Scale: Percent making internal choices for each item by gender[11]

Item	All	% Female	% Male	Item	All	% Female	% Male
# 1	-	-	-	# 15	73%	70%	78%
# 2	76%	74%	78%	# 16	82%	83%	80%
# 3	24%	25%	21%	# 17	52%	52%	53%
# 4	48%	47%	49%	# 18	29%	26%	33%
# 5	45%	45%	46%	# 19	-	-	-
# 6	63%	63%	62%	# 20	23%	19%	28%
# 7	23%	20%	27%	# 21	52%	52%	41%
# 8	-	-	-	# 22	61%	61%	57%
# 9	55%	49%	64%	# 23	34%	34%	35%
# 10	73%	72%	74%	# 24	-	-	-
# 11	77%	78%	75%	# 25	56%	56%	48%
# 12	50%	48%	51%	# 26	68%	68%	62%
# 13	61%	60%	62%	# 27	-	-	-
# 14	-	-	-	# 28	30%	30%	22%
				# 29	51%	51%	41%

Table 2

Comparison of statistically significant items for females

Items
Factor 1 – 3, 4, 12, 17, 22, 29
Factor 2 – 4, 5, 10, 13, 23, 28
Factor 3 – 11, 15, 16, 20
Factor 4 – 2, 9, 18, 20, 21, 25, 29
Factor 5 – 7, 26

11 Note that Rotter reported that he designed the instrument to contain only items that he expected would be chosen by at least 15 percent of respondents (Rotter, 1975).

Table 3
Comparison of statistically significant items for males

Items
Factor 1 – 3, 12, 17, 18, 21, 22, 29
Factor 2 – 2, 11, 15, 16, 18, 28
Factor 3 – 4, 5, 6, 9, 10, 15, 25
Factor 4 – 7, 9, 20, 26, 28