Original Research Article

Grit In Online Education

ABSTRACT

Aim: This study sought to explore the role of the elusive non-cognitive skill set known as grit, or the resolve and determination to achieve goals regardless of impediments, on student success in online education. It represents an area of exploration where there is a dearth in the available literature and reports the results of a study conducted at a Mid-Atlantic minority-serving university that examined the relationship between grit and student performance in fully online courses.

Methodology: Students were administered the standard 12-Question Grit Scale with the addition of a series of validated questions that sought to measure perceived self-learning efficacy. Additionally, student performance in online courses were recorded and correlations conducted. Basic statistical analyses such as mean, mode, standard deviation, variance, and confidence interval were calculated. Two hypotheses were introduced as part of this study and tested with Anovas and crosstabulations.

Results: According to the findings, where all p values were greater than .05, there is a direct positive correlation between grit score and both self-discipline and perceived learning self-efficacy. Additionally, higher grit scores were found to correspond progressively to more successful performance in online classes.

Conclusion: The implications of this study are that grit and self-discipline play a significant role in student success in online education, raising the question as to whether students should be vetted for grittiness before enrolling in online programs or courses, and/or whether grit can, and should, be taught as a skill set prior to students undertaking an online course of study?

Keywords: grit, online education, grit in distance education, self-regulation, assessment in e-learning, lifelong learning

INTRODUCTION

Not all success can be attributed simply to talent and opportunity. Rather, self-regulation and resilience can play a major role in determining ones achievement. Grit is defined as the persistence and perseverance to achieve goals; more specifically, it is the “tenacious” long-term pursuit of goals despite setbacks and obstacles (Duckworth & Gross, 2014). Grit is a skill set associated with life-long learning and educational success and attainment (Duckworth & Quinn, 2009) as well as professional achievement (Vallerand, Houlfort, & Forest, 2014). Further, a number of studies have shown that grit can serve as a predictor of success (Buzzetto-Hollywood, 2017; Eskreis-Winkler, L., Duckworth, A.L., Shulman, E., & Beal, S., 2014; Duckworth et al, 2007; Duckworth & Quinn, 2009; Goodwin and Miller, 2013).

Self-discipline and self-regulation are consistently associated with grit (Buzzetto-Hollywood, 2017; McClendon, Neugebauer, & King, 2017) and when examined in terms of academic outcomes, self-regulation has been shown as being the best predictor of academic performance over any other single aspect of personality or temperament (Duckworth, &Allred, 2012). Self-regulated learning speaks to students as individuals who have the ability to self-pace and complete assignments on their own. They have the ability to evaluate and function within academics and work through issues that might serve as a deterrent to success (Wolters & Hussain, 2015).

Students, who are defined as grittier, tend to also align with being mastery goal oriented. Mastery goal oriented students have a focus on acquiring knowledge and self-improvement (Park et al, 2018). Being mastery goal oriented and focused on self-improvement also relates to growth mindset. Growth mindset is the belief that cognitive capabilities are not fixed but rather can be developed through hard work and dedication (Dweck, 2018). It is generally believed that one can have a growth mindset without being gritty; however, it is impossible to have grit without first developing a growth mindset (Duckworth, 2016; McClendon, Neugebauer, & King, 2017).

There is a relatively new, small, and compelling body of research that is examining the role of non-cognitive factors such as grit, mindset, and self-regulation and their impact on student success in online education. Why link grit to online learning? It is believed that grit and self-determination may be traits that contribute to student success in online education (Bawa, 2016; Buzzetto-Hollywood, 2017; McClendon et al., 2017).

As of 2014, one in seven (14%) higher education students in the United States was completing their studies wholly online with 85% of all students taking at least some of their classes online (Allen, Seaman, Poulin, & Straut, 2016). Online enrollments climbed between 2011 and 2016 while traditional on-campus enrollments decreased (Allen et al., 2016). Online education, quite simply, continues to increase in popularity giving a broad and diverse population access to higher education; however, despite its growth, online education is plagued by low retention rates (Gering, Sheppard, Adams, Renes, & Morotti, 2018). At the course level, studies have consistently found online course completion rates to be much lower than the rates for face-to-face courses (Boston, Ice, & Gibson, 2011; Gerring et al., 2018).

The discussion of grit as it applies to online education is still relatively new; however, positive relationships continue to be discovered (Buzzetto-Hollywood, 2017). Further, studies are reporting that when grit is present in e-learning, learners are found to be able to 1) overcome obstacles, 2) learn from mistakes, 3) express passion for learning, 4) exhibit self-control, 5) achieve long-term goals, and set high standards (Pappas, 2016).

Online education often employs a constructivist methodology (Buzzetto-More, 2007) where learners have to be self-directed in order to make discoveries, solve problems, and build self-knowledge (McClendon, Neugebauer, & King, 2017). Students who lack self-regulation and self-discipline may struggle in online courses quickly losing the motivation to succeed (Bawa, 2016; McClendon et al., 2017). Academic success in e-learning requires that students exhibit strong self-regulation (McClendon et. Al, 2017) with students better at self-regulation found to have more learner presence defined as planning, monitoring, adapting, and reflecting strategies in online learning environments (Shea, Hayes, Smith, Vickers, Bidjerano, Gozza-Cohen, & Tseng, 2013).

Using a sampling of university students, a paper published in Computers in Human Behavior (Aparicio, Bacao, & Oliveira, 2017) found that grit was indeed a determinant of e-learning success with positive effects on both learner satisfaction and performance in e-learning environments. More specifically, after exploring the perceptions and experiences of 383 university students they concluded that grit, information quality, system quality, and service quality have significant impacts on e-learning satisfaction. Further, grit was found to correspond directly to perseverance effort and consistency of interest and that “grit is a statistically significant determinant of e-learning system satisfaction (p. 16).”

Gerring et al. (2018) conducted a three phase study where they looked at the enrollments across four years in online courses then gave an assessment of perception and non-cognitive attributes to a sample of 257 students, and conducted personal interviews with a subset of 12 students who had completed the initial survey and assessment. They found that non-cognitive factors such as the ability to teach one’s self, student initiative, and time management were significant factors in online student success.

Not all studies have found positive correlations between grit and student success in online education. Phillips-Martinez (2018) examined the role of grit, mindset, and gender and whether they were predictors of student success in an online high school course. The results of the study did not find a significant difference in student grade when organized by grit, mindset, or gender categories.

McClendon et al (2017) introduced a set of deliberate practices for building grit and growth mindset in online education. The five steps in the process include:

1) Identifying an exemplar of effectiveness,
2) Setting high, yet realistic, expectations,
3) Engaging in focused and targeted practice,
4) Providing detailed formative assessment feedback, and
5) Reflection, observation, and communications.

While McClendon et al (2017) have not tested the success of these specific practices, they do offer them as a potential solution to mindfully improve retention in online education. In fact, they posit that grit and growth mindset are attributes that encourage students to earn higher grades, exhibit stronger focus, stay enrolled, and persist in online education and that incorporating teaching strategies that foster grit will help improve retention and graduation rates in online programs.

The examination of grit and online education is still in its infancy. The study presented in this paper is designed to fill some of the major gaps in the existing literature and purports to move the discourse forward in a meaningful manner by examining the correlation between grit score and student success in online courses via a multi-phased study conducted at a mid-Atlantic minority-serving university.

METHODOLOGY

Founded in 1886, the University of Maryland Eastern Shore (UMES) is a Historically Black, 1890 land grant institution. It is a member of the University system of the State of Maryland and primarily serves first generation, low income, and minority learners. The student population is approximately 3400, as of the fall of 2016, with a student body that is approximately 78% African American, 9.6% white, 1.4% Hispanic, and 11% international, primarily coming from the continent of Africa and/or from the Caribbean region. The gender distribution of the University is 64% female and 36% male. The freshmen-to-sophomore retention rate is 71%, and the graduation rate is 41%. The student to faculty ratio is 15 to 1 and 85% of students receive financial aid.

UMES has a couple of fully online degree programs; however, the vast majority of traditional on-campus students will elect to complete a portion of their courses online. All students included in this study were enrolled in traditional campus-based programs of study and had elected to enroll in fully online versions of courses that were also offered in-person.

For quality assurance, all online courses at UMES are evaluated according the standards set forth by the Quality Matters Rubric. The Quality Matters Rubric is set of eight General Standards and 43 Specific Review Standards used to evaluate the design of online courses. The Rubric has a scoring system used to determine whether a course meets “Standards”. Using a peer-review process applying the rubric, online courses are evaluated within the first few terms of being taught. All courses included in this study had previously passed through the online review process.

The study presented in this paper was initiated in the Spring of 2016 in the School of Business and Technology at the University of Maryland Eastern Shore. The courses selected for inclusion in this study included BUAD 200Online: Business Ethics and BUAD 233Online: Business Communications. Both courses utilized an e-book with the course designed around 5 units. Each unit required active participation in online discussions, quizzes, practice exercises, video and PowerPoint learning resources, and cases studies and/or assignments graded with rubrics. An assessment and remediation system provided by the textbook publisher was employed for the delivery of quizzes and there were instructor developed constructivist course projects also incorporated into the instructional process.

During the first phase, students enrolled in the selected fully online courses were administered the standard 12-Question GRIT Scale with the addition of a series of validated questions that sought to measure student learning behaviors, attitude, and perceived self-learning efficacy. The supplemental

questions were reviewed by a group of experienced researchers and piloted with a small sample of 30 students prior to being administered. Both the 12 Grit-Scale questions and the perceived leaning self-efficacy questions were placed in the form of an online survey instrument that was delivered through the Survey Monkey system. Upon completion of the study the data was exported and appropriately evaluated with descriptive and inferential statistical analyses performed.

Phase 1 of this study, conducted in the Spring and Fall of 2016, was completed by 160 students representing a response rate of >85%. During the second phase, performed in 2017, the grades and actual course performance of a random sample of 60 students who had participated in phase 1 of the study were examined and their grades for the term recorded. In 2018, all of the data was analyzed and basic statistical analyses such as mean, mode, standard deviation, variance, and confidence interval were calculated. Anovas and crosstabulations to explore relationships and test hypotheses were also conducted.

Two hypotheses were introduced as part of this study and tested as follows:

H_1- There is a correlation between Grit score and being academically self-disciplined.

Self-discipline and self-regulation are shown in the research to be the best predictor of academic performance over any other single aspect of personality or temperament (Duckworth, &Allred, 2012). A student exhibiting self-discipline has the ability to control one's feelings and overcome weaknesses in order to stay on task in order to pursue goals in the face of temptation. As such, self-discipline is often considered the most relevant aspect of grit in terms of success in online education and therefore was specifically the focus of hypothesis one.

This hypothesis was measured with responses to a five-point Likert scaled statement “I am self-disciplined when it comes to my studies” whereas a summative pivot table and an Anova were conducted to compare the results to that statement and to participant grit scores. Additionally, pivot tables were prepared with respect to the statement “I am self-disciplined when it comes to my studies” and three of the specific items on the 12 item grit assessment which included “I am a hard worker”, “I finish what I begin” and “I am diligent”. Finally, a pivot table was employed to explore the relationship between student’s belief that they are self-disciplined when it comes to their studies and their agreement to the statement “I can learn by working independently”.

H2- There is a correlation between Grit score and performance in online classes.

This hypothesis considered a random sample of 60 individuals who had completed the grit assessment and additional self-perception questions. It was measured by comparing student grit scores to their end of term grades. Additionally, responses to a five-point Likert scaled statement “I have the skills to be successful online” were considered relative to grit score via a pivot table.

RESULTS

During the first phase of the study, 160 students completed an online survey that was sent to them at the start of the academic term via an email with a direct link with a response rate of >85%. The respondents were 61% female and 49% male which is reflective of the gender distribution of the larger institution. With respect to academic classification 0.63% of respondents were freshmen, 20.89% were sophomores, 37.97% were juniors, and 40.51% were classified as seniors. Information regarding the participants age was also collected whereas 76.73% of respondents were 18-22, 18.24% of respondents were 23-29, 3.14% were 30-39, and 1.89% were over 40 years of age.

The 12-item Grit assessment developed by Duckworth, Peterson, and Matthews (2007) was utilized as part of the study. It is comprised of a series of statements where participants were asked to note their level of agreement via a five point scale that includes “very much like me” to “not like me at all.” The data was analyzed with mean, standard deviation, mode, variance, and confidence level at 95% calculated.

These results are presented in Table 1. Additionally, and as is customary, the findings of the 12-item assessment were used to calculate a single grit score with results that are depicted in Table 2 and which demonstrate an overall mean score of 3.75, a standard deviation of 0.522, a variance of 0.272, and a confidence interval at 95% of 0.034.

Table 1: Results of 12-Item Grit Assessment

N=160	New ideas and projects sometimes distract me from previous ones	My interests change from year to year.	I often set a goal but later choose to pursue a different one.	I become interested in new pursuits every few months.	New ideas and projects sometimes distract me from previous ones6	I have difficulty maintaining focus on projects that take more than a few months to complete
Mean	3.47	3.37	3.47	3.65	3.52	2.70
Standard Dev.	1.000	0.963	0.971	0.998	1.081	1.280
Mode	3	4	3	4	3	2
Variance	0.999	0.927	0.943	0.997	1.168	1.637
Confidence	0.064	0.062	0.062	0.064	0.069	0.082
N=160	I have overcome setbacks to conquer an important challenge.	Setbacks don't discourage me	I am a hard worker	I finish whatever I begin	I have achieved a goal that took years of work.	I am diligent.
Mean	4.14	3.62	4.2	4.16	4.12	4.32
Standard Dev.	1.018	1.174	0.799	0.799	1.030	0.759
Mode	5	5	5	5	5	5
Variance	1.037	1.378	0.638	0.639	1.060	0.576
Confidence	0.065	0.075	0.051	0.051	0.066	0.049

Table 2: Grit Score

N=160	*Overall Results of the 12 Question Grit Assessment*
Mean	*3.75*
Standard Deviation	*0.522*
Variance	*0.272*
Confidence @95%	*0.034*

H1- There is a correlation between Grit score and being academically self-disciplined.

Evaluation of this hypothesis started with responses to a five-point Likert scaled statement "*I am self-disciplined when it comes to my studies*" where one equaled not at all like me and five equaled very much

like me. The results are reported in Table 3 and present a mean of 3.92, a standard deviation of .8978, a mode of 4, and a confidence interval at 95% of 0.144.

Table 3: Self-Discipline.

N=159	*I am self-disciplined when it comes to my studies.*
Mean	*3.92*
Standard Deviation	*0.8978*
Mode	*4*
Variance	*0.8061*
Confidence @95%	*0.144*

A crosstabulation was conducted and a summative pivot table generated that is presented in Table 4. The table shows that as agreement with the statement "*I am self-disciplined when it comes to my studies*" increased so did participants average grit scores with a mean of 3.00 for students who responded "not at all like me", a mean grit score of 3.22 for students who selected "not much like me", a mean grit score of 3.51 for students who selected "somewhat like me", a mean grit score of 3.81 for students who responded "mostly like me", and a mean grit score of 3.95 for students who choose "very much like me."

Table 4: Grit Score and Self Discipline

I am self-disciplined when it comes to my studies.	*Avg. Grit Score*
Not At All Like Me	3.00
Not Much Like Me	3.22
Somewhat Like Me	3.51
Mostly Like Me	3.81
Very Much Like Me	3.95

An Anova was used to explore the relationship between grit score and self-discipline. An Anova determines whether there are any statistically significant differences between the means of groups. The Anova conducted in conjunction with hypothesis one examined grit score and student responses to the statement "*I am self-disciplined when it comes to my studies*". These results are displayed in Table 5 and present a P value that is greater than .05.

Table 5 ANOVA: Grit Score & Statement I am self-disciplined when it comes to my studies.

	SS	df	MS	F	P
Between:	1.407	1	1.407	2.609	0.108
Within:	115.371	214	0.539		
Total:	116.778	215			**P=.05**

A pivot table series were also prepared with respect to the statement *"I am self-disciplined when it comes to my studies"* and three of the specific items on the 12 item grit assessment which included *"I am a hard worker", "I finish what I begin"* and *"I am diligent".* These findings are presented in Table 6 and indicate a positive relationship between a student's belief that they are academically self-disciplined and also a person who finishes whatever they begin, diligent, and a hard worker.

Table 6: Self Discipline and Aspects of Grit

I am self-disciplined when it comes to my studies.	*Avg. of I finish whatever I begin*
Not At All Like Me	3.4
Not Much Like Me	3.5
Somewhat Like Me	3.51
Mostly Like Me	3.81
Very Much Like Me	4.19
I am self-disciplined when it comes to my studies.	*Avg. of I am diligent*
Not At All Like Me	3.2
Not Much Like Me	4
Somewhat Like Me	4.1
Mostly Like Me	4.32
Very Much Like Me	4.71
I am self-disciplined when it comes to my studies.	*Avg. of I am a hard worker*
Not At All Like Me	2.0
Not Much Like Me	3.8
Somewhat Like Me	4.19
Mostly Like Me	4.46
Very Much Like Me	4.78

Finally, a pivot table was prepared to look at the relationship between student responses to the statement *"I am self-disciplined when it comes to my studies"* and the statement *"I can learn by working independently"* which had a mean of 3.86, a standard deviation of 0.981, a mode of 4, a variance of 0.962, and a confidence interval at 95% of 0.063. The results are displayed in Table 7 and depict a slight correlation between the belief that one is self-disciplined and the belief that one can work independently.

Table 7: Self Discipline and Ability to Work Independently

I am self-disciplined when it comes to my studies.	*Avg. I can work independently*
Not At All Like Me	2.00
Not Much Like Me	3.8
Somewhat Like Me	3.23
Mostly Like Me	3.90
Very Much Like Me	4.39

H2- There is a correlation between Grit score and performance in online classes.

Evaluation of this hypothesis started with responses to a five-point Likert scaled statement "*I have the skills to be successful in online classes*" where one equaled not at all like me and five equaled very much

like me. The results are reported in Table 8 where the analyses .of the data found a mean of 4.36, a standard deviation of .8758, a mode of 5, a variance of .7670, and a confidence interval at 95% of 0.0563.

Table 8: I have the skills to be successful online

N=158	*I have the skills to be successful in online classes*
Mean	*4.36*
Standard Deviation	*0.8758*
Mode	*5*
Variance	*0.7670*
Confidence @95%	*0.0563*

A summative pivot table was generated that shows that as agreement with the statement "*I have the skills to be successful in online classes*" increased so did participants average grit scores. These results are presented in Table 9 whereas students who responded "not at all like me" had a mean grit score of 3.083, students who responded "not much like me" had a mean grit score of 3.51, students who responded "somewhat like me" had a mean grit score of 3.47, students who responded "mostly like me" had a mean grit score of 3.56, and students who responded "very much like me" had a mean grit score of 3.95.

Table 9: Grit Score and Self-Perception of One's Success in Online Courses

I have the skills to be successful in online classes	*Avg. Grit Score*
Not At All Like Me	3.083
Not Much Like Me	3.517
Somewhat Like Me	3.472
Mostly Like Me	3.560
Very Much Like Me	3.955

A random 60 student sample from participants who had completed Phase 1 of the study was selected and these respondents' grit scores were compared to the student's actual performance in the online course in which they were enrolled. Both pass fail rates and final letter grades for the term were considered. The results are presented in Table 10 and show that higher grit scores correlate positively to student success in the online class in which they were enrolled.

Table 10: Grit Score and Student Performance

Grade	Avg. Grit Score
F	3.03
D	3.36
C	3.65
B	3.84
A	4.08

An Anova was also conducted to determine whether there are any statistically significant differences between the means of groups and explored in terms of grit score and student grades in online classes. These results are depicted in Table 11 and present a P value that is greater than .05.

Table 11: ANOVA: Grit Score & Course Performance					
	SS	df	MS	F	P
Between:	1.445	1	1.445	1.631	0.20
Within:	139.933	158	0.886		
Total:	141.378	159			**P=.05**

DISCUSSION OF FINDINGS

Hypothesis one sought to examine the relationship between grit and perceived academic self-discipline, with self-discipline recognized as a key component of grit. The 12 item Grit assessment was employed to measure students' grit with a number of additional validated questions added. Included among these additional questions was a Likert-scaled question that asked students to self-report whether they are self-disciplined in their academic studies. A cross tabulation and an Anova were performed on the data. Based on the findings of the cross tabulation which is depicted in this paper as a pivot table, a positive correlation was found whereas as students' strength of agreement in perceived self-discipline increased, so did their grit score. An Anova with P>.05 further confirmed this relationship. Additionally, pivot tables were prepared to look at perceived academic self-discipline and such aspects of grit as being a hard worker, finishing what one begins, and being diligent with positive correlations indicated. Finally, a pivot table was prepared in order to consider the relationship between students' perceived self-discipline and their perceived ability to work independently with a small positive relationship also indicated. The data reviewed has affirmed Hypothesis one "*There is a correlation between Grit score and being academically self-disciplined.* " These findings are consistent with what has been reported in the literature in particular Duckworth and Allred (2012); Eskreis-Winkler et al. (2014); Goodwin and Miller (2013); McClendon et al (2017); Pappas (2016); and Wolters and Hussain (2015).

Hypothesis two examined the relationship between grit and student performance in fully online courses. Evaluation of this hypothesis started with responses to a five-point Likert scaled statement "*I have the skills to be successful in online classes*" designed to consider students' self confidence in their ability to be successful in online courses. A pivot table showed a slight correlation between students' grit scores and strength of agreement to the statement under consideration. Next, a random sample of 60 students who had participated in phase one of the study were considered and their actual course performance relative to their grit scores analyzed. A pivot table showed a direct positive correlation between higher grit scores and higher letter grades. Further, an Anova was conducted and a P>.05 was achieved. These findings are considered to serve as positive affirmation of Hypothesis 2 "*There is a correlation between Grit score and performance in online classes"* and are consistent with the limited findings that have been reported in the literature to date that have sought to specifically examine grit score and student success in online education including Aparicio, Bacao and Oliveira (2017); Buzzetto-Hollywood (2017); Cross (2014); and Gerring et al. (2018).

The implications of this study are that grit and self-discipline play a significant role in student success in online education raising the question as to whether students should be vetted for grittiness, self-discipline, and perhaps even mindset before enrolling in online programs or courses, and/or whether grit and growth mindset can, and should, be taught as a skill set prior to students undertaking an online course of study? There have been studies that have found that mindset interventions are successful at increasing the academic performance of students (DeBacker, Heddy, Lopez-Kershen, Crowson, Looney, & Goldman, 2016; Dweck, 2018; Paunesku, Walton, Romero, Smith, Yeager, & Dweck, 2015) and that these types of interventions are inexpensive and efficient (Dweck, 2018). Unfortunately, there is little available research specific to mindset interventions and their success with students enrolled in online higher education. In terms of evaluating students' grittiness and/or mindset prior to enrolling in online education, there are a

number of institutions of higher education such as UNC Chapel Hill, California State University Stanislaus, Portland State University, Loyola University New Orleans, and Texas Wesleyan University that while they do not measure grit, have implemented self-assessments for students designed to help students evaluate their e-learning readiness (Hanley, 2013). While no instrument can definitively predict success in online education, the goal of these self-assessments are to help student evaluate their strengths and weaknesses and determine both their readiness as well as steps that they might take to help them increase their likelihood of e-learning success.

The authors of this study are currently looking to develop, or adopt, a functional model for delivering a mindset intervention in online higher education courses that is specifically designed to increase students' grittiness the goal of which will be improved student outcomes. The authors believe that such a model may be particularly effective with at-risk learners and first-generation college students.

LIMITATIONS

The greatest limitation of this study is that is focused exclusively on students attending a single institution. However, at the same time, this study provides research on a population that is expanding in numbers in higher education and that many educators, and much research, reports as being under-prepared for academic success (Buzzetto-Hollywood, Wang, Elobeid, & Elobaid, 2018; Adams, 2012). The study presented in this paper is designed to fill some of the major gaps in the existing literature and purports to move the discourse forward in a meaningful manner.

CONCLUSION

As online education continues to grow, providing opportunities to foster and strengthen student success in online courses and programs is increasingly important. E-learning success requires that students exhibit strong self-regulation, self-discipline, resilience, dutifulness, conscientiousness, and low impulsivity all of which are attributes of grit. As such, grit is presented as a promising area of exploration for increasing student achievement in online education. This study, conducted at a mid-Atlantic minority-serving institution, found that higher grit scores correlated progressively to both self-discipline and positive student achievement in fully online courses. It marks a meaningful contribution to a body of literature that is still in its infancy and where a dearth of available studies can be found. It is the goal of the authors of this paper that this study will encourage, and inspire, more studies that explore the role of grit and student success in online education.

COMPETING INTERESTS

No competing interests exist.

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