

USING AN ONLINE ASSESSMENT TO EXAMINE ENTREPRENEURSHIP STUDENT TRAITS AND TO MEASURE AND IMPROVE THE IMPACT OF ENTREPRENEURSHIP EDUCATION

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ABSTRACT

This paper concerns Entrepreneurial Education and the application of an online assessment tool to benefit student selection, retention, and development and to also measure and improve entrepreneurship curriculum success. Through the use of an innovative testing and mentoring approach, it is hypothesized that universities can assist students in becoming self-aware of their unique entrepreneurial traits and then, facilitate the development of skills required for future success. This paper reviews initial student-reporting data at Western Carolina University (WCU) and draws conclusions on whether entrepreneurship students differ from other students in both personality and skill traits and also discusses the implications of these results for measurement and enhancement of university entrepreneurship programs.

Findings indicate there are distinct differences in the traits of entrepreneurship students compared to other majors and these differences have implications for how to best market and position entrepreneurship programs as well as potential consequences for how to structure and deliver curriculum content. Initial results show the Entrepreneurial Mindset Profile can be an effective assessment tool and indicate that the Western Carolina University Entrepreneurship course curriculum results in improvements in student entrepreneurial skills in two categories, execution, and optimism.

INTRODUCTION

Entrepreneurship is a driving force in the economy. It creates innovation and productivity growth. New businesses account for nearly all new jobs in the economy, with companies less than a year-old averaging 1.5 million new jobs per year for the past three decades (Wiens and Jackson 2015). Along with economic importance, entrepreneurship has become socially relevant, with movies about entrepreneurs (e.g., *The Social Network*) and TV shows regarding entrepreneurs and entrepreneurship (e.g., *The Profit* and *Shark Tank*).

Given its economic and social impact, entrepreneurship has become the fastest growing field of study within collegiate academics. According to a recent report published by the Kauffman Foundation, in 1985, approximately 250 college courses taught entrepreneurship (Torrance and Ruach 2013). This number exploded, and by 2008, 5,000 such courses were offered at two and four-year institutions in the U.S., with over 400,000 students enrolled in entrepreneurship classes each year (Guilles 2015).

Students entering the field of entrepreneurship seek to obtain the necessary skills required for success, and universities have responded with a plethora of programs. This increase in entrepreneurship education is important since higher levels of education relate to an increased

propensity to start businesses and to improved entrepreneurial success (Wiens and Jackson 2015). However, with so many course offerings, how can one ensure entrepreneurship content meets the needs of students and, also, best helps students understand personal strengths and knowledge weaknesses to assist in their growth as future entrepreneurial leaders?

It is with this question in mind the authors sought to determine if a statistically valid assessment instrument existed for use at Western Carolina University (WCU), one that would help students progress toward becoming better-prepared entrepreneurs as well as serve as a mechanism to evaluate and improve the Entrepreneurship program. The Entrepreneurial Mindset Profile (EMP) assessment tool was selected to enhance the scope and effectiveness of the WCU Entrepreneurship program through value-added entrepreneurial instruction, feedback, and action.

LITERATURE REVIEW

There is an underlying assumption that education in general and entrepreneurship instruction, in particular, builds intellectual capital that benefits entrepreneurs when starting businesses. Studies support this belief. Jo and Lee (1996) find an entrepreneur's education is correlated with business profits, but not with growth. Broström and Baltzopoulos (2013) take a broader view and conclude that higher education correlates with both improved success and improved survival. The benefit of higher education comes not just from better skills and knowledge, but also from building a local business network of people from the same institution.

There is conflicting evidence, however, for the assumption of the positive impact of education on entrepreneurial success. Davidsson & Gordon (2012) conducted a meta-analysis of entrepreneurship studies using panel data. While their focus is on methodological issues to help design better future studies, they report that only seven of the fifty-three studies examined showed a positive impact of education on entrepreneurial outcomes.

In these studies, the focus is on overall educational attainment rather than specific entrepreneurship teaching and instruction. While research comparing the impact of general and entrepreneurship education does not appear to exist, there are individual studies and meta-analyses on the impact of entrepreneurship education on entrepreneurial outcomes. In general, entrepreneurship education correlates with entrepreneurial success; although, different studies find different implications. Chrisman et. al. (2012) believe that entrepreneurship education is related to new venture launch, but not to performance. However, Rideout and Gray (2013) and Martin et. al. (2013) find that entrepreneurship education leads both to more startups and to entrepreneurial success. Also, Martin et. al. (2013), found the type of teaching matters, with a theoretically-based instruction associated with a larger, positive impact than entrepreneurship training.

Others have sought to define a framework for entrepreneurship education. Ghina et. al. (2015) propose a model with the goals of providing a basis for systematic research into entrepreneurship education combined with a structure for delivering effective entrepreneurship education. On one "end" of this framework are student recruitment and selection, while on the other end is assurance of learning. In between are the entrepreneurship program itself, the curricula, faculty, and staff, and the infrastructure to deliver content.

There is also evidence that active pedagogies improve entrepreneurship content delivery. Tan and Ng (2006) argue that a problem-based learning approach to entrepreneurial education can be effective. Jones and English (2004, p. 416), cite a growing literature on entrepreneurship education that favors active (experiential) learning over lecture-centered, passive learning. Heinonen and Poikkijoki (2006) recommend using an entrepreneurial approach to teaching

entrepreneurship education, meaning students should learn by “doing.”

The idea that experiential learning improves outcomes is not unique to entrepreneurship, but it is not without debate. Gosen and Washbush (2004) review experiential learning effectiveness, and they conclude studies show it is effective. However, they believe these studies are not well designed, so the results are not conclusive. Norman and Schmidt (2016) add that problem-based learning is not the panacea promised for non-entrepreneurship disciplines. In fact, Norman and Schmidt believe problem-based learning does not result in significant improvements in student outcomes.

So, if active learning is effective for entrepreneurial programs, are entrepreneurship students different from other students, is entrepreneurship as a discipline distinctive, or are both unique? For experiential learning practices to specifically benefit entrepreneurship education, either entrepreneurship students must differ from other students with the disparities benefiting from a different pedagogy, or content must vary from other disciplines in a way that requires unique instruction or both.

There is evidence that entrepreneurs differ from managers and others, suggesting that the success of formalized education pedagogies may vary as well. Entrepreneurial personality traits have been studied in both business and psychology literature. One idea is that to understand entrepreneurship, one must understand the entrepreneur and, if entrepreneurs share certain behavioral characteristics, then entrepreneurship theories should take these into account.

Business-oriented entrepreneurship literature tends to focus on risk propensity, need to achieve, innovativeness, and other, specific characteristics commonly associated with entrepreneurs (Caliendo et. al. 2014, Carland et. al. 2015, Markham & Baron, 2013). The psychology literature focuses on the Five Factor Model (FFM) (Rauch & Freese, 2007, Brandstätter 2011, Zhao & Seibert 2006). While some contradictory results exist, (Gartner 1985), there is significant support for the idea that, on average, entrepreneurs and managers have different personality profiles.

The result is one may infer that students drawn to entrepreneurship differ from other students, including other business students, and that they are better served by courses taught in another way from traditional business courses delivery methodologies. Research on learning styles and personality traits (e.g., Busato et. Al., 1998) supports this idea, where the authors find matching learning styles with personality traits can improve outcomes.

As with entrepreneurial personality traits, the breadth of entrepreneurial skills and competencies identified is extensive (Baum et al. 2001; Man 2001) and the focus of research is broad. Morris et. al. (2013) identify a wide set of competencies. They work to distinguish between general business skills and those competencies, such as opportunity identification, that are unique to entrepreneurs. Others argue entrepreneurs must be “jacks-of-all-trades” and have balanced sets of skills without being experts in any specific area (Lazear 2004, Stuetzer et. al. 2012). This is complemented by work on entrepreneurial teams that investigate the impact of team structure and competencies on entrepreneurial success (Zhao et. al. 2013, Klotz et. al. 2014). What this implies, however, are entrepreneurial skills differ from those of general managerial skills. Thus, what is taught in entrepreneurship programs also needs to change from instruction in a general business curriculum.

Whatever the content or learning methodology, its effectiveness must be assessed the “end” of the Ghina et. al. (2015)’s framework. Different researchers have proposed different bases for assessment, including:

1. Changes in entrepreneurial intention (Fayolle et al, 2006),

2. The number of business start-ups (Kolvereid and Moen 1997), and
3. Competencies in major business/entrepreneurship skills (Thursby, Fuller and Thursby 2009).

Reviews of literature on the impact of entrepreneurship education (e.g., Rideout and Gray, 2013 and Duval-Couetil, 2013) highlight some of the difficulties with these measures and with assessing entrepreneurial education impact. In particular, the effect of time, especially for outcomes such as the number of new ventures started, requires years of follow-up assessment.

Duval-Couetil (2013) lays out parameters for proper evaluation programs. These parameters include a balanced approach that addresses the needs of the various constituents, one that provides both summative and formative assessment, and one that provides course-level, program-level, and entrepreneurial construct evaluations. While the focus is on the characteristics, structure, and approach to designing an evaluation program rather than on specific instruments, Duval-Couetil claims the assessment tool must be practical. We argue that “practical” means the tool should:

1. Tie into to the program’s goals,
2. Provide timely information,
3. Be easy to administer,
4. Be independent, and
5. Be sensitive enough to capture changes in desired outcomes.

The measures used for assessment must relate to the program’s goals (Ghina et. al. 2015), implying that there will not be a universal set of appropriate metrics for all programs. For example, tracking the number of business startups within ten years of graduation as a measure of program success when an entrepreneurship program’s goal is to provide students with an understanding of what entrepreneurship is will not show effectiveness or be useful for improving the program. Finding a set of measures that correlate with instructional goals that can be used across numerous programs will facilitate both research and benchmarking for program improvement.

The measures need to provide timely information. Information timeliness is necessary for good decision making with less timely information being less valuable. More timely information, however, typically costs more. The relative tradeoff depends on the decision maker’s action set (Greer 1983). To improve an entrepreneurship program, program effectiveness measures need to be available during or immediately after students complete the program.

The assessment tool needs to be easy to administer (Keup 2008). Faculty are busy teaching, conducting research, serving their universities and communities. Adding data collection for assessment, while necessary, can be resented. The easier the evaluation is to administer, the more it ties to the faculty members’ teaching goals and approaches, the more they will accept the tool.

Independent measures provide two benefits. They are less likely to be manipulated by the entrepreneurship program, thus providing a less biased assessment. They also facilitate comparisons with other programs. This ability to benchmark can increase the identification of and spread of best practices -- at least it has in healthcare (Shaw 2004).

To be useful, an assessment tool or set of measures must be sensitive enough to capture changes in the desired outcomes. As a tape measure calibrated in miles would not be useful for an interior designer measuring room sizes, in the same way, an assessment tool must be able to identify whether and how an entrepreneurship program changes students’ attitudes, abilities, and skills.

OVERVIEW OF THE ENTREPRENEURIAL MINDSET PROFILE ASSESSMENT TOOL

The Entrepreneurial Mindset Profile (EMP) assesses the "entrepreneurial mindset" and provides feedback on fourteen discrete scales that fall within two broad domains: personality characteristics that distinguish entrepreneurs from managers, and skill dimensions that indicate how entrepreneurs approach tasks and the abilities they demonstrate. Table 1 enumerates these fourteen dimensions.

Table-1 ENTREPRENEURIAL MINDSET DIMENSIONS	
Personality Characteristics	Skill Dimensions
Independence	Future Focus
Limited Structure	Idea Generation
Nonconformity	Execution
Risk Acceptance	Self-confidence
Action Orientation	Optimism
Passion	Persistence
Need to Achieve	Interpersonal Sensitivity

The EMP takes less than ten minutes to complete and is available online. The toolset is easy to administer, provides timely feedback, and is given at the program's convenience. The report is comprehensive and easy to understand. It enables students to compare their results with entrepreneurs and corporate leaders across all industry segments, and it includes useful strategies to develop student entrepreneurial skills. Thus, it is helpful for both formative and summative assessment. Figure 1 shows a typical EMP graphical presentation of personality characteristics scores; in this case, for Bill Richmond. Figure 2 illustrates his skills dimensions scores. In each case, there is a line showing the average scores for entrepreneurs and a line showing average scores for managers to enable the person (Bill) to see how they compare. By reviewing the graphs, it is easy to see Bill more closely resembles the average manager than the average entrepreneur; although regarding idea generation, he exceeds both averages and concerning interpersonal sensitivity, he is much lower than both averages.

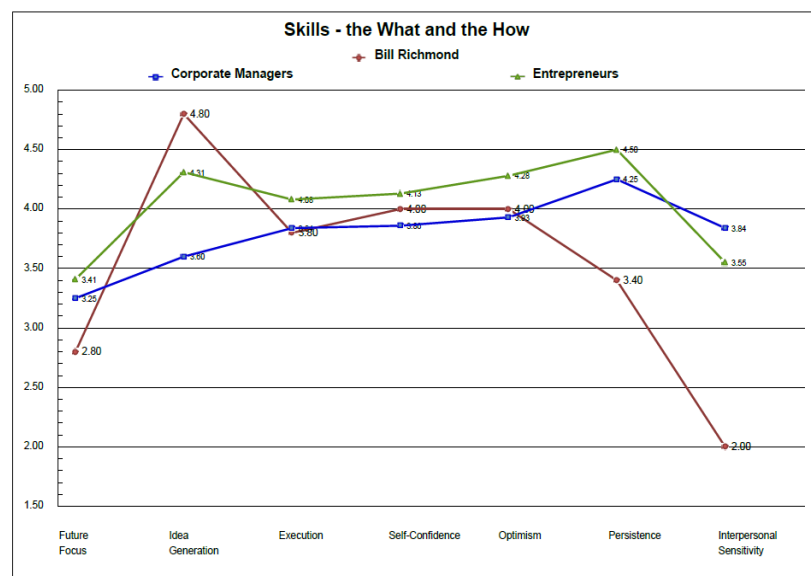
In addition to graphs, the EMP provides a detailed report describing the fourteen entrepreneurial characteristics as well as a development guide that helps to answer the important question of, "So what now?" Students use this information to understand their strengths and weaknesses better as entrepreneurs and to take concrete actions to prepare themselves for future success. Finally, summary reports are also available for teams. These reports enable students working on group projects to identify potential weaknesses within their team and to take action to address those shortcomings.

While the EMP may not be an appropriate assessment tool for all entrepreneurship programs, it meets evaluation criteria for WCU, including capturing an intention for new venture launch and being sensitive enough to detect changes in student characteristics over the course of the education program.

Figure-1
EMP PERSONALITY CHARACTERISTICS - BILL RICHMOND



Figure-2
EMP SKILLS DIMENSIONS - BILL RICHMOND



One of the primary goals stated by the WCU Dean of the Business School is for graduates to launch new businesses. The EMP measures this goal by capturing “intention to launch,” a metric directly correlated with actual launch (Fayolle et. al. 2006). Finally, as student-specific EMP data is captured over time, the toolset measures changes in student and program outcomes.

Based on the literature review and the potential of the EMP tool, in this paper we test the following four hypotheses:

- H1 Entrepreneurship students differ from non-business students in terms of the fourteen EMP characteristics*
- H2 Entrepreneurship students differ from other business students in terms of the fourteen EMP characteristics.*
- H3 The EMP set of measures is sensitive enough to detect changes in student characteristics over the course of the entrepreneurship education program.*
- H4 The measures captured by the EMP are correlated with intention to launch, a goal of the WCU Entrepreneurship program*

IMPLEMENTATION AT WESTERN CAROLINA UNIVERSITY

Western Carolina University is the westernmost institution of the University of North Carolina college system. Located in the Cullowhee Valley, WCU serves over 10,000 full-time undergraduate and postgraduate students from forty-three states and twenty-five countries (Western Carolina University 2015).

The mission of the WCU Entrepreneurship program is to provide "graduates with the skills necessary to think creatively, to successfully launch and grow their own businesses, or to support an employer in launching and growing an entrepreneurial venture." The program includes undergraduate and master's level courses in both residential and distance settings and serves approximately 300 students seeking degrees in:

1. Bachelor of Science in Entrepreneurship
2. Bachelor of Science in Business Administration, Innovation Leadership & Entrepreneurship
3. Master of Innovation Leadership & Entrepreneurship

The Bachelor of Science in Entrepreneurship (BSE) provides students with the knowledge and skills to launch a new venture. The BSE degree builds a foundation in entrepreneurial concepts, which students combine with discipline-specific knowledge for the types of businesses they would like to start. This degree is designed for students wishing to start and run their venture. Consequently, the program includes a survey of basic business concepts provided by various departments in the College of Business, specific courses in entrepreneurship that build a foundation of knowledge in the skills and abilities unique to starting and growing a new venture, and requires significant coursework in a discipline that will be the underlying basis of the new venture.

By contrast, the Bachelor of Science in Business Administration with a major in Innovation Management and Entrepreneurship (IME) provides students with the knowledge and skills to drive innovation within an existing organization or within their own venture. The IME builds a foundation in intrapreneurial and entrepreneurial concepts. Students focus on identifying, driving, and leveraging innovation for both internal and external opportunities.

WCU implemented the Entrepreneurial Mindset Profile to improve its entrepreneurial education and to provide data for entrepreneurship research. Concerning improving its entrepreneurial education, the specific goals were to:

1. Use the EMP to recruit students who are likely to succeed as entrepreneurs,
2. Serve as a mentoring instrument for students in the program, and
3. Support the assessment and improvement process for the Entrepreneurship curriculum.

Since successful entrepreneurs have certain characteristics, one EMP goal is to identify those WCU students with some of those traits (using WCU's analytics system) and invite them to take an introductory entrepreneurship class. In those courses, the identified students will take the EMP. Based on individual results, students will be encouraged to major or minor in entrepreneurship.

For use as a mentoring tool, the EMP not only provides a set of scores on fourteen different dimensions, but it also provides suggestions and guidance for how to address individual weaknesses. This guidance includes how to improve scores such as in skill traits. It also includes ways to identify and work with others to mitigate individual limitations. Thus, the EMP provides a basis for mentoring students and customizing (to a degree) their individual learning and development plans as they progress through the WCU Entrepreneurship Program.

Finally, the EMP will be used as part of a continuous improvement process for the WCU Entrepreneurship Program. Duval-Couetil (2103) describes some of the issues assessing the impact of entrepreneurship education and provides recommendations for establishing an assessment and improvement program. The ultimate program goal is to prepare students to succeed. In some cases, that is in starting and growing their own business, but it can also include helping students understand they do not want to be entrepreneurs, but rather, preparing them to succeed within a larger organization. Assessing the ultimate program goal requires tracking students after graduation - something that is done, but imperfectly. An advisory board composed of entrepreneurs, venture capitalists and business leaders provides input on the WCU Entrepreneurship curriculum and, with other local entrepreneurs, evaluates student projects and presentations from junior and senior-level courses. This process provides a subjective, external assessment of student learning. The EMP will augment this process by providing an objective, independent measure of student growth.

Because WCU Entrepreneurship students will take the EMP in their first entrepreneurship class (typically in a student's freshman or sophomore year) and again at the end of the capstone class (senior year), WCU can use results to assess and improve its Entrepreneurship curriculum. A program goal is to move the needle on those dimensions of the EMP that are learned (skill traits) and to improve a student's understanding of their own behavioral characteristics that will affect future entrepreneurial success. Pre and post EMP results will provide a measure of the impact of the program - especially when compared to results of students who did not major in entrepreneurship. Approximately 50% of the students who take introductory entrepreneurship classes do not major or minor in entrepreneurship, and a subset of these students will be asked to retake the EMP their senior year. This group will form the control group.

EMP Pilot Program

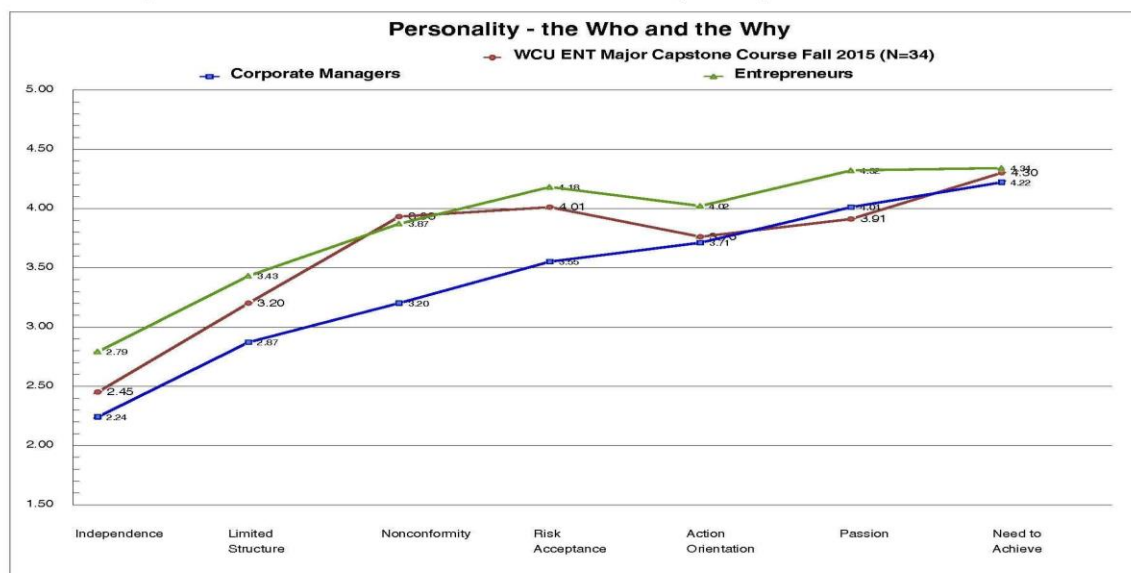
WCU piloted the EMP during the Spring 2014 and 2015 Semesters in the New Venture Leadership and New Venture Planning classes. Approximately 60 students, juniors and seniors, participated. At the beginning of the semester, students were invited to take the EMP assessment, and individual and group results were calculated for the fourteen EMP dimensions. Then, class leadership development exercises were tailored to incorporate EMP materials, and throughout the semester, students worked to improve their entrepreneurial skill sets. Finally, WCU administered the EMP at the end of the semester and compiled individual and class results.

Initial results of the pilot were biased. Some students, during end of semester "out processing," indicated they did not take the initial assessment seriously. However, as the

semester progressed, they grew to appreciate the EMP approach and the ability to track their progress and development. Therefore, at the conclusion of the semester, these same students approached the assessment with more seriousness and accuracy. So, keeping in mind this bias, results of the EMP indicated on average, WCU students have characteristics similar to the average entrepreneur (assuming such a thing exists), but in a small number of ways, they are also like corporate managers. As Figure 3. EMP Personality Dimensions illustrates, while WCU Entrepreneurship students mirror the "curve" for entrepreneurs, they could be more entrepreneurial by having higher levels of passion and action orientation.

Improvements in skills occurred (see Figure 4). Based on the data, student scores increased in "Idea Generation" and "Execution." Both are concepts taught and practiced in the courses participating in the pilot program, and thus, the WCU Entrepreneurship curriculum made a positive impact. The students are on a path to acquiring the needed content knowledge and skills to become successful entrepreneurs.

Figure-3
EMP PERSONALITY CHARACTERISTICS – WCU PILOT

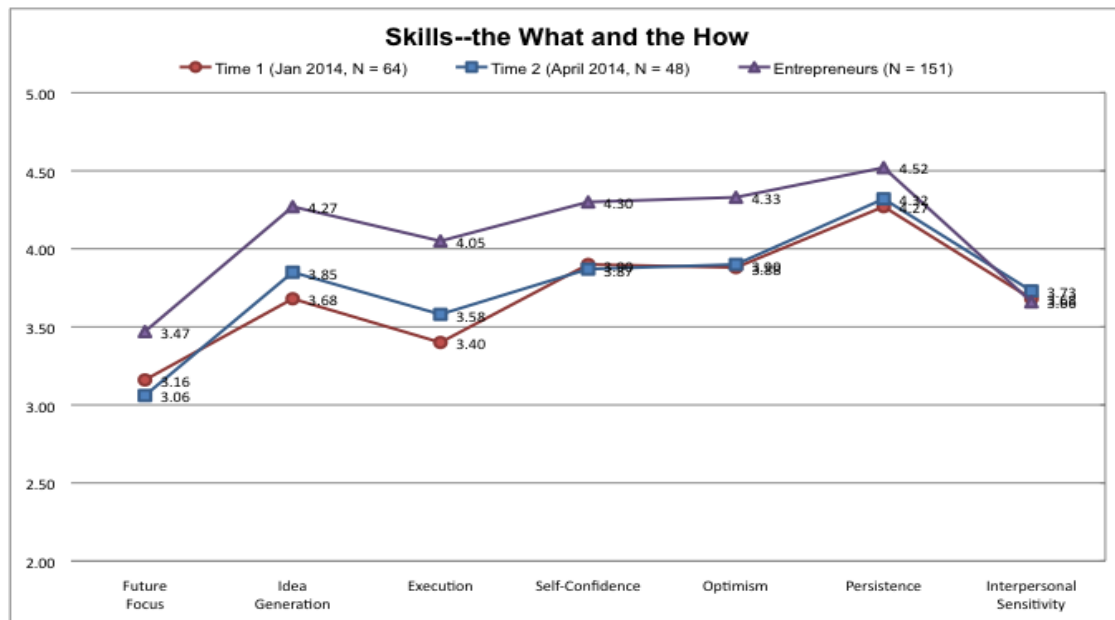


EMP Rollout Plan

Based on results of the pilot program, WCU approved the EMP for an aggressive 4-year rollout at the University. The plan calls for:

1. The use of the EMP for all undergraduate BSE and BSBA Entrepreneurship majors,
2. The EMP to be administered to all students in introductory entrepreneurship classes (Introduction to Entrepreneurship, Innovation, and Creativity, and Social Entrepreneurship). This administration will include all students majoring in entrepreneurship as well as students from other disciplines who are interested in understanding the basics of entrepreneurship, including freshman and community college transfers,
3. The tool to serve as a yearly student and curriculum progress assessment as well as a way to collect and analyze cross-sectional & longitudinal data, and
4. Benchmarking against other university programs.

Figure-4
EMP SKILL DIMENSIONS - WCU PILOT



METHOD AND DATA

Use of the EMP is in the early states at WCU. As part of its rollout plan, an initial implementation of the EMP was administered in the Fall 2015 and Spring 2016 Semesters. The goal was to have all Entrepreneurship majors take the EMP to establish baseline scores and to understand potential differences in students as they progress through the Entrepreneurship program.

In addition to Entrepreneurship majors, students from other majors enrolled in introductory entrepreneurship classes (these classes are available to all WCU students) were also invited to take the EMP. The objective of having non-entrepreneurship students take the EMP was to determine if any differences exist between entrepreneurship and non-entrepreneurship students regarding personality characteristics and skill dimensions.

Overall, 297 students in nine course sections were invited to take the EMP. Trained EMP administrators met with each class to describe the EMP and its benefits as well as to be available to review and discuss results. For distance (online) students, an introductory session was recorded and made available to students before administration of the EMP assessment, with a follow-up recording published describing how to interpret and use the data. Online video conferencing mentoring sessions were also made available for students wishing to discuss individual results.

Of the invited 297 students, 219 or 73.7% completed the EMP. Table 2 shows summary statistics. Based on "Majors," EMP respondents were comprised of 44.7% Entrepreneurship majors, 31.1% non-entrepreneurship business majors, and 24.2% non-business majors. Class representation from "freshman" to "senior" was roughly equivalent when comparing class size to class size. 77.6% of respondents identified their race as "White," about the same as the

University average of 79.8%. However, respondents include a disproportionate share of students identifying as “Black” (12.3% versus 6.4% University average) and males versus females (69.9% male and 26.5% female versus the University average of 45% men and 55% women) (Western Carolina University 2015).

Table-2			
EMP ROLLOUT SUMMARY STATISTICS			
Gender			Percent
	Male	153	69.9
	Female	58	26.5
	Unreported	8	3.7
Age			
	Minimum	17	
	Maximum	53	
	Average	21.1	
	Standard Deviation	4.7	
Race			
	American Indian	2	
	Asian or Pacific Islander	2	
	Black	27	12.3
	Hispanic	4	
	Other	9	
	White	170	77.6
	Unreported	5	
Majors			
	Entrepreneurship	98	44.7
	Other business	68	31.1
	Other non-business	53	24.2
Class			
	Freshman (0-30 hours completed)	61	27.9
	Sophomore (31-60 hours completed)	47	21.5
	Junior (61-90 hours completed)	64	29.2
	Senior (> 90 hours completed)	47	21.5

To determine if entrepreneurship students differ from other business students and non-business students, simple t-tests were used. Because the EMP was administered only to students enrolled in entrepreneurship classes, we note there is a selection bias in the data. Thus, we would expect to find smaller differences in results between these students than differences between entrepreneurship students and those who do not take an entrepreneurship class.

To determine if the EMP aligns with the goal of intention to launch, a logistic regression of EMP data was performed. Logistic regression has been used to predict whether students intent to start their own business after graduation (Bhandari 2006) as well as whether nascent entrepreneurs start their own business (Lukeš and Zouhar 2013). In the data, the dependent variable was the student’s intention to launch a business after graduation, and the independent variables were the fourteen characteristic scores from the EMP. The dependent variable was

captured from EMP survey questions where students were asked: “What do you plan to do after you earn the degree you are currently pursuing?” The potential responses are:

- A. Go into business for myself,
- B. Earn another degree,
- C. Join a family business,
- D. Get a salaried job, or
- E. Other.

“Go into business for myself” was coded as a 1. All other responses were coded as a 0.

INITIAL EMP RESULTS

Results indicate there are differences between Entrepreneurship majors and other groups of students, including other business students, thus supporting the hypotheses Entrepreneurship students differ from non-business students and from other business students in terms of the fourteen EMP characteristics (*H1 and H2*).

Table 5 and Table 6 show how WCU Entrepreneurship majors compare to other students on EMP personality characteristics (Table 5) and EMP skills dimensions (Table 6).

Compared to all other students, Entrepreneurship majors, exhibit a higher preference for independence, non-conformity, and risk-acceptance, with a need for limited structure. These students also report greater skill dimensions scores in idea generation, self-confidence, and persistence.

When compared to other business majors, Entrepreneurship students score higher in independence, non-conformity, risk-acceptance, and limited structure as well as future focus, idea generation, and persistence.

Some researchers (e.g., Mitchelmore and Rowley 2013) have found differences between female and male entrepreneurs. At WCU, there appear to be only minor differences. Women Entrepreneurship majors scored higher in interpersonal sensitivity while males reported higher scores in risk acceptance.

The logistic regression relating the fourteen EMP characteristics to an intention to launch was significant; although the R^2 was only 25% (Table 3). Table 4 presents the correlation matrix for the variables in the logistic regression model. While the largest correlation is only 0.5, a multicollinearity analysis shows that there are significant multicollinearity issues with VIFs greater than 2 for Persistence and Action Orientation. Whether this is a problem depends on the goal. If the purpose is to predict the intention to launch and if the multicollinearity patterns remain constant, the model can be used (Neter et. al. 1985). Alternatively, if the goal is to use the parameter estimates to understand which factors affect student intention to launch and to use that information as part of program assessment and improvement, the multicollinearity issues should be addressed. Since the model was dictated by the convenience of the EMP rather than by theory, a simple expedient is to drop variables from the model. A stepwise logistic regression results in a simplified model with only two variables:

$$P(\text{Intention to start a business}) = \alpha + \beta_1 (\text{limited structure}) + \beta_2 (\text{idea generation}) + \varepsilon$$

The results for this model are also in Table 3. Again, the model is significant and the results are similar to the full model. For this model, analysis reveals that there are no significant multicollinearity issues. This supports the hypothesis that for WCU, the EMP is linked to a key goal stated by its Dean and can provide information for assessment (*H3*). Other institutions with other goals or with students whose EMP characteristics have different multicollinearity structures may need a different assessment tool or at least need to show the EMP supports their environment.

Table-3
LOGISTIC REGRESSION RESULTS

Parameter	Full Model					Reduced Model				
	DF	Estimate	Std. Error	Wald Chi-Sq.	Pr > Chi-Sq.	DF	Estimate	Std. Error	Wald Chi-Sq.	Pr > Chi-Sq.
Intercept	1	-7.1231	2.6897	7.0134	0.0081					
Independence	1	-0.0922	0.3101	0.0885	0.7661					
Limited Structure	1	0.7130	0.3053	5.4553	0.0195	1	0.7063	0.2334	9.1577	0.0025
Nonconformity	1	0.2098	0.3551	0.3489	0.5547					
Risk Acceptance	1	0.7600	0.3578	4.5132	0.0336					
Action Orientation	1	-0.6305	0.4616	1.8661	0.1719					
Passion	1	-0.3077	0.3897	0.6237	0.4297					
Need to Achieve	1	0.5535	0.4103	1.8197	0.1774					
Future Focus	1	0.1404	0.2866	0.2400	0.6242					
Idea Generation	1	0.7904	0.3291	5.7685	0.0163	1	0.7333	0.2604	7.9287	0.0049
Execution	1	-0.0596	0.3777	0.0249	0.8746					
Self Confidence	1	-0.2347	0.3274	0.5137	0.4735					
Optimism	1	0.2527	0.2980	0.7193	0.3964					
Persistence	1	-0.0567	0.5342	0.0113	0.9154					
Likelihood Ratio	40.8515	14	0.0002			28.1801	2	<.0001		
Max-rescaled R-Square	0.2529					0.1795				
Percent Concordant	77.1					73.6				
Percent Discordant	22.9					26.0				
Percent Tied	0.0					0.4				

Table-4
CORRELATIONS AMONG THE FOURTEEN EMP CHARACTERISTICS

	IN D	LS	NC	RA	AO	Pass	NtA	FF	IG	Ex	SC	O	P	IS
IN D	1.0	.337 7	.164 2	.059 2	- .006 8	- .041 2	- .154 7	.006 9	.067 6	- .015 4	- .037 5	- .168 4	- .036 0	- .417 5
LS		1.0	.331 7	.327 4	.295 5	.055 8	- .290 1	- .097 1	.350 6	.190 2	.153 6	- .052 3	.147 0	- .353 2
NC			1.0	.288 0	.354 9	.302 5	.199 2	.197 7	.430 6	.345 2	.268 3	.095 8	.401 6	- .171 3
RA				1.0	.373 8	.189 4	.017 2	.012 1	.132 1	.074 0	.365 1	.186 2	.180 1	- .094 3
AO					1.0	.257 4	.230 4	- .031 2	.370 7	.500 0	.449 0	.151 4	.488 7	- .178 6
Pas s						1.0	.319 5	.427 2	.364 7	.395 6	.276 8	.110 0	.442 8	.007 5
Nt A							1.0	.287 9	.036 0	.280 1	.231 7	.153 7	.431 5	.064 6
FF								1.0	.112 9	.197 8	.109 8	.038 4	.245 1	.056 2
IG									1.0	.395 0	.163 3	.168 0	.213 3	- .121 3
Ex										1.0	.357 0	.163 7	.494 1	- .123 6
SC											1.0	.399 4	.496 7	.040 2
O												1.0	.315 5	.409 2
P													1.0	- .018 0
IS														1.0
IND = Independence								FF = Future Focus						
LS = Limited Structure								IG = Idea Generation						
NC = Nonconformity								Ex = Execution						
RA = Risk Acceptance								SC = Self Confidence						
AO = Action Orientation								O = Optimism						
Pass = Passion								P = Persistence						
NtA = Need to Achieve								IS = Interpersonal Sensitivity						

Interestingly, self-efficacy (measured by Execution in the EMP) is not a factor in predicting a WCU student's intention to start his or her own business. In other research (Fayolle et. al. 2006, Zhao et. al. 2005) self-efficacy was a significant predictor of intention to launch. This emphasizes the importance of different student populations -- a key factor in Ghina et. al.'s

2013 framework. Understanding the differences among student populations is key to effective program and therefore to assessment.

Finally, results were assessed to see if scores increased, particularly in skill dimensions, as students progressed through the WCU Entrepreneurship program. As longitudinal data does not yet exist and because of the lack of the number of freshman entrepreneurship EMP respondents in the initial implementation, scores compare Entrepreneurship sophomores to seniors. Data indicates (Table 6) seniors score higher in execution and optimism, but only at the 0.10 significance level. This weakly supports the hypothesis EMP measures are sensitive enough to detect changes in student characteristics over the course of the entrepreneurship education program (*H3*).

Table-5 EMP PERSONALITY DIMENSIONS COMPARISONS						
	Entrepreneurship Major vs. Other Majors	Entrepreneurship Major vs. Other Business Majors	Entrepreneurship Major vs. Non-business Major	Females vs. Males (overall)	Females vs. Males (Ent.)	Entrepreneurship Seniors vs. Sophomores
Independence	↑↑	↑↑	↑↑	--	--	--
Limited Structure	↑↑	↑↑	↑↑	↑↑	--	--
Nonconformity	↑↑	↑↑	↑↑	--	--	--
Risk Acceptance	↑↑	↑↑	↑↑	↑↑	↑↑	--
Action Orientation	--	--	↑↑	--	--	--
Passion	↑↑	↑↑	--	--	--	--
Need to Achieve	--	--	--	--	--	--

Table-6 EMP SKILLS DIMENSIONS COMPARISONS						
	Entrepreneurship Major vs. Other Majors	Entrepreneurship Major vs. Other Business Majors	Entrepreneurship Major vs. Non-business Major	Females vs. Males (overall)	Females vs. Males (Ent.)	Entrepreneurship Seniors vs. Sophomores
Future Focus	--	↑↑	--	--	--	--
Idea Generation	↑↑	↑↑	↑↑	--	--	--
Execution:	--	--	--	--	--	↑
Self-Confidence	↑↑	--	↑↑	↑↑	--	--
Optimism	--	--	--	--	--	↑
Persistence	↑↑	↑↑	↑↑	--	--	--
Interpersonal Sensitivity	--	--	--	↓↓	↓↓	--
↑↑ implies significance at the .05 level. ↑ implies significance at the .10 level.						

IMPLICATIONS & THOUGHTS

Initial EMP results confirm students attracted to entrepreneurship differ from other students in both personality characteristics and skills dimensions. They are more independent and non-conforming than their peers. They also accept more risk and report higher levels of passion than non-entrepreneurship business majors.

So, what are the implications of these results and how can university entrepreneurship programs apply what is learned? The authors assert these results have an impact in at least three areas, in the use of EMP personality characteristics for tailored marketing of entrepreneurship programs, in the implementation of teaching methodologies designed to meet the unique personalities of entrepreneurship students best, and finally, in the use of EMP skills dimensions to measure and improve entrepreneurship course content. These results are discussed below.

Tailored Marketing

A benefit of understanding the unique personality characteristics of students entering entrepreneurship programs is universities can tailor marketing efforts to more effectively reach potential students most likely attracted and suited to the program.

Market segmentation strategies can be developed based on reported characteristics (for WCU, independence, nonconformity, risk acceptance, and passion) and then pushed out to potential high school students, community college transfers, and undeclared students. It is felt by uniquely tailoring its marketing efforts around these defined personality characteristics, universities will become more efficient with messaging.

In turn, it is believed this effort will result in higher growth for entrepreneurship programs and a better "student/program" fit, leading to improved retention rates. Success with these efforts can be measured by comparing current and future growth and retention rates for programs with rates for the university and the college of business. Also, potential changes and trends in EMP personality characteristics for students entering entrepreneurship programs can be monitored to assess whether refinements are needed to marketing efforts.

Teaching Methodologies Tailored to Student Personalities

EMP personality results for entrepreneurship students provide universities with an opportunity to assess and potentially modify approaches used to instruct entrepreneurship students. For example, consider WCU Entrepreneurship students demonstrate high levels of:

1. Independence,
2. Limited structure, and
3. Non-conformity.

Because these Entrepreneurship students have the above characteristics, traditional academic learning instruction may not be best suited for student success. Rather, student-learning styles that are more self-directed might better capture student enthusiasm for course content and lead to improved results. At this point what changes, if any, should be made or what specific

teaching methodologies should be deployed are unknown. While the topic is not the focus of this paper, potential opportunities exist, and further research is recommended to determine if different teaching methodologies will better reach these students. If so, that investigation should be applied and results measured.

Finally, the use of EMP data to form student groups for coursework is a topic of interest to the authors. Individual student EMP data can be used to develop "balanced" teams or ones that may have a better chance of success. Instead of allowing students to self-select for course projects, groups can be formed to include students with strengths complementary to each other. For example, a team could be assembled to include students excelling in the skills of idea generation, execution, and interpersonal sensitivity, resulting in a team that possesses a broad range of EMP personality characteristics and skill dimensions.

While team success (and course grades) may increase, the authors wonder if students would benefit in the long-term from this approach. Rather, it might be better to "force" unbalanced teams (members with non-complementary EMP characteristics and skill dimensions), so students gain experience in dealing with group dynamics issues, controversy, and conflict resolution.

Aligned Entrepreneurship Curriculum Review and Improvement

The ultimate objective of entrepreneurship education is to best prepare students for success after graduation. To help achieve this goal, the seven EMP skills dimensions of Future Focus, Idea Generation, Execution, Self-Confidence, Optimism, Persistence, and Interpersonal Sensitivity can be aligned with course curriculum. Then, increases (if any) in student scores in these areas can be used as an objective measurement of student progress, with the results used to review and improve content delivery.

For example, the WCU Innovation and Creativity class focuses on innovation and the development of successful business ideas so increases in student EMP "Idea Generation" scores from the beginning to the end of the course can be used as a measurement of success. As another example, the New Venture Execution class provides students with expertise in how to launch and grow successful businesses so increases in student "Execution" scores can be used.

Also, as the WCU Entrepreneurship program is designed to build upon knowledge obtained in previous courses, it is also necessary to evaluate progress made over a student's WCU career. Together, EMP score increases within courses and over student careers can be measures of the success of delivery and retention of course content and skill dimensions and the EMP provides universities with a powerful tool for continuous improvement.

Limitations and Future Research

This research has several limitations. Because it was conducted early after the rollout of the EMP, the data is limited. Over time, students will take the EMP in their first entrepreneurship class, and then in their capstone class. This will enable the examination of individual student changes in EMP scores. Non-entrepreneurship students who take the EMP will be asked to complete it again in their senior year. This will act as a control, albeit a biased one. As more data

are collected, more detailed assessments of the impact of the WCU entrepreneurship program and comparisons across other programs are planned.

The EMP measures a predefined set of characteristics. Whether these are the right or best set is an open question. For example, the EMP assesses tolerance for risk as a personality trait, but it does not address the ability to manage risk. Which is more critical for entrepreneurs? Does the EMP or other traits affect intention to launch differently than new venture performance? Finally, there are also other surveys that purport to assess entrepreneurial characteristics. Does it matter which survey is used? Are these surveys correlated enough to enable cross-program comparisons?

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