

# The Relationship Between Simulation Strategies And Exit Exam Scores: A Correlational Assessment Of Glo-Bus And Peregrine

Candace Forbes Bright, East Tennessee State University USA

Justin Bateh, Florida State College at Jacksonville, USA

Danielle Babb, American Public University USA

## ABSTRACT

*Simulations are used in business education to improve skill attainment and application. Exit examinations, however, remain imperative measures used for accreditation. This research assesses the relationships between skill sets across business students to test the hypothesis that competencies within and between Glo-Bus as a simulation and Peregrine as an exam positively correlate. We find that while all Peregrine competencies correlate, 11 of 36 possible correlations are present within the Glo-Bus competencies and 47 of 153 possible correlations are present between Glo-Bus and Peregrine competencies. Overall, Glo-Bus and Peregrine scores are weakly, positively correlated,  $r(157) = .242, p < .01$ .*

**Keywords:** Accreditation; Assessment; Glo-Bus, Measurement; Peregrine; Simulation

## INTRODUCTION

There have been two significant trends in higher education aimed at improving learner knowledge and retention of material, with the goal of transparency related to actual skills gained in an undergraduate or graduate program. The first trend is toward the use of inbound and outbound examinations to assess the level of learning that has taken place, with the examinations often being used for accreditation and reporting (Economic Policy Committee, n.d., p. 39). Another trend has been the use of simulations to improve learner understanding and retention, thereby, in theory, improving the outbound examination scores and student knowledge (Kaufman & Ireland, 2016). It is widely believed that simulation games help learners comprehend real world opportunities within the theoretical framework of a course and may potentially improve knowledge and retention. Models and simulations are increasingly being used in advanced experiential learning environments to place the student in the “world” by which the instructor seeks for students to interact with phenomena being studied. From a student-centered constructivist approach, simulation often includes placing the student in a game, activity, or role-play scenario to allow them to control ambiguity by making strategic, informed decisions, after which the instructor can determine the achievement of the desired educational impact of the simulation. Rather than “surface learning” scenarios such as memorization, simulations may promote deeper learner through immersion and the application of concepts. One such simulation, Glo-Bus offers an online gradable exercise where teams of students run companies that are in a race for global market leadership. Simulations, such as those offered by Glo-Bus, allow students to practice their learning in an environment that is free from risks and considered more enjoyable for the learner (Karriker & Aaron, 2014).

It has been noted that a student’s approach to learning and his or her attainment of desired materials is correlated, particularly when taking a deep, rather than superficial, approach to learning (Gijbels, Van de Watering, Dochy, & Van den Bossche, 2005), which in theory, simulations could provide. Across disciplines, simulations allow students to apply course content in realistic situations, reinforcing the relevance of this content as it is engaged with through

learning processes. Courses using simulation have higher average final grades, as well as higher attendance (Clayton & Gizelis, 2012). In an evaluative study of simulation-based learning, 67% of students agreed or strongly agreed that simulations helped them understanding theoretical concepts, 70% agreed or strongly agreed that simulation allowed them to practically apply course content and assisted in comprehension, 59% agreed or strongly agreed that they prepared more thoroughly for simulations than they did for normal seminars, 48% agreed or strongly agreed that they contributed more to simulations than they did for normal seminars, and 78% agreed or strongly agreed that their fellow students participated more in simulations than in normal seminars (Clayton & Gizelis, 2012). Similarly, Meintjes (2016) used an experimental design to discover distinct advances for the cohort exposed to simulation-based learning over those who only received traditional instruction.

Both Glo-Bus simulations and Peregrine examinations help identify the competency of learners in business domains. Glo-Bus domains include leadership skills, collaboration, teamwork, financial analysis, operations management, marketing management, human resources management, strategic analysis and planning, and corporate and social responsibility. Glo-Bus is noted to be direct in its simulation and application of principles, and comprehensive in nature (Cotae, Musabende, & Vallardares, 2016).

Peregrine examinations are nationally normed programs for internal and external evaluation of learner understanding, which may be used to meet accrediting guidelines and requirements for transparency (Peregrine Academic Services, 2018). They can be used to guide university administrators and faculty into a more thorough understanding of inbound and outbound measurements with regard to competencies in the business domain. They are often used as a midpoint assessment to determine if intervention or modification to a learning plan is needed to improve outbound scores (Peregrine Academic Services, 2018).

It is widely promoted that the Peregrine examination provides a direct measurement of the value-added learning that an institution has offered a student (Peregrine Academic Services, 2018). The domains assessed using the Peregrine examination include accounting, business ethics, business finance, business integration and strategic management, business leadership, macroeconomics, microeconomics, global dimensions of business, information management systems, legal environment of business, management, human resource management, operations and production management, organizational behavior, marketing, and quantitative research techniques and statistics.

Business simulations and examinations have been related to Bloom’s taxonomy and learning theory to add approaches to improve learner understanding in both practical and theoretical dimensions (Cotae et al., 2016). It has been noted, however, that available programs do not necessarily follow the academic progression as defined by typical coursework, and therefore may have some significant limitations as assessments (Cotae et al., 2016). This has been noted as significantly limiting in the area of international business, for example, and indicates a growth area for business schools (Cotae et al., 2016).

### **Measuring Progress in Quality of Academic Programs**

Institutions are expected to be in a continual state of improved achievement, as defined by the institution, the accrediting agency, and other stakeholders. Colleges and universities are being asked to provide some assurance of learning and outcomes (Green, Stone, & Zegeye, 2014; Lawrence, Reed, & Locander, 2011). While always looking for the best ways to improve outbound scores and therefore achieve a higher status in the academic hierarchy, faculty, administrators, and future hiring managers also have a stake in the learning that takes place in the collegiate classroom. Programmatic accreditation requires transparency, and the International Assembly of Collegiate Business Education (IACBE) has recently strengthened its requirement of public disclosure (Castiglia & Turi, 2011).

Making continuous improvement in student outcomes is time and resource intensive. Glo-Bus, Peregrine, and other simulations can have significant barriers in their application. They can be costly and difficult to implement, confusing for students and faculty, and IT-intensive. Even the most straight-forward and most often used methods of assessment result in only minor modifications to courses, and pushback from faculty occurs due to the time commitment and lack of knowledge required to conduct studies of student achievement (Kelley, Tong, & Choi, 2010). When analyzing the value and impact that simulations such as Glo-Bus and tests such as Peregrine have on student learning, it is helpful

to see the bottom-line impact to achievement of learning objectives and desired outcomes. University faculty and administrators may wish to identify the impact of Glo-Bus and/or Peregrine scores as they relate to student skillsets. It is possible that when used together, university faculty and administrators may be able to be more selective about which courses they implement simulations; for example, to identify where their student population may benefit from the method of learning, and have a more thorough understanding of the student population they are serving and their readiness to enter the workplace.

Business schools, in particular, have been under scrutiny for not developing managerial skills in future managers in MBA programs (Varela, Burke, & Michel, 2013). The students who enter these programs often earn business degrees in their undergraduate studies. In this study, the researchers focus on identifying correlations between the use of Glo-Bus and Peregrine examinations and student skillsets. The participants were undergraduate Supervision and Management majors at a state college with the Florida College System. Outcomes assessments have become the gold standard for academic institutions to indicate their ability to impart knowledge upon learners and maintain learner retention of new knowledge (Dinur & Sherman, 2009).

### **Evaluation of Supervision and Management Student Competencies**

#### *Glo-Bus*

The Glo-Bus Learning Assurance Report (LAR) competencies include: leadership skills, collaboration and teamwork, financial analysis, operations management, marketing management, human resources management, strategic analysis and planning, and corporate social responsibility (Glo-Bus, 2018). The LAR scores are designed to offer credible measures of competency in each of these areas (Glo-Bus, 2018).

#### *Peregrine*

The Peregrine is a widely used business administration exam that aligns with the AACSB, ACBSP, and IACBE learning outcomes, providing academic benchmarking using an in-bound/out-bound approach (Peregrine Academic Services, 2018). The Peregrine provides competency scores for each of the following domains: accounting, business ethics, business finance, business integration and strategic management, business leadership, economics, economics: macroeconomics, economics: microeconomics, global dimensions of business, information management systems, legal environment of business, management, management: human resource management, management: operations/production management, management: organizational behavior, marketing, and quantitative research techniques and statistics. Additionally, each of these scores is totaled for a comprehensive score (Peregrine Academic Services, 2018).

## **METHODS**

### **Research Hypothesis**

This research assesses the relationships between interdisciplinary skill sets across business students in a senior undergraduate capstone course to test the hypothesis that competencies within each of the tools and across the two tools will positively correlate and that the use of Glo-Bus simulations will improve Peregrine scores.

### **Materials and Methods**

The Glo-Bus and Peregrine instruments were used to collect data from 158 exiting undergraduate Supervision and Management majors at a state college in the Florida College System in Spring, Summer, and Fall semesters of 2017.

## Data Evaluation

Using SPSS 25, descriptive statistics were first calculated for each of the Peregrine and Glo-Bus domains. Next, the Glo-Bus domains were correlated in matrix format, followed by a correlation matrix of the Peregrine domains. Finally, we assessed the correlation between the Glo-Bus and the Peregrine competencies.

## RESULTS

The means, standard deviations, and sample size for each competency are provided in Table 1.

**Table 1.** Descriptive Statistics of Competencies

Measure	Skill area	N	Min	Max	Mean	Std. Dev.
Peregrine	Accounting	158	10	100	65.70	20.577
	Business Ethics	158	0	100	65.63	23.981
	Business Finance	158	0	100	60.32	25.248
	Business Integration and Strategic Management	158	0	100	69.94	23.769
	Business Leadership	158	0	100	68.29	22.266
	Economics	158	0	100	55.00	19.606
	Economics: Macroeconomics	158	0	100	53.04	25.230
	Economics: Microeconomics	158	0	100	56.96	23.801
	Global Dimensions of Business	158	0	100	59.68	22.838
	Information Management Systems	158	0	100	71.90	22.886
	Legal Environment of Business	158	0	100	64.49	21.222
	Management	158	0	100	72.03	22.623
	Management: Human Resource Management	158	.00	100.00	70.0425	31.12464
	Management: Operations/Production Management	158	.00	100.00	67.1943	30.00531
	Management: Organizational Behavior	158	.00	100.00	78.4284	27.72899
	Marketing	158	0	100	62.53	23.727
	Quantitative Research Techniques and Statistics	158	0	100	61.08	24.458
	<b>Final Score</b>	<b>158</b>	<b>4.16</b>	<b>93.33</b>	<b>64.7116</b>	<b>17.13478</b>
Glo-Bus	Leadership Skills	158	2	97	53.42	29.425
	Collaboration and Teamwork	158	3	98	56.47	28.436
	Analytical Skills	154	3	100	65.88	30.901
	Financial Management	158	15	93	63.28	17.467
	Operations Management	158	1	88	34.27	17.375
	Marketing Management	158	3	91	53.54	26.269
	Human Resources Management	158	4	90	49.13	28.022
	Strategic Analysis & Planning	154	2	99	51.68	32.341
	Corporate Social Responsibility	158	4	95	52.59	27.602
		Valid N (listwise)	154			

Correlations between the Glo-Bus competency scores are provided in Table 2, in which capitalized letters are used as row headings to align with the competencies presented in the column. Of the 36 possible correlations between the Glo-Bus competencies, 11 are significant at the  $\alpha=.05$  level. These statistically significant relationships are provided in Table 2 as indicated by Pearson's correlation coefficient and associated p-value. Two of these competencies, however, were negatively correlated. Moreover, 9 of the 11 bivariate correlations are significant at the .01 level (2 tailed,  $p < .01$ ), and two are significant at the .05 level (2 tailed,  $p < .05$ ).

Next, we calculated Pearson's correlation coefficient for all Peregrine competencies. The results indicate there is a statistically significant correlation between all Peregrine competencies ( $N = 157$ ). Specifically, there is a moderate to strong correlation between all 17 Peregrine competencies, with all correlations being significant at the .01 level (2-tailed,  $p < .001$ ).

Table 2. Correlation between Glo-Bus Competencies

Glo-Bus Competencies	Glo-Bus Competencies								
	[1] LS	[2] CT	[3] AS	[4] FM	[5] OM	[6] MM	[7] HRM	[8] SAP	[9] CSP
[1] Leadership skills	-	.904 (.000)							
[2] Collaboration and teamwork	-	-							
[3] Analytical skills	-	-	-	.206 (.010)		-.273 (.001)		.443 (.000)	
[4] Financial management	-	-	-	-	.293 (.000)	.197 (.013)		.481 (.000)	
[5] Operations management	-	-	-	-	-		.391 (.000)		-.217 (.006)
[6] Marketing management	-	-	-	-	-	-		.824 (.000)	
[7] Human resources management	-	-	-	-	-	-	-		.245 (.002)
[8] Strategic analysis & planning	-	-	-	-	-	-	-	-	
[9] Corporate social responsibility	-	-	-	-	-	-	-	-	-

We then assessed the relationship between the Peregrine competencies with the Glo-Bus scores. In Table 3, we present the results, which indicate that there are 47 statistically significant relationships among the nine Glo-Bus competencies and the 17 Peregrine competencies, which presents a total possibility of 153 relationships. However, some competencies had a greater propensity to correlate than other competencies. For instance, Corporate Social Responsibility (denoted as Glo-Bus [9] CSP) does not correlate to any Peregrine competency with any statistical significance. On the other hand, Strategic Analysis and Planning (denoted as Glo-Bus [8] SAP) is significantly correlated to 14 of the 17 Peregrine competencies.

Finally, the cumulative Glo-Bus and cumulative Peregrine scores were correlated using Pearson's  $r$ . Glo-Bus and Peregrine scores are weakly, positively correlated,  $r(157) = .242, p < .01$ .

**Table 3.** Correlation between GLO-BUS and Peregrine Competencies

Peregrine scores	Glo-Bus Competencies								
	[1] LS	[2] CT	[3] AS	[4] FM	[5] OM	[6] MM	[7] HRM	[8] SAP	[9] CSP
Accounting			.161 (.046)			.213 (.007)		.227 (.005)	
Business ethics			.287 (.000)	.181 (.024)		.232 (.003)		.321 (.000)	
Business finance			.329 (.000)		-.224 (.005)	.260 (.001)		.335 (.000)	
Business integration and strategic management			.163 (.043)			.186 (.020)		.260 (.001)	
Business leadership						.176 (.027)		.212 (.008)	
Economics	.275 (.001)	.252 (.001)		-.187 (.019)				.159 (.049)	
Economics: macroeconomics	.296 (.000)	.235 (.003)			-.157 (.050)				
Economics: microeconomics		.165 (.039)							
Global dimensions of business		.168 (.035)	.205 (.011)		-.174 (.029)			.217 (.007)	
Information management systems			.200 (.013)		-.217 (.006)			.196 (.015)	
Legal environment of business									
Management			.235 (.003)			.229 (.004)		.262 (.001)	
Management: human resource management								.216 (.007)	
Management: operations/production management			.185 (.022)			.212 (.008)		.192 (.017)	
Management: organizational behavior			.226 (.005)					.193 (.017)	
Marketing			.205 (.011)			.197 (.013)		.281 (.000)	
Quantitative research techniques and statistics	.168 (.036)		.210 (.009)			.234 (.003)		.202 (.012)	

## DISCUSSION

*Do Glo-Bus simulations improve Peregrine scores?* Glo-Bus is utilized for its direct application of principles (Cotae et al., 2016), but to date, no studies have assessed the alignment of the scores that Glo-Bus produces based on these principles with those of Peregrine exit exam scores. Thus, it is unknown if Glo-Bus improves Peregrine scores and as such, if Glo-Bus competencies provide instructors with any indication of Peregrine scores. As simulations are being increasingly used in business education to improve skill attainment and application, it is essential to explore their relationship with exit exams for numerous reasons, including for improving instruction, for selecting simulation programs, and for aligning these programs to accreditation and reporting. Thus, the results of this study are of interest to university faculty and administrators who may wish to identify the impact of simulations as they relate to student skillset and exit examination scores. This research has assessed the relationships between interdisciplinary skill sets across business students in a senior undergraduate capstone course to test the hypothesis that competencies within and between Glo-Bus as a simulation and Peregrine as an exam positively correlate. Rather, we explored if and to what extent competencies correlate within and across the Glo-Bus and Peregrine.

Given the increasing reliance on exit examinations (Economic Policy Committee, n.d., p. 39), as well as the increased reliance on simulations in instruction (Kaufman & Ireland, 2016), the results of this study hold numerous implications. First, while simulations may be more enjoyable to the learner (Karriker & Aaron, 2014; King, Mayer & Richardson, 2011), in the example of the Glo-Bus simulation and Peregrine exam, there is no consistency in correlation between the competencies of the two tools. Using data from 158 exiting undergraduate Supervision and Management majors at a state college in the Florida College System in 2017, we found that while all Peregrine competencies correlate, 11 of 36 possible correlations are present within the Glo-Bus competencies and 47 of 153 possible correlations are present between Glo-Bus and Peregrine competencies. Overall, Glo-Bus and Peregrine scores are weakly, positively correlated. Second, as Glo-Bus is noted to be direct in its simulation and application of principles (Cotae et al., 2016), instructors can use the statistically significant relationships presented within this study to improve areas in the Peregrine in which students may be under-performing. For instance, the data indicate that there is a positive statistically significant correlation between the Glo-Bus Strategic Analysis and Planning (SAP) competency and 14 of the 17 Peregrine competencies. Thus, improving SAP through the use of the Glo-Bus simulation is demonstrated to have the greatest effect on Peregrine scores.

#### AUTHOR BIOGRAPHIES

**Candace Forbes Bright** is Assistant Research Professor at East Tennessee State University in Johnson City, TN. Her research focuses on methodological advances across disciplines. E-mail: [brightcm@etsu.edu](mailto:brightcm@etsu.edu)

**Justin Bateh** is a Professor of Business at Florida State College at Jacksonville. His research, focusing on both scholarly advancement and practical management implications, addresses multi-faceted aspects of business operations, often highlighting the nuanced managerial decisions of organizations, for the purpose of applying evidence-based practices to improve outcomes.

**Danielle Babb** is a Professor of Business at American Public University in West Virginia. Her research focuses on online education, entrepreneurship, faculty satisfaction, and student success factors. Most of her work centers around finding a strong balance between an entrepreneur-based education work environment that promotes strong student success with satisfied faculty. E-Mail: [danielle.babb@my.apus.edu](mailto:danielle.babb@my.apus.edu)

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