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A Tier 1 Research University Study of Fee-Based Corporate Students and Their Representative Business/Industry Organizations

Dr. Mitchell L. Springer PMP, SPHR, Purdue University - West Lafayette

Dr. Mitchell L. Springer, PMP, SPHR

Dr. Springer currently serves as the Executive Director for Purdue University's Polytechnic Institute located in West Lafayette, Indiana. He has over 35 years of theoretical and industry-based practical experience from four disciplines: Software Engineering, Systems Engineering, Program Management and Human Resources. Dr. Springer possesses a significant strength in pattern recognition, analyzing and improving organizational systems. He is internationally recognized, has contributed to scholarship more than 150 articles, presentations, books and reviews on software development methodologies, management, organizational change, and program management. Dr. Springer sits on many university and community boards and advisory committees. He is the recipient of numerous awards and recognitions; most recently he was awarded the Purdue University, College of Technology, Equity, Inclusion and Advocacy Award.

Dr. Springer received his Bachelor of Science in Computer Science from Purdue University, his MBA and Doctorate in Adult and Community Education with a Cognate in Executive Development from Ball State University. He is certified as a Project Management Professional (PMP), Senior Professional in Human Resources (SPHR & SHRM-SCP), in Alternate Dispute Resolution (ADR), and, in civil and domestic mediation. He is a State of Indiana Registered domestic mediator.

Mr. Mark T. Schuver, Purdue University - West Lafayette

Mark Schuver is the Director for the Center for Professional Studies in Technology and Applied Research (ProSTAR) in the Polytechnic Institute at Purdue University in West Lafayette, Indiana. He is responsible for the administration/operations of the Center with Program Management oversight of the Rolls-Royce Master of Science Degree, the Construction Management Master of Science Degree and Product Lifecycle Management Certificate Programs for working professionals. Prior to joining Purdue in 2002, Mark was employed by Caterpillar, Inc for 35 years with assignments in Product Design, Research and Development, Supplier Management, Quality Management, Logistics Management and various leadership positions. He holds an Associate Degree in Drafting Technology from North Iowa Area Community College, a BS in Business Administration and MS in Management from Indiana Wesleyan University.

Mark is a member of the American Society for Engineering Education and serves on the Executive Board of the Continuing Professional Development Division. He is also a member of College/Industry Partnerships, Engineering Technology and Graduate Studies Divisions of ASEE. Mark is a Lifetime Certified Purchasing Manager with the Institute of Supply Management (formerly NAPM).

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Abstract

Corporate participation in fee-based programs changes over time based on numerous corporate criteria; corporate finances, availability of applicable programs and perception that the available training and educational opportunities provide for a positive return on investment.

While we want to attract and serve the needs of professional working adult learners and their respective corporations, we can only do so if we have an advanced understanding of these two entities; professional working adult learners, and, their represented corporate organizations.

In an effort to better understand the participants, and needs of our fee-based corporate representative adult learners, it is a requirement to understand, at a macro level, both the demographics of the corporate student and their respective corporations.

This paper will focus on a tier 1 research university study of participating corporate students and their respective corporations. This paper will qualitatively assess the top participating organizations and industry sectors, and their professional students of fee-based degree programs. The following hierarchical questions will be addressed to provide the rich and enhanced detail necessary to further understanding:

- What are the critical academic success factors for incoming participating corporate students
- What is the hierarchy of predominant disciplines of participating corporate students
- Relative to represented corporate demographics, what is their frequency of participation
- Relative to represented industry demographics, what is their frequency of participation

The above hierarchical question collection, from student to representative organization to industry sector, provides valued insight into fee-based student participation and their representative organizations by frequency and industry. From this, a target rich opportunity exists to expand future fee-based offerings through serving the needs of these participating individuals and their representative organizations.

Critical Academic Success Factors for Evaluating Admissions Acceptability[1]

Colleges and universities, especially Tier 1 research universities, use undergraduate Grade Point Average (GPA) and the Graduate Record Examinations (GRE) as key criteria for acceptance of students into Masters' level education programs. While GPA and GRE are relevant as critical success factors to traditional students, the applicability of these criteria alone becomes skewed when considering potential applicants who are professional working adult learners. Professional working adult learners have additional criteria that more accurately predicts their educational success than the historical undergraduate GPA or GRE. Undergraduate GPA and GRE scores, as admissions criteria, further clouded the discussion by our desire as an academic unit to maintain high standards for admission.

Other factors contributing to professional working adult learner success include, but are not limited to, years since last degree, undergraduate field of study, reasons for undergraduate GPA (if low), GPA of classes taken more recently (post-undergraduate), GPA in the first two years versus the last two years, demonstrated application of undergraduate assimilated knowledge through successfully greater career opportunities, recommendations from supervisors and third parties and the potential students statement of purpose. In the final analysis, it is a judgment decision on maturity, based on a collection of factors that support an informed decision on the potential success of an applicant. These many career oriented factors are typically not available when assessing the Master's applicant who has just completed their undergraduate degree.

A 2013 study of professional working adult learners[1] shares the quantitative results of a longitudinal study of nearly 400 working professional adult learners, from business and industry, who graduated from a tier 1 research university series of programs designed and developed for professional learners. This cohort-based set of programs employs a hybrid classroom and distance-supported, innovatively-delivered graduate degree (MS) in technology studies[2,3].

The study explored follow-on considerations in balancing and managing the potential for lowering an academic unit's overall admissions GPA against weighting undergraduate GPA differently for incoming professional working adult learners.

The data of the referenced study is comprehensive and rich in description. The data, in part, has been used for previous attendant tangential studies providing baselines for peer and aspirational future research[4,3].

Critical to determining undergraduate GPA impact on graduation rates or more specifically graduate GPA, is the definition of success in targeted programs. While statistical significance is certainly applicable and appropriate, it is perhaps more appropriate to examine practical significance; that being "…it is possible that, based on the available sample data, methods of statistics can be used to reach a conclusion that some treatment or finding is effective, but common sense might suggest that the treatment or finding does not make enough of a difference to justify its use or to be practical[5]…"

To this end, current graduate school requirements as well as those of the College of Technology require a minimum of a 3.0 graduating GPA to receive a degree. Through careful qualitative analysis and discussion, it was determined the average recorded GPA of the lowest entry undergraduate GPAs, minus the average recorded GPA of the highest entry undergraduate GPAs would be a consideration in the findings of the practical analysis. If this graduate GPA difference was more than .5, then practically speaking there was enough of a differential to merit further discussion and potentially subsequent undergraduate GPA consideration for entry into the program.

Additionally, numerous of the professional adult learners were engaged in an industry focused applied research and development project called simply the Directed Project.

The Directed Project is a project agreed upon between the student, student's company and the faculty advisor. The project is intended to parallel the thesis format and employs applied research and development methodologies to generate a project with potential for significant return on investment to the student's company. Frequently, a member of the student's company serves on the student's graduate committee – while precautions are taken to avoid conflict of interest. The Directed Project results in a document which is essentially equivalent in size and standard to the conventional theses. The university and program faculty implement procedures to guard the confidentiality of the project information where necessary.

As a percent of the entire population of this analysis and study, the cumulative value of the Directed Projects were taken into consideration.

Critical Academic Success Factor Study Findings

There were 27 total programs that formed the basis of the referenced study. For each program cohort, the average undergraduate GPA, MS graduating GPA, chronological age on entry into the program, and years of work experience are:

- Average graduate GPA is 3.79
- Average undergraduate GPA is 3.19
- Average age is 35.85
- Average years of work experience is 14.85

Additionally, figure 1.0 depicts:

- 37%, 178 of the 481 graduating program professional working adult learners have an undergraduate entry GPA less than the required 3.0.
- Of those 37% of the professional adult working learners who graduate from the program, their cumulative Directed Project return on investments totaled over $17M.

Relative to those potentially entering with less than the required undergraduate GPA of 3.0, there are two influencing factors. First, the standards of the university and the College of Technology require increasingly greater undergraduate entry GPAs, this to accomplish many objectives. Professional working adult learners entering with less than this desired target undergraduate GPA actually create a negative drag on the overall university and applicable college. Second, and to the first topic, those entering with less than the university and college required 3.0 GPA are accepted conditionally[6].

In comparing the average graduating GPA to the average entering undergraduate GPA, of the program adult professional learners, the difference is .05, well below the .5 determined to be of practical significance. To this end, although the entering undergraduate average GPA of those entering with less than the required 3.0 is 2.65, there does not appear to be a practical significance, as collectively agreed to, in their average graduating GPA.

Equally important, and perhaps most leveling, is the return on investment, as determined by a third party, of the students' Directed Projects on the well-being of the State and their respective employers. A third party verified ROI in excess of $17M is financially significant and a testament to the maturity and professionalism of those adult working professionals who entered the program with undergraduate GPAs less than the required 3.0[7]. In a sample of those students who completed a Directed Project contributing to the cumulative $17M ROI, 40% had less than the required 3.0 undergraduate GPA on entry into the graduate program. Of those with less than the required 3.0 undergraduate GPA only .02% did not complete the program; stated differently, 99.98% did graduate from the program.

Number of Students (cumulative)	% of Total Students	Undergrad GPA Ave	Grad GPA Ave	DP (verified 3rd Party) Est Savings
178	37%	2.65 (<3.0)	3.74	$17,100,000.00
481	100%	3.19	3.79	N/A

Figure 1.0 – Average Undergraduate to Graduate GPA, and Directed Project Savings

Figure 1.0 depicts the Directed Project ROI of $17M. These 178 students were in programs that required a Directed Project. The 481 students depicted in figure 1.0 were a combination of the 178 students and the remaining 303 students who were not in programs that required a Directed Project, hence the "N/A" in the cell titled "DP Est Savings".

Critical Academic Success Factors Conclusions

In response to the original research question of the study, the above findings would support practical significant findings that:

- Undergraduate GPA of entering professional working adult learners has no practical significance to their respective graduating GPA.

- Those professional working adults who participate in the design, development and subsequent third party validation of a Directed Project, generate roughly $17M in return on investment to the State and to their respective business/industry organizations.

From these conclusions, it can be stated that other than entering undergraduate GPA, other factors may, and do, play a role in professional adult learner success. Student ability to provide thoughtful and insightful solutions to their business/industry seems to demonstrate a level of professional maturity; personally, professionally and specifically to their individual disciplines.

Hierarchy of Predominant Disciplines of Participating Corporate Students [8]

A lead-in to discussing the disciplines of participating corporate students requires an understanding, and differentiation, of post-Bachelor's degree assumed employment titles and roles. To this end, the following addresses these many titles and roles assumed by those who are the predominate participants to fee-based graduate programs.

In a recently published academic study by Land[9], the author reports the position titles of hired graduates from engineering and technology, into business/industry positions. The Land study, enhanced by an understanding of where in the product/process life-cycle these titles are employed, and therefore what function each title performs, provides valuable insight into the continuing professional development needs of engineering and technology professional adult learners.

In the recent Land study, titles assigned to technologists and engineering Bachelor of Science graduates were reported. The study received responses from nearly 200 business and industry technology-oriented companies. The Land study reflected, while there were titles assigned to both; the titles of design engineer, senior engineer and engineer were predominately assigned to engineering graduates. This, while the titles of engineering technologist, technologist, engineering technician and technician were generally reserved for technologists; i.e., BS Engineering Technology (BSET) graduates.

The natural derivation of this previous Land study is to enhance and build on the understanding of the identified titles for each; the technologist and the engineer. Subsequently, the next step is a better understanding of the theory to practice curriculum continuum professional fee-based organizations offer to professional working adult learners (students).

Defining roles and their mapping

Figure 2.0 depicts the titles assigned to graduate technology and engineering majors mapped to the generally accepted product life-cycle model phases[10,11].

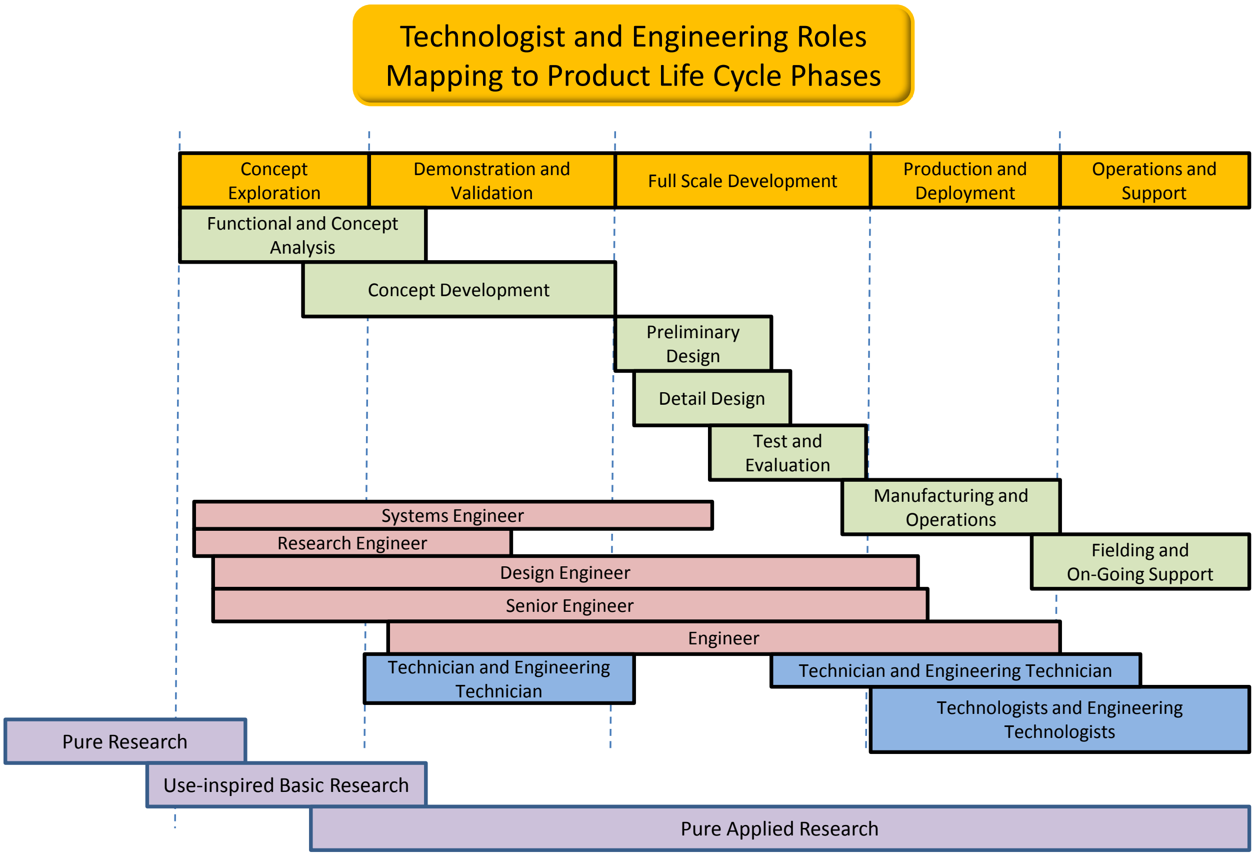

Figure 2.0 – Technologist and Engineering Titles/Roles Mapping to Product Life-Cycle Phases

At the macro view, there are five major phases to a product's life-cycle; concept exploration, demonstration and validation, full scale development, production and deployment, and, operations and support[12].

Concept exploration is that phase which identifies and evaluates alternative potential solutions. The primary activities of this phase are focused on determining the financial possibility and market opportunity of a given program's products or services.

During the demonstration and validation phase, the primary technologies, both hardware and software are essentially prototyped in a manner to verify and validate the original premise that the program's product or service can be produced in accordance with the customer's stated requirements.

As the prototype is fleshed for risk, components, both hardware and software, are demonstrated to be feasible economically and technically. The demonstration and validation of the concept is moved into the full scale development phase. Full scale development is a massive ramp up of resources. It transitions the concept, as conceived and validated in the demonstration and validation phase, through a series of increasingly detailed process steps; preliminary design, detailed design, build, test and evaluation.

In the production and deployment phase, the objectives are "…(1) to establish a stable, efficient production and support base; and (2) to achieve operational capability that satisfies [the customer][10]…" this phase requires the continual testing of the deliverable product from component to sub-system to system.

Operations and on-going support overlaps with the previous production and deployment phase. Its purpose is to ensure a stable and functioning deployed system.

The above is not singularly defined and used unanimously by all business and industry organizations involved in the product design, development and implementation through product life-cycle processes. The above model does however, provide a natural and required additional deeper perspective on the differentiation and understanding of the roles predominantly occupied by technologists and engineers. It also allows for a greater understanding of the engineering to applied engineering natural continuum for product design, development and implementation.

The above provides insight into the engineering and technologist titles assigned to current adult professional learners, and how those titles and their attendant roles apply to the product/process life-cycle model. With this, continuing professional development administrative organizations can more readily define the most applicable elements of the theory to practice curriculum continuum. Given this greater understanding, continuing professional development administrative organizations are more able to define the derived requirements of their target audience. And more applicably, are better able to suggest what may be stated course requirements as part of a proposed curriculum.

Engineering and Technology Educational Continuum[13]

Figure 3.0 depicts the engineering-technology educational continuum. Looking from left to right indicates increasingly greater levels of knowledge. Clearly delineated is the transition of knowledge and skills from theoretical knowledge (far right) to applied knowledge (2nd from right).

Figure 3.0, coupled with figure 2.0 provides a natural and required additional deeper perspective on the differentiation and understanding of the roles predominantly occupied by technologists and engineers. It also allows for a greater understanding of the engineering to applied engineering natural continuum for product design, development and implementation.

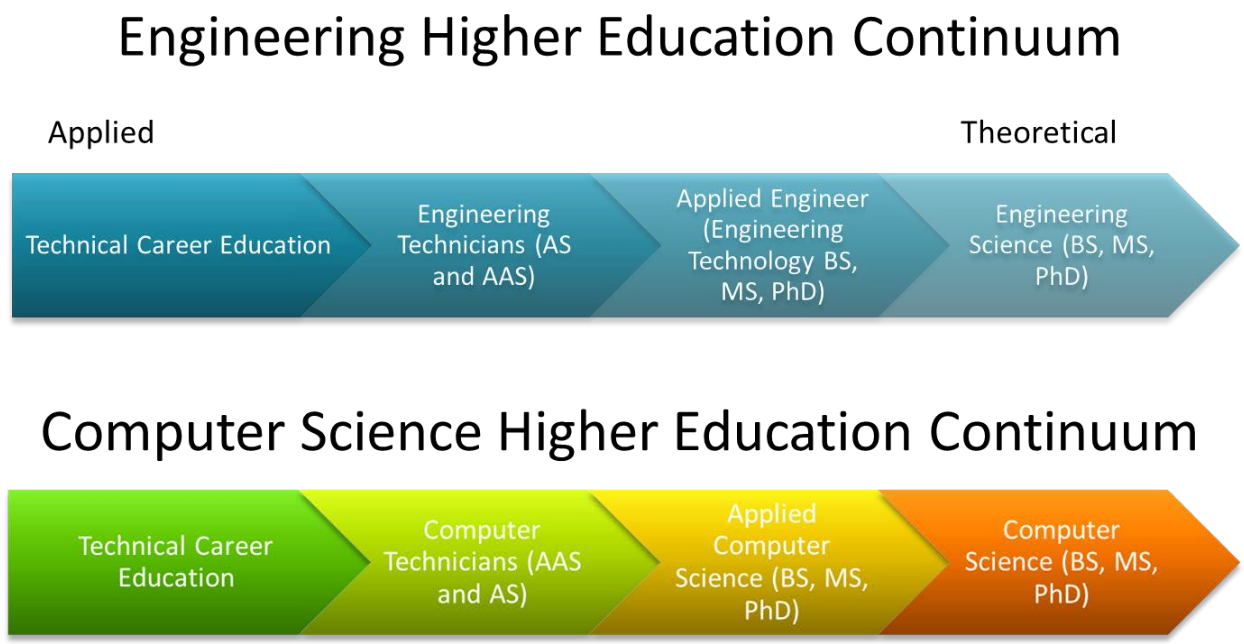

Figure 3.0 – Engineering-Technology Educational Curriculum

Undergraduate Discipline by STEM and Non-STEM Program Participation

From above, a deeper dive has provided insight into:

- What constitutes academic entry success criteria into fee-based graduate programs
- What roles are assumed by those who predominantly participate in fee-based graduate programs, and, how are those roles mapped to the basic product/process life-cycle

Given this background understanding, then, the below depicts the hierarchy of discipline participation of those participating in fee-based graduate programs.

Figures 4.0 and 5.0 below provide STEM and non-STEM undergraduate discipline participation understanding by providing insight into the many predominant disciplines of those participating in STEM and non-STEM oriented professional fee-based programs.

From figure 4.0, we see the top disciplines of participants into STEM-based professional programs are:

- Engineering
- Technology related
- Computer science
- Business
- Pharmacy

- Liberal Arts
- Leadership
- Architecture
- Communications
- Agriculture

Figure 5.0 depicts the top general categories of disciplines for non-STEM program participants. This data reflects all participants in non-STEM graduate programs. The hierarchy of disciplines, then, are:

- Technology
- Liberal Arts
- Management
- Health and human sciences
- Engineering
- Agriculture

What separates STEM from non-STEM program offerings is the orientation toward technical leadership versus first-, second-, or third-line leadership. More specifically, STEM is strictly leadership of STEM oriented endeavors, providing various courses in six sigma, quality initiatives and business statistics with a coupled directed project. Non-STEM program offerings are for leadership positions with a general understanding of team collaboration, human resource management and similar non-technical courses, culminating with a capstone project.

The findings would suggest STEM oriented curricula attract those participants with a predominance of STEM oriented undergraduate experiences. This while the non-STEM program offerings would attract participants with a true leadership perspective; STEM or non-STEM.

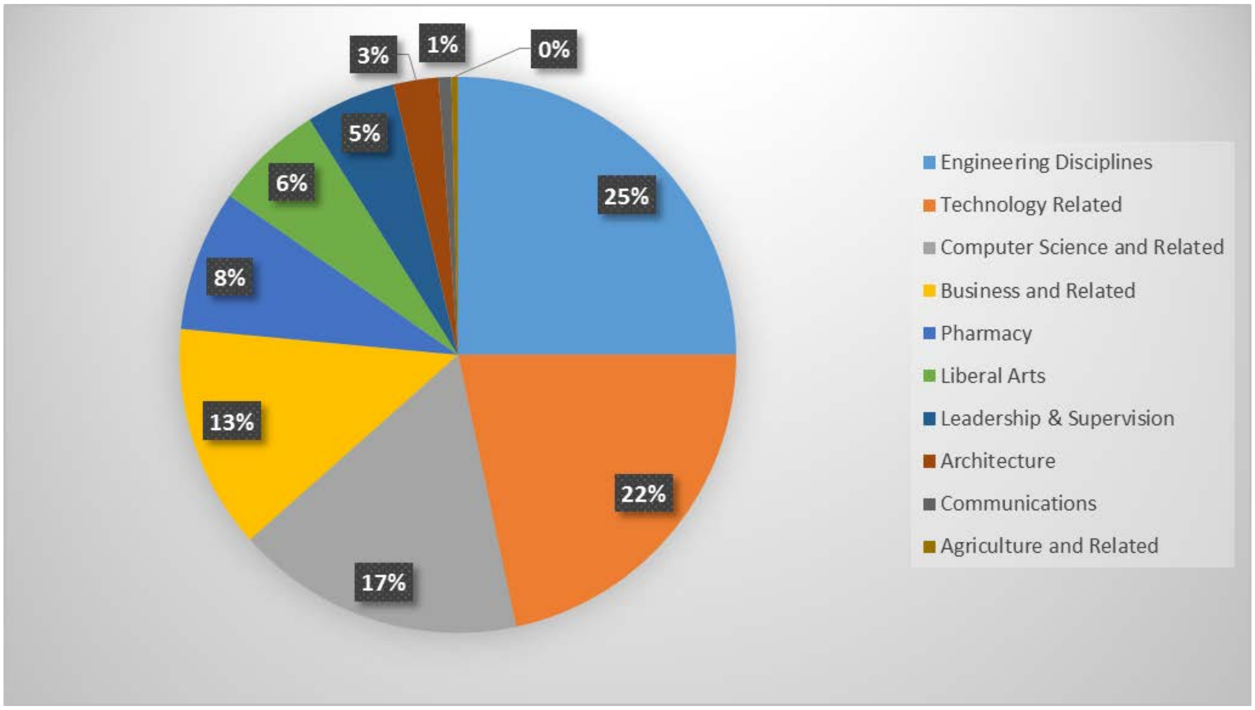

Figure 4.0 – Stem-Based Programs - Undergraduate Percent of Total by Discipline

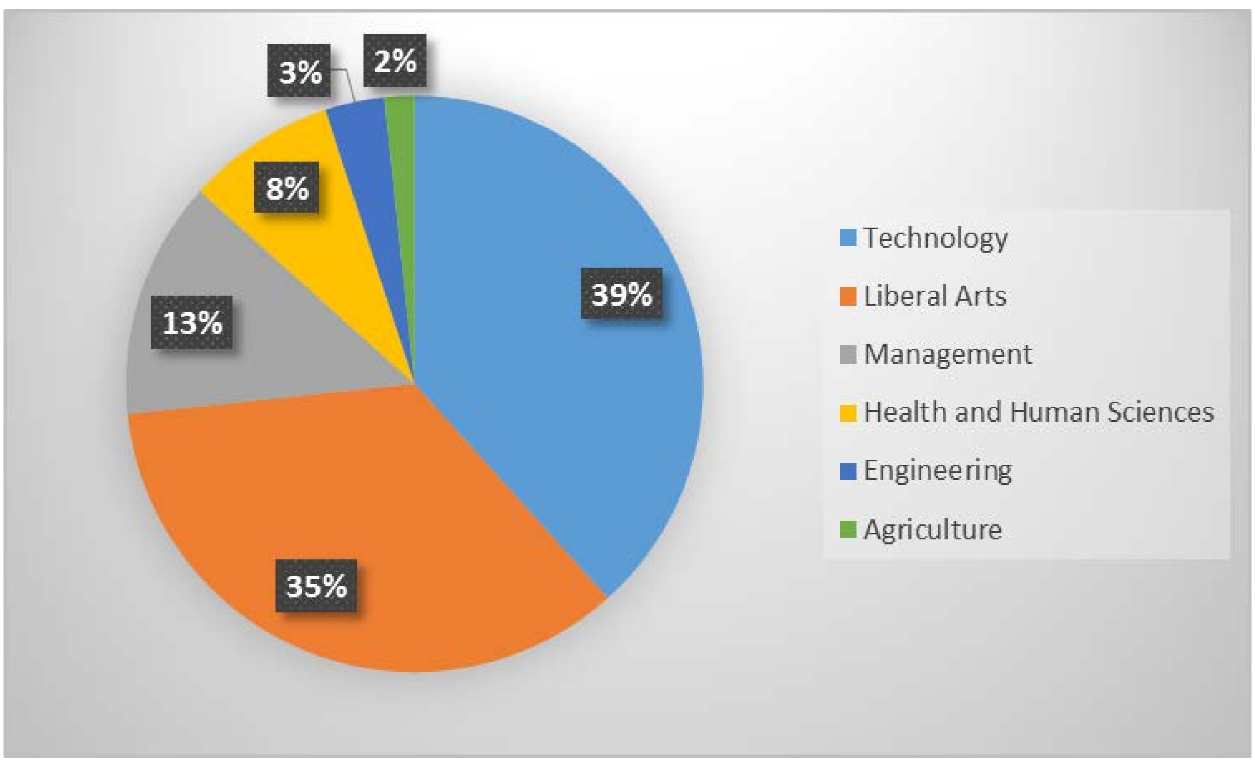

Figure 5.0 – Non-STEM Programs – Undergraduate Percent of Total by Discipline

Represented Corporate and Industry Sector Demographics – Frequency of Participation

With an understanding of the participating students, their titles and roles, and their disciplines, the next logical discussion is premised on their representative corporations.

Corporate demographics are composed of two views: (a) named organizations as a percent of total organizations participating in fee-based professional programs, and (b) industry sector participation as a percent of total industry participation in fee-based professional programs.

Figure 6.0 depicts the top participating named organizations as a percent of total organizational participation. This data provides qualitative insight into areas for future focus. Simply looking at the data from figure 6.0 provides valuable insight into which companies may be targeted for better understanding; this given their percent participation. In this manner, allocation of marketing resources could be made specific to participation rich organizations.

Equally, insight extracted from figure 7.0 provides a view by industry sector. This, similar to the perspective enhanced by figure 6.0, supports a general understanding of curriculum needs. This becomes increasingly true when coupled with successive insights into discipline specific participation by incoming students.

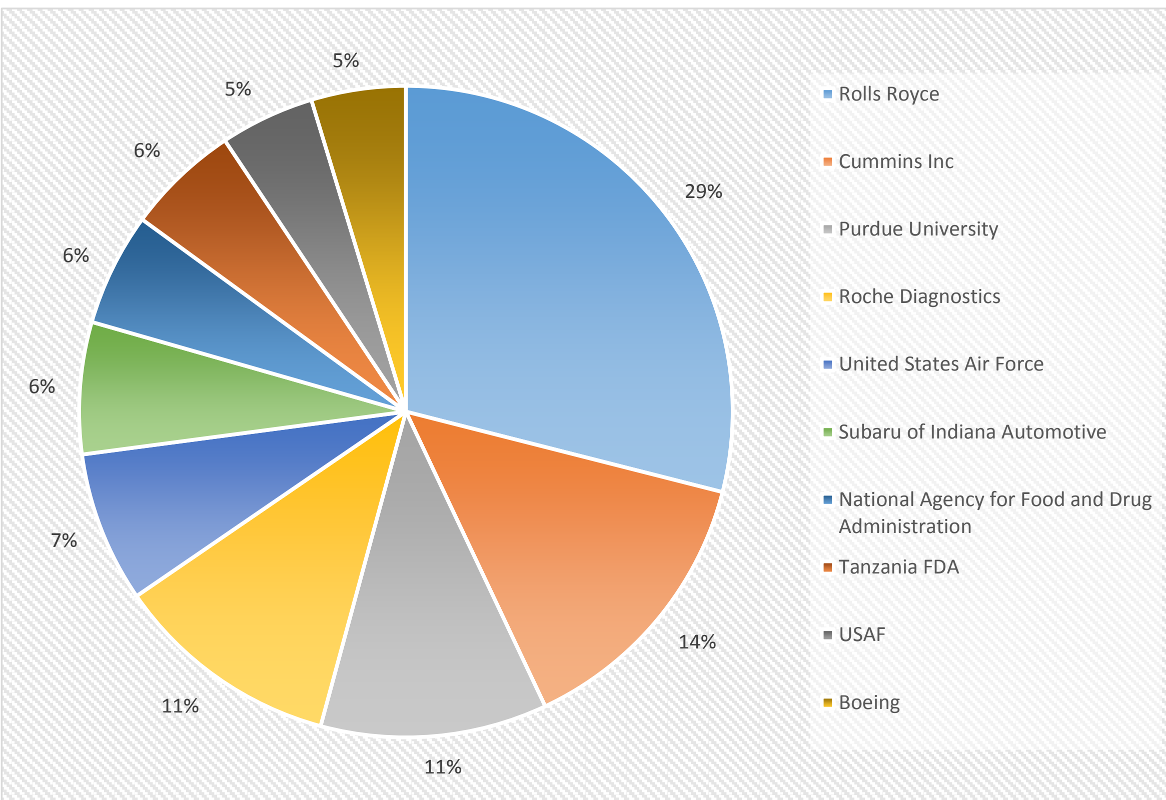

Figure 6.0 – Organizations by Percent of Total Participation

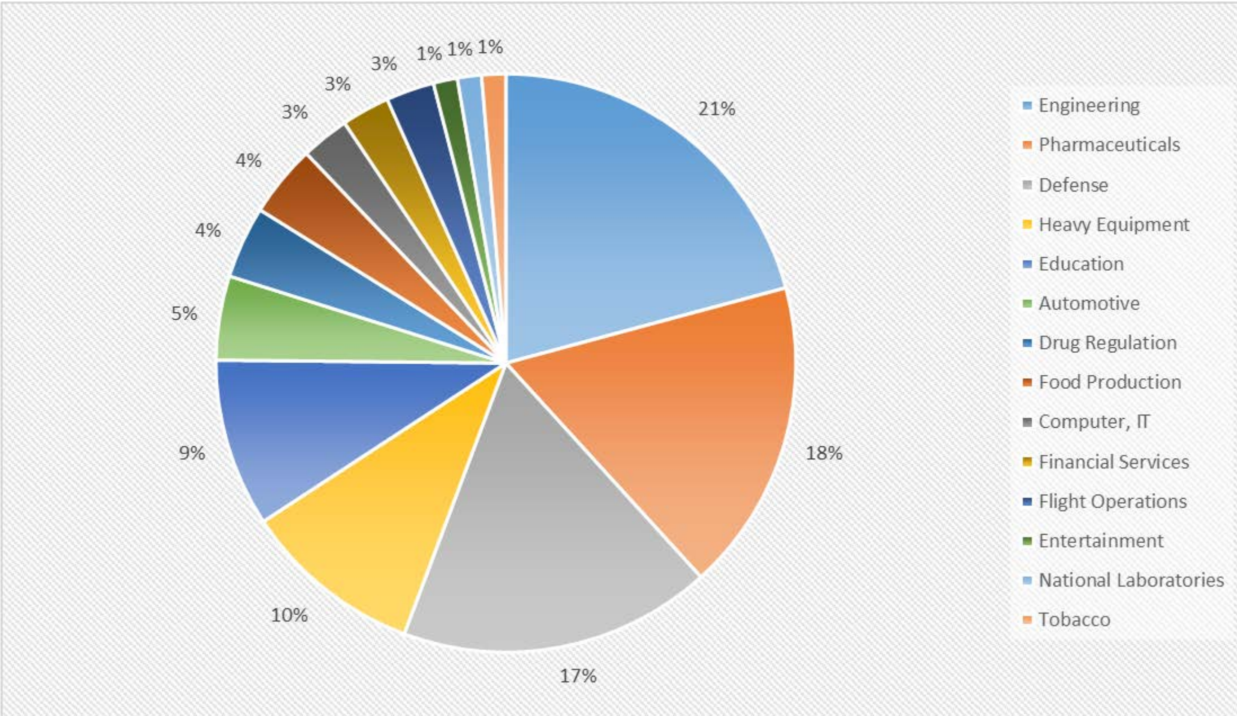

Figure 7.0 – Industry Demographics as a Percent of Total Industry Participation

Conclusion

This paper focused on a tier 1 research university study of participating corporate students and their respective corporations. The study qualitatively assessed the top participating organizations and their professional students of fee-based degree programs.

This paper addressed the following research questions:

- What are the critical academic success factors for incoming corporate students
- What are the predominance of disciplines of participating corporate students
- Relative to represented corporate demographics, what is their frequency of participation
- Relative to represented industry demographics, what is their frequency of participation

The above hierarchical question collection, from student to representative organization to industry, provides valued insight into fee-based student participation and their representative organizations by frequency and industry sector. From this, a target rich opportunity exists to expand future fee-based offerings through addressing and serving the needs of these participating individuals and their representative organizations.

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