



## Educational Needs in Computing of Experienced Full-Time Working Professionals

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### Abstract

*Pace University introduced an industry-based doctoral degree in Computing for experienced full-time working professionals (EFWPs) in 1999. The Pace University Doctor of Professional Studies (DPS) in Computing accepts students with several years of experience into a weekend-based on-campus doctoral program. Faculty with exceptional industry and academic experience lead the DPS program. This research examines the educational needs of students who have enrolled in the DPS program. Specifically, the research reports on the responses to a survey sent to them. The survey queries past and current students on overall educational motivations, time constraints, budget constraints, job constraints, and research interests. Survey responses indicate that EFWPs chose the Pace University program based on the hybrid program structure, dissertation research relating to the student's full-time working experience, location, and costs. The survey reports on major obstacles to completing the program, student incitements to matriculate, average hours of full-time work per week, degree funding, and length of time to complete degree. The results of the survey can be used to inform curriculum design with the needs of EFWPs.*

**Keywords:** professional computing educational needs, education.

### 1. Introduction

One perennial difficulty in staying current in a technical career is the barriers to completing graduate degrees while satisfying the requirements of a full-time professional career. Experienced full-time working professionals, hereafter EFWPs can hit barriers on their career tracks or in switching careers that would be best resolved by a doctoral degree, but the highest level of education typically available to “nights and weekends” or remote students is a Master’s Degree in technical areas Ellrodt et al. 2018 [1].

We surveyed the current and former students of the Doctor of Professional Studies in Computing program at Pace University. The program is discussed in Grossman et al. [2] and Merrit et al. [3]. We gained insights into the needs of EFWPs for such a doctoral program and the challenges they had finding and completing it.

We composed a twenty-three question survey in Qualtrics. The categorical questions were graded on a Likert scale. Eleven questions were posed to every respondent and an additional ten were posed only to those who self-identified as alumni of the program -- the survey itself did not define alumni, but successful defense of a dissertation is a degree requirement -- two questions were only given to non-alumni and one of those (“What are some major obstacles faced while working on your degree?”) was given only to current students.

We then selected the questions discussed in this paper on the basis of pertinence of the survey item to the topics of obstacles and interests and the informativeness of the results.

### 2. Literature Review

We explore recent related works on topics for the meta-research of doctoral research topics, doctoral student, student need surveys, and customer need surveys.

#### 2.1 Doctoral Student Meta-Research

Ellrodt et al. [1][4], Freeman et al. [5], and Haigler et al. [6], examine DPS student research topics through the lens of machine learning. Our work employs term frequency infrequent document frequency (TF-IDF) text analysis to cluster dissertation topics into categories to examine common

research topics among EFWPs. Ellrodt et al. [1][4] examined doctoral student research abstract for clustering. Freeman et al. [3], examined different clustering algorithms. Haigler et al. [6] explored the clustering of full text analysis.

## 2.2 Doctoral Student Well-Being

A survey from Hansson and Schmidt [7] examined doctoral student “well-being” in shaping their career in academics. The research postulates that “well-being is closely related to employee productivity and efficiency, strategies associated with maintaining well-being during Ph.D. studies might be crucial for higher education, its outcomes and—just as importantly—for a balanced life of Ph.D. students.” They performed a strengths weakness opportunities and threats (SWOT) analysis to address the strengths and weaknesses of student well-being. Based on the review findings and the SWOT analysis they created a multidimensional view of the well-being of doctoral students. Ultimately they used the survey results to “proposes a more student-centered approach to meeting doctoral students’ needs, and the enhancement of doctoral student well-being in order, as a long-term goal, to improve academics’ well-being and productivity.” [7]

## 2.3 Doctoral Student Retention

A study in the US, a paper from Dorn and Papalewis [8], reports on a case study of 108 doctoral students over eight universities to understand the role of student and peer mentoring for the improvement of doctoral student retention. The study reports on a program at the “The University of California/California State University Fresno Joint Doctoral Program in Educational Leadership” where 50 percent of all doctoral students were failing to complete their programs [8].

## 2.4 Student Needs

Research has been conducted to look at global issue of students needs. A study in China, written by Luo [9], looked at doctoral student need to develop a “input-process-output-development (IPOD) framework.” The research surveyed doctoral students and doctoral graduates from six agricultural universities in China. Their research reported that doctoral students in “agriculture have higher graduation delay rates, relatively consistent academic backgrounds, a longer learning input time, and fewer foreign research and teaching experiences, along with insufficient career guidance, and expectations for academic careers. Doctoral graduates have diversified career paths, but their jobs tend to match their specialty.” The survey results informed the development of the framework.

## 2.5 Customer Needs

Lastly, Bettencourt & Ulwick [10], Ulwick [11] and Ulwick [12] explore methodologies to determine potential customer needs. Their scientific process involves customer interviews, customer surveys, and customer rankings for helping to uncover unmet customer needs. One of the formulas they share is that unmet needs can be categorized by the following formula: “opportunity = [importance + max(importance - satisfaction, 0)].” The elements with the highest opportunity are typically areas to examine first for tapping into customers unmet needs.

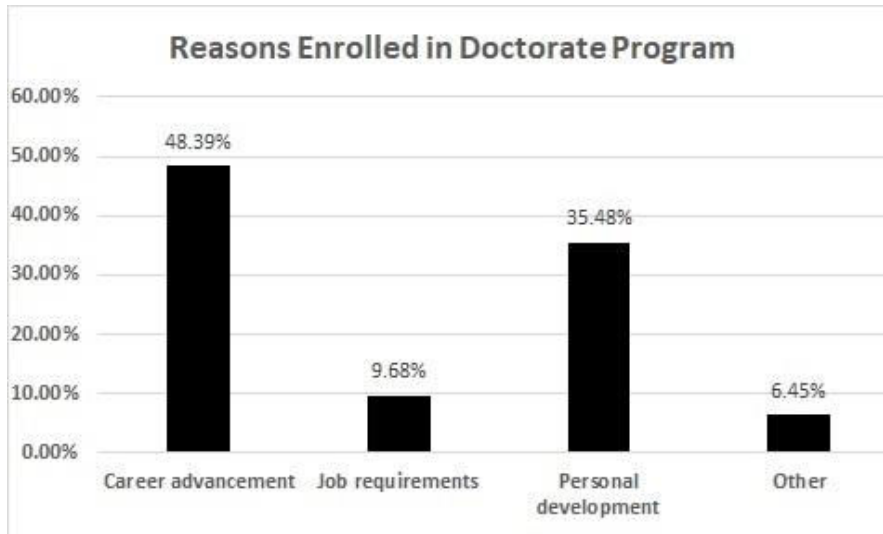
## 3. Professional Educational Needs

We sent out a survey, which was Internal Review Board (IRB) reviewed, to all the Pace University Seidenberg DPS students to learn about their educational needs. The survey was distributed to a list of 288 members via Qualtrics of which there were 40 responses as the time of this writing. The results of our survey on full time industry-based professional research are presented in Haigler et al. [6].

Our goal for our study was to identify what motivates and is essential for the DPS students. The survey collected important opinions, comments, and feedback from students.

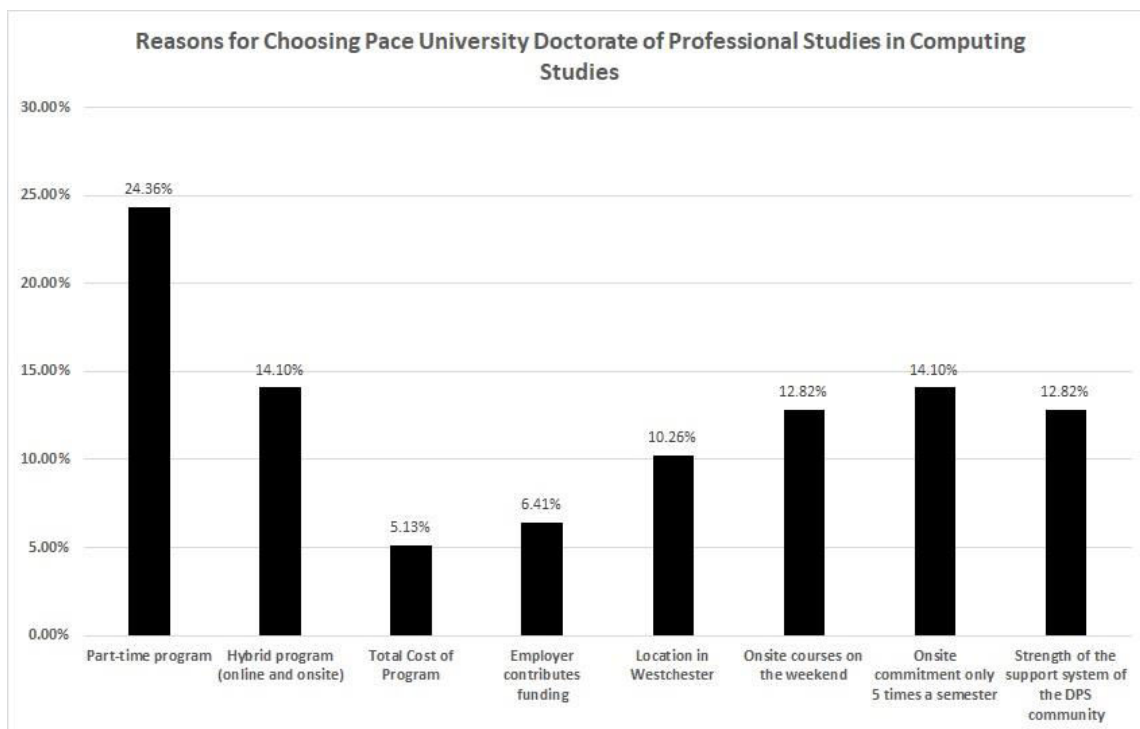
### 3.1 Reason enrolled in the Pace DPS Program

The survey question, “Please rank reasons you enrolled in a doctorate program?”, showed the highest ranked priority of the four was career advancement.



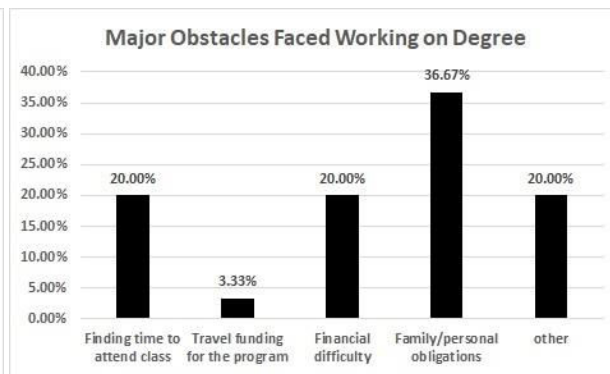
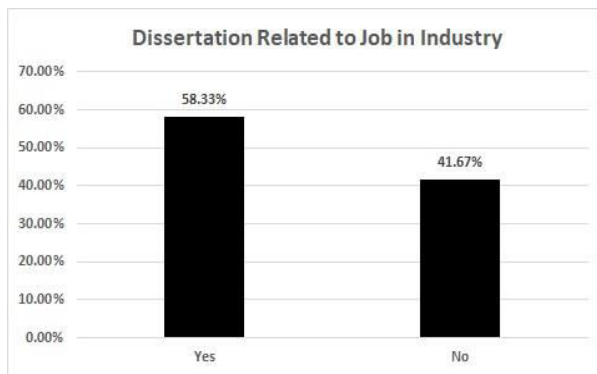
### 3.2 Priorities for Selecting a Doctoral Program

The survey question, “Why did you choose the Pace University Doctorate of Professional Studies in Computing Studies?”, showed the highest ranked priority of the eight was a Part-Time Program.



### 3.3 Relation of Dissertation Research to Industry Experience

The survey question, “Was your dissertation related to your job in industry?”, showed (below) that majority of respondents indicated that the dissertation was indeed related to their industry job.

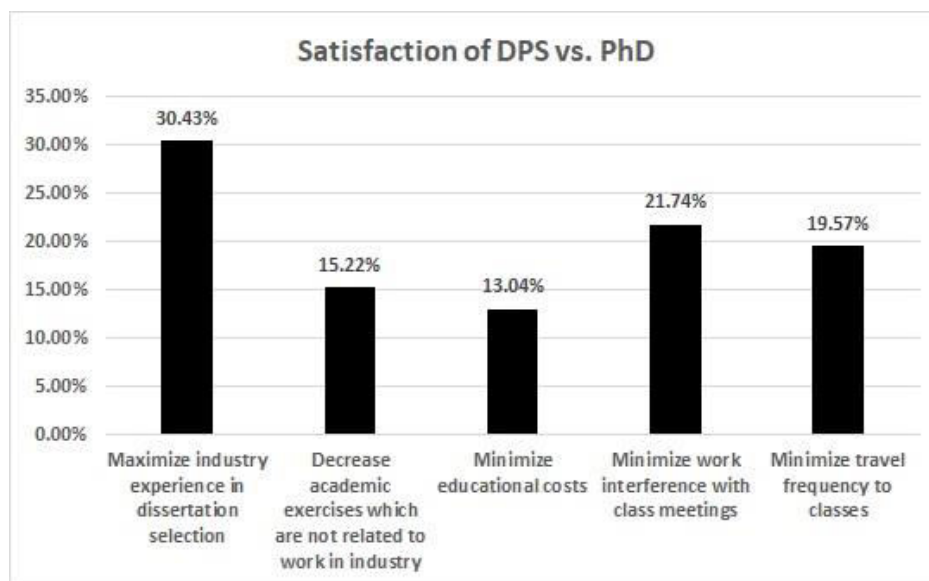


### 3.4 Obstacles faced while in Program

The survey question, "What are some major obstacles faced while working on your degree?", showed (above) that the highest ranked obstacle was Family/Personal Obligations of the five.

### 3.5 Satisfaction of DPS Program versus a Traditional PhD Program

The survey question, "Please rate the below on order of satisfaction with the Pace DPS program versus a traditional PhD Program", showed the highest satisfaction of the five was in maximizing industry experience in the student dissertation selection.



## 4. Conclusions and Future Work

Our analysis uncovered needs of experience full-time working professionals (EFWPs). Our study builds on the limited investigational literature that exists specific to EFWP doctoral student education and research needs. Our work presented insights for the education community at large regarding the doctoral level goals and needs for the EFWPs population. The results of the survey can inform curriculum and program design for the needs of EFWPs.

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