

# The Role of '*Doggedness*' in the Completion of an Undergraduate Degree in Engineering

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# Background

- **APS Data Collected from Four Institutions:**
- Public/ Private
- Research/ Technical Orientation
- Size of Student Population
- Ratio of Male to Female Students

# Introduction

- Research over the past 15 years has shown that the interest in pursuing undergraduate degrees in engineering has declined.
- Research focuses on factors used to predict the likelihood that a student will successfully complete an undergraduate degree in engineering.
- There is a lack of research and discussion pertaining to the significance of characteristics that can be described as ‘doggedness’.

# Methodology

- Subset of the larger APS sample used to assess levels of commitment, persistence, and satisfaction
- Second year study participants were asked open and closed-ended questions
- Data from structured interviews were analyzed qualitatively
- A 'within case' analysis was used to provide a snapshot of characteristics that demonstrate doggedness in the sample

# What is Doggedness?

- Doggedness entails perseverance, tenacity, and the ability to stubbornly adhere to a course of action.
- It holds the potential promise of pointing to a valuable personality attribute or characteristic that supports greater levels of persistence in engineering students.

# Operational Definition

- ‘*Doggedness*’ is operationalized to include factors and characteristics that show:
  - a high level of commitment to completing a degree in engineering;
  - an intention towards perseverance for its own sake; and
  - varying degrees of enjoyment and satisfaction
- Doggedness may have some impact on students’ ability to complete undergraduate engineering degrees, and may play a role in influencing what students do with the degree (work in engineering industry or pursue graduate degree in engineering).

# How Doggedness was Determined

- Primary evidence for doggedness was revealed by student responses in two areas:
  - level of commitment
  - persistence
- Enjoyment and satisfaction were used as secondary measures for doggedness to assess whether or not they are important factors, and to determine the range of responses for persisters.

# How committed are you to pursuing an engineering major?

	YEAR 1 2004		YEAR 2 2005		YEAR 3 2006	
	Freq	%	Freq	%	Freq	%
<b>Very Committed</b>	27	45.0	49	81.6	52	86.7
<b>Somewhat Committed</b>	27	45.0	8	13.3	6	10.0
<b>Not Very Committed</b>	2	3.3	0	0.0	2	3.3
<b>Not Committed</b>	1	1.7	1	1.7	0	0.0
<b>Invalid Response</b>	2	3.3	1	1.7	0	0.0
<b>No Response</b>	0	0.0	1	1.7	0	0.0
<b>Don't Know</b>	1	1.7	0	0.0	0	0.0
	n = 60	100%	n = 60	100%	n = 60	100%



# How committed are you to pursuing an engineering major? And why?

- Students displayed a range of responses to “why” they selected a particular level of commitment
- The intensity of their persistence stood out
- Examples of student responses include:
  - “I've gone too far to turn back now”; “I've put in a lot of work and there's no reason to back out whatsoever right now”; and “I'm in too deep to leave and, even though its very hard right now, I think it will pay off in the end”

# Three types of '*dogged*' students

- Unyielding Persister
- Intense Goal Setter
- Economic Rationalizer

# Unyielding Persister

- **Brian, a male petroleum engineering major:**  
During his second year, he indicated that he was very committed to getting a degree in engineering. He pointed to the number of times that he had to retake some of his courses, and his insistence that *“I will stay here as many years as I have to, to get my petroleum degree”*, as testimony to his persistence. In the end, he declared, *“if I wasn’t committed then I wouldn’t be here”*.

# Intense Goal Setters

- **Melissa, a third year female chemical engineering major:** said, *“I set this goal for myself and not much is going to get in my way”*. She established that it was just her “nature” to finish. She said, *“I can’t quit anything ...I’m just driven, I guess”*.
- **Thomas, a second year male aeronautical engineering major** said that *“when I say that I’m gonna do something I always do it. I can’t stand when I fail at something that I say I’m going to complete”*. In a subsequent year, he explained that he was the kind of guy that *“usually goes all out”* and that he is *“not going to drop out just because it’s hard”*.

# Economic Rationalizers

- **Philip, a male management science and engineering major**, said that there was “*a practical reason for being very committed to completing the major in engineering*”. If he were to change majors, he predicted that he “*would be in school for another four years*”. In addition, he said that he really enjoyed his classes related to engineering, and predicts that he will enjoy the companies that he plans to work for in the future.
- **Steven, a male mechanical engineering major**. Steven allowed time to explore courses in political science, philosophy, and history in the midst of a very demanding engineering program. Engaging in other subjects allowed him to determine that he “*would never want to do those majors*” and stated that “*at this point in my school career, I’m not changing majors [because] my parents are not going to pay for a fifth year in college and I wouldn’t finish anything at that point anyhow*”. He concluded by adding, “*when I looked at all the different majors I could possibly pursue at school, engineering was the only one that really appealed to me*”.

# Enjoyment and Satisfaction

- During the structured interview, students were asked, “Are there any aspects of engineering that you particularly like?” and “Are there any aspects of engineering that you particularly dislike?”
- Questions probed specific features of engineering programs that students experience.

# Responses

**Likes:** A greater frequency of students stated they liked their engagement in problem solving and the design aspects of their coursework

**Dislikes:** The quantity of work, associated stress, and the considerable amount of time required to carry out class assignments

The subset of very committed and persistent students, when reviewing level of program enjoyment, left a fairly unchanged group of respondents called 'dogged'.

# Future Plans of Dogged Engineering Students

Plans	Short Term Plan	Long Term Plan
	%	%
<b>Work in Engineering</b>	45.2	17.1
<b>Graduate School in Engineering</b>	22.6	8.1
<b>Uncertain</b>	12.9	0.0
<b>Travel/ Take Time Off</b>	11.3	0.0
<b>Engineering Management</b>	6.5	3.2
<b>Work in Non-Engineering</b>	4.8	1.6



# FINDINGS

- A small but identifiable group of dogged engineering students was found in the structured interview segment of the study
- High levels of commitment, persistence, and satisfaction are conveyed across the spectrum of engineering majors
- Doggedness is a characteristic that develops and increases with time
- Students identified as *dogged* exhibited varying levels of enjoyment and satisfaction. Students that primarily enjoyed experiences associated with pursuing their engineering degrees were more intent on working in the engineering industry

# Conclusion

- Continued effort needs to be made to promote graduate education among engineering degree recipients
- To increase the number of engineering students entering graduate school, undergraduate program coordinators need to address some of the aspects of the program that students dislike.

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