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Investigating the Theory-Practice Gap in Sales Engineering Transitions

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Honors Thesis

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Abstract

This research paper reports the investigation of the theory-practice gap that exists for engineering graduates transitioning into sales engineering or technical sales roles. Sales engineering is the practice of employing technical knowledge to facilitate the sales process of complex engineered products and services, acting as a bridge between engineers and customers. A balance of technical knowledge and sales acumen are critical to success in these positions. To investigate this theory-practice gap, the researcher employs a mixed-method design consisting of self-assessment surveys directed at current and previous sales engineers to gauge their readiness and skills at graduation versus the skills they have acquired throughout their career. These surveys explore the aspects of missing skills, if any, that they have observed in their industry experience. This research provides valuable insights for educators, industry professionals, and aspiring sales engineers, facilitating a more seamless integration of theory and practice in this growing field.

Acknowledgements

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University *of* Dayton

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Introduction

An important and dynamic field of work for engineering graduates is technical sales or sales engineering. Technical sales is a unique field of work due to the required skills that blend technical engineering knowledge with professional selling skills like persuasion, pricing, and developing leads. As for any career that requires specific skills, there is often a gap between the theoretical knowledge taught in higher education and the actual practice, coined theory-practice gap [1]. Theory-practice gap has been studied in a variety of career fields, especially in fields like nursing where the application of education is highly critical immediately upon graduation [1]. In technical sales, the theory-practice gap is the discrepancy between the theoretical taught in the classroom, or lack of, and the true practice in industry. Sales engineers are critical in industries selling a technical product, whether it is a commodity or special engineered product. Sales engineers spread the gap between the outside sales team, which is focused on creating and building relationships with the client, and the engineering team, who design and build out the project [2]. They support the outside sales team with technical knowledge for the client and communicate the needs of the client back to engineering in a familiar language. Sales engineers are key contributors to the selling process in nearly every industry, and with new technologies, will only become even more critical. These jobs are predicted to grow by five percent from 2022 to 2032, faster than the national average [3]. With the sales engineer workforce growing, many companies have developed "Technical Sales Development" or similar programs to teach graduates the techniques of selling a technical product [4]. These programs are beneficial; however, this is an extended training period for a new hire and potential value of the hire is lost during the training period. The objective of this work-in-progress research paper is to investigate the theory-practice gap for engineering graduates transitioning into sales engineering roles and identify what skills are commonly missing upon graduation.

Even with a growing need for sales engineers [3] and very few universities offering sales engineering curriculums [5], [6], there has been notable research completed in sales engineering education. Sly, Bumblauskas, and Carberry conducted research on the development of a sales engineering undergraduate course. Trane Technologies made a donation to Iowa State University to create such a program [7]. This research found that students who took the sales engineering course rated their sales skills and perceptual interest in the industry growing significantly in self-assessment surveys [8]. This study demonstrates that there are sales skills to be learned in school that would not have been taught otherwise. Students in this study perceived their sales and social skills to have grown from this course developed by previous sales engineers. This suggests that students are indeed lacking the necessary sales skills if they have not taken a sales engineering course like those offered at Iowa State University.

Additional research from Sly et Al. [7] focuses purely on the development of an engineering sales program at Iowa State University with industry. This program developed a Technical Sales 1 and Technical Sales 2 series of courses, based on input from nine industrial committee members, representing distinct industry sectors. The Technical Sales 1 class primarily covers foundation skills such as the selling process, request for proposal (RFP) process, and value selling. The Technical Sales 2 course

focuses on multi-level sales organizations, global sales, and case study evaluations [7]. These courses were created based on the input of the Industrial Advisory Committee. Other universities offering technical sales minors include Pennsylvania State University, University of Florida, and Purdue University Polytechnic Institute, each with similar programs [5],[6], [8]. Pennsylvania State University offers a Technical Sales minor to engineering and engineering technology students [5]. This program of study requires students to take 19 credit hours in marketing, supply chain, personal selling, and project management courses. At Purdue University Polytechnic Institute, Supply Chain and Sales Engineering Technology is a part of the Industrial Engineering Technology major. Students take courses in Business to Business (B2B) Sales Management and Technical and Service Selling and also learn Enterprise Resource Planning (ERP) software such as SAP [6].

Work Rotations

It has been established that internships and co-ops are highly beneficial in engineering education [9]. Internships and co-ops provide valuable, short-term experience in real industry situations. Internships, in this research, are referred to as single semester experiences with a company, meanwhile, co-ops are multiple semester rotations with the same company. These terms are typically intermixed, depending on the university and industry. In this research, internships and co-ops will be called work rotations.

Sales engineering work rotations are beneficial for students looking to explore sales engineering and gain skills not taught in a typical engineering class. A standard sales engineering work rotation job posting will describe the skills to be learned and the expected typical technical sales experience. These postings can be very different from typical engineering work rotation postings as sales engineering positions will prefer some sales experience, however, it is not typically required as engineering students often have no background in sales. This is much different compared to the traditional engineering work rotation that will require a certain set of technical skills. As demonstrated in a sales engineering job posting, technical aptitude is preferred with strong writing, presentation, and communication skills [10]. The skills to be learned include B2B relationship development, RFP writing, and value selling. Each of these skills was addressed in the Technical Sales courses by Sly et Al at Iowa State University [3], [7].

Technical Sales Development Programs

After work rotation opportunities, full-time hires often join Technical Sales Development Programs at their hiring company. A Technical Sales Development Program can be defined as an extended training program for new hires, designed to teach selling skills and techniques of a technical product [4]. Respective companies run programs differently, some ranging from six months to two years and others may vary in curriculum. However, the primary objective of these programs is to bring engineering graduates up to speed on the selling skills that were not taught in their engineering degrees. These programs create valuable technical salespeople; however, this is a significant investment and perhaps potential lost value over the program's length. These programs can be as large as 40 trainees in one class [11].

A prevalent example of a Technical Sales Development Program can be found at Cognex, a company developing machine vision systems [12]. The Cognex Technical Sales Development Program is six months long at their headquarters, including in-field training to learn to sell AI-enabled products [12]. The requirements for this position include a four-year degree in engineering, business, or marketing and an interest in technical sales. Like work rotations, experience in selling is not required or even listed as preferred. The popularity of these programs for companies demonstrates not only the need for engineers in technical sales positions, but most importantly portrays the missing practical sales of engineering graduates entering sales positions.

For the majority of engineering programs and engineering graduates, there is a clear skill gap between theory and practice of engineering graduates entering technical sales positions. Some research has been conducted in developing and offering courses at universities to teach the practical skills of selling to technical students, but few universities offer these courses. Due to this gap in teaching of selling skills, many employers offer technical sales work rotations to teach selling skills to engineering students while still in school. Technical Sales Development Programs also exist but are much larger investments in time and funds to teach selling skills and techniques to new full-time hires. With limited research around the technical sales skills gap, this research paper will investigate and identify the specific selling skills missing from new engineering hires to better understand the theory-practice gap in technical sales skills from engineering graduates.

Research Methods

The primary study tool to answer the research questions as posed above was an online survey administered by Qualtrics. The participants of this study include current or previous full-time sales engineers that have graduated from an undergraduate engineering program. These participants provide in-depth information on their transition into a sales engineering role. Initial participants invited to the survey have been involved in the University of Dayton's Society of Sales Engineers or the National Society of Sales Engineers. Additional survey invitations will be sent out to referred contacts as initial participants complete the survey.

The survey (included in the Appendix) is made up of the following sections:

- Educational Preparedness
- Theory-Practice Gap Perception
- Skills Preparedness
- Open-Ended
- Demographics and Additional Contacts

Educational Preparedness Section

The Educational Preparedness portion of the survey identifies the extent to which sales engineering was introduced during their undergraduate education. This includes a question asking how well each choice prepared the participant for their sales engineering career. These options include engineering education, work rotation, and post-graduate job

training or other. This is scored on a scale of 1 (not prepared at all) to 5 (extremely prepared and well equipped). These questions are labeled Q2.X in the Appendix.

Theory-Practice Gap Perception Section

The Theory-Practice Gap Perception section (Q3.X) defines theory-practice gap to the participant and asks if they feel the said gap exists in the field. The other question asks participants to rate the alignment between their engineering education and the skills needed for sales engineering.

Skills Preparedness Section

The skills preparedness section asks participants about their level of preparedness of 14 different skills common in sales engineering which Sly et Al. utilized in a sales engineering course survey [8]. These items are scored on a scale of 1 (very unprepared) to 4 (very prepared) or does not apply to the participant. These questions are labeled Q4.X and Q5.X in the survey.

Open-Ended Section

The open-ended section (Q5.X) asks the research participants about the challenges they faced when they entered their first sales engineering position. Another question asks the participant to choose the three most important technical sales skills to them and proceeds to have them rank those skills. This section was included to capture qualitative insights from the participants that may not have been measured in the other sections.

Demographics and Additional Contacts Section

In the final section of the survey, the participants are asked to share demographic data and information about their career, including their age (Q6.1), years of experience in sales engineering (Q6.2), industry of their first sales engineering position (Q6.5) and a few additional questions. These questions can be found in Appendix Q6.1-Q6.8.

Upon the survey's completion, participants are asked if they are willing to share additional contacts that qualify for it (Q7.1). If the respondents answered “yes”, they are directed to an additional confidential survey where they input those contacts. The researcher then reaches out to the shared participants with the survey invitation. The full survey is included in Appendix. This study received approval from the University of Dayton Institutional Review Board.

Results & Discussion

The survey yielded 45 total responses from participants who are current full-time sales engineers with an undergraduate degree in engineering. Six of these responses were partially completed and have been included to maximize the sample size. The following sections present the findings from the survey, organized by each individual section of the survey.

Demographics

With the demographics section at the end of the survey, 41 participants completed this portion (N=41 in this section). Table 1 and Table 2 present the distribution of age and years in sales engineering. 31 of the participants were between the ages of 18 and 34, representing the majority of the sample. 22 of the participants also had four or fewer years of experience in sales engineering.

Table 1: Age demographics

Age (years)	N	%
18-24	11	26.2
25-34	20	47.6
35-44	5	11.9
45-54	1	2.4
55-64	4	9.5
65+	1	2.4
Total	41	100.0

Table 2: Years of sales engineering experience

Experience (years)	N	%
0-4	22	53.7
5-11	8	19.5
12-20	6	14.6
20+	4	9.8
Missing	*1*	*2.4*
Total	41	100.0

The researchers also collected data on the number of sales engineering positions the participants have held in their careers. Table 3 displays this distribution.

Table 3: Sales engineering positions held

Positions held	N	%
1	18	43.9
2	16	39.1
3	6	14.6
4+	1	2.4
Total	41	100.0

Also collected was the industry of the respondent's first sales engineering job based on the US Bureau of Labor's most common industries of sales engineers [3]. Most of the participants categorized their jobs as in the manufacturing industry, which corresponds to the data from the US Bureau of Labor Statistics. The industries of the respondents that chose "other" were in motion control, industrial automation, and power generation. This data is displayed in Figure 1.

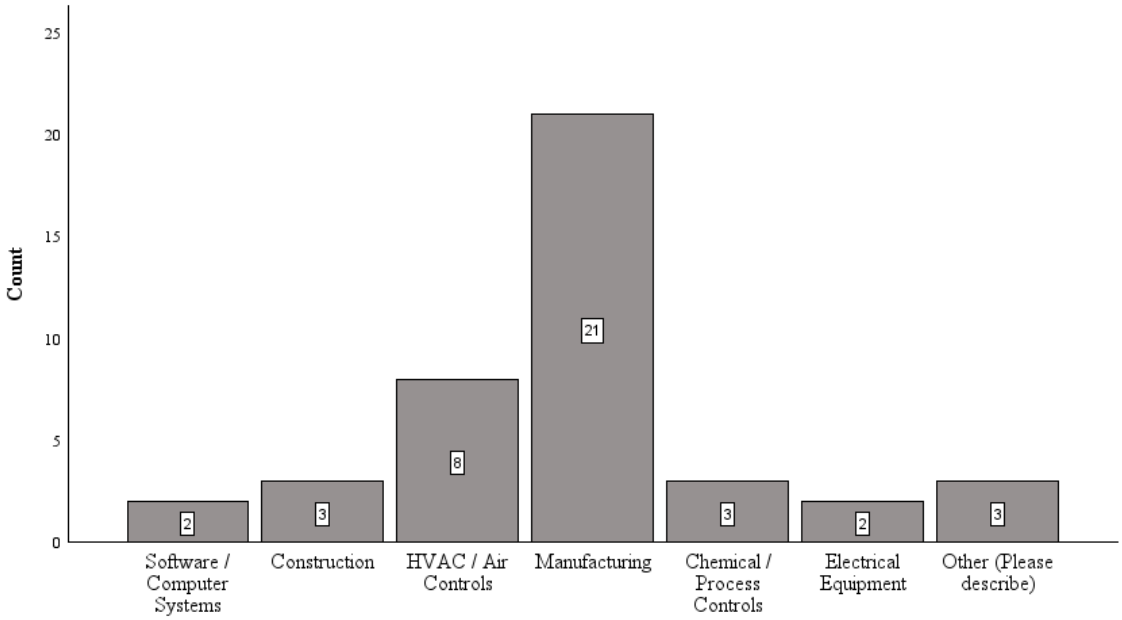

Figure 1: Industry of first sales engineering position

Although the sample appears to represent the various technical sales industries well, the age demographics appear to represent a biased sample of primarily graduates of the past decade, with 75.6% (31 of 41) of participants between the ages of 18 and 34 years old. This sample distribution may impact their perceptions of preparedness and the theory-practice gap. This may also impact their perception and recollection of their engineering education this was much more recent.

Theory-Practice Gap Perception

44 responses (N=44) were collected in this section. Participants were provided a definition of the theory-practice gap and asked to rate their perception of the theory-practice gap in sales engineering. They answered on a five-point scale from "Strongly disagree" to "Strongly agree." 38 of the 44 participants somewhat or strongly agreed that there is a theory-practice gap in sales engineering. The following survey question asked the participants to rate how their education aligned with the skills required in technical sales. Table 4 correlates these two questions and how participants answered in this section. Despite the majority of respondents in agreeance that a theory-practice gap exists, 29 of the 44 of the participants reported that their education was "somewhat aligned" with the skills needed for the position. Of the 38 participants that "somewhat" or "strongly" agreed with the theory-practice gap statement, 60.5% (23 of 38) felt their education somewhat aligned with the skills required and 28.9% (11 of 38) felt somewhat misaligned.

Table 4: Theory-Practice gap and alignment scores

		Do you agree there is a Theory-Practice gap in sales engineering?					
		Strongly disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Strongly agree	Total
Rate the overall alignment between your education and skills necessary for your sales engineering Position	Strongly Misaligned	0	0	0	1	0	1
	Somewhat Misaligned	1	1	0	7	4	13
	Somewhat Aligned	0	0	3	16	7	26
	Strongly Aligned	0	1	0	2	0	3
	Does not apply.	0	0	0	1	0	1
Total		1	2	3	27	11	**44**

The findings that most participants agree that a theory-practice gap exists aligns with industry and the existence of "Technical Sales Development" programs created by companies to address this exact issue. This emphasizes the need to address sales skills in an engineering curriculum and realign curriculum to better suit those entering the workforce in technical sales. However, engineering curricula are still valuable and applicable as 23 of the participants agreed that their education at least somewhat aligned with the skills they needed.

Educational Preparedness

The first section of the survey questions participants on their educational preparedness. Participants reported how well they felt their education, work rotation, and post-graduate job training prepared them for a career in sales engineering. Table 5 shows the means and standard deviations of the responses on the scale. The data shows that post-graduate on-job training made the respondents feel best prepared, followed by work rotations and engineering education.

Table 5: Education, work rotation, and job training preparedness scores

	N	Mean	Std. Dev
Engineering education	42	2.43	.914
Internship, Co-op, or other work rotations during education	41	2.73	1.184
Post-graduate on-job training	41	4.15	1.085

These findings confirm that post-graduate on the job training best prepares graduates for their career in sales engineering. This makes sense as job-specific training is going to be best tailored to that certain industry or product. Work rotations were also significantly higher ranked at preparing graduates for sales engineering positions. Even with fewer work rotations available to students in sales engineering compared to those of traditional engineering, work rotations, in general, appear to prepare students better than their education for sales engineering. This could be attributed to the fact that students in work rotations often have the ability to choose different skills or aspects of the business they want to learn about, including technical sales.

The other questions in the Educational Preparedness portion of the survey asked the participants if they had a specific course in their education about sales engineering, if they received formal sales training in their full-time position, and if they were hired into a sales engineering development program upon graduation. Table 6 presents these responses. Of the 44 respondents, only four had taken a course that taught sales engineering topics in their undergraduate education. Also, 24 of the respondents were hired into a technical sales development program or similar program as shown in Table 6.

Table 6: Educational preparedness section responses

	Yes	No	Other
Was there a specific course in your education about sales engineering?	4	39	1
Did you have formal sales training when you began your first sales engineering position?	25	14	5
Were you hired into a "Sales Engineering Development" program in your first sales engineering position?	24	18	2

Most of the participants claimed to have some form of formal sales training in their first sales engineering position. There were still 14 responses that did not have sales training in this job, which leaves one to ask how and when they learned those skills. Chances are they did not learn those skills from their engineering education based on the results from Table 5. One possibility is that sales training was not necessary for the specific position as technical sales claims a wide range of definitions and job responsibilities and the position solely leveraged their technical background. Some of the "other" responses explain this as one respondent claimed that formal training was not required for their inside sales position, a position that typically stays in the office and supports the outside sales team – the team that travels to the customer – by providing quotes and other technical product assistance. Another respondent denoted that "they wanted us to be very informed on every product group and use that knowledge to have conversations" where training was not so focused in sales but rather around the product.

24 of the respondents claimed they were hired into a Sales Engineering Development Program, or similar six-month or longer program dedicated to technical sales training as described in the literature review. With most participants in this research graduating within the past decade, this result aligns with the growth of Sales Engineering Development programs in this time frame. Once again, these programs are incredibly effective at preparing engineering graduates for technical sales. However, the longer the program lasts, the more valuable time is lost for the employee to provide value.

Skills Preparedness

44 participants completed the Skills Preparedness portion of the survey. The respondents were assessed on their preparedness upon graduation of 14 different technical sales skills on a scale of 1-4 with scores ascending from very unprepared (1), somewhat unprepared (2), somewhat prepared (3), and very prepared (4). Figure 2 presents the mean skills preparedness ratings of respondents based on whether they enrolled in a course with sales engineering topics in their engineering education. The participants who took a sales

engineering course, shown in blue, rated that they felt better prepared when entering their first sales engineering role in most skills. The preparedness ratings differed most significantly in the performing the selling process skill, where those who did take a course rated at 3.0 compared to those who did not take a course at a mean of 1.6. Other significant differences in skills ratings included understanding customer needs, knowing stakeholder roles, and performing a sales call.

Each of these skills of those who took a sales course felt significantly better prepared makes sense given the nature of these skills. For this reason, the researchers sorted Figure 2 in descending order of difference between skills. The skills with the most significant differences in rating, such as performing a sales call or performing the selling process, are specific selling skills that rarely overlap with engineering curricula. Interestingly, other skills similar to these are seen towards the left side of the graph such as knowing stakeholder roles and identifying a decision maker. These results make sense given the assumption that few, if any, engineering courses are going to teach these skills.

Meanwhile, skills that overlap into engineering curricula, such as working with a team, were closely rated by both groups of respondents. In fact, working with a team was rated significantly higher than any other skill by those who had not taken a sales engineering course. The close skills ratings are seen throughout the right side of the graph which consists of skills such as financial decisions and communication with the customer. This suggests that engineering curricula are preparing graduates well to collaborate with a team and make other decisions around finances and other aspects.

Another result worth noting from the skills preparedness responses in communication of technical terms to non-technical audiences. The “yes” group had a mean rating of 2.8 meanwhile those who did not take a course in sales engineering rated similarly at a mean of 2.6. While the group who took a sales engineering course did rate higher, the researchers encountered limitations in conducting further statistically relevant analyses. This was due to the small sample size of only four graduates who had taken such a course, which prevented the application of additional measures such as t-tests or ANOVA. Otherwise, engineering curricula appear to be fairly preparing graduates to communicate with others who do not understand technical concepts. This is very similar to the data shared before about working with a team and communication with the customer. Engineering education appears to be doing well in these skills that apply to all engineering fields of work. Courses such as senior project, where students complete an industry-based project, and other team-based project courses may contribute to this preparedness.

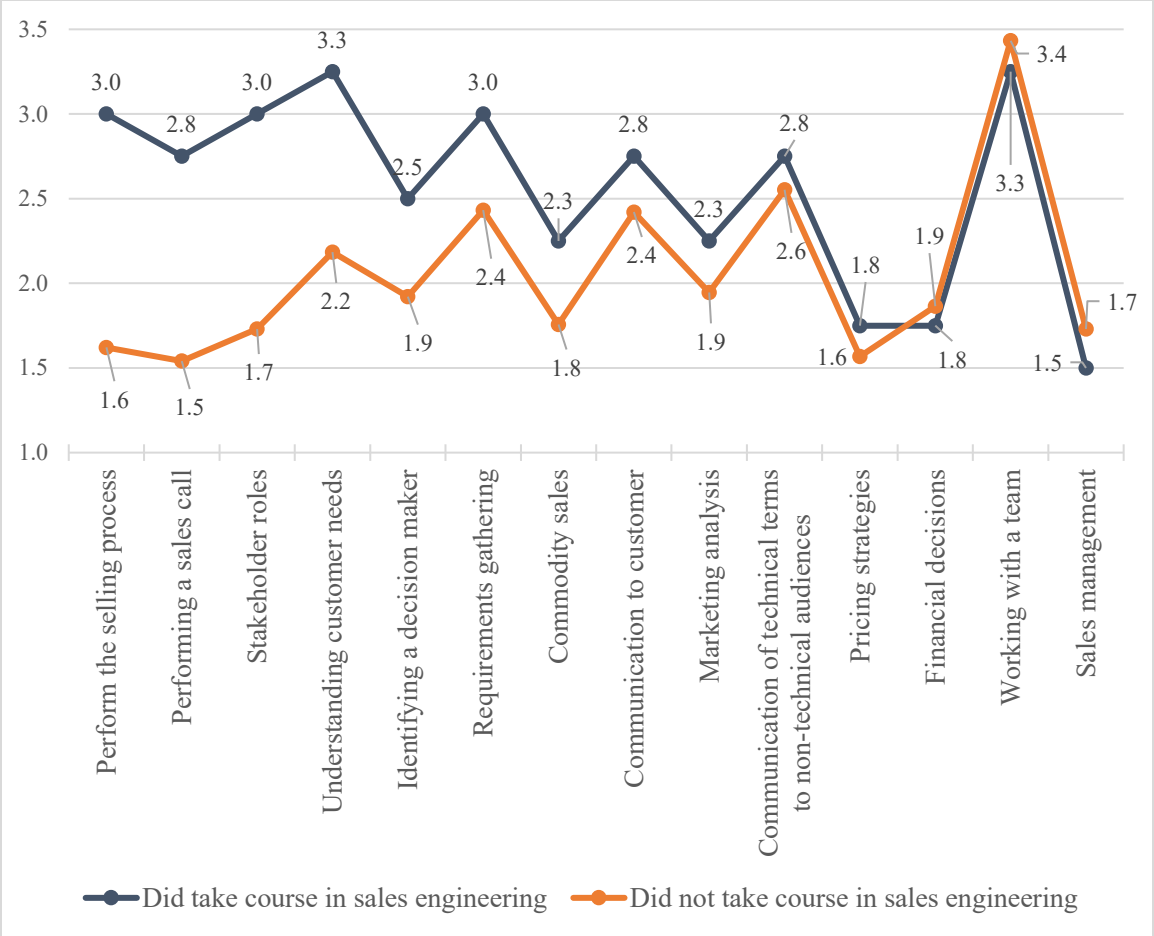

Figure 2: Mean skills preparedness based on sales engineering courses

Open-Ended

The open-ended section was completed by 31 of the sales engineer participants. The primary question of this section asked about the challenges they faced in their first sales engineering role. The responses were initially categorized into the 14 skills from the skills preparedness section and the categories were adjusted and combined as best fit. Table 7 presents this open-ended data. The most common responses focused on business acumen and product knowledge as well as performing the selling process in general. Soft skills and communication with the customer were common responses with 13.3% of respondents reporting some difficulty in communication skills.

Table 7: Open-ended challenges encountered in the first sales engineering position

Skills	N
Understanding customer needs	1
Soft skills & communication with customer	4
Identifying a decision maker	2
Performing the selling process	4
Pricing strategies	1
Communication of technical terms to non-technical audiences	1
Negotiation skills	2
Business acumen & product knowledge	6
Learning as you go	2
Utilizing sales tools	2
Business development and relationship building	2
Sales psychology & politics	3

The findings of this data present that business acumen and product knowledge are the most common areas of struggle upon graduation. This aligns with the assumption that specific product knowledge is something that all engineers will learn when they enter a full-time job, regardless of career path. However, multiple respondents noted that business acumen and technical product knowledge went hand-in-hand. It is one thing to understand the technical product, but with that knowledge one must understand the "business side of things" such as manufacturing processes and how those affect business aspects of the product. This is interesting as this extension of a manufacturing process on business is a simple extension for an engineering course. One example could be the cost of manufacturing the product and its effects on lead time.

Another interesting point around these findings was the idea of people being naturally talented in sales. This was also discussed in the technical sales course research completed by Sly et Al. at Iowa State University which discussed that students believed that some people were "born" with sales skills, even after completing an entire course in technical sales [8]. One of the respondents of the transitions survey reported a similar belief, stating the most significant challenge in the transition was "Lack of exposure to business terminology… those who are well suited for a sales role have a decent amount of typical sales qualities that come natural to them." Even current sales engineers believe that sales is something that "naturally" comes to people. This was shared despite technical sales skills having been proven to be taught to engineers through the research completed at the Iowa State University technical sales courses [8].

Conclusions, Implications, & Future Work

Existence of the Theory-Practice Gap

This research has been based on the research question of does a theory-practice gap exist between engineering education and sales engineering positions and if so, what skills are missing from graduates entering the workforce in technical sales. With the results of the survey, specifically in the theory-practice gap question, the existence of this gap has been shown with the majority of industry respondents in agreement that the gap exists. This

aligns with the trends seen in industry with the development of extensive Sales Engineering Development programs which are aimed at addressing this gap. Although the survey sample was skewed towards graduates from within the last decade, the results are still very valuable and represent graduates of all ages in sales engineering positions.

Skills and Educational Alignment

Despite the recognition of a theory-practice gap in transitioning into a sales engineering position, most of the respondents recognized their education as "somewhat" or "strongly" aligned with the prepared skills. This suggests that education is not as far off as some of the responses of the theory-practice make it seem. However, based on the data from the skills preparedness and open-ended sections, an assumption can be made that the applicable skills from engineering curricula are the technical and team working skills. The misalignment in engineering education may primarily exist in specific sales skills such as performing a sales call, identifying a decision maker, and sales politics.

There appear to be a few immediate areas in which engineering curricula can prepare students without teaching a specialized sales engineering course. Following the data from Figure 2, skills such as working with a team and communication of technical concepts to non-technical audiences already rank relatively high among graduates who did not take a technical sales course. There has been significant research completed in this area, such as teaching these concepts in a Finite Element Analysis course as demonstrated by Cress and Thomas at the University of Dayton. The researchers developed a course focused on developing visual communication and technical content delivery skills [13]. This is an example of utilizing a technical course to teach communication skills. Communication and soft skills are required for all engineering graduates and should be further developed, however, elective courses like this can improve the lacking soft skills.

Impact of Technical Sales Courses

The engineering graduates who enrolled in a course with sales engineering or similar topics reported significantly higher preparedness ratings in industry, an assumption can be made that these courses are critical in bridging the theory-practice gap in sales engineering. The findings show that engineering curricula well prepare students in areas that overlap like working in a team, but struggle in preparing with specific sales skills. These technical sales or similar courses which teach some of the sales process to students are critical in addressing this gap.

Industry Collaboration

The findings suggest a need for additional collaboration between engineering programs and industry to improve the alignment of graduates' skills entering the workforce. There is always a push to continue to grow partnerships with industry, but the findings of the paper suggest that there is work to be done around technical sales. Industry professionals, especially those leading the implementation of Technical Sales Development Programs, provide great value and guidance in the knowledge and skills needed in the workforce. The establishment and expansion of advisory boards with technical sales professionals will ensure the relevance of engineering programs to industry needs.

Future Work

A future area of study around this research is to better understand the curricula and the specifics of what is taught in Technical Sales Development Programs by corporate employers. These programs continue to grow in popularity and to be developed to better address the gaps in engineering education. It would be beneficial to interview the leaders responsible for developing these programs as well as analyze the curricula of these programs.

Another area of future work is to understand the impact of experiential learning and organizations on students' interest in technical sales and preparedness of skills upon graduation. Student organizations such as the National Society of Sales Engineers have multiple chapters at universities across the United States and host a national technical sales competition annually. Analysis of the impact of these experiential learning opportunities would be beneficial to understand if engineering students can successfully learn technical sales skills if they are not taught in a classroom.

The work of this paper, paired with future research and attention around the technical sales field, will be critical to make the improvements necessary to foster the growth and development of future sales engineers.

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Appendix: Sales Engineering Transition Survey

Start of Block: 1. Educational Preparedness

Q2.1 Did your engineering education introduce sales engineering as a career prospect?

- ○ Yes
- ○ No
- ○ Other (Please describe) _____

Q2.2 To what extent did the following prepare you for a career in sales engineering?

	Not at all prepared: Did not prepare me for a career in sales engineering.	Slightly prepared: There was minimal alignment between it and the requirements of a career in sales engineering.	Moderately prepared: It provided some preparation, but there is room for improvement in preparing for a career in sales engineering.	Very prepared: It effectively prepared me for a career in sales engineering.	Extremely prepared: It exceptionally well-equipped me for a successful career in sales engineering.
Engineering education	○	○	○	○	○
Intern, Co-op, or other work rotations during education	○	○	○	○	○
Post-graduate on-job training	○	○	○	○	○

Q2.3 Did you have a specific course in your education about sales engineering?

- ○ Yes
- ○ No
- ○ Other (Please describe) _____

Q2.4 Did you receive formal sales training when you began your first sales engineering position?

- ○ Yes
- ○ No
- ○ Other (Please describe) _____

Q2.5 Were you hired into a "sales engineering Development" - typically a six to twelve month training position - or similar program in your first sales engineering position?

- ○ Yes
- ○ No
- ○ Other (Please describe) _____

End of Block: 1. Educational Preparedness

Start of Block: 2. Theory-Practice Gap Perception

Q3.1 Theory-practice gap is defined as a misalignment that may exist between the theoretical knowledge and concepts learned in academic settings, such as university courses and academic research, and the practical skills and experiences required to function in the workplace in sales engineering positions. The challenge with a theory-

practice gap is that graduating students may not have the actual required skills for the workplace.

Rate the following statement: There is a theory-practice gap between engineering preparation and sales engineering

- ○ Strongly disagree
- ○ Somewhat disagree
- ○ Neither agree nor disagree
- ○ Somewhat agree
- ○ Strongly agree

Q3.2 Rate the overall alignment between your education and the skills necessary of your sales engineering position.

- ○ Strongly Misaligned: There is a significant mismatch between my education and the skills required for my sales engineering position.
- ○ Somewhat Misaligned: There is a noticeable misalignment between my education and the skills necessary for my sales engineering position.
- ○ Somewhat Aligned: My education is somewhat aligned with the skills necessary for my sales engineering position, but improvements could be made.
- ○ Strongly Aligned: My education is highly aligned with the skills required for my sales engineering position.
- ○ Does not apply.

Q4.1 Please rate your preparedness on the following skills when you first began your first sales engineering position:

	Very unprepared (Zero knowledge)	Somewhat unprepared (Some coursework, but not career ready)	Somewhat Prepared (Some coursework, somewhat career ready)	Very Prepared (Career Ready)	Does not apply
Understanding customer needs	○	○	○	○	○
Communication with customer	○	○	○	○	○
Communication of technical terms to non-technical audiences	○	○	○	○	○
Identifying a decision maker	○	○	○	○	○
Performing the selling process	○	○	○	○	○
Requirements gathering	○	○	○	○	○
Understanding stakeholder roles	○	○	○	○	○
Commodity sales	○	○	○	○	○
Pricing strategies	○	○	○	○	○
Making financial decisions	○	○	○	○	○
Sales management	○	○	○	○	○
Performing a sales call	○	○	○	○	○

Working with a team	○	○	○	○	○
Lead development	○	○	○	○	○

End of Block: 3. Skills Preparedness

Start of Block: 4. Open-Ended

Q5.1 What challenges, if any, did you encounter in your first sales engineering position due to lack of preparation?

_____

Q5.2 Please select and/or list up to three of the missing skills that were the most critical in your first sales engineering position:

- ☐ Understanding customer needs
- ☐ Communication with customer
- ☐ Communication of technical terms to non-technical audiences
- ☐ Identifying a decision maker
- ☐ Performing the selling process
- ☐ Requirements gathering
- ☐ Understanding stakeholder roles
- ☐ Commodity sales
- ☐ Pricing strategies
- ☐ Making financial decisions
- ☐ Sales management
- ☐ Performing a sales call
- ☐ Working with a team
- ☐ Lead development
- ☐ Other #1 (Please specify) _____
- ☐ Other #2 (Please specify) _____
- ☐ Other #3 (Please specify) _____

Q5.3 Please rank the previously selected skills in order of most important to least important in ability to execute the responsibilities in sales engineering:

_____ Understanding customer needs
_____ Communication with customer
_____ Communication of technical terms to non-technical audiences
_____ Identifying a decision maker
_____ Performing the selling process
_____ Requirements gathering
_____ Understanding stakeholder roles
_____ Commodity sales
_____ Pricing strategies
_____ Making financial decisions
_____ Sales management
_____ Performing a sales call
_____ Working with a team
_____ Lead development
_____ ChoiceTextEntryValue/31
_____ ChoiceTextEntryValue/32
_____ ChoiceTextEntryValue/33

End of Block: 4. Open-Ended

Start of Block: 5. Demographics

Q6.1 How old are you?

- ○ Under 18
- ○ 18-24 years old
- ○ 25-34 years old
- ○ 35-44 years old
- ○ 45-54 years old
- ○ 55-64 years old
- ○ 65+ years old

Q6.2 How many years of experience do you have in sales engineering?

- ○ 0-4 years
- ○ 5-11 years
- ○ 12-20 years
- ○ 20+ years

Q6.3 How many sales engineering positions have you held?

- ○ 1
- ○ 2
- ○ 3
- ○ 4+
- ○ Other (Please specify) _____

Q6.4 How many years of experience do you have in Full-Time work?

- ○ 0-4 years
- ○ 5-11 years
- ○ 12-20 years
- ○ 20+ years

Q6.5 What industry best classifies your first sales engineering position?

- ○ Software / Computer Systems
- ○ Construction
- ○ HVAC / Air Controls
- ○ Manufacturing
- ○ Chemical / Process Controls
- ○ Electrical Equipment
- ○ Communications Equipment
- ○ Fabricated Metal Products
- ○ Other (Please describe) _____

Q6.6 What is the highest level of education you have completed?

- ○ G.E.D
- ○ Associate's Degree
- ○ Bachelor's Degree
- ○ Post-graduate Degree (MS, MBA, PHD, etc.)
- ○ Other (Please describe) _____

Q6.7 Which (if any) pre-professional experiences did you have in your degree program?

- ☐ Internship (1 work rotation with 1 company)
- ☐ Multiple Internships (1 work rotation with multiple companies)
- ☐ Co-op (Multiple work terms with 1 company)
- ☐ Multiple Co-ops (Multiple work terms with multiple companies)
- ☐ Other (Please describe) _____

End of Block: 5. Demographics

Start of Block: Further Participation

Q7.1 Thank you for taking the time to complete this survey and support this research. To ensure the success of this research, the researcher kindly asks you to share other potential colleagues that this survey would apply to. The researcher will reach out to these contacts

individually. This data is anonymously collected and will not be associated with your previous responses

Would you be willing to provide name(s) and email address(es) of additional potential survey takers?

- ○ Yes
- ○ No

End of Block: Further Participation