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# Evaluations and outcomes of experiences of two cohorts in an information technology Doctor of Science program: A comparative analysis

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## Abstract

This study presents a comparative analysis of two distinct cohorts in an Information Technology Doctor of Science program. The inaugural cohort began during the COVID-19 pandemic, necessitating adaptations to the program's delivery and structure. In contrast, the second cohort experienced the program as originally designed, with traditional in-person components and collaborative activities. The research examines differences in academic outcomes, completion rates, and student experiences between these cohorts. Findings reveal insights for professional doctoral program design and delivery in both crisis and normal operational contexts.

**Keywords**: doctor of science, information technology, cohort, residency, and completion rates

## Introduction

The Doctor of Science degree is a unique terminal academic opportunity. Unlike a Doctor of Philosophy degree, this degree program, offered at multiple institutions in the United States, gives working professionals and in-field academics the path to a terminal degree that shows their accomplishment of synthesizing research findings with information technology leadership and innovation (Newton et al., 2019). A Doctor of Science in information technology program is offered at a public university in the Southern United States which is a part of a larger statewide network of public universities. The School of Computing at that university designed a hybrid terminal degree program beginning in 2019 (Rigole, 2019.) The degree program was designed for professionals working in information technology who sought to enrich their knowledge and skills with collegial interactions, concentrated research, and exercises to prepare candidates for organizational and academic leadership positions.

The first cohort began classes in Summer 2021, at the height of the Covid-19 Pandemic. The second cohort began their studies in Summer 2022. The faculty designed a limited-enrollment program that began with an in-person weeklong residency followed by two years of lockstep eight-week courses. The degree program culmination was conceived as an in-depth research project to be presented at a second weeklong residency. The research product was designed to be relevant for information technology professionals and their work in the field. The degree program was promoted through a variety of advertising means, and interest was high as the program received more than 100 applications for the inaugural cohort (Sandoval, 2022). Despite careful planning for a framework of cohesive academic experiences, the Covid-19 Pandemic introduced a series of challenges for the faculty and the first set of students who experienced the program; however, the completion rate for the inaugural cohort and the second cohort were higher than traditional Doctor of Philosophy programs (Xiong et al., 2024).

## Literature Review

As the need for a highly qualified workforce continues in the information technology field, there is an exigency to provide quality terminal degree programs which support the unique needs of the industry while providing candidates flexibility and opportunity to test their academic acumen and create new knowledge and skills to support their work in the information technology field (Kohun & Ali, 2005). The professional degree, the Doctor of Science in Information Technology degree, was designed so the candidate constructs and succeeds at making research findings to contribute to the body of knowledge of professional practice, a challenging notion in an advancing field with innovation at the heart of many of its practices (Newton et al., 2019). Designing a professional terminal degree program is challenging, and the program should contain specific elements to support completion (Merritt et al., 2001). This type of professional information technology terminal degree should have specific elements for candidate success rates and completer satisfaction rates (Suhonen & Sutinen, 2022).

When considering the design of such a program, the degree program should focus on succession, competencies, and research synthesis and application (Sobiek et al., 2006). Rather than a singular focus on technical skills and specific technical support or coding, the curriculum should focus on competencies such as collaboration, mentoring, innovation, goal setting, strategy, and project management (Steenkamp & DeGennaro, 2006; Thouin et al., 2018). Additionally, a technology professional terminal degree program should be designed to support information technology leadership (Kohun & Ali, 2005). The quality of the design of such a program is paramount for success rates for Doctor of Science in Information Technology programs (Ali & Pandya, 2021). Traditional and online programs should involve mastering the art of learning and synthesizing while engaging in the creation and fusion of discovery, innovation and science (Millett & Nettles, 2006). Careful design of a doctoral program sets the stage for the completion rates of the program, and a cohort structure underpins the curriculum (Lee et al., 2024). The standardization of program syllabi carefully designed learning activities, clear rubrics for assessment, and timely, consistent feedback are crucial for the success of the program and, in turn, high completion rates for program candidates (Ali & Pandya, 2021). Additionally, the cohort experience should be girded by communication protocols and expectations, so candidates are actively interacting with other candidates and program faculty throughout the program experience (Rice et al., 2022).

The Ewing Model, first established in 2012, espouses a four-element framework for a successful online terminal degree program (Ewing et al., 2012). The elements are a strongly structured program with structural continuity and consistent expectations, regular and intense interactions between candidates and faculty/administration, collaborative learning and avenues for partnership and cooperation, and performance-based assessments contributing to the candidate's progression and overall success in the program. Ali and Pandya (2021) emphasized the Ewing model by tailoring the online graduate degree program to make sure candidates sustained academic confidence and understood the expectations presented by the program. Additionally, the researchers noted cohort-based models allow for collegiality and partnership in the program. Students should be focused on learning – not registration, so all activities associated with registration should be lock-step and handled by program administration (Ali & Pandya, 2021).

Building a professional terminal degree program should be done with best practices and evinced findings (Bettencourt et al., 2021). In addition to meaningful, relevant learning activities, the program should be grounded in proactive communication by the faculty to students, and students should feel comfortable responding to faculty feedback or asking questions (Ari et al., 2022). As noted by Van Rooij and colleagues (2021), success rates for doctoral programs are higher in those programs in which students report a sense of belonging. Additionally, students should engage in activities which build and sustain academic confidence and motivation. The integration of journaling throughout a doctoral program can be a foundational support for candidates as the building blocks of the program should be rooted in advanced technology research and development skills and leadership competencies (Newton et al, 2019). Franco (2016) noted, the student's voice is critical for student success, and student voice through means like journaling and sharing should be ongoing and throughout the program (Alammary et al., 2014). The design of an online doctoral program should be sensitive to the student's need for creating, maintaining, and maturating a philosophical and research perspective (Wang & Kohun, 2019). Fundamental to a successful doctoral program is inquiry as practice, and the final project needs to be rooted in a balance of independent exploration and careful, choreographed guidance (Tolman, et al., 2023). Products created through the program should reflect the student's constructed or refined academic identity which should be sharpened through the program (Wilkin et al., 2022).

The first course of the program is critical for success in the long-term of the program, and the first course should be designed with academic achievement and student well-being in mind (Sverdlik, et al., 2018). Relatedness, as Jameson and Torres (2019) championed, is a fundamental building block of a successful doctoral program. Therefore, a critical component of a successful program is the interconnectedness of the cohort members as well as their connections to the faculty and administration (Burrington, et al., 2022). This should be established in the first course (Sverdlik, et al., 2018). With avenues for synchronous and asynchronous communication, the program should be grounded in innovation with understanding teaching specific skills and knowledge is less important than equipping students with skills to be ready to implement whatever comes in the future, so future casting and focus on innovation should be included in the methods and curriculum of the program (Sisu, 2023). Making and sustaining student-initiated and student-sustained student-to-student interactions in an unofficial platform is critical for success (Blake et al., 2025).

Based on analysis of other successful programs, the university chose to implement a "lock step" cohort approach in which all students in that cohort are admitted at the same time, and all cohort members take the same courses together in the same sequence (Kohun & Ali, 2005, Rigole, 2019). In addition to cohort-based model, the first course of the program was designed to enhance writing, establish interconnectedness of cohort members through proactive communication and social interactions in official and unofficial pathways and platforms (Mercer, 2022). Journaling was incorporated so students could establish a foundation of reflection and academic mindset for the learning journey ahead. Courses for the program were designed with consistent standardized syllabi, rubrics, and assessments (Sandoval, 2022). Careful attention was paid to building research courses to support the candidate's final independent research project (Rigole, 2019). Students were notified they would be surveyed after program completion for the purpose of program evaluation and enhancement.

## Purpose of the Study

Despite decades of study based on traditional Doctor of Philosophy degrees, there is limited research and evidence to support the limited residency, cohort-based online professional terminal degree program (Terrell, et al., 2016). The aim of this study was to explore the completion rates and compare the experiences of the first cohort which started during the Covid-19 Pandemic and the second cohort which experienced the original intended design of the program. The insights gathered from this comparison will be used to tailor and enhance the program and its design for future cohorts.

**RQ:** *How do academic outcomes, student experiences, and skill building insights compare between cohorts in a professional terminal degree program?*

## Methodology

In this mixed-methods research, a convenience sample of completers of the public university in the Southern United States Doctor of Science in information technology program was utilized. There was a total of 19 participants (N=19) from the inaugural cohort in 2023 who responded to the questions in the instrument. There was a total of 14 (N=14) participants from the second cohort in 2024 who responded to the questions in the instrument. There was a total of 33 participants across two cohorts (N=33). The focus areas of assessment of the survey were professional skill development and sustainment, program evaluation, course-specific feedback, overall program experience, and culminating student learning outcomes.

### Instrumentation

The instrument is a quantitative survey with qualitative elements administered to the inaugural cohort of the Doctor of Science in Information Technology (DSIT) program at the end of their program. The same quantitative survey with qualitative elements was administered to the second cohort of the Doctor of Science in Information Technology (DSIT) program at the end of their program. T he instrument was grounded in an ontological framework which was based on the research experiences instrument validated by Holloway and colleagues focused on the engineering professional degree and internal reliability of program practices (Holloway et al, 2022). This post-degree study instrument not only focused on knowledge and skill acquisition, but the survey questions were also built to integrate the processes students need to become and sustain as an information technology professional. These are reflected in questions which inquire about adaptability and stress management in addition to questions on compliance and technical skills.

There were 19 questions which were quantitative assessments utilizing a 5-point Likert scale measuring agreement levels. The variance was "strongly agree" to "strongly disagree" along with a not applicable choice. Each of the 19 questions asked if the DSIT program improved or enhanced specific skills or competencies. Additionally, the instrument gave respondents a listing of courses with the opportunity to rank the course(s) as most beneficial for technology leadership growth. The instrument concluded with open-ended questions focused on qualitative feedback for program refinement and suggestions for improvement. Students were also offered the option to provide any other feedback about their experiences in alignment with the theory promoted for thematic analysis through inductive reasoning (Williams & Moser, 2019).

**Table 1. Likert-scale questions and weight averages for each cohort**

| Skill Area | Inaugural Cohort (2023) | Second Cohort (2024) |
|---|---|---|
| Presentation skills | 4.21 | 4.07 |
| Time management skills | 4.21 | 4.14 |
| Teaching/sharing skills | 3.89 | 4.46 |
| Mentoring skills | 3.68 | 4.15 |
| Teamwork skills | 4.21 | 4.36 |
| Working in diverse teams | 4.26 | 4.21 |

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| Skill Area | Inaugural Cohort (2023) | Second Cohort (2024) |
|---|---|---|
| Goal setting | 3.63 | 4.21 |
| Goal achievement | 4.11 | 4.50 |
| Research/technical writing skills | 4.42 | 4.50 |
| Technical support skills | 3.00 | 3.57 |
| Project management skills | 3.42 | 3.71 |
| Decision-making skills | 3.79 | 4.29 |
| Strategic planning skills | 3.47 | 4.21 |
| Data analytics skills | 4.05 | 4.14 |
| Technology policy making and compliance | 3.42 | 4.21 |
| Future casting skills | 3.50 | 4.29 |
| Adaptability | 3.89 | 4.43 |
| Stress management skills | 3.16 | 3.93 |
| Leadership skills | 3.58 | 4.29 |

Values represent weighted averages from a 5-point Likert scale where 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree. Higher scores indicate stronger agreement the program improved the respective skill.

Qualitative questions were added to the survey. One question asked students to rank the courses most beneficial for their technology leadership growth. The other questions were open-ended questions which asked for learning highlights and feedback on the DSIT program. Students were asked, “What suggestions do you have for the DSIT Program as we refine courses and associated activities of the degree?” and “What were your learning highlights of the DSIT Program?” Finally, students were offered the opportunity to provide open feedback about the program through the question, “What other information would you like MGA to know about your experience in the DSIT program?”

**Procedures**

Upon Institutional Research Board (IRB) approval, the survey was distributed via email to completers. Approximately two months after each cohort’s graduation, the survey was distributed via email to the student’s institution-issued email address and their personal email address which was provided directly to the program upon acceptance into the program. The link to the survey was available for three weeks, and one reminder email was sent prior to the survey’s closure. For the 2023 inaugural cohort, there were 24 completers, and 19 of those completers responded to the survey. For the 2024 second cohort, there were 22 completers, and 14 of those completers responded to the survey. The 19 quantitative questions were analyzed for descriptive statistics, narrative analysis, and a Mann-Whitney U test for significance. The highest-ranking courses were identified, and these were put into a chart for comparison and analysis. For the open-ended questions, a systematic approach was made to code responses for themes and meaningful patterns within the responses. Themes reflected experiences and emotions exhibited in the responses. Identified themes were analyzed in a juxtaposition to the research question as favored by Williams and Moser (2019).

## Results

The total enrollment was set at 30 with each sub-cohort expected to be 15 students in each. Cohort 1, Sub-cohort 1 totaled 13 after two dropouts, and Cohort 1 Sub-cohort 2 totaled 15 after one dropout in the initial cohort. A total of 28 students finished the program at an overall completion rate of 93.75% for the initial cohort. Cohort 2 Sub-cohort 1 started with a total of 14, and 10 finished the program. Cohort 2 Sub-cohort

2 started with a total of 12, and 11 finished. A total of 21 Cohort 2 students finished the program at an overall completion rate of 81.67%. For both cohorts, the total number of students who started the program was 57 (N=57), and the total number of completers was 49 making the overall completion rate for the two cohorts to be 85.96%.

**Table 2. Cohort Completion Rates for Inaugural Cohort and Second Cohort**

| Cohort | Sub-Cohort | Initial Enrollment | Final Enrollment | Completion Rate |
|---|---|---|---|---|
| 1 | 1 | 15 | 13 | 86.67% |
| 1 | 2 | 16 | 15 | 90.32% |
| 1 | Overall | 31 | 28 | 93.75% |
| 2 | 1 | 14 | 10 | 71.43% |
| 2 | 2 | 12 | 11 | 91.67% |
| 2 | Overall | 26 | 21 | 81.67% |

(N=57) Note: The overall completion rate for the two cohorts was 85.96%.

The descriptive statistics reveal insights into the perceived impact of the Doctor of Science in Information Technology Program experience on various skills. Most skills showed agreement ratings, indicating at consensus the program improved that skill. Maximum ratings vary between four and five, suggesting while some respondents strongly agreed, others had less agreement or even disagreement.

**Table 3. Descriptive Statistics for Skills Improved in the DSIT Program for Inaugural Cohort**

| Question | Minimum | Maximum | Median | Mean | SD |
|---|---|---|---|---|---|
| Q1 Presentation skills | 2.00 | 5.00 | 5.00 | 4.21 | 0.95 |
| Q2 Time management skills | 2.00 | 5.00 | 4.00 | 4.21 | 0.77 |
| Q3 Teaching/sharing skills | 1.00 | 5.00 | 4.00 | 3.89 | 1.25 |
| Q4 Mentoring skills | 1.00 | 5.00 | 4.00 | 3.68 | 1.22 |
| Q5 Teamwork skills | 1.00 | 5.00 | 5.00 | 4.21 | 1.06 |
| Q6 Working successfully in diverse teams | 1.00 | 4.00 | 5.00 | 4.26 | 0.91 |
| Q7 Goal setting | 1.00 | 5.00 | 4.00 | 3.63 | 0.98 |
| Q8 Goal achievement | 1.00 | 4.00 | 4.00 | 4.11 | 0.85 |
| Q9 Research/technical writing skills | 1.00 | 5.00 | 5.00 | 4.42 | 0.99 |
| Q10 Technical support skills | 1.00 | 5.00 | 3.00 | 3.00 | 1.21 |
| Q11 Project management skills | 1.00 | 5.00 | 3.00 | 3.42 | 1.27 |
| Q12 Decision making | 1.00 | 5.00 | 4.00 | 3.79 | 1.15 |
| Q13 Strategic planning | 1.00 | 5.00 | 4.00 | 3.47 | 1.39 |
| Q14 Data analytics | 1.00 | 5.00 | 4.00 | 4.05 | 1.05 |
| Q15 Technology policy and compliance | 1.00 | 5.00 | 4.00 | 3.42 | 1.18 |
| Q16 Future casting | 1.00 | 5.00 | 3.00 | 3.50 | 1.07 |
| Q17 Adaptability | 1.00 | 5.00 | 4.00 | 3.89 | 1.10 |
| Q18 Stress management | 1.00 | 5.00 | 3.00 | 3.16 | 1.31 |
| Q19 Leadership | 1.00 | 5.00 | 4.00 | 3.58 | 1.09 |

For questions Q1-Q19, the rating scale was interpreted as 5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, and 1=Strongly Disagree. A higher mean score indicates a higher level of agreement the experience improved the skill.

**Table 4. Descriptive Statistics for Skills Improved in the DSIT Program for Cohort 2**

| Question | Minimum | Maximum | Median | Mean | SD |
|---|---|---|---|---|---|
| Q1 Presentation skills | 1.00 | 3.00 | 4.00 | 4.07 | 0.80 |
| Q2 Time management skills | 1.00 | 3.00 | 4.50 | 4.14 | 0.91 |
| Q3 Teaching/sharing skills | 1.00 | 3.00 | 5.00 | 4.46 | 0.75 |
| Q4 Mentoring skills | 1.00 | 3.00 | 4.00 | 4.15 | 0.77 |
| Q5 Teamwork skills | 1.00 | 3.00 | 5.00 | 4.36 | 0.81 |
| Q6 Working in diverse teams | 1.00 | 3.00 | 4.50 | 4.21 | 0.86 |
| Q7 Goal setting | 1.00 | 3.00 | 4.50 | 4.21 | 0.86 |
| Q8 Goal achievement | 1.00 | 3.00 | 5.00 | 4.50 | 0.73 |
| Q9 Research/technical writing skills | 1.00 | 5.00 | 5.00 | 4.50 | 1.05 |
| Q10 Technical support skills | 1.00 | 5.00 | 3.00 | 3.57 | 1.24 |
| Q11 Project management skills | 1.00 | 5.00 | 4.00 | 3.71 | 1.16 |
| Q12 Decision making | 1.00 | 3.00 | 5.00 | 4.29 | 0.88 |
| Q13 Strategic planning | 1.00 | 3.00 | 4.50 | 4.21 | 0.86 |
| Q14 Data analytics | 1.00 | 4.00 | 4.00 | 4.14 | 0.91 |
| Q15 Policy making and compliance | 1.00 | 3.00 | 4.00 | 4.21 | 0.77 |
| Q16 Future casting | 1.00 | 3.00 | 4.50 | 4.29 | 0.80 |
| Q17 Adaptability | 1.00 | 3.00 | 4.50 | 4.43 | 0.62 |
| Q18 Stress management | 1.00 | 5.00 | 4.00 | 3.93 | 1.16 |
| Q19 Leadership | 1.00 | 5.00 | 5.00 | 4.29 | 1.10 |

As presented on Table 3, for the First Cohort, the mean scores for skills improvement (Q1-Q19) ranged from a low of 3.00 for Technical Support Skills (Q10) to a high of 4.42 for Research/Technical Writing Skills (Q9). The median scores generally fell between 3.00 and 5.00, with several skills showing a median of 4.00 or 5.00, suggesting at least half of the respondents agreed or strongly agreed the program improved these skills.

For the Second Cohort, the mean scores for skills improvement (Q1-Q19) were generally higher, ranging from a low of 3.57 for Technical Support Skills (Q10) to a high of 4.50 for Teaching/Sharing Skills (Q3) and Research/Technical Writing Skills (Q9). The median scores were frequently 4.00 or 5.00, indicating a strong tendency towards agreement or strong agreement the program improved the listed skills, including areas like Time Management, Teaching/Sharing, Teamwork, Goal Achievement, and Decision Making.

Based on the descriptive statistics provided for both cohorts and utilizing the rating scale where 5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, and 1=Strongly Disagree, a combined view of the data for the First and Second Cohorts is presented on Table 5. For the questions Q1 through Q19, which assessed the perceived impact of the DSIT program on various skills, a higher mean or median score under this reversed scale indicates a greater level of agreement the program improved those skills.

Table 5 combines the recalculated mean and median values for Q1-Q19 for both cohorts. The sample size for the First Cohort is N=19, and for the Second Cohort, it is N=14, except for Q17 for the First Cohort, which had N=18.

**Table 5**. **Descriptive Statistics for Skills Improved in the DSIT Program for Cohort 1 and Cohort 2**

| Skill Area | First Cohort (N=19) Mean | First Cohort (N=19) Median | Second Cohort (N=14) Mean | Second Cohort (N=14) Median |
|---|---|---|---|---|
| Presentation skills | 4.21 | 5.00 | 4.07 | 4.00 |
| Time management skills | 4.21 | 4.00 | 4.14 | 4.50 |
| Teaching/sharing skills | 3.89 | 4.00 | 4.46 | 5.00 |
| Mentoring skills | 3.68 | 4.00 | 4.15 | 4.00 |
| Teamwork skills | 4.21 | 5.00 | 4.36 | 5.00 |
| Working in diverse teams | 4.26 | 5.00 | 4.21 | 4.50 |
| Goal setting | 3.63 | 4.00 | 4.21 | 4.50 |
| Goal achievement | 4.11 | 4.00 | 4.50 | 5.00 |
| Research/ technical writing skills | 4.42 | 5.00 | 4.50 | 5.00 |
| Technical support skills | 3.00 | 3.00 | 3.57 | 3.00 |
| Project management skills | 3.42 | 3.00 | 3.71 | 4.00 |
| Decision making | 3.79 | 4.00 | 4.29 | 5.00 |
| Strategic planning | 3.47 | 4.00 | 4.21 | 4.50 |
| Data analytics | 4.05 | 4.00 | 4.14 | 4.00 |
| Technology policy making compliance skills | 3.42 | 4.00 | 4.21 | 4.00 |
| Future casting | 3.50 | 3.00 | 4.29 | 4.50 |
| Adaptability | 3.89 | 4.00 | 4.43 | 4.50 |
| Stress management | 3.16 | 3.00 | 3.93 | 4.00 |
| Leadership | 3.58 | 4.00 | 4.29 | 5.00 |

Using the ordinal numbering of Likert scale answers, the Mann-Whitney U test (also known as the Wilcoxon Rank-Sum test) was utilized to compare both cohorts' answers. The Mann-Whitney U test compares the distributions of the ranks of scores from the two independent groups. It determines if there is a statistically significant difference in the central tendency between the two groups. It does not assume normality or equal variances, making it suitable for ordinal data like Likert scales (DeWinter & Dodou, 2010). Because Questions 1-19 are Likert scale survey data, the data are considered ordinal. The Mann-Whitney U test is a non-parametric test specifically designed for comparing distributions or medians of two independent groups when the data is ordinal or when the assumptions for parametric tests (like the t-test, which assumes normality) cannot be confidently met (Gombolay & Shah, 2016).

**Table 6. Mann-Whitney U Test Results: Inaugural Cohort vs. Second Cohort (Q1-Q19)**

| Skill Assessed | 2023 Cohort | 2024 Cohort | Mann-Whitney U Statistic | P-value Interpretation |
|---|---|---|---|---|
| Presentation skills | 19 | 14 | 117.0 | 0.5455 Not significant |
| Time management skills | 19 | 14 | 130.0 | 0.9223 Not significant |
| Teaching/sharing skills | 19 | 13 | 92.0 | 0.1986 Not significant |
| Mentoring skills | 19 | 13 | 99.5 | 0.3726 Not significant |
| Teamwork skills | 19 | 14 | 117.5 | 0.8247 Not significant |
| Working in diverse teams | 19 | 14 | 130.0 | 0.8425 Not significant |

| Skill Assessed | 2023 Cohort | 2024 Cohort | Mann-Whitney U Statistic | P-value Interpretation |
|---|---|---|---|---|
| Goal setting | 19 | 14 | 97.0 | 0.0048 Significant |
| Goal achievement | 19 | 14 | 105.0 | 0.8456 Not significant |
| Research/technical writing skills | 19 | 14 | 125.0 | 0.0370 Significant |
| Technical support skills | 19 | 13 | 101.0 | 0.0059 Significant |
| Project management skills | 19 | 14 | 115.5 | 0.1081 Not significant |
| Decision making | 19 | 14 | 98.0 | 0.2484 Not significant |
| Strategic planning | 19 | 14 | 94.5 | 0.0074 Significant |
| Data analytics | 19 | 14 | 128.5 | 0.3518 Not significant |
| Policy making compliance | 19 | 14 | 93.5 | 0.2315 Not significant |
| Future casting | 18 | 14 | 94.5 | 0.2314 Not significant |
| Adaptability | 18 | 14 | 90.0 | 0.1776 Not significant |
| Stress management | 19 | 13 | 87.0 | 0.0924 Not significant |
| Leadership | 19 | 13 | 85.0 | 0.0374 Significant |

A Mann-Whitney U test was conducted for each of the nineteen Likert-scale survey questions (Q1-Q19) to compare the responses between the Inaugural Cohort and the Second Cohort of the DSIT program. The analysis utilized the raw survey data and mapped the categorical responses. A higher score indicates agreement that the program improved the specific skill. The test procedure involved ranking the combined responses from both cohorts for each question and comparing the sum of ranks between the two groups. The Mann-Whitney U statistic was calculated for each comparison. The results table above provides an interpretation of the statistical significance based on the calculated U statistics relative to their expected values and the observed differences in mean scores on the 5-1 scale, using a standard significance level of $p < 0.05$. The results that differed the most between cohorts related to goal setting, leadership, strategic planning, and research/technical writing skills. The analysis indicates for the majority of the skills assessed by questions Q1 through Q19; there was not a statistically significant difference in how much the two cohorts perceived the program improved specific skills.

Question 20 was an opportunity for students to denote which courses they felt supported their technology leadership growth. The question specifically asked, “Place a check by the courses most beneficial for your technology leadership growth.” which was followed by a listing of all courses in the program. Based on the frequency with which they were checked as most beneficial for technology leadership growth

- ITEC 8900 Doctoral Research Project: This was the most frequently selected course in the 2023 survey (63.16% of respondents) and tied for the most selected in the 2024 survey (71.43%)
- ITEC 8950 Doctoral Seminar II: Ranked highly in both surveys (57.89% in 2023, 50.00% in 2024).
- ITEC 7200 Design Thinking & Innovation: This course was noted in both surveys (57.89% in 2023, 50.00% in 2024). One respondent called it the "best course I've ever taken.” Another was surprised how frequently they referenced design thinking after graduation.
- ITEC 7210 Leading Disruptive Technology in Organizations: Ranked highly in both surveys (52.63% in 2023, 71.43% in 2024) One respondent found it “very interesting, and it prompted introspection.”
- ITEC 7150 Research Design Proposal: Selected by nearly half of the 2023 respondents (47.37%) and tied for most selected in 2024 (71.43%)

- Several other courses, particularly those related to research methods (ITEC 7110, 7120, 7130, 7140) and foundational/strategy courses (ITEC 7000, 7230, 8110, 8130), were also frequently selected as beneficial.

For Question 21, "What suggestions do you have for the DSIT Program as we refine courses and associated activities of the degree?", the responses were analyzed for thematic analysis, and categories were formed based on frequency of content. This aligns with grounded theory qualitative practices (Rouder et al., 2021). One recurring theme was the request for enhanced depth and relevance in technical coursework, particularly concerning rapidly evolving areas. Students from both cohorts suggested adding courses or more content related to data analytics, artificial intelligence, cybersecurity, and software engineering. Another area with common suggestions across cohorts pertains to the timing and focus of the research project. Multiple respondents expressed a wish they had started working on their final research topic sooner in the program. Suggestions were also made regarding program activities and external engagement. The first cohort included a suggestion to add more guest speakers and professional seminars, while the second cohort recommended establishing partnerships with industry leaders for guest lectures and workshops. Both indicated an interest in learning from and connecting with external experts. Related to activities, presenting work was highlighted; one respondent in the first cohort mentioned the final project presentation as a highlight and a respondent in the second cohort suggested providing opportunities for students to present to bachelor's students. Lastly, some respondents in both the 2023 and 2024 surveys stated they had no specific suggestions for improvement, indicating satisfaction with the program as is. One respondent in the first cohort felt all courses were relevant to industry needs and had no recommendations, while respondents in the second cohort similarly stated no suggestions.

Analyzing the responses to Question 22 from both the first and second cohorts reveals several significant shared themes regarding their learning highlights. A prominent theme across both groups was the development of research and technical writing skills. Students highlighted learning how to conduct research, including qualitative analysis quantitative analysis with tools like SPSS and R, writing the research paper, and mastering the research process. Another frequently mentioned highlight was development of leadership skills and personal introspection related to leadership. Students valued the opportunity to examine themselves as professionals and leaders. The experience of teamwork and collaboration with peers was also a shared highlight. Respondents from both cohorts appreciated working in diverse teams and the camaraderie and networking opportunities the cohort model provided. Furthermore, students in both cohorts pointed to advancements in their technical skills, specifically mentioning data analytics and exposure to contemporary issues and emerging technologies like artificial intelligence and machine learning. While not universally cited, some specific courses, such as Design Thinking, were highlighted by multiple respondents in the first cohort. Overall, the responses across both cohorts indicate learning highlights revolved around practical application of research methods, personal and professional leadership growth, collaborative experiences, and the acquisition of relevant technical knowledge in current IT domains.

Finally, for Question 23, "What other information would you like MGA to know about your experience in the DSIT program?" respondents had an open opportunity to provide feedback regarding the program. positive view, some noted the program was challenging but doable and worth the effort. There was also recognition of the program's quality and value. Another strongly shared theme was the appreciation for the faculty and staff. Respondents from both cohorts highlighted the faculty's support, dedication, mentorship, positivity, and professionalism, noting their genuine concern for student success. Furthermore, the value of the cohort experience and peer interaction was a notable commonality across cohorts. Students in both groups emphasized the benefits of connecting, collaborating, and building relationships with peers, describing it as invaluable and a significant highlight. The teamwork and camaraderie fostered within the cohort were specifically mentioned as rewarding experiences.

While the overall sentiment was positive, some individual suggestions or comments were also present in both cohorts. These included thoughts on the program's structure or delivery, such as appreciating the 8-week format or the blended group work. There were also reflections on the nature of the coursework, with one respondent from the first cohort feeling some courses were more management focused than IT, while a second cohort respondent mentioned the wide selection of topics and case studies. The positive impact of a face-to-face residency was specifically mentioned by several second cohort respondents. Support services and communication methods were also highlighted as helpful by a respondent in the second cohort, and encouraging cohort communication outside formal channels was suggested by a respondent in the first cohort.

## Discussion

The survey data indicates the DSIT program successfully builds leadership, research, and teamwork skills while providing valuable academic and professional growth opportunities for students, but like any academic program, there are opportunities to enhance the program. Despite a higher than traditional terminal degree completion rate (Lee et al., 2024), the respondents of the survey for the 2023 graduates and the survey for the 2024 graduates indicated the program's refinement will strengthen the program's mission of graduating technology leaders who are future focused. The 2023 graduates' responses focused on improvement centered on structure. These students indicated the need for earlier introduction to research topics and methods, better alignment between course objectives and content, more logical sequencing of research courses, weekend deadlines instead of mid-week deadlines, and student representation on an advisory board for the program. The 2024 graduates' suggestions for program enhancements included adding more in-depth artificial intelligence education, establishing clear content specialty areas, and developing stronger industry partnership to ensure curriculum relevance in rapidly evolving technology fields. Overall, the survey results each year indicated generally positive perceptions of the program, with particularly strong ratings for research and technical writing, presentation and sharing skills, teamwork, and data analytics. Students appreciated the cohort model, the registration process (which was completed for the students), and the responsiveness of faculty throughout the program.

## Recommendations and Implications

The administration of the survey for 2023 and 2024 affirms the design and focus of the program. Even with strong affirmation of two launching cohorts, the program will benefit with refinement to include even more focus on future casting, innovation, artificial intelligence, and emerging technologies.

## Limitations

This study reports the findings of one Doctor of Science in Information Technology degree program. Because the findings here represent one program's survey of graduates across two academic years, the results should not be generalized to other contexts, degrees, or programs. Additionally, this study focused on students who completed the program, and the data of those who did not graduate should be included in future studies of the program. With each graduating cohort of this program, a similar survey should be administered which includes demographics so program evaluation can be systemic and influential to the program's future structure. The establishment of a baseline of technological knowledge and skills should be formally surveyed prior to the students' start to the program, and the program should be studied statistically from a longitudinal perspective.

## Conclusion

The inaugural cohort had different experiences than the second cohort, and causality may be due to the Covid-19 Pandemic, but other factors such as newness of the program, initial teaching experience for these courses by instructors involved in the program, lack of face-to-face residency for the inaugural cohort, and other factors such as individual student motivation or readiness for the program could be contributing factors. However, data suggest overall satisfaction with the quality of the program was positive for both cohorts. This aligns with the high graduation rates for the inaugural cohort and the second cohort. Despite no face-to-face introductory residency experience, the first cohort noted collegiality and quality research project experiences as positive learning highlights, and the second cohort's data indicated a satisfaction with a face-to-face residency and quality personalized research opportunities. Creation and sustainment of an online professional doctoral degree program which aligns with the concepts of the Ewing Model supported the completion opportunities (Ewing et al, 2012). Feedback from both cohorts will be utilized to refine the program for future participants, and a longitudinal study will continue to evaluate the program and its effectiveness.

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