

Closing the Education Gap and Building a Competent Workforce: Improving Digital Skills Among Underprivileged Youth Through Data Analytics Certification Programs

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Introduction

Digital skills have become essential in today's technological landscape. Industries across sectors are increasingly relying on digital technologies and data-driven decision-making processes. These skills encompass a broad range of competencies, including data analytics, programming, digital marketing, cybersecurity, and proficiency in using various software and tools. The demand for digital skills in various industries has been growing steadily, even before the COVID-19 pandemic. As growth is increasingly progressive in the country, a significant gap can be seen between industry requirements and the digital competencies of its workforce.

The Enterprise Data Practitioner (EDP) certification programme aims to improve the digital skills among underprivileged youth at university level, closing the education gap and addressing the need for competent workforce with digital and data analysis skills that align with the Malaysia Digital Economy Blueprint. The Blueprint aims to ensure that digitalisation is successfully embedded and adopted within talent development at various levels of education so that they will be well-equipped with digital skills to thrive in the evolving digital economy. The target is to develop professional digital talents including 20,000 cyber security knowledge workers and 30,000 data professionals by 2025 as the success of local businesses will depend on the skills and capabilities of the workforce.

This EDP programme is being managed by a business management consulting firm, Q3 Management Solutions Sdn Bhd as a program partner with a Government Agency that seeks to provide better employment opportunities for underprivileged youth (beneficiaries) with household income not exceeding RM4,850.00 per month and currently pursuing diploma or bachelor's degree in public or selected private universities from year 1 to final year, provided that they are still holding student status prior to completion of the programme. The beneficiaries also need to have access to computers / laptops with good internet access and able to give full commitment to the classes as this programme is run solely online.

In this EDP programme, the beneficiaries will:

1. Learn the foundation of data analytics with powerful Business Intelligence tools such as Microsoft Excel and Tableau.
2. Unlock capabilities through expert level visualization techniques.
3. Create dashboards to customize reporting for different audiences and purposes.
4. Apply data visualization and storytelling principles to produce information with data that facilitates decision-making process.
5. Drive informed decision-making using robust data-driven strategy.

A mixed-methods research design was employed, consisting of surveys administered to program beneficiaries before and after the program to measure changes in digital skills, employability, and academic achievement. Additionally, a tracer study using the Graduate Engagement System

(GES), an internal system built to track learning progress, students' engagement, and to facilitate better communication with program beneficiaries, is conducted to ensure the effectiveness and efficiency for data collections and trace. Upon completion of the programme and passing the assessment, the beneficiaries will be awarded a Certified Enterprise Data Practitioner (EDP). This programme is recognized by Malaysia Board of Technologists (MBOT), a professional body that gives Professional Recognition to Technologists and Technicians in relation to technology and technical fields.

As the current programme is still ongoing, the sample data used is solely from the beneficiaries who have completed the program and participated in the survey.

Problem Statement

The demand for digital skills has been growing rapidly, but the supply of adequately skilled workers has not kept pace. There is a significant gap between the skills required by industries and the proficiency levels of the existing workforce. This skill shortage can hinder productivity, innovation, and overall economic growth. Additionally, there are current challenges among graduates who are entering a highly competitive job market, where employers demand additional skills such as digital analytic skills, proficiency in English and networking abilities.

Data collected from Job Market Insights First Quarter 2023 - Institute for Labour Market Information and Analysis (ILMIA), for Q1, 2023 indicates a high demand for Advertising and Marketing Professionals, with a staggering 17,409 vacancies available across various industries. These positions encompass vital roles such as Business & Development, Sales, Marketing, and Digital Marketing. Candidates with educational backgrounds in marketing, management, media & communication (non-STEM) are highly sought after for these roles. The positions specifically require a diverse skill set, including expertise in marketing strategies, effective communication, proficiency in digital marketing tools and platforms, and the ability to conduct marketing research with data analytic skills. As businesses increasingly embrace data-driven marketing approaches, professionals equipped with these skills will play a crucial role in driving growth and success for their respective organizations. Through data-driven insight, the ability to analyse data from multiple sources such as online platforms, research papers, survey, social media and programmatic advertising platform, organization may identify specific audience segments, their preferences, and the channels through which they are most likely to engage or to do business with and enables them to allocate their budgets more effectively and achieve higher Returns on Investment (ROI).

In PWC's Hopes and Fears Survey 2021 Malaysia report, approximately 57% of Malaysian respondents believed that their jobs are likely to become obsolete in the next 5 years due to technological advancements. Additionally, 43% expressed concern about not receiving relevant training related to technical or digital skills from their employers. In the same survey conducted in 2022, targeting respondents who acknowledged a shortage of skilled workers in their country, 63% of employers in Malaysia confirmed that they are actively upskilling their workforce, while 35% stated their focus on automating and / or enhancing work through technology. The survey also highlighted changes in talent recruitment strategies, with 37% of employers prioritizing diversity by widening their recruitment efforts, 24% opting to outsource work to third parties (local or abroad), and 22% hiring qualified workers from overseas.

According to the 2021 report from the Department of Statistics Malaysia (DOSM), the number of unemployed graduates rise by 22.5% in 2020 to 202,400, up from 165,200 in 2019. Some fortunate students have managed to bridge this gap by attending extra classes, investing in updated technology hardware and software, or enrolling in reputable local or international universities. These changes were implemented by employers to address the shortage of skills

and labor among the local workforces. With the significant upskilling efforts undertaken by corporations and the hiring of young graduates from overseas and / or local private universities who have the privilege of acquiring new knowledge of technology, the situation indirectly and directly affects local public universities graduates, especially those from underprivileged backgrounds. The lack of access to quality education and resources hinders their opportunities. Disparities in digital infrastructure, internet connectivity, and educational resources contribute to a digital divide, leaving certain segments of the population at a disadvantage in acquiring essential digital skills.

Research Questions

1. How does the Enterprise Data Practitioner (EDP) certification program impact the beneficiaries' proficiency in data analysis skills, including data collection, analysis, and interpretation?
2. Does the data analytics program equip underprivileged students with data analytics skills and contribute to closing or reducing the skilled workforce gap in Malaysia, particularly in meeting the demand for digital and data analysis skills in the job market?
3. Can a student who is not studying STEM (Science, Technology, Engineering, and Mathematics), i.e. religious studies, excel in data analytics, and what factors contribute to their success in this field?

Methodology

The beneficiaries will undergo a 12-week Business Analytics Certification program, consisting of 4 to 8 hours of classes per week. The program will be fully online, offering both self-paced learning and Online Instructor-Led Lectures (OILL). Each cohort will consist of 30 beneficiaries and will run simultaneously based on the intake of beneficiaries. Online classes will be conducted on Fridays, Saturdays, and Sundays, allowing beneficiaries to choose and block their preferred day through the Graduate Engagement System (GES) calendar. This program aims to equip beneficiaries with data analytics skills to enhance business performance, catering specifically to Business Intelligence Analysts, thereby expanding their career prospects. The curriculum will leverage widely used software such as Microsoft Excel and Tableau to facilitate smooth adaptations.

Beneficiaries will be assessed through surveys administered before and after the program, including Pre-module assessments, evaluations after each module (assessment or project work), quizzes, and a Capstone project to measure changes in digital skills. Additionally, a tracer study using GES, an internal system designed to track learning progress, employability, academic achievement, student engagement, and facilitate better communication with program beneficiaries, will be conducted to ensure the effectiveness and efficiency of data collection and to trace the following outcomes: -

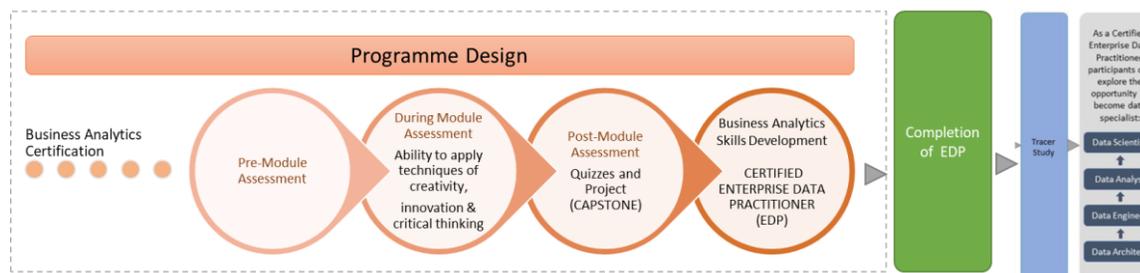


Figure 1: EDP Assessment

- i. Students' Engagement
- ii. Find Links to the Online Classes
- iii. Monitor Progress
- iv. Check on Results of Assessments / Tests / Quizzes
- v. Depository of Handouts / Reading Materials

For these studies, the academic achievement and employment outcomes could not be presented fully as the program is still ongoing.

Result

A total of 1,026 beneficiaries were awarded full scholarships to join this program, recruited from 20 local Public Universities. The first batch started their classes in December 2021. At the initial stage, we encountered various challenges, particularly in handling underprivileged students attending and completing the fully online program. Some of the observations we noted are as follows:

No.	Challenges	Details	Action taken / to be taken
1.	Attendance	<p>Several reasons for absences:</p> <ul style="list-style-type: none"> ✓ Examination ✓ University programme ✓ Ad-hoc university test/class ✓ Unwell ✓ Family Matters ✓ Poor internet connection ✓ Working Part-time (During semester break) 	<p>Recognizing the importance of effective time management, we provide students with tools and resources to plan their study schedules efficiently. A series of follow up with beneficiaries and trainers done in order to make sure the beneficiaries received needed material for their makeup assessment.</p> <p>Our online learning platform allows students to access course materials at their convenience, enabling them to study at their own pace. Alternative to meet the 100% attendance requirement:</p> <ul style="list-style-type: none"> ✓ Attend other group sessions on the same topic. ✓ Watch class recordings through our Graduate Engagement System (GES) and do self-learning and makeup assessment (if any).
2.	Participation	<p>Overall, the beneficiaries collaborated well in groups and enjoyed generating creative ideas during the creativity sessions. Although some beneficiaries experienced difficulties in staying connected during the sessions, they managed to understand the content of the learning sessions with some revision, and</p>	<p>The trainer and programme administrator will visit the zoom breakout rooms to encourage them to start the conversation and break the ice.</p> <p>In the event of technical difficulty happened, the beneficiaries who are stuck or faced with error will be asked to share their screen with the class and trainer will help the beneficiaries during class session.</p>

No.	Challenges	Details	Action taken / to be taken
		important points were emphasized throughout the class.	
3.	Self-learning and online quiz	It is challenging to get the beneficiaries to complete their self-learning modules and online quizzes.	The programme administration and trainer will conduct tutorial sessions before their Excel class starts. A recording and PDF guideline are provided for beneficiaries to complete their self-learning modules.
4.	Final Assessment	Beneficiaries are required to attend a 2-day CAPSTONE session for their final assessment. Many beneficiaries are unable to attend both sessions due to the challenges mentioned above.	The program administration has agreed to make only the first 2 hours of the first-day session compulsory for attendance. During these 2 hours, beneficiaries will receive a briefing on the tasks they need to complete and will be divided into groups. Beneficiaries will be given one week to discuss and prepare for their presentation. On the presentation day, only one team member is required to present on behalf of the group. While it is advised for beneficiaries to attend the whole session, if they are unable to attend the Day-2 session, they are required to attend only 30 minutes during their group's presentation.

Overall, our focus on flexibility, support, and accessibility empowers beneficiaries to overcome these challenges and excel in their EDP. By fostering a student-centered approach, we aim to create an inclusive learning environment that promotes academic achievement and personal growth, irrespective of the obstacles our students encounter.

The data in this study are collected as May 2023 whereby 464 students have already completed the programme, 346 completed the survey while the balance of the beneficiaries will be completing gradually until October 2023.

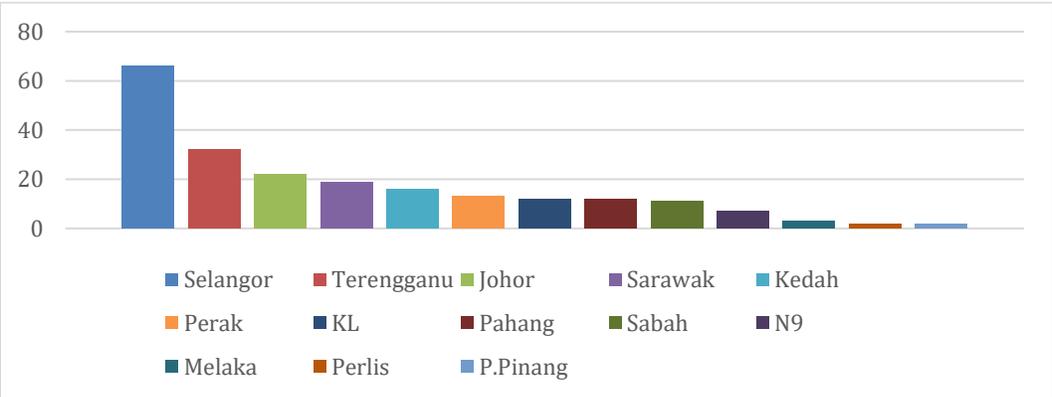


Figure 2 Beneficiaries enrolled in EDP according to State in Malaysia

The EDP is opened to students from all fields of study, and not limited to STEM (Science, Technology, Engineering, and Mathematics) students only. While data analytics does have strong connections with STEM fields due to its reliance on quantitative methods and data-driven approaches, it is increasingly being utilized in non-STEM areas as well.

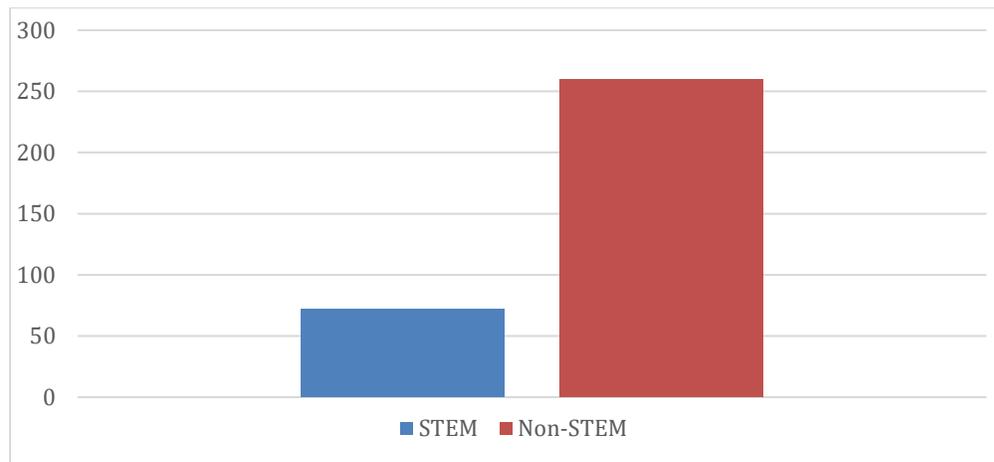


Figure 3 Beneficiaries' Field of Studies

The majority of beneficiaries that enrolled in EDP are from Non-STEM studies, and the combination of creativity skills with data analytics can be a powerful asset for the majority non-STEM beneficiaries, as it provides them with the ability to derive insights from data, which can spark creative ideas and solutions. By identifying patterns and trends in data, they can make more informed and innovative decisions in their respective fields. Majority of the beneficiaries came from Kelantan, with the lowest GDP per capita, RM16,597 (2022), in Peninsular Malaysia and majority of beneficiaries are non-STEM students (Religious Studies). Out of 105 beneficiaries who are attending religious studies in Kelantan, 64 beneficiaries have completed the programme, with 6 of the beneficiaries employed.

Data analytics acts as a catalyst for creativity in problem-solving. The ability to extract insights from data empowers them to make informed and innovative decisions. Data visualization allows them to communicate complex information creatively, influencing stakeholders effectively. This also could lead to personalized customer experiences, fostering stronger connections with target audiences. As the EDP programme welcomes students from both fields of studies, it encourages collaboration between non-STEM and STEM beneficiaries. This interdisciplinary approach sparks the exchange of ideas, inspiring innovation and problem-solving from diverse perspectives. The fusion of domain knowledge and data insights drives new levels of creativity and ingenuity.

The Impact after completion of EDP

Over a span of 6 weeks, the beneficiaries underwent the theoretical introduction to IR4.0 & Big Data Analytics, Big Data Analytics 101, and Applying Creativity, Innovation & Critical Thinking in Business Analysis.

Before the programme commenced, the beneficiaries' knowledge and skills in data analytics were assessed through a pre-module evaluation. This initial assessment provided a baseline measure of their understanding and capabilities in the subject matter.

A post-module evaluation was conducted after end of modules to gauge the beneficiaries' progress and improvement in data analytics knowledge and practical application as follows:

- i. **Excel Analytics**
During this segment, the beneficiaries were exposed to the realm of data visualization using Microsoft Excel to effectively convey complex information in a visually appealing and easily understandable manner. Various chart types in Excel, such as bar charts, line graphs, and pie charts, were explored to represent data trends effectively by creating interactive dashboards and presenting data insights.
- ii. **Data Visualization using Tableau**
The focus was on enriching the visualization content by incorporating more statistical analysis capabilities within Tableau, including Boxplot, Histogram, and Linear Regression techniques.
- iii. **Data Storytelling**
In this module, the beneficiaries are expected to transform complex data into simple and coherent explanations. This skill enables them to effectively communicate their findings and insights to various stakeholders.
- iv. **Capstone Project**
As a culminating part of the programme, the beneficiaries were assigned a capstone project. They were provided with real-world data to be analyzed and presented online. This practical exercise allowed them to apply the knowledge and skills acquired during the training in a real-world scenario, thereby solidifying their understanding of data analytics concepts.

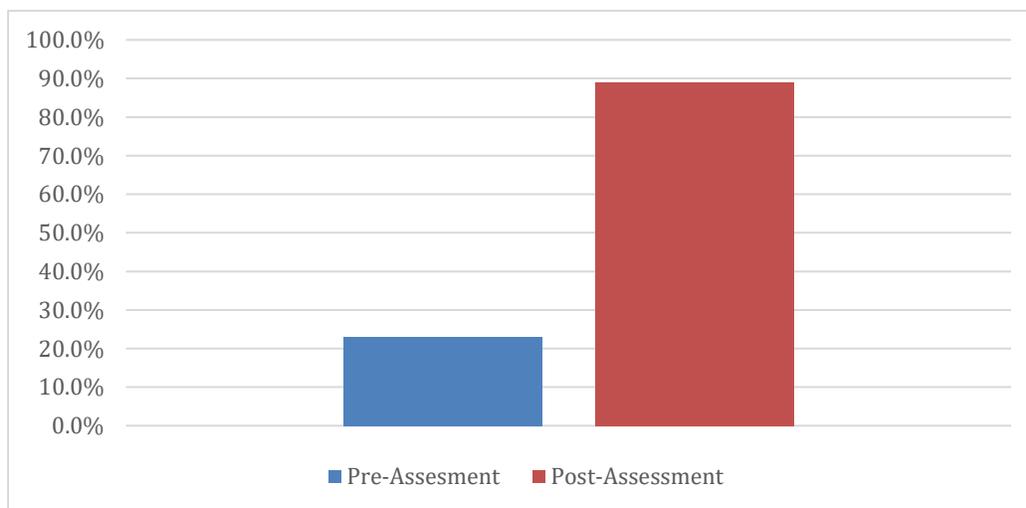


Figure 4 Beneficiaries average score for EDP pre- assessment and post-assessment

A total of 464 beneficiaries successfully completed the data analytics training programme as of May 2023. Before the programme, their average pre-assessment score was 22.98%. However, after undergoing the whole modules, their average score showed a remarkable improvement, soaring to 88.93%.

This data highlights the significant impact of the EDP programmes on the beneficiaries' understanding and proficiency in data analytics. The average post-assessment score of 88.93% reflects the substantial progress made by the beneficiaries during the course of the programme. The increase of over 65% in their average scores demonstrates the effectiveness of the training in equipping the beneficiaries with valuable data analytics skills and knowledge.

The beneficiaries were asked about the usage of the data analytics skills that they acquired on

day-to-day basis, 97% of them are utilizing the knowledge obtain from the programme. That number is significant with the objectives to equip beneficiaries with the skills that could improve their data analysis skill either during their studies or when they are working in the future.

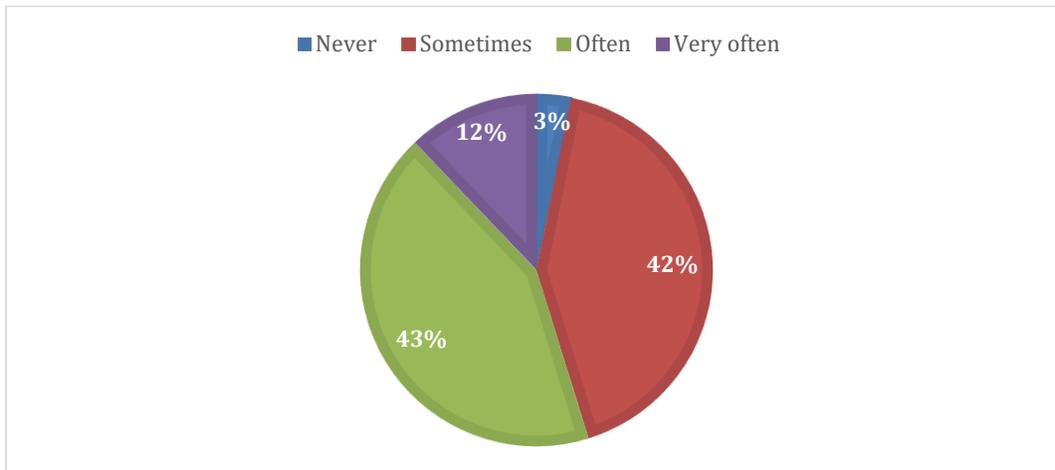


Figure 5 Beneficiaries utilization of EDP knowledge

The beneficiaries were also asked in the survey if they are interested in progressing further in their career in the future and if they do, what kind of programme that they would like to pursue in the future. The survey results revealed that the top three choices for further studies were closely related to data analytics. Career Development, Technology, and Leadership programs ranked as the most preferred options, indicating the beneficiaries' keenness to upskill themselves in the dynamic field of data analytics.

Entrepreneurship and Business-related programs were also notable choices, though they ranked slightly lower than the top three.

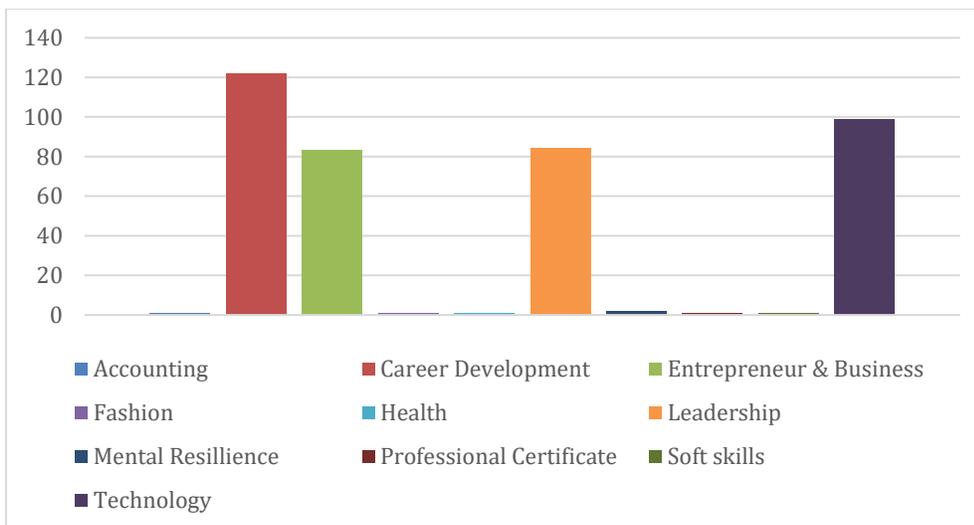


Figure 6 Interest in Pursuing Career Development Opportunities in the Future

Of the 346 beneficiaries who completed the survey, 16 of them did not answer their year of completion. Nevertheless, 100% of beneficiaries that graduated in 2022 have been employed, whereby 4 out of 76 beneficiaries that are expected to graduate this year has been employed prior to their graduation day. The rest of the 252 beneficiaries are expected to graduate from the year 2024 to 2026. Although the data is too small for the researcher to analyse, it shows that there

is a possibility that the knowledge that they acquired from the programme somehow supported them in getting hired.

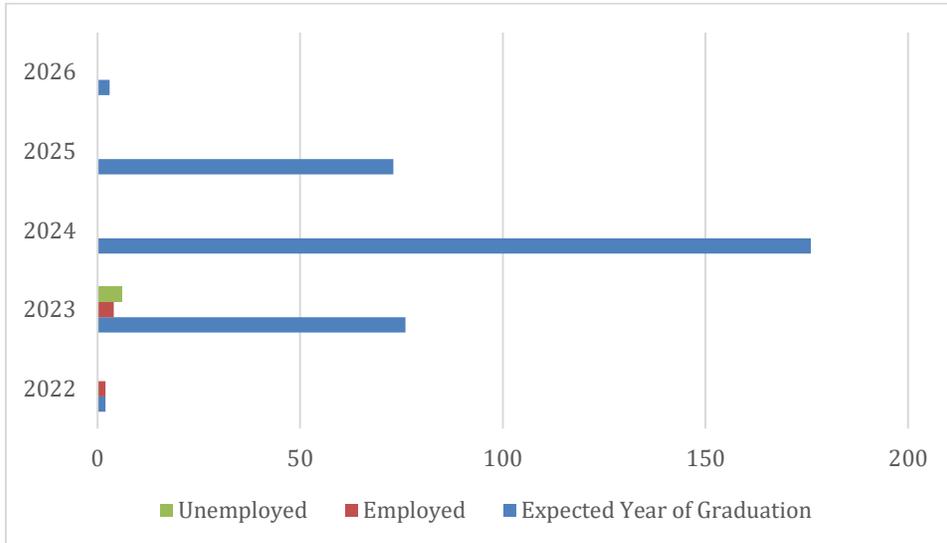


Figure 7 Students' Expected Year of Graduation

Conclusion

The Enterprise Data Practitioner (EDP) certification program has shown a positive impact on the beneficiaries' proficiency in data analysis skills, including data collection, analysis, and interpretation. The program has not only improved their technical abilities but also boosted their morale and motivation in the learning process. Although the data collection phase is still ongoing, we anticipate that this program will significantly contribute to upskilling students in digital competencies, thereby enhancing their employability prospects in the future. As the data analysis unfolds, we expect to observe concrete evidence of how the program equips students with crucial digital skills sought after in today's job market.

The data analytics program has demonstrated potential in equipping underprivileged students with valuable data analytics skills. Leveraging data analytics study for all students can bring numerous benefits and prepare them for the data-driven world we live in today. Introducing data analytics to students helps develop data literacy skills, enabling them to understand, interpret, and make informed decisions based on data. Data analytics involves analyzing information, identifying patterns, and drawing conclusions. By engaging in data analysis, students with Data analytics skills are in high demand across industries. By introducing students to data analytics early on, they would have a head start in preparing for careers in data science, data analysis, and related fields.

With the continuous growth in demand for professionals well-versed in data analytics and digital tools, beneficiaries completing the EDP certification program can gain a competitive advantage in their career pursuits. By acquiring the necessary expertise, they will be well-positioned to make valuable contributions to their respective fields and thrive in the digital age.

In conclusion, while the data collection phase is still underway, the foreseen impact of this program on enhancing students' digital skills and employability prospects is promising. As we gather and analyze the data, we look forward to quantifying the program's positive influence and shaping a brighter future for our students in the dynamic and data-centric job market.

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