ASSESSING THE EFFECTIVENESS OF IT SKILLS DEVELOPMENT PROGRAMS IN PROMOTING DIGITAL SKILLS AMONG YOUTH IN BALOCHISTAN

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ABSTRACT

The government of Pakistan has launched several national IT skill initiatives (e.g., DigiBizz, NAVTTC, and DigiSkills). These programs aim to equip youth with digital skills and enhance their employability. However, the implementation and effectiveness of these programs remain uneven in Balochistan. The purpose of this research project is to explore and examine the impact of IT skill initiatives on youth digital literacy and employability. The study also aims to investigate the structural and contextual factors influencing the implementation and effectiveness of these programs. This study used a mixed-methods approach. The qualitative data were collected through semi-structured interviews (n = 34) and focus group discussions (n = 21). The data was analyzed using NVivo software. Quantitative data (n = 270) were collected via a self-administered survey and analyzed using IBM SPSS and partial least squares structural equation modeling (PLS-SEM). The findings revealed key themes such as infrastructure and access, course content, and teaching methods. Gender inclusivity, the timing and duration of the programs, and the digital ecosystem were also major findings of the study. The results of the quantitative study demonstrated that course content, effective teaching methods, and resources are significantly related to digital literacy, employability, and freelancing. However, technical barriers impede it. Additionally, the study revealed that digital literacy enhances employability; however, this effect is moderated by participants' levels of qualification. These findings highlight the importance of quality teaching and course content, adequate infrastructure, and targeted training objectives to maximise the impact of IT skills initiatives. Overall, the study provides valuable insights for policymakers and practitioners seeking to enhance youth employability and digital literacy in Balochistan.

PREFACE

This study aims to explore and evaluate the impact of DigiBizz, NAVTTC, and DigiSkills initiatives on youth digital literacy and perceived employability. The research was conducted among participants from seven public sector universities across Balochistan who were engaged in these programs. The researchers gratefully acknowledge the valuable financial support and mentorship that contributed to the successful execution of this project. We are grateful to our mentors, Dr. Abdul Salam Lodhi and Dr. Hafeez Jamali for their valuable insights and support throughout the study. We also appreciate the valuable comments of the anonymous reviewers, participants of the mid-term review workshop, the Research Advisory Committee (RAC), and the Project Management Unit (PMU) at Research for Social Transformation and Advancement (RASTA) PIDE.

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INTRODUCTION

In the era of globalization and digitalization, almost every dimension of social, economic, and professional life is shaped by digital technologies. Pakistan, as a rapidly transforming developing country, is increasingly integrating into the digital economy. Its urban centres are increasingly integrated into the digital economy and information landscape. Metropolitan cities in Pakistan offer growing opportunities in software development, freelancing, and digital services. However, significant regional disparities persist. Digital literacy in Balochistan is significantly lower compared to other regions of the country (GOP, 2025). Due to its limited corporate sector and digital infrastructure, Balochistan is less integrated into the national digital sphere than Punjab and Sindh. There are various causes for this incongruity. Despite poor performance in the information technology (IT) sector, Balochistan has the ability to use its human resources for the country's social and economic development. For this purpose, the Government of Pakistan has launched various IT skills initiatives to enhance youth digital literacy, skills, and entrepreneurial capabilities. However, to the best of the researchers' knowledge, very few studies have investigated the effectiveness and implementation of these initiatives. Thus, it is essential to assess the effectiveness and implementation of IT skills initiatives undertaken by federal and provincial Governments in Balochistan.

The Government of Pakistan and the Government of Balochistan have launched several initiatives to enhance digital literacy among Balochistan's youth. These programs include National Vocational and Technical Training Commission (NAVTTC) (NAVTTC, n.d.), DigiSkills (DigiSkills, n.d.), and DigiBizz (DigiBizz, n.d.). NAVTTC and DigiSkills are federal government projects, while DigiBizz is sponsored and administered by the Government of Balochistan. All three programs are implemented across public-sector universities in Balochistan.

The purpose of these IT skills programs is to enhance youth digital literacy and high-tech skills. These programs include training in e-commerce, digital marketing, creative design, web development, freelancing, and soft skills. In sum, the objectives of these initiatives are to enhance public service efficiency, enhance youth market-driven, conventional, and high-tech skills, raise their digital literacy, and employability. By fostering digital literacy and entrepreneurial capabilities, these programs seek to fill the skills gap and empower individuals to access better job opportunities in both global and local markets. Although studies have revealed that the public service quality has developed due to digital government initiatives (Arfeen & Nielsen, 2017), the multitude of factors restricts their impact (Arfeen & Nielsen, 2017; Rehman et al., 2012; Kamal et al., 2013). The Government of Balochistan has also started a number of ICT projects, but failed to deliver outcomes due to a lack of trained human resources in IT and infrastructure (Arfeen & Nielsen, 2017; Rehman et al., 2012). Thus, this research aims to assess the effectiveness and implementation of IT Skills initiatives in Balochistan. In addition, the purpose of this study is to explore the role of these initiatives in stimulating digital skills, job creation, and entrepreneurship among youth, and to identify the challenges hindering desired outcomes.

1.1. Purpose and Scope of the Study

Internet penetration in Balochistan is only 15 per cent, significantly lower than the national average of 45.7 per cent (Bridging the Digital Divide in Balochistan - (World Geostrategic Insights, n.d.). In many remote areas of the province, the internet connectivity is either unreliable or nonexistent. This lack of access and poor connectivity further aggravates the existing economic and social disparities of the people of Balochistan, especially in the era of digital connectivity. The lack of digital infrastructure, such as fibre-optic networks, is one of the major sources of this divide. According to a report, 60 per cent of Balochistan lacked access to fibre-optic cables in 2013 (Hamid, 2024). This digital isolation has a profound negative impact on students' online

learning opportunities, educational tools and digital resources. All these resources are an integral part of modern education.

The expansion of digitalisation in Pakistan has opened numerous opportunities for education, economic growth, and social interaction. With 71.70 million social media users in 2024 (29.5%), Pakistan is increasingly capitalising on the digital economy (Hamid, 2024). Platforms like YouTube are used by 64.6% of the country's internet users. It has become an important element of earning, digital content creation, and a source of access to global markets. However, the potential of this digital transformation is not evenly distributed.

In Balochistan, this disparity in digital technologies places its population at a definite disadvantage compared to the rest of the country. While the people of Punjab and Sindh, and other urban regions thrive on these digital technologies for the generation of income, education, and engagement in e-commerce. However, the people of Balochistan are unable to turn the technologies into lucrative opportunities. This disparity is further exacerbated by poor and unreliable internet connectivity in Balochistan (Hamid, 2024). The province's limited infrastructure, such as the lack of fibre-optic networks, prevents reliable internet access, even for mobile users. This exclusion from digitalisation has resulted in the continuation of economic inequalities in Balochistan. It has further made the people of Balochistan unable to engage in activities that are rapidly transforming the lives of people in more developed parts of the country.

Although the government has initiated the NVTTC, DigiBzz, and DigiSkills, no substantial evidence exists that these investment project goals are being achieved effectively. Thus, the purpose of the project was to scrutinise the implementation and impact of the DigiBizz, NAVTTC, and DigiSkills programs on enhancing the youth's digital literacy, perceived employability, and entrepreneurial activities. In doing so, this study aims to address the following two broad research questions.

1.2. Research Question

RQ1: What is the status of implementation of IT skills development programs (DigiBizz, NAVTTC, and DigiSkills) relative to the project's proposed physical, human, financial, and technical resources?

RQ2b: What measurable impact do DigiBizz, NAVTTC, and DigiSkills programs have on graduate employability and participation in freelancing in Balochistan?

1.3. Research Objectives

To address the above-mentioned research questions, the following research objectives are proposed.

RO1: To assess the current implementation status of IT skills development programs (DigiBizz, NAVTTC, and DigiSkills) across BUITEMS, University of Loralai, Mir Chakar Khan Rind University Sibi, University of Turbat, University of Gwadar, and University of Khuzdar.

RO1a: To evaluate the adequacy of physical, human, financial, and technical resources allocated for the implementation of DigiBizz, NAVTTC, and DigiSkills programs across the selected universities.

RO1b: To examine the extent to which DigiBizz, NAVTTC, and DigiSkills programs have been implemented in accordance with their planned goals, project timelines, budget utilization, course content, relevancy, teaching methodology, and training targets as specified in their planning and approval documents.

RO1c: To identify the challenges and barriers that hinder the implementation of DigiBizz, NAVTTC, and DigiSkills programs in achieving their set targets.

RQ2: To what extent have DigiBizz, NAVTTC, and DigiSkills programs improved participants' digital literacy, technical skills, employability, and participation in freelance work across selected universities in Balochistan?

RO2a: To determine the extent to which DigiBizz, NAVTTC, and DigiSkills programs have enhanced participants' digital literacy and technical skills across selected universities in Balochistan.

RO2b: To assess the measurable impact of DigiBizz, NAVTTC, and DigiSkills programs on graduate employability and freelance work participation in Balochistan.

1.4. Scope of the Study

This study is geographically limited to Balochistan and focuses on schemes for students of the University of Loralai, UET Khuzdar, University of Turbat, University of Gwadar, MCKRU Sibi, and BUITEMS. It focuses on DigiSkills, NAVTTC, and DigiBizz projects designed for students of the above-mentioned universities. The research population consists of students and staff involved in the implementation of these programs from the above-mentioned universities. It also includes those who were beneficiaries of government initiatives but have already graduated.

1.5. Relevance to Public Policy

The findings of this study have various implications for the Government of Pakistan, in general, and Balochistan, in particular. First, this study provides evidence based insights to help policymakers align youth development initiatives with the actual needs of youth. By evaluating the effectiveness of DigiBizz, NAVTTC, and DigiSkills in Balochistan, the study identifies strengths, gaps, and areas for improvement. Besides, the study helps in making informed decision-making, redesign underperforming programs, and foster public-private partnerships where appropriate. The study's findings support data-driven planning for future initiatives and contribute to outcomes in employability, entrepreneurship, and freelancing. The study also offers policy-relevant guidance for curriculum development, teaching methodology, course design, and the development of a digital ecosystem, and provides guidelines for the assessment and evaluation of the programs. Overall, the study advances development goals by indicating how IT skills training can promote youth employability, digital literacy, innovation, and freelancing for the socio-economic development of Balochistan. A detailed theoretical and practical importance of the study is given in the last chapter of the study.

LITERATURE REVIEW

This chapter explores and examines the effectiveness and implementation of DigiBizz, DigiSkills, and NAVTTC in promoting digital literacy, employability and freelancing. The discussion focuses on how IT skills programs enhance students' perceived employability, digital competencies, as well as the barriers and challenges participants face during IT skills training.

2.1. Background of the IT Skills

Research specifically examining IT skills programs in Balochistan is notably scarce. The available literature reveals significant gaps in empirical studies. One study notes that "Balochistan and Khyber Pakhtunkhwa have shown the capacity to alleviate poverty and empower disadvantaged youth" through skills development programs, but provides limited detail on specific IT interventions (Ali et al., 2024). A qualitative study examining barriers faced by refugee women in Quetta found that "Digital Technologies empower Quetta-based refugee women to find jobs by offering digital skills training programs" (Atif et al., 2025). Soft skills and digital competencies are identified as critical for career intentions and employability (GOP, 2017). Scholars also argue that there is an incongruity between IT education and the demands of the labor market. This undermines employability and leads to prevalent skills gaps in technical and soft areas (communication, problem-solving) (Pervez et al., 2024; Sahin & Celikkan, 2020). This study suggests that digital skills training can prepare participants to become graphic designers, freelancers, independent entrepreneurs, and digital marketers. However, despite its significance, Balochistan is the only province without an approved youth policy (Ahmed, 2022). This suggests a significant policy gap that may affect the implementation of IT skills development programs in the province.

Over the past decade, the evolution of information technology education and vocational training in Pakistan has been marked by efforts to align curricula with industry needs, yet persistent gaps remain (Ansari & Wu, 2013; Shirani & Roldan, 2014). With more than 40% of Pakistan's working-age population being youth (Khan & Ali, 2024; Raza & Akram, 2024), enhancing employability through education reforms is vital for socio-economic development (Khan & Ali, 2024; Raza & Akram, 2024). Despite the availability of youth, most graduates from Higher Education Institutions (HEIs) lack practical skills and industry-readiness (Pervez et al., 2024; Sahin & Celikkan, 2020). Graduates with IT skills are not sufficiently trained to meet labor market and industry needs (Pervez et al., 2024). Despite numerous initiatives, such as the NAVTTC (Raza & Akram, 2024), (Asad et al., 2023), technical vocational education and training (TVET), Digibizz, and DigiSkills, the challenges persist (Khan & Ali, 2024; Raza & Akram, 2024). These challenges include outdated curricula, insufficient industry-academia collaboration, and limited practical training opportunities (Asad et al., 2023; Khan & Ali, 2024; Raza & Akram, 2024; Sahin & Celikkan, 2020).

The knowledge gap is evident in the insufficient integration of soft skills, digital competencies, and experiential learning within academic programs (Shah et al., 2023; Tablatin, 2023).. The consequences of this gap include high graduate unemployment and underutilization of Pakistan’s demographic dividend (Ahmed et al., 2023; Khan & Ali, 2024). Alamgir et al. (2021) identified a significant gap between industry and academia after conducting interviews with industry practitioners. Scholars have also called for institutional reforms to bring institutions in line with industry needs (Akash & Suganya, 2024).

2.2. IT Skills Programs

Study on the influence of IT-related programs in Pakistani universities on students' digital literacy has been a critical area of inquiry amid the accelerating digital transformation and its implications for workforce

readiness (Jabeen et al., 2024; Malik et al., 2022). Although universities in developed countries have undergone significant changes, HEIs in developing countries, such as Pakistan, are lagging behind in adopting current trends and practices (Malik et al., 2022). For the last few decades, the incorporation of digital skills into higher education curricula has evolved from basic ICT to comprehensive frameworks addressing Industry 4.0 demands and Education 4.0 paradigms (Butt et al., 2020). This development reflects the significance of digital literacy not only for academic success but also for employability and economic development in Pakistan (Huzooree & Soupramanien, 2024; Malik et al., 2022).

Studies suggest that a persistent gap exists between digital literacy, IT industry demand, and the practical skills imparted by Pakistani universities (Alamgir et al., 2021). Alamgir et al. (2021) also argue that academic-industry linkage is missing from the literature. Although universities have introduced IT-related programs, there remains a lack of alignment with industry needs, particularly in terms of hands-on experience and the development of soft skills (Alamgir et al., 2021; Baig et al., 2018; Mohammed & Ozdamli, 2024). The knowledge gap is evident in the literature, and there is limited research on the influence of IT-related programs on digital literacy. Only a few studies have discussed the significance of IT skills in improving graduate employability and digital literacy (Quraishi et al., 2024). In this study, we predict that IT skills-related program such as DigiBizz, DigiSkills, and NAVTTC is positively related to digital literacy. In the following section, three IT related programs for this study are discussed.

DigiBizz is a fully funded freelancing and entrepreneurship program initiated by the Science and IT Department of the Government of Balochistan with a total cost of Rs. 200 million (DigiBizz, n.d.). Designed to empower the province's youth, DigiBizz provides comprehensive four-month training in high-demand digital skills, including Amazon E-Commerce and Web Development, Digital Marketing and Advertising, and Creative Design (DigiBizz, n.d.). To date, more than 2,000 individuals have been trained through the program. So far, the program has paid out over $423,620 in verified income, with total estimated earnings reaching around $600,000 (DigiBizz, n.d.). In sum, DigiBizz aims to build a strong freelancer community in Balochistan to promote innovation, create job opportunities, establish a gig economy, and the develop a skilled workforce.

The NAVTTC was established in 2005 under the Ministry of Federal Education and Professional Training (NAVTTC, n.d.). The NAVTTC's key initiatives are the Matric-Tech Program, IoT and Data Coding, Fashion Designing, Professional Chef training, and Tourism expertise (NAVTTC, n.d.). NAVTTC offers a wide range of short courses, such as 3D Animation, Advanced CNC, AI and Robotics, and eCommerce. The purpose of NAVTTC is to strengthen the country's skilled workforce and enhance youth technical skills and employability (NAVTTC, n.d.).

Digi Skills is another initiative of the government of Pakistan that aims to enhance graduate IT skills and employability (DigiSkills, n.d.). The DigiSkills training and support program was DigiSkills' national initiative, launched on October 2, 2023. It offers 2,000 free courses at Khuzdar, Turbat, and Gwadar universities (DigiBizz, n.d.). Each eligible trainee was supposed to enrol in two courses, such as freelancing and a blended learning approach that includes both online content and in-person instruction in well-equipped labs (DigiSkills, n.d.).

2.3. Digital Literacy

Digital literacy is defined as having the knowledge and ability to use a wide range of technology tools for multiple purposes (Tinmaz et al., 2022). According to Tinmaz et al. (2022), digital literacy is a multifaceted construct consisting of six dimensions. These dimensions include (a) photo-visual thinking (understanding and using visual information); (b)social-emotional thinking (understanding and applying cyberspace rules);

(c) branching thinking (navigating in non-linear hyper-media environments); (d) information thinking (evaluating and combining information from multiple digital sources); (e) reproduction thinking (creating outcomes using technological tools by designing new content or remixing existing digital content); (f) real-time thinking (simultaneously processing a variety of stimuli) (Eshet, 2004). Real-time thinking refers to understanding and using visual information, while photo-visual thinking involves understanding and using visual information (Eshet, 2004).

Digital literacy is a crucial skill that includes expertise in data literacy, media literacy, technical proficiency, and information technology (Phippen, 2025). It is a critical competence for personal fulfilment, active citizenship, social inclusion, and employment in the twenty-first century (Marín & Castaneda, 2022). It is not an academic term but a social practice that shapes daily life, underscoring the importance of understanding the ethical, political, and social dimensions in a datafied world (Marín & Castaneda, 2022). In the literature, the term digital literacy has also been used interchangeably with computer literacy and IT (Marín & Castaneda, 2022). In the last few decades, there has been a growing demand for skilled human capital in the digital economy (Pirzada & Khan, 2013; Shirani & Roldan, 2014). Therefore, digital literacy has become a primary objective of each nation's development policy.

Despite numerous IT initiatives, such as NAVTTC (Asad et al., 2023; Raza & Akram, 2024), TVET, Digibizz, and DigiSkills, certain IT related challenges persist (Khan & Ali, 2024; Raza & Akram, 2024). These challenges include outdated curricula, insufficient industry-academia collaboration, and limited practical training opportunities (Asad et al., 2023; Khan & Ali, 2024; Raza & Akram, 2024; Sahin & Celikkan, 2020). Another challenge pertaining to digital literacy is cultural differences, the lack of access to technology, and affordability (Phippen, 2025). Thus, digital literacy requires input from various stakeholders, including educators, governments, technology providers, and community organisations (Phippen, 2025).

2.4. Perceived Employability

Students' perceptions of their abilities, strengths, skills, and competencies are known as perceived employability (González-Navarro et al., 2019). Scholars have also defined perceived employability as the "ability to obtain or keep a job". Research reveals that mere educational qualifications are not sufficient for entering the labour market. Instead, graduate perceptions of their abilities, skills, and competencies are a precondition for meeting real-world labour-market demand (González-Navarro et al., 2019). In recent times, students transitioning from university to the workforce often lack skills, such as problem-solving, interpersonal skills, and efficiency, that make them less competitive than workers (González-Navarro et al., 2019). As a result, these deficiencies among students prevent them from getting jobs. According to Antonio & Tuffley (2017), it is the individual's abilities that determine their place in the labour market, rather than their qualifications.

Since Pakistan's economy is in a transition stage (Khilji & Wang, 2007) and its economic performance, in terms of growth and sustainability is improving (GOP, 2015). Therefore, it becomes essential for the government of Pakistan in general and Balochistan in particular, to instill skills and abilities that not only enhance graduate competencies but also make them more employable in the competitive labor market. For these reasons, the Government of Balochistan has started several IT programs for promoting IT skills in the province.

2.5. Barriers and Challenges of IT-related Programs

Infrastructure is one of the primary obstacles in digital world. Studies have reported that “challenges such as infrastructure limitations and varied initial abilities among participants” are significant challenges (Gustiana

& Satria, 2024). In addition, digital differences, gender disparity, technological literacy, sociocultural norms, affordability and barriers to access are other challenges in IT skills programs (Jumani et al., n.d.).

2.6. Hypothesis Development

2.6.1. Relationships between Resources, Digital Literacy, Employability, and Freelancing

This study hypothesises that resources are significant for employability, digital literacy, and freelancing. The resource-based view (RBV) theory explains these relationships. This theory advocates that resources are valuable, rare, inimitable, and non-substitutable (Gerhart & Feng, 2021). These resources can be tangible and intangible (Coetzee, 2023). Tangible resources include physical infrastructure (workspace, equipment), human capital (education, skills, experience), financial capital (income, savings, access to funding), and technical resources (technology access, digital tools) (Suhardjo et al., 2023). RBV theory states that people with resource endowments are more likely to signal competence, acquire capacities, and have better job outcomes (Gerhart & Feng, 2021).

For instance, engaging in online job marketplaces now requires having access to technological resources (such as computers and internet connectivity) (Arifin & Darmawan, 2021). In the same vein, financial resources allow people to engage in human capital improvements, certifications, and skill development that increase employability (Xu & Jiang, 2024). Physical resources, such as devices and internet connectivity, are fundamental prerequisites for digital literacy (Arifin & Darmawan, 2021; Zaborovskaia et al., 2020).

Financial resources (e.g., income, savings, credit availability) are significant for employment and career development (Wang, 2025). Financial capital enables investments in education, training, and certifications that enhance skills and credentials (Wang, 2025). Individuals with greater financial resources can afford these investments, creating advantages in digital skill acquisition (Xu & Jiang, 2024). Studies of digital divide dynamics have shown that financial resources enable not only device acquisition but also ongoing investments in software, subscriptions, and learning resources that support continuous digital skill enhancement (Wang, 2025). Therefore, we predict that:

H1: Physical resources are positively related to: H1a: digital literacy, H1b: perceived employability and H1c: freelancing.

H2: Human resources are positively related to: H2a: digital literacy, H2b: perceived employability and H2c: freelancing.

H3: Financial resources are positively related to: H3a: digital literacy, H3b: perceived employability and H3c: freelancing.

H4: Technical resources are positively related to: H4a: digital literacy, H4b: perceived employability and H4c: freelancing.

Similarly, the lack of these resources is negatively related to freelancing, perceived employability, and digital literacy. For example, infrastructural deficiencies, outdated curricula, lack of industry engagement, and irrelevant practical experiences, as well as poor decision-making and limited resources within HEIs, are other factors that hinder the success of youth (Pervez et al., 2024). Following RBV theory, this study predicts that:

H8: Technical resource barriers are negatively related to: H8a: digital literacy, H8b: perceived employability, and H8c: freelancing.

2.6.2. Relationship between Teaching Method, Project Goals, Training Targets, Digital Literacy, and Freelancing

Teaching methods, project goals, and training targets may significantly influence the desired outcomes of IT skills initiatives. For example, Hussain & Phulpoto (2024) are of the view that integrating digital skills into the curriculum is essential for employability. Prasastiningtyas et al. (2024) found that when students are given online courses, it increases their opportunities to engage in learning and thus enhances their literacy. Likewise, Rabayah & Sartawi (2008) conducted a training program that included real cases, practical implementation, and essential topics; students were more likely to seek jobs and engage in entrepreneurial activities. During training sessions, when course content aligns with market demand and industry needs, employees are more likely to believe they can find a job (Peng & Deng, 2022). This is because relevant skills broaden individuals' skills. These are critical for them to thrive , participate, and navigate in the digital age, and ensure their long-term growth and development (Peng & Deng, 2022). Pervez et al. (2024) also found that curricula are positively related to employability.

Besides, digital literacy programs enable teachers to employ innovative teaching methods and engage students more effectively. E-learning and digital classrooms offer flexible, personalized learning experiences that accommodate diverse learning styles (Prasastiningtyas et al., 2024). Training programs that offer educators opportunities to integrate innovative methods, digital tools, and resources enhance instruction, provide interactive learning experiences and facilitate communication(Bibi et al., 2024). Kee et al. (2023) is of the view that course quality and effective pedagogy are essential for successful learning. This suggests a perceived gap between academic training and the practical skills and attitudes required in the workforce (Duggal et al., 2024).

For a digital literacy project, defining specific, measurable goals (which skills, which populations, which wider outcomes) and aligning design and evaluation with those goals is crucial to achieving meaningful impact. Clear, specific learning goals are linked to higher motivation, self-regulation, and persistence in online and technology-rich environments, which in turn improve achievement (Martins van Jaarsveld et al., 2025). Thus, when goals are clearly defined and stated, it is more likely to achieve desired outcomes. Thus, based on the literature, this study predicts that:

H6: Course content is positively related to digital literacy.

H7: Teaching method is positively related to digital literacy.

H8: Program goal is positively related to digital literacy.

H9: Program goal is positively related to Freelancing.

H10: Training target is positively related to digital literacy.

2.6.3. Relationships between Digital Literacy and Employability

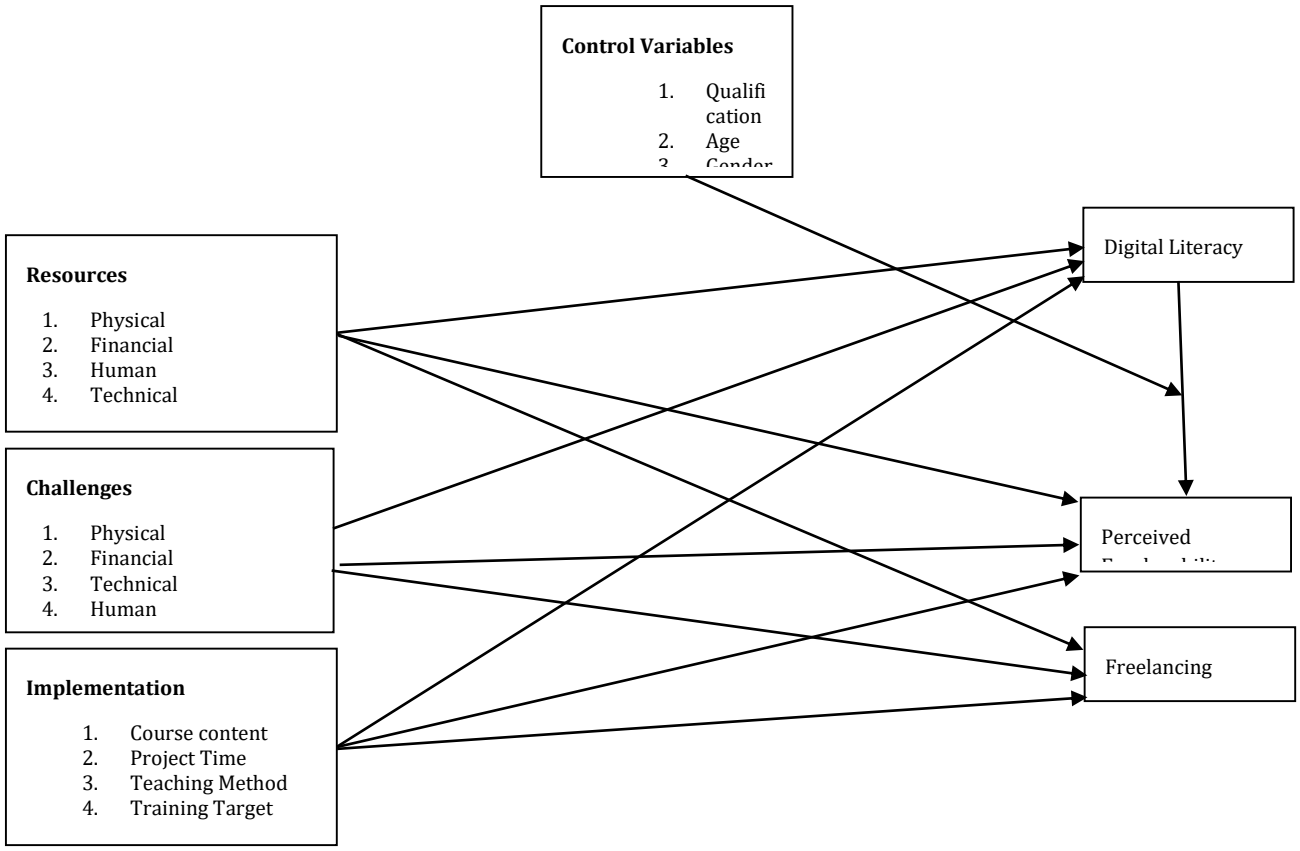
In this study, we hypothesize that IT skills initiatives are positively associated with digital literacy, employability, and freelancing. This is because a graduate's literacy depends on the number of IT skills programs. Research indicates that those who receive explicit training in digital technology are significant predictors of digital literacy (Quraishi et al., 2024). Riswanti Rini et al. (2022) found that self-directed learning also significantly enhances digital literacy. Hussain & Phulpoto (2024) also found that IT training and education improve digital literacy. Hussain & Phulpoto (2024) found that people who are aware of digital tools are more likely to obtain job opportunities. Prasastiningtyas et al. (2024) found that digital literacy or IT skills training enhances participants' access to the job market and increases their employability. Mukherjee et al.

(2024) also hold that digital skills training provides participants with psychological empowerment and enhances their ability to find a job. Finally, IT skills programs have also been shown to make people freelancers and entrepreneurs. Al-Zekri et al. (2024) establish that students who work on their problem-solving skills and engage in hands-on practice are more likely to become freelancers. In one study, Rabayah & Sartawi (2008), participants who received ICT training and entrepreneurial skills reported gaining valuable knowledge and capabilities and were more likely to start their own businesses and seek jobs. Based on the above discussion, this study predicts that:

H11: Digital literacy is positively related to perceived employability.

H12: Qualification moderate the relationship between digital literacy and employability.

Figure 1 Conceptual Model



Source: Authors' compilations.

RESEARCH METHODOLOGY

For this study, a mixed-methods approach was used. The use of qualitative and quantitative methodologies are crucial for understanding both statistical trends and personal experiences. It also enhances the validity of the findings (Creswell & Poth, 2018).

3.1. Research Design

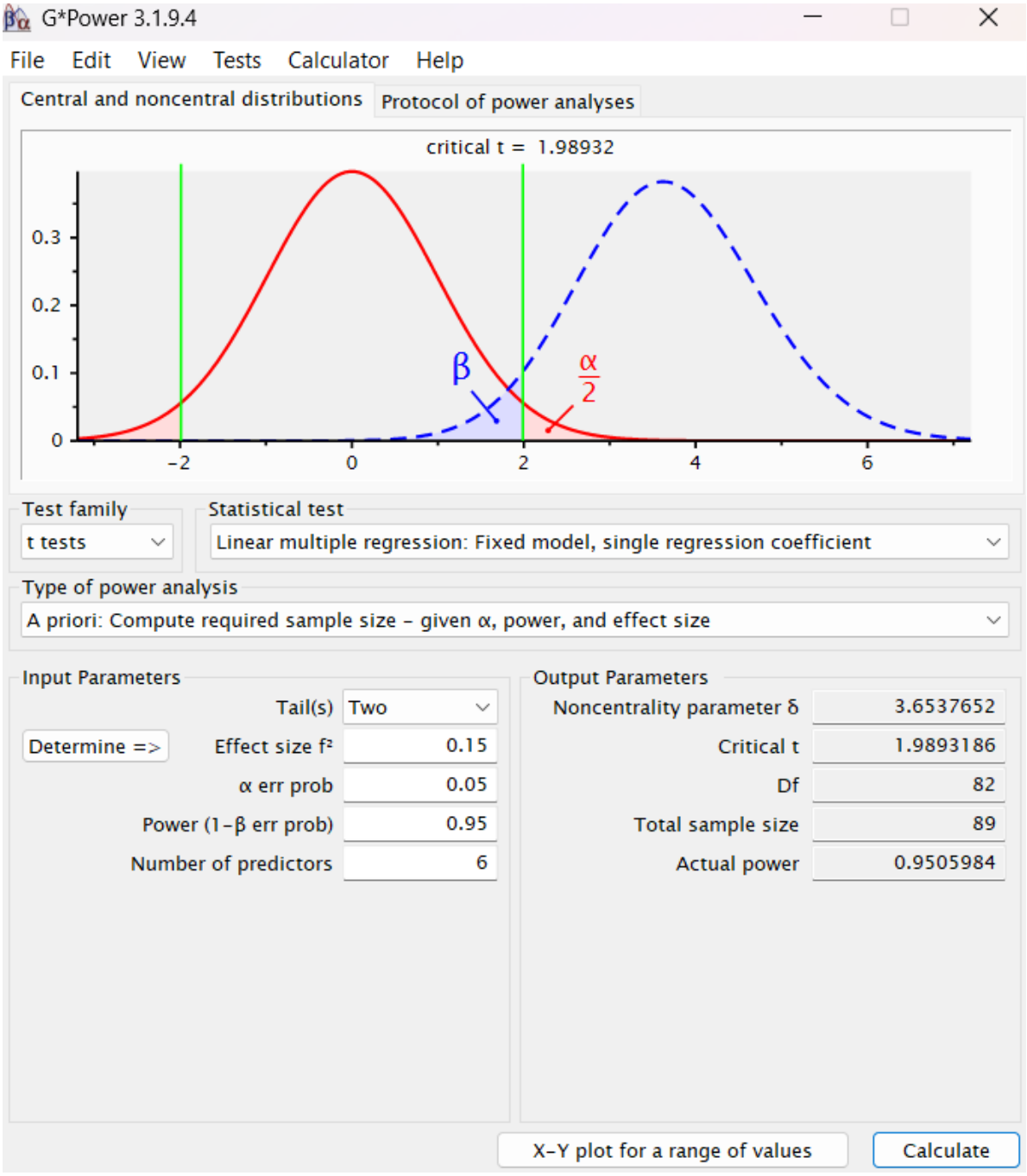
In this study, we used a quasi-experimental design with matched comparison groups. We identified a comparison group of individuals with similar characteristics who did not participate in these training programs. This allowed us to compare medium-term outcomes of comparison group who did not participated in the training with those who participated in the training.

3.2. Sample and Population

In Balochistan, the estimated number of current and former trainees are 1,500 in DigiBizz (DigiBizz, 2025), 85,000+ in NAVTTC (NAVTTC, n.d.), and 107,190 in DigiSkills (DigiSkills, n.d.). To effectively assess the implementation and impact of these programs, a reliable sample of participants was selected. The exact sample size was determined using principle of saturation for the qualitative study. Data saturation refers to the point in data collection where further inquiry yields no new information, themes, or insights. At this stage, further data collection is considered unnecessary or redundant (Guest et al., 2006). For this study, we arrived at the saturation point after 34 semi-structured interviews (SSIs) and 21 focused group discussions (FGDs).

For the quantitative part, the sample size was determined using Faul et al. (2007) G*Power . Using a medium effect size (0.5), a power of 0.80, and an alpha of 0.05, the minimum required sample size for each program is 89 (Figure 2). Since there are three IT skills programs, the total sample size across the three programs is 267. The data were collected from students of public-sector universities in Balochistan using purposive and stratified sampling.

Figure 2: Sample Size



Source: Authors' computations.

3.3. Instruments

For this study, the quantitative variables were measured using well-established scales from the literature. For example, youth-perceived employability was measured by a scale developed and validated by Wittekind et al. (2010). The sample item of the scale is "I am sure I shall find work easily if I start looking." The quantitative survey questionnaires were rated on a 5-point Likert scale (see APPENDICES

Appendix 1).

The questionnaire for qualitative data collection were designed after an extensive review of related literature and consultation with experts, including NVTTC resource persons, trainers, students, and academicians. All instruments used in the study underwent rigorous face and content validity checks to ensure reliability and clarity. After incorporating the expert feedback, the final version of the qualitative questionnaire was approved for final data collection (Appendix 2).

3.4. Sources of Data Collection

3.4.1 Survey Questionnaire (Quantitative Data)

Quantitative data were gathered through closed-ended questionnaires administered through survey to both participants and non-participants in the IT skills program. The questionnaire assesses key constructs, including implementation status (e.g., physical, human, and financial resources and technical resources). The study also includes questionnaires on program effectiveness (covering course content, soft and technical skills, and digital literacy). In addition, the study includes questionnaires that determine the challenges faced by the study participants.

The researchers distributed the questionnaire to participants, and the survey included a cover letter outlining the study's objectives, ensuring respondents' confidentiality, and clarifying that the data is only for research purposes only. The participants were also informed that their participation in the survey was voluntary and that they can withdraw at any time of the data collection.

3.4.2. Semi-structured Interview (Qualitative Data)

For the qualitative part of the study, focus group discussions (FGDs) and semi-structured interviews (SSIs) were conducted with trainees, graduates, trainers, focal persons, and the heads of the respective programs. Focus group discussions were also conducted in computer labs to facilitate open interaction among participants in a familiar learning environment.

RESULTS AND DISCUSSION

This section critically discusses key findings and results of the study.

4.1. Qualitative Data Analysis

For this study, data were collected through interviews and FGDs from seven universities in Balochistan, as listed in Table 1. The interviews were audio-recorded for NVivo analysis and transcribed for final analysis.

Table 1: Demographic Profiles of the SSIs and FGDs

S No	Universities	DigiBizz		NAVTTC		DiGiSkills	
		FGD	SSI	FGD	SSI	FGD	SSI
1	University of Loralai	1	4	1	1	-	-
2	University of Balochistan	3	5	1	1	-	1
3	BUITEMS	2	5	1	1	-	-
4	MCRU Sibi	1	1	2	4	-	-
5	BUETK Kuzdar	-	-	-	-	3	4
6	University of Gwadar	-	-	-	-	2	3
7	University of Turbat	-	-	-	-	4	5
		7	**15**	**5**	**7**	**9**	**12**
Total		**7+15+5+7+9+12 = 55**					

Source: Author's own compilation.

Table 1 presents the demographic profile of the qualitative data collected through FGDs and SSIs. A total of 55 qualitative data were collected covering DigiBizz, NAVTTC, and DigiSkills.

To explore participants' lived experiences, perceptions, and contextual challenges associated with digital skills initiatives, data were collected through SSIs and FGDs. Pseudonyms were used to ensure participant anonymity. All interviews and discussions were audio-recorded and subsequently transcribed verbatim for qualitative analysis. The transcribed data were imported into NVivo software for systematic coding and analysis.

NVivo, along with thematic analysis, was used to organise, manage, and analyse the qualitative data (Braun & Clarke, 2006), and an inductive approach was used (Mortelmans, 2025). Initial coding were conducted to identify meaningful segments of text (Mortelmans, 2025) related to program design, implementation, resource availability, teaching quality, curriculum relevance, administrative practices, financial support, motivation, employability outcomes, and equity considerations. These initial codes were then grouped into broader themes and sub-themes. These themes reflected recurring patterns across participants' narratives. The final coding structure comprised major themes and associated codes. Detailed descriptions and illustrative participant quotations support each theme and its subthemes. The results of the qualitative data, including themes, their codes, and descriptions generated in NVivo, are discussed in the following section and presented in the

Appendix 3.

4.2. Results of the Qualitative Data

The data obtained from SSIs and FGDs was analysed through NVivo. The analysis of the data generated multiple interrelated themes. These themes reflect participants' experiences regarding the implementation and effectiveness of DigiBizz, DigiSkills, and NAVTTC programs.

4.2.1. Infrastructure and Access

Infrastructure and access emerged as a critical barrier. This included persistent issues related to poor internet, inadequate lab facilities, power outages, and limited access to digital tools. Infrastructure plays a 90% importance level in determining technology effectiveness (King & Gotte, 2024). A lack of infrastructure restricting effectiveness has also been reported by Kormos (2018). Students lacking access to computers, tablets, and reliable internet connectivity (King & Gotte, 2024) are in disadvantageous position compared to those who have better access. The lack of these devices constrained effective learning. The participants narrated that:

"In Balochistan, the internet goes off every day, how can we learn online?" "There is a shortage of working computers." "Some systems don't have CPUs.""It's very difficult to attend classes in Sibi without AC." "AC and generator issues due to load-shedding." "We had to buy tools ourselves, like M10 and Keepa, costing 3,000–4,000 PKR monthly" "Some lacked laptops or stable internet access."

4.2.2. Teaching Quality

Teaching quality was generally perceived positively, with regard to trainer qualifications and practical teaching approaches. However, concerns were raised regarding trainer continuity, face-to-face learning, and the need for improved teaching aids. Under curriculum relevance, participants acknowledged alignment with market demands. But some participants raised concerns about outdated content and limited practice time. The results also suggest the addition of emerging domains such as AI, web development, and video editing.

"Trainers change every month." "*master trainer was not physically present" "The focal person visited the class only once in four months and was unresponsive" "We learned practical tools like creating Shopify stores." "Larger rooms needed better sound systems." "Proper audio equipment is needed.""We were taught both visually and practically.""Classroom equipment could be improved , especially mics and speakers."*

4.2.3. Program Management

The theme program management stated that program objectives and timelines were clearly stated. However, recurring issues that affected the program's effectiveness were administrative delays, delay in certificate distribution, the conflicts with university classes with IT training sessions, and weak monitoring mechanisms. The academic calendars and training programs were not aligned. Moreover, late fund release and financial processing negatively affected program implementation.

"The objectives and time period were communicated in advance.""Internal processing of funds is quite difficult." "Attendance was maintained through an online system." "Certificates are still pending." "We completed it in 2023 but haven't received certificates yet.""They rarely visited or monitored progress." "Timing conflicts with university classes." "Coordination with trainers was excellent."

4.3.4. Financial Support

This theme revealed that stipends were insufficient, unevenly distributed, and often delayed. Furthermore, a lack of access to premium digital tools and software further increases financial burdens on participants. Despite such challenges, the motivation and engagement of the trainees were high. However, high dropout and low completion rates were also evident.

"We had to buy tools ourselves." "Many essential tools are paid and expensive." "The one-time payment was insufficient." "This was demotivating." "Funds were released late." "Trainer salaries were not released initially." "Students don't have access to premium tools.""Some tools cost up to 10,000 PKR." "Universities had higher capacity but less funding."

4.3.5. Motivation and Engagement

Despite the recognition of digital skills, participation in the training was partly determined by financial support. The trainees' enthusiasm declined when stipends, tools, and basic facilities were insufficient, and it was one of the major reasons of high dropout. In addition, extreme weather (e.g., Sibi) and lack of transportation further intensified dropout. The lack of libraries, printing services, laptops, and multimedia, further exacerbated IT initiatives implementation. In one of the universities, the screen of the multimedia system was reflected on the room's wall. Such an environment not only makes teaching ineffective but also results in students' disengagement. Although trainees were interested in the training, but more than half of the participants discontinued the programs. These results suggest that adequate material and logistic support is essential to sustain participation.

"Only about 10% completed it." "Completion rate was low." "Some students joined expecting stipends." "Participation was linked to financial support." "Many dropped out due to lack of tools." "Hot weather and lack of transport." "All participants agreed that digital skills are important."

4.3.6. Outcomes and Employability

In terms of employability, the results showed mixed results. Some participants successfully started freelancing and remote work. Others experienced limited employability due to a number of reasons. For example, difficulties in bank and profile account-opening, lack of practical experience and difficulties in finding initial clients were some of the reason of poor employability. The study also found that people with higher qualifications were more employable than trainees with lower qualifications. Thus, inconsistent earnings raise questions about the sustainability of these programs.

"Payment methods weren't working.""Reported earnings exceeded $600,000." "No one earned consistently." "Freelancing provides remote opportunities." "Certificates were required as proof." "Some students are working online as freelancers." "One student got clients from the UK."

4.3.7. Equity and Inclusion

Themes related to equity and inclusion highlighted transport issues and awareness gaps. The findings highlight that lack of transport for females was one of the major reason of their high dropout ratio. Despite these challenges, the female widely acknowledged the program. This suggests that it is the structural barriers that prevent females from the potential benefits of digital skills initiatives. Additionally, lack of awareness and unclear registration processes further limited participation.

"We don't even know how to register." "Lack of transport limited female participation." "It is especially good for girls." "Girls can run their own businesses." "Most students had no official information." "Lack of awareness was a key issue." "Transport was a major issue for girls."

4.3.8. Contextual Factors

The results indicate that extreme weather conditions (e.g., Sibbi in summer and Quetta in winter) had a substantial impact on program participation and attendance. In addition, despite prior assurances, inadequate transport arrangements also affected student retention. This suggests that non-academic factors can also undermine the effectiveness of IT skills initiatives.

"Transport was promised but not provided." "Transportation issues caused dropouts." "We faced extreme heat." "Summer conditions affected attendance." "Weather created difficulties." "Lack of transport facilities."

4.3.9. Recommendations

Finally, the last theme generated from the data was participants' recommendations. The participants recommended that such initiatives should continue with a hybrid learning model and the adoption of the latest domain in the field of IT. The study also revealed that post-training mentorship either in the form of a helpline center may also play a major role in strengthening the initiatives. In addition, providing laptops, a strong outreach program, awareness campaigns, orientations, and promotional activities are essential to improve enrollment. Finally, unmet commitments, such as delayed certificates and lack of stipend undermine program credibility.

"Awareness campaigns should be launched." "Posters and orientations are needed." "Without promotion, participation remains low." "Such programmes should continue." "More centres should be established." "A combination of online and physical sessions would be best." "Certificates and results are still pending even after 4 months of course completion" "Provide laptops and technical equipment." "Ensure proper transport facilities." "Support for equipment is essential." "After training completion, follow-up is needed.""A laptop was promised to the topper, but no one received it"

4.4. Analysis of Quantitative Data

As stated above, the quantitative data were analyzed using IBM SPSS and SmartPLS software. The descriptive statistics of the study variables are shown in Table 2.

4.4.1. Correlation Matrix

The correlation matrix in Table 3 shows the interrelationships among the study's variables. Overall, most variables exhibit moderate to strong positive correlations, suggesting that improvement in one aspect of the training (e.g., course content, teaching methods, or program goals) tends to be associated with improvements in others (e.g., digital literacy, freelancing, or employability). The results in Table 3 show that course content has strong positive correlations with digital literacy (r = 0.734), employability (r = 0.758), freelancing (r = 0.782), program goals (r = 0.815), and teaching method (r = 0.859). Freelancing also shows strong correlations with digital literacy (r = 0.871), employability (r = 0.807), and program goals (r = 0.793). Program goals and teaching methods are also highly interrelated (r = 0.819).

Table 2: Demographic Profile

Gender		
Male	143	52.96
Female	127	47.04
***Age** (Years)*		
Below 25	169	62.59
25-34	76	28.14

Gender		
35-44	25	9.26
Name of the Program		
DigiBizz	169	62.69
Digi Skills	18	6.66
NAVTTC	83	30.74
Other	0	0
Designation		
Students	217	80.37
Focal Person	13	4.81
Program Coordinator	4	1.48
Administrative Staff	20	7.4
Trainers	16	5.92
Qualification		
BS	217	80.37
Master	29	10.74
MPhil	15	5.55
PhD	9	3.33

Source: Author's own compilation.

Table 3: Correlation Matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Course Content	1															
2. Course Content Barriers	0.145	1														
3. Digital literacy	0.734	0.317	1													
4. Employability	0.758	0.012	0.678	1												
5. Financial Barriers	0.217	0.536	0.403	0.085	1											
6. Financial Resources	0.341	-0.239	0.276	0.605	-0.086	1										
7. Freelancing	0.782	0.329	0.871	0.807	0.318	0.358	1									
8. HR Barriers	0.288	0.611	0.473	0.237	0.537	0.02	0.442	1								
9. HR	0.713	0.052	0.538	0.73	0.057	0.565	0.638	0.235	1							
10. Physical Barriers	0.307	0.639	0.436	0.152	0.622	-0.179	0.423	0.543	0.105	1						
11. Physical Resources	0.653	-0.063	0.552	0.661	0.062	0.56	0.589	0.125	0.728	0.164	1					
12. Program Goals	0.815	0.15	0.682	0.802	0.192	0.411	0.793	0.296	0.773	0.246	0.684	1				
13. Teaching Method	0.859	0.167	0.787	0.702	0.309	0.355	0.79	0.297	0.749	0.347	0.725	0.819	1			
14. Technical Barriers	0.289	0.548	0.4	0.228	0.388	0.099	0.456	0.55	0.272	0.514	0.157	0.277	0.321	1		
15. Technical Resources	0.61	-0.136	0.484	0.707	0.063	0.658	0.559	0.115	0.703	0.005	0.613	0.646	0.601	0.124	1	
16. Training Targets	0.692	-0.087	0.473	0.765	-0.072	0.539	0.599	0.08	0.691	0.115	0.627	0.749	0.653	0.239	0.598	1

Source: Author's own compilation.

4.5. Path Model AnalysisSource: **Author's own creation based on data using SmartPLS 4.1.1.4.**

Figure 3 illustrates the path model developed for the present research. For model assessment, we used PLS-SEM. In PLS-SEM, the path model is divided into two essential components. The first is the measurement model, also known as the outer model (Hair et al., 2017). The second is the structural model, or inner model (Hair et al., 2017), which depicts the hypothesized relationships among the latent variables. The path model analysis was conducted in two stages.

4.5.1. Stage One: Assessment of the Measurement Model

To assess the measurement model, individual indicator reliability,Cronbach's Alpha, composite reliability, and AVE were evaluated using SmartPLS 4.1.1.4. The results in Table 4 and Figure 3 show that all constructs have loadings above 0.60. Additionally, the values of Cronbach's Alpha, composite reliability, and AVE exceed the minimum thresholds of 0.70 and 0.50, respectively. AVE values above 0.50 indicate that all variables in the study are convergently valid and reliable (Table 4)).

Discriminant validity measures the degree of distinctiveness of a construct from the rest of the variables in the study. In PLS-SEM, discriminant validity was assessed using the Average Variance Extracted (Fornell & Larcker, 1981). Fornell & Larcker (1981) suggest that a construct demonstrates discriminant validity when the square root of its AVE is greater than its highest correlation with any other construct in the model. As shown in Table 5, the diagonal values representing the square roots of AVE exceed the inter-construct correlations, confirming that discriminant validity is established.

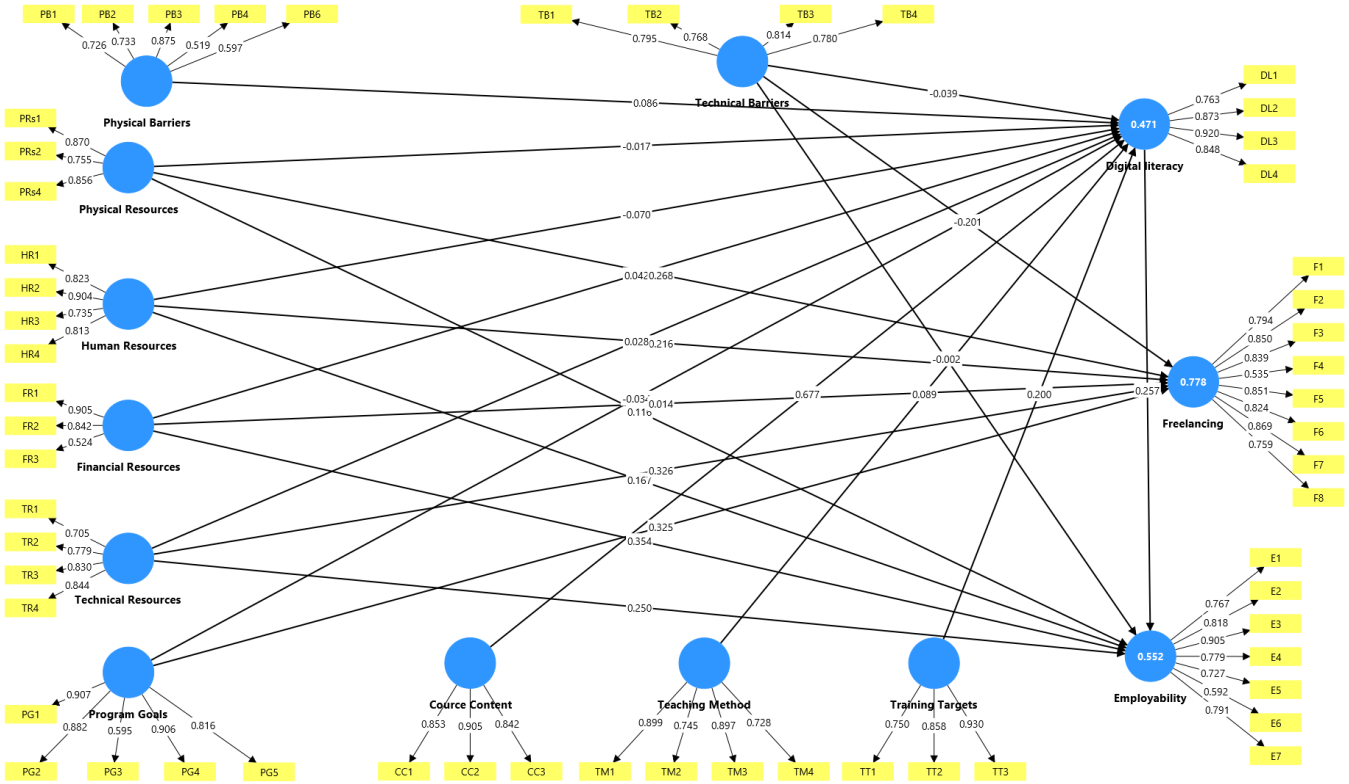
Table 4: Results of the Measurement Model

Constructs	Items	Factor Loadings	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
Course Content	CC1	0.853	0.835	0.901	0.752
	CC2	0.905			
	CC3	0.842			
Digital literacy	DL1	0.763	0.874	0.914	0.728
	DL2	0.873			
	DL3	0.920			
	DL4	0.848			
Employability	E1	0.767	0.886	0.911	0.598
	E2	0.818			
	E3	0.905			
	E4	0.779			
	E5	0.727			
	E6	0.592			
	E7	0.791			
Freelancing	F1	0.794	0.915	0.932	0.635
	F2	0.850			
	F3	0.839			
	F4	0.535			
	F5	0.851			
	F6	0.824			
	F7	0.869			
	F8	0.759			
Financial Resources	FR1	0.905	0.705	0.812	0.601
	FR2	0.842			
	FR3	0.524			
Human Resources	HR1	0.823	0.850	0.892	0.674
	HR2	0.904			
	HR3	0.735			

Constructs	Items	Factor Loadings	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
	HR4	0.813			
Physical Barriers	PB1	0.726	0.768	0.824	0.591
	PB2	0.733			
	PB3	0.875			
	PB4	0.519			
	PB6	0.597			
Program Goals	PG1	0.907	0.883	0.915	0.688
	PG2	0.882			
	PG3	0.595			
	PG4	0.906			
	PG5	0.816			
Physical Resources	PRs1	0.870	0.774	0.868	0.687
	PRs2	0.755			
	PRs4	0.856			
Technical Barriers	TB1	0.795	0.814	0.869	0.623
	TB2	0.768			
	TB3	0.814			
	TB4	0.780			
Teaching Method	TM1	0.899	0.843	0.891	0.675
	TM2	0.745			
	TM3	0.897			
	TM4	0.728			
Technical Resources	TR1	0.705	0.799	0.870	0.626
	TR2	0.779			
	TR3	0.830			
	TR4	0.844			
Training Targets	TT1	0.750	0.837	0.885	0.722
	TT2	0.858			
	TT3	0.930			

Source: Author's own compilation.

Figure 3: Measurement Model



Source: Author's own creation based on data using SmartPLS 4.1.1.4.

Table 5: Fornell-Larcker Criteria

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Course Content												
2. Digital literacy	0.765											
3. Employability	0.688	0.495										
4. Financial Resources	0.314	0.187	0.596									
5. Freelancing	0.802	0.659	0.792	0.414								
6. Human Resources	0.114	0.141	0.156	0.188	0.218							
7. Physical Barriers	0.450	0.338	0.308	0.232	0.585	0.316						
8. Physical Resources	0.679	0.426	0.660	0.711	0.779	0.112	0.300					
9. Program Goals	0.671	0.439	0.535	0.333	0.727	0.200	0.544	0.535				
10. Teaching Method	0.817	0.545	0.573	0.344	0.796	0.166	0.495	0.741	0.803			
11. Technical Barriers	0.335	0.265	0.268	0.213	0.493	0.111	0.682	0.248	0.383	0.352		
12. Technical Resources	0.750	0.490	0.694	0.569	0.849	0.118	0.371	0.817	0.602	0.781	0.273	
13. Training Targets	0.687	0.296	0.772	0.670	0.639	0.124	0.331	0.687	0.551	0.603	0.280	0.647

Source: Author's own creation based on data.

4.5.2 Stage Two: Assessment of the Structural Model

A structural model shows the relationships between latent variables and tests the significance of the proposed hypotheses. In this study, PLS-SEM was used to examine the structural model. The analysis involved several steps: (1) testing for multicollinearity, (2) assessing the coefficient of determination (R^2), (3) checking the effect size (f^2), (4) evaluating the model's predictive relevance (Q^2), and (5) testing hypotheses using path coefficients (Sarstedt et al., 2017).

The structural model is shown in Figure 4. Table 6 presents the structural model results generated through SmartPLS using PLS-SEM. The table includes the original sample estimates (β), standard deviations, t-statistics, and p-values for each hypothesised relationship between variables. A relationship is considered statistically significant when the p-value ≤ 0.05 and the t-value ≥ 1.96 (Hair et al., 2019).

The results of the structural model revealed that physical resources relationship with digital literacy was not significant (H1a: $\beta = -0.018$, $t = 0.270$, $p = 0.788$), however, it showed positive effect on employability (H1b: $\beta = 0.114$, $t = 1.971$, $p = 0.051$) and freelancing (H1c: $\beta = 0.266$, $t = 5.030$, $p < 0.001$), thereby supporting H1c and H1b but not H1a. The findings suggest that physical resources are essential for the effectiveness of the IT skills initiatives. Physical resources, including computer labs, infrastructure, and learning spaces, provide an enabling environment for hands-on practice. The findings that physical resources are essential for employability and digital literacy align with scholars who argue that providing resources is an essential component of the effective implementation of digital skills (Jain & Mitra, 2025). Hussain & Phulpoto (2024) argue that digital access, especially in rural areas, is a major challenge for policymakers. Our findings also corroborate the work of (Ndjama (2025) that physical resources are pivotal for shaping access to and the effective use of digital technologies.

Human resources' relationship with digital literacy was not significant (H2a: $\beta = -0.075$, $t = 0.734$, $p = 0.464$). However, human resources significantly predicted employability (H2b: $\beta = 0.160$, $t = 3.493$, $p = 0.001$) and freelancing outcomes (H2c: $\beta = 0.212$, $t = 4.126$, $p < 0.001$), thus supporting H2b and H2c. These findings suggest that human resources, such as trained instructors, IT support staff, and mentors, play a pivotal role in translating access to technology into meaningful skill development. The availability and effective utilization of these resources not only enhance digital literacy but also strengthen individuals' employability and readiness for freelancing. When technology use is supported by sufficient financial, physical, and human resources, learners are better equipped to develop market-relevant

digital competencies. These findings align with those of Alom & Vijaykumar (2024) that digital tools and educational materials foster technical proficiency and critical thinking.

With respect to financial resources, it had no effect found on digital literacy (H3a: $\beta = 0.044$, $t = 0.733$, $p = 0.465$) or freelancing (H3c: $\beta = -0.002$, $t = 0.046$, $p = 0.963$). In contrast, financial resources had a strong positive effect on employability (H3b: $\beta = 0.295$, $t = 6.097$, $p < 0.001$), supporting H3b.

The findings suggest that financial resources, which enable institutions to invest in training programs, digital infrastructure, and continuous skill upgradation, are important. This aligns with Labudova & Fodranova (2024), who found that countries with higher financial investment in skills training outperformed those with lower investment in training and skills programs. Neumeyer et al. (2020), in line with our study findings, are also of the view that a lack of financial and material resources makes basic investments in hardware and software challenging, which, in turn, hinders the adoption of digital technology.

Similarly, technical resources did not significantly influence digital literacy (H4a: $\beta = 0.035$, $t = 0.458$, $p = 0.648$). However, it significantly enhanced employability (H4b: $\beta = 0.217$, $t = 3.306$, $p = 0.001$) and freelancing (H4c: $\beta = 0.305$, $t = 5.712$, $p < 0.001$), supporting H4b and H4c. These findings indicate that technological resources, such as internet connectivity, labs, computers, and digital gadgets in the classroom, are likely to enhance students' digital literacy. These findings align with Soufghalem (2024), who found that students with access to technical resources were more likely to engage in digital learning than those without. Prior research also emphasises that technological resources are foundational requirements for effective digital learning (King & Gotte, 2024; Means et al., 2013; UNESCO, 2021).

The technical barriers had no significant effect on digital literacy (H5a: $\beta = -0.037$, $t = 0.654$, $p = 0.514$) and employability (H5b: $\beta = -0.029$, $t = 0.479$, $p = 0.633$). However, technical barriers had a significant negative effect on freelancing (H5c: $\beta = -0.215$, $t = 6.175$, $p < 0.001$), indicating that higher technical barriers reduce freelancing outcomes. This suggests that resource barriers restrict students' exposure to industry-relevant technologies, which is particularly critical in vocational education (Ndjama, 2025). These findings conform with the work of King and Gotte (2024), who found that many developing countries lack sufficient financial and technical resources to implement IT skills initiatives. In line with the findings of Prasastiningtyas et al. (2024), insufficient technological infrastructure and resources hinder participants' development of essential digital skills (Prasastiningtyas et al., 2024). Thus, our findings corroborate the work of King and Gotte, (2024); Prasastiningtyas et al. (2024). Mukherjee et al. (2024) found that while digital skills training empowered unemployed women, but social constraints and limited access to technology restricted participants' ability to fully leverage their skills for self-employment. This is because the introduction of educational technologies will enable teachers to develop 21st-century skills among students (Kormos, 2018).

The results further showed that course content had a strong and significant positive effect on digital literacy (H6: $\beta = 0.678$, $t = 9.882$, $p < 0.001$), providing support for H6. This suggests that course content should be inclusive, up-to-date, and meet 21st-century demands. These findings are also in agreement with the work of Hanip and Hossain (2021) and Pillutla and Narayana (2014) that a curriculum design must include four parameters, such as knowledge, competence, pedagogy, and outcomes and should meet content to learners' needs and industry demands (Samuel et al., 2025). The relevance of the curriculum to industry needs is a critical factor influencing employability outcomes (Herbert et al., 2024; Kee et al., 2023).

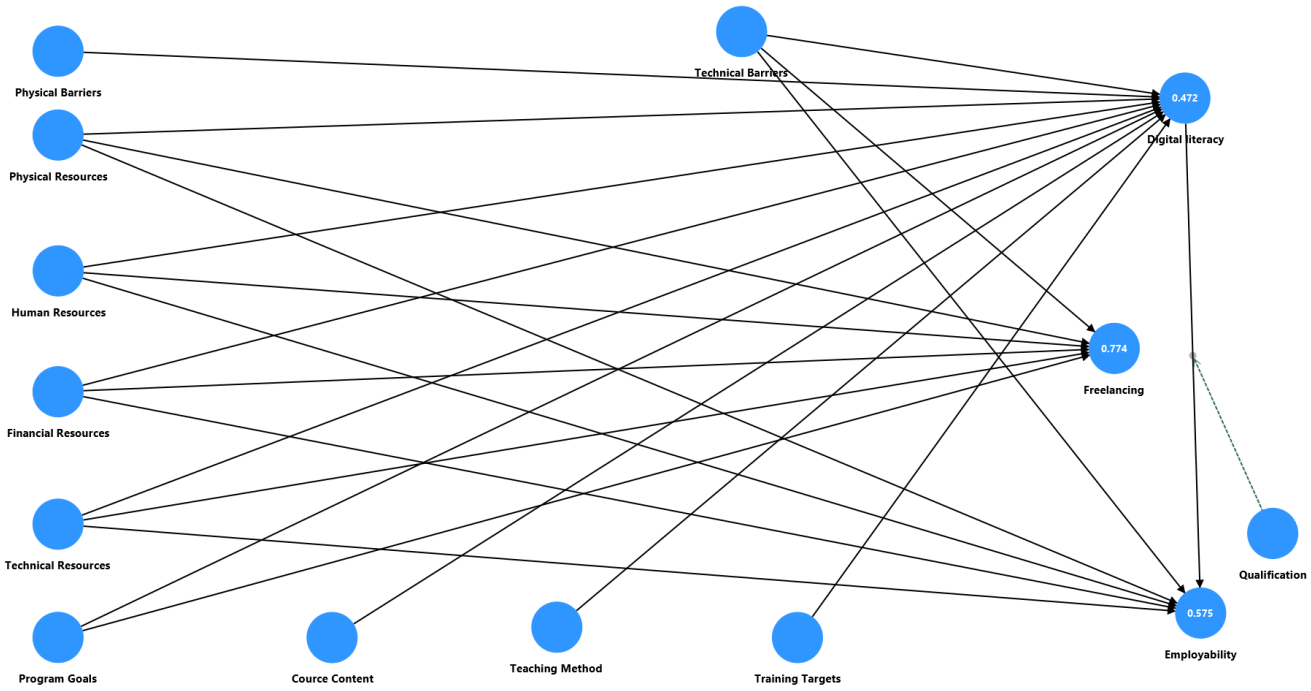
Teaching method (H7: $\beta = 0.102$, $t = 1.385$, $p = 0.169$) and program goals (H8: $\beta = -0.067$, $t = 0.733$, $p = 0.465$) did not significantly predict digital literacy. Training targets significantly improved digital literacy (H10: $\beta = 0.194$, $t = 2.630$, $p = 0.010$), supporting H10. These findings align with the work of King and Gotte (2024) and Basabe and Galigao (2024), who found that the lack of resources and teacher training impeded the quality of teaching. Bibi et al. (2024) and Labudova and Fodranova (2024) also support our findings that support, collaboration, structural challenges and technology integration are effective for the effectiveness of training programs. Prior studies also acknowledge the importance of course content and teaching methods (Hodges et al., 2020; King & Gotte, 2024). This finding is also in line with Alom & Vijaykumar (2024), who state that teaching tools, such as instructors and IT equipment, available to the instructor are likely to positively affect students' employability and their attitude towards freelancing. The importance of mentorship and guidance has also been vital for students' learning (Fleischmann & Ward, 2014; Prior et al., 2019).

Furthermore, digital literacy itself had a significant positive effect on employability (H11: $\beta = 0.249$, $t = 4.027$, $p < 0.001$). Prior studies also report that IT skills programs are effective in achieving expected outcomes, such as enhancing students' content creation and problem-solving skills (Samuel et al., 2025) and digital literacy (Miliou & Angeli, 2023). According to Kee et al. (2023), a digital talent hunt program, quite similar to DigiBizz, DigiSkills, and NAVTTC, significantly improved their digital literacy (e.g., web design, digital marketing, and content creation).

Finally, the moderation analysis indicates that qualification positively moderated the relationship between digital literacy and employability (H12: $\beta = 0.146$, $t = 2.648$, $p = 0.009$), suggesting that the strength of this relationship varies with level of qualification. In other words, it indicates that students' ability to find a job is conditioned by their level of qualification. The higher the qualification, the greater the belief that they can find a job easily. The study found that youth with some prior understanding of IT had positive views of the IT initiatives. This implies that training programs should be offered with their prior IT knowledge in mind.

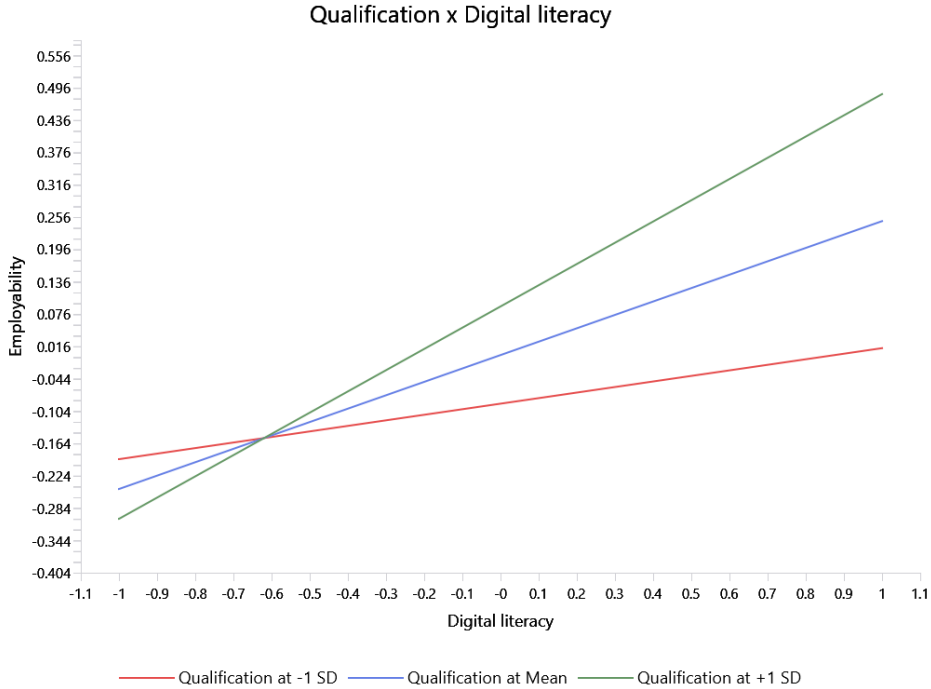
Since this study employed a quasi-experimental design with a matched comparison group. For this purpose, we run a multigroup analysis in SmartPLS 4 with trained and untrained students. The study found that digital literacy had a positive, significant effect on employability among students who participated in the training (trained group) ($\beta = 0.256$, $t = 3.333$, $p < 0.001$). However, the results also revealed that students who did not participate in the training (untrained) had no significant effect of digital literacy on employability ($\beta = 0.152$, $t = 1.128$, $p < 0.262$). These findings suggest that IT skills training programs play a significant role in transforming digital literacy into employability beliefs among participants. One of the findings of this study was that an IT skills program not only enhances employability but also prepares students to become freelancers and independent entrepreneurs. These findings are also consistent with those of Al-Zekri et al. (2024), who found that IT skills initiatives enhance students' entrepreneurial abilities and freelancing (Al-Zekri et al., 2024), participation in job opportunities (Hussain & Phulpoto, 2024), and technical proficiency and critical thinking (Alom & Vijaykumar, 2024).

Figure 4: Structural Model



Source: Author's own creation based on data using SmartPLS 4.1.1.4.

Figure 5: Moderation Slop Analysis



Source: Author's own creation based on data using SmartPLS 4.1.1.4.

Table 6: Results of the Structural Model

S No	Hypothesese	β	Standard deviation	T statistics	P values
H1a	Physical Resources -> Digital literacy	-0.018	0.067	0.270	0.788
H1b	Physical Resources -> Employability	0.114	0.058	1.971	0.051
H1c	Physical Resources -> Freelancing	0.266	0.053	5.030	0.000
H2a	Human Resources -> Digital literacy	-0.075	0.102	0.734	0.464
H2b	Human Resources -> Employability	0.160	0.046	3.493	0.001
H2c	Human Resources -> Freelancing	0.212	0.051	4.126	0.000
H3a	Financial Resources -> Digital Literacy	0.044	0.061	0.733	0.465
H3b	Financial Resources -> Employability	0.295	0.048	6.097	0.000
H3c	Financial Resources -> Freelancing	-0.002	0.040	0.046	0.963
H4a	Technical Resources -> Digital Literacy	0.035	0.076	0.458	0.648
H4b	Technical Resources -> Employability	0.217	0.066	3.306	0.001
H4c	Technical Resources -> Freelancing	0.305	0.053	5.712	0.000
H5a	Technical Barriers -> Digital Literacy	-0.037	0.057	0.654	0.514
H5b	Technical Barriers -> Employability	-0.029	0.061	0.479	0.633
H5c	Technical Barriers -> Freelancing	-0.215	0.035	6.175	0.000
H6	Course Content -> Digital Literacy	0.678	0.069	9.882	0.000
H7	Teaching Method -> Digital literacy	0.102	0.073	1.385	0.169
H8	Program Goals -> Digital literacy	-0.067	0.091	0.733	0.465
H9	Program Goals -> Freelancing	0.330	0.044	7.546	0.000
H10	Training Targets -> Digital literacy	0.194	0.074	2.630	0.010
H11	Digital literacy -> Employability	0.249	0.062	4.027	0.000
H12	Name of Program x Digital literacy -> Employability	0.146	0.055	2.648	0.009

Source: Author's own creation based on data using SmartPLS 4.1.1.4.

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

The IT skills initiatives among youth have emerged as a significant concern for policymakers and practitioners in Pakistan, in general, and in Balochistan in particular. The primary purpose of this mixed-methods research study was to examine and explore the effectiveness and implementation of the IT skills initiative for youth digital competence, technology adoption, and employability. The findings of this study indicate that digital skills initiatives (e.g., DigiBizz, DigiSkills, and NAVTTC) have significant potential to enhance digital literacy, freelancing, and employability among youth in Balochistan. The findings revealed that participants were highly motivated and recognised the value of digital skills. However, the effectiveness of these programs was limited by some challenges. These challenges include outdated curriculum, online classes, scheduling conflicts with regular classes, short duration of the program and timing. In addition, poor internet connectivity, inadequate labs, power outages, insufficient financial support, delayed certification, and weak monitoring mechanisms also negatively affected the IT skills initiatives. Additionally, contextual barriers, such as extreme weather conditions, transportation, and gender-related mobility constraints, further limited participation. One of the major challenges for the trainee was opening an account on an international platform and receiving funds from the donors. Despite these challenges, participants strongly recommended continuing and expanding such initiatives. The study also revealed an urgent need for improved infrastructure, better program management, enhanced outreach, and post-training support to ensure sustainable employment outcomes and maximise the impact of digital skills programs in the province.

5.2. Policy Implications and Recommendations

It is the first study on digital skills and literacy programmes in Balochistan; therefore, its findings have widespread practical implications. This study has shown that ill-informed policies can undermine their effectiveness in achieving desired results (Yin et al., 2025). Given that, digital literacy has strategic importance for the country's overall economic growth; this study is instrumental in realigning policies, particularly in Balochistan. Informed, data-driven policy is essential to achieving the project objectives (Hopkins et al., 2021), as policies on paper do have limitations in grasping realities on the ground. The following are the key interventions and policy recommendations from this study's findings.

Course Content and Employability: One important implication of this study's findings is for the course content of the IT skills initiative. There has been a fundamental shift from content-focused to outcome-focused education (Pillutla & Narayana, 2014). Therefore, according to Pillutla and Narayana (2014), a curriculum design must include four parameters: knowledge, competence, pedagogy, and outcomes. Thus, this study proposes that the curriculum must be developed in consultation with various stakeholders such as industry members, the chamber of commerce, academics, government officials, international institutions, and IT experts.

The course content should focus on emerging IT domains such as artificial intelligence, machine learning, data science and data analytics, cybersecurity, and cloud computing. Advanced modules in AI, YouTube automation, and digital content creation courses shall be included in the upcoming batches (Pedro, 2008).

Hands-on Learning: One of the recommendations from this study is that students should be provided with hands-on practice. For example, these students should be given the opportunity to work with industry experts and receive guidance from tutors. This hands-on practice, guided and mentored by an industry expert, will make them more employable. When the client and an industry expert provide guidance and feedback to

students, students develop the skills required in the ICT industry (Fleischmann & Ward, 2014). In addition, students who worked under the guidance of industry and academic mentors created more learning opportunities for themselves (Prior et al., 2019).

Teaching Approaches: In this study, we found that IT skills initiatives are delivered through various teaching methods, including online, blended and face-to-face classes. Blended project-based learning enhanced student learning outcomes compared to traditional face-to-face (Giatman & Mukhaiyar, 2025), while project-based learning can effectively develop digital competencies (Andone & Frydenberg, 2022). However, online approaches present challenges, including technology access barriers, reduced opportunities for informal interaction and mentorship, and increased demands on students' self-regulation capabilities (Andone & Frydenberg, 2022; Efendi & Trisnawati, 2023). Therefore, this study finding suggest that all IT related program should be face to face. This policy of face-to-face learning will not only bring students from remote areas at par with those of UoB and BUITEMS (only these universities offer face-to-face learning), but will also enhance their digital skills, perceived employability, and tendency towards freelancing.

Program Timing Challenges: Policymakers and program administrators should offer these programs during winter or summer vacation, or target them to students who have already graduated. Furthermore, to address this issue, it is recommended that every BS Program include a course on digital skills.

Training Duration Effectiveness: This study found that the training program should be of a longer period rather than one or two weeks. This is because for higher-order learning to occur, the length of the training program should be increased (Ktoridou & Eteokleous-Grigoriou, 2011; Samuel et al., 2025). Short-duration training programs cannot yield maximum output (Ktoridou & Eteokleous-Grigoriou, 2011; Samuel et al., 2025) and may not develop the competencies required for complex and professional tasks (Miliou & Angeli, 2023; Pillutla & Narayana, 2014).

Digital Ecosystem Development: One of the suggestions from this study is that digital platforms and ecosystems may play a crucial role in connecting freelancers and IT skills specialists with clients. These platforms established at the national and international level may facilitate freelancers in finding clients and customers.

Resource Investment Priorities: The findings underscore the need for policymakers to prioritise investment in physical, human, financial, and technical resources. Government bodies and HEIs authorities should allocate dedicated funding for the development of digital infrastructure, computer labs, and access to licensed software.

Leaders of the educational institutions should invest in the development of teachers and trainers.

There should be a uniform compensation for trainers, with additional incentives for those serving in universities outside Quetta to encourage their physical presence.

Industry and Academia Collaboration: To strengthen employability and digital literacy, the government and program initiators should formally integrate industry experts into policy and program design. This will support students' professional development, exposure to real-world practices, and network building. Regular consultation with industry partners and systematic analysis of job market demands are essential for maintaining curriculum relevance (Herbert et al., 2024).

Digital Infrastructure Enhancement: It is recommended that universities and the Government of Balochistan's IT Department work together to upgrade computer labs. Resources shall be allocated to upgrade computer systems in existing labs and to equip them with better facilities.

Additionally, partnerships with industry, IT firms, and freelancing platforms (e.g., Upwork, Fiverr, PeoplePerHour) can help institutions align digital skill development with labour-market needs, thereby enhancing students' perceived employability.

Urban and Rural Disparity: Universities in rural areas lacked access to face-to-face learning, while universities in urban areas, such as UoB and BUITEMS, had face-to-face instructor facilities. This undermines the effective implementation of the IT skills initiatives in remote areas. It is recommended that physical classes be mandatory, and online classes should be available only if physical classes are not possible.

Evidence Based Policy: The Government of Balochistan should adopt an evidence-based, differentiated policy approach to IT skills initiatives. Policymakers should regularly evaluate the effectiveness of existing programs (e.g., DigiBizz, NAVTTC, DigiSkills) using learner outcomes, completion rates, and student perceptions to identify best-performing models. Programs shown to be effective, such as DigiBizz, should be scaled up and used as benchmarks for redesigning less effective initiatives.

Practical Education Model: One significant implication of this study is that an integrated work-and-study program should be initiated. It's a model in which a person studies (education or training) while working, either part-time or in a flexible format. The goal is to gain education and practical experience simultaneously.

Paid Software Provision: The Government of Balochistan should purchase expensive software and subscriptions and grant access to all students enrolled in digital skills programs across the province. Alternatively, a dedicated budget head should be assigned to purchase paid tools for digital freelancing.

Equitable Resource Allocation: The policymaker should prioritise equitable resource allocation, particularly in marginalised and remote areas. The computer lab and the infrastructure were in poor condition compared to those of universities located in urban areas.

Gender Inclusion: Female participation in the digital literacy program was encouraging. Thus, capitalising on the interest of female students, the Government may launch a training program specifically for females and provide IT training at all divisional headquarters. Furthermore, for greater female participation, the programs should be advertised from a female perspective, i.e., linking them to skills that females find interesting or easy, such as designing and content writing.

In addition, there should be a tendency test for interested students to identify their inclination towards a specific area. If a tendency test is taken before the commencement of a batch, it will enable students to excel in their field of choice and yield greater competency.

Decentralised Management: The federal government may work either in partnership with the provincial government or sponsor the projects to the provincial government. Management at the provincial level helps tackle issues in a timely manner and reduces coordination loops.

Awareness and Evaluation: The study suggests that institutions should start awareness programs, engage stakeholders, and offer incentives for institutions to adopt digital technologies. Lastly, monitoring and evaluation systems should be embedded within policy design to regularly assess resource adequacy, program delivery, and outcomes.

Finally, the IT Department of the Government of Balochistan shall operate a 24/7 online service to respond to freelancers' queries and support them in completing their tasks. There should be a dedicated online support service for freelancers.

5.3. Limitations

Despite the significance of this study, it has certain limitations that should be considered when generalizing its findings. Although this study provides evidence that IT skills training produces desirable outcomes, future researchers are encouraged to conduct a longitudinal study. Most studies assess immediate outcomes such as skill gains, confidence, or short-term employment, but do not follow participants over extended periods to examine career progression, earnings growth, or sustained employment. Therefore, we recommend a longitudinal study. Furthermore, the participants in this study were students and graduates of only the seven public sector universities, which may limit the generalizability of the findings. Future scholars are encouraged to expand the sample to the entire province of Balochistan and Pakistan. Moreover, the data were self-reported; therefore, the issue of common method bias may be an issue. Future scholars are encouraged to collect data from third-party partners in IT skills programs.

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APPENDICES

Appendix 1: Questionnaire

Item	Statement	1	2	3	4	5
Physical, Human, Financial and Technical Resources						
	Physical Resources					
1	The classrooms/labs are adequately equipped for program delivery.	☐	☐	☐	☐	☐
2	There is sufficient seating and workspace for participants.	☐	☐	☐	☐	☐
3	Internet connectivity is reliable and accessible.	☐	☐	☐	☐	☐
4	Physical infrastructure supports the smooth delivery of the program.	☐	☐	☐	☐	☐
	Human Resources					
1	Adequate number of qualified trainers/instructors are available.	☐	☐	☐	☐	☐
2	Support staff are sufficient to handle administrative tasks.	☐	☐	☐	☐	☐
3	Trainers possess relevant digital and technical skills.	☐	☐	☐	☐	☐
4	There are sufficient mentors/guides available for learners.	☐	☐	☐	☐	☐
	Financial Resources					
1	The financial resources provided were sufficient for both training materials and general operations.	☐	☐	☐	☐	☐
2	The amount of funding allocated for technological infrastructure is sufficient.	☐	☐	☐	☐	☐
3	Financial support is timely and well-managed.	☐	☐	☐	☐	☐
1	**Technical Resources** Sufficient number of functional computers/devices are provided.	☐	☐	☐	☐	☐
2	The learning management system (LMS) is accessible to all participants.	☐	☐	☐	☐	☐
3	Adequate software tools and applications are available for learning.	☐	☐	☐	☐	☐
4	Technical support is available to resolve issues promptly.	☐	☐	☐	☐	☐
Implementation Status						
	Planned Goals/Project Timeline					
1.	The program objectives were clearly communicated.	☐	☐	☐	☐	☐
2.	The training was aligned with the stated goals of the program.	☐	☐	☐	☐	☐
3.	The program outcomes matched the initial expectations set in the planning documents.	☐	☐	☐	☐	☐
4.	The training started as per the planned schedule.	☐	☐	☐	☐	☐
5.	The course was completed within the stipulated time frame.	☐	☐	☐	☐	☐
6.	The timeline for assignments and tasks was manageable.	☐	☐	☐	☐	☐
7.	The resources provided were sufficient for effective learning.	☐	☐	☐	☐	☐
8.	The facilities provided (internet, equipment, materials) were adequate and matched with original program plan.	☐	☐	☐	☐	☐
9.	The financial support matched the program's stated budget allocations.	☐	☐	☐	☐	☐
	Course content relevancy					
1	The course content was relevant to current job market needs.	☐	☐	☐	☐	☐
2	The course content followed the original curriculum plan	☐	☐	☐	☐	☐
3	All the promised topics were covered in the training.	☐	☐	☐	☐	☐
	Teaching methodology					
1	The trainers used effective teaching methods.	☐	☐	☐	☐	☐
2	The online platforms used in the training were effective	☐	☐	☐	☐	☐
3	The interaction between trainers and trainees was satisfactory.	☐	☐	☐	☐	☐
4	The practical components (hands-on tasks) were sufficient.	☐	☐	☐	☐	☐
	Training Targets					
1	The number of participants who enrolled met the program's target.	☐	☐	☐	☐	☐
2	The number of participants who completed the program was as expected	☐	☐	☐	☐	☐
3	The program achieved its skill development targets.	☐	☐	☐	☐	☐

Appendix 2: Semi-structured Interview Questionnaire

1. Can you describe the adequacy of the classrooms, labs, and overall physical infrastructure provided for your training program?
2. What are your thoughts on the availability and quality of trainers, mentors, and administrative staff involved in the program?
3. How effective were the internet access, learning devices, and software tools provided during your training?
4. Was the financial support for the program, including funding for materials, operations, and infrastructure, sufficient and timely in your view?
5. Were the objectives and timelines of the training program clearly communicated and followed throughout?
6. To what extent did the course content align with job market needs and meet your expectations?
7. How would you assess the effectiveness of teaching methods and online platforms used during your training?
8. Can you describe the hands-on learning opportunities you had? Are they useful for your skill development?
9. Was the program able to retain participants through completion? What factors helped or hindered participant engagement?
10. Did you or others face any challenges in joining or continuing the training (e.g., digital access, registration issues, gender or family restrictions)?
11. What difficulties were faced in terms of coordination, curriculum delivery, or administrative issues during implementation?
12. What did you learn about freelancing platforms like Fiverr or Upwork, and have you used them since the training?
13. How are you applying the skills you learned, either through freelancing, employment, or your own business?
14. Has the training improved your chances of employment or increased your income? Please elaborate.
15. Based on your experience, what would you suggest to improve the effectiveness or accessibility of the program in the future?
16. In your opinion, which mode of teaching is more effective for student learning: 1) pre-recorded lectures or 2) face-to-face lectures, and why?
17. How do you evaluate the quality of DigiBizz, DigiSkills, and NAVTTC at your institution"
18. What aspects (e.g., content, delivery method, resources, or instructor support) do you think need improvement?

Appendix 3 Themes and Codes and their References

Themes	Codes	Description (References)
Infrastructure and Access	Poor internet connectivity	*"but the internet connection was slow"."Internet connectivity was poor" "In Balochistan, the internet goes off every day — how can we learn online?"*
	Inadequate lab infrastructure	***"There is a shortage of working computers." "Some systems don't have CPUs."***
	Uncomfortable learning environment	*"There were also seating issues due to overcrowding" "During summer, we faced extreme heat as the ACs were not working" "It's very difficult to attend classes in Sibi without AC."*
	Power/load-shedding issues	*"AC and generator issues due to load-shedding." "There were occasional power fluctuations." "Long power outages affected physical classes."*
	Digital access constraints	*"We had to buy tools ourselves, like M10 and Keepa, costing 3,000–4,000 PKR monthly" ""Some lacked laptops or stable internet access." "I didn't have a laptop earlier." "Access issues were a major barrier."*
Teaching Quality	Qualified trainers	*"The trainers assigned to BUITEMS are well-qualified and competent." "Our trainer was well-qualified." "They have a good command over their subjects."*
	Supportive trainer behavior	*"master trainer was not physically present" "the master trainer was absent. The focal person visited the class only once in four months and was unresponsive" ""The trainers assigned to BUITEMS are well-qualified and competent." "Our trainer was well-qualified." "They have a good command over their subjects."*
	Practical teaching approach	*"We were taught both visually and practically." "We learned practical tools like creating Shopify stores." "Assignments and practical tasks were given."*
	Trainer continuity issues	*"Trainers change every month." "After a month, a new person starts teaching." "The master trainer was not physically present."*
	Need for teaching aids	*"Classroom equipment could be improved , especially mics and speakers." "Larger rooms needed better sound systems." "Proper audio equipment is needed."*
Curriculum Relevance	Market-aligned curriculum	*"The course content matches current market demand." "We teach the most in-demand tools used globally."*
	Misaligned curriculum	*"The course outline is outdated." "We were told we'd become capable of working independently. However, the focus was on Amazon, and not enough time was spent on Shopify or web development."*
	Need for curriculum expansion	*"More courses should be added." "Introduce Web Development, Video Editing, and AI." "New domains should be included."*
	Insufficient content depth	*"Other parts were rushed." "Only Amazon was covered extensively." "We need more depth in topics."*
	Need for more practice time	*"Only two months of actual teaching happened." "Extend the course duration for better learning." "More practical tasks are needed."*

Themes	Codes	Description (References)
Program Management	Clear program communication	*"Everything was clearly explained." "The objectives and time period were communicated in advance." "Once enrolled, the objectives became clear."*
	Scheduling conflicts	*"Timing conflicts with university classes.""University classes continued regularly."* *"There was no time to join sessions."*
	Strong institutional coordination	*"Coordination with trainers was excellent." "Attendance was maintained through an online system."* *"The system worked smoothly."*
	Administrative delays	*"Internal processing of funds is quite difficult." "The release was delayed by NAVTTC."* *"Operational strain occurred due to delays."*
	Certification delays	*"Certificates are still pending." "We completed it in 2023 but haven't received certificates yet." "Certificate distribution is pending."*
	Monitoring gaps	*"External officials were not cooperative." "They rarely visited or monitored progress."* *"We expected monthly or quarterly visits."*
Financial Support	Stipend insufficiency	*"The one-time payment was insufficient." "Some tools cost up to 10,000 PKR."* *"The stipend did not cover expenses."*
	Unequal financial distribution	*"Private institutions received more allocations." "Universities had higher capacity but less funding."* *"This was demotivating."*
	Payment delays	*"Funds were released late." "Trainer salaries were not released initially."* *"Payments were delayed."*
	Lack of premium tools	*"We had to buy tools ourselves." "Many essential tools are paid and expensive."* *"Students don't have access to premium tools."*
Motivation & Engagement	High student motivation	*"All participants agreed that digital skills are important."* *"Students showed strong interest." "Motivation levels were high."*
	Stipend-driven participation	*"Some students joined expecting stipends." "They were told stipends would be provided."* *"Participation was linked to financial support."*
	Dropout factors	*"Many dropped out due to lack of tools."* *"Hot weather and lack of transport."* *"Financial problems caused dropouts."*
	Low completion rate	*More than half dropped out." "Only about 10% completed it."* *"Completion rate was low."*
Outcomes and Employability	Freelancing success outcomes	*"Some students are working online as freelancers." "One student got clients from the UK."* *"Reported earnings exceeded $600,000."*
	Limited employability outcomes	*"No one earned consistently." "Payment methods weren't working."* *"Limited employability was observed."*
	Work-from-home opportunity	*"Girls can work from home." "Freelancing provides remote opportunities."* *"Students can earn from home."*

Themes	Codes	Description (References)
	Certification proof requirement	*"Certificates were required as proof." "Results were pending." "Certification delays affected credibility."*
	Credibility concerns	*"Some participants show fake revenue." "Only revenue is shown as profit."* *"Reporting systems were inconsistent."*
Equity & Inclusion	Gender mobility barriers	"Transport was a major issue for girls." "Many girls dropped out." "Lack of transport limited female participation."
	Female empowerment	"It is especially good for girls." "They can become independent." "Girls can run their own businesses."
	Awareness gaps	"Most students had no official information." "We don't even know how to register." "Lack of awareness was a key issue."
Contextual Factors	Extreme weather constraints	"We faced extreme heat." "Summer conditions affected attendance." "Weather created difficulties."
	Transport barriers	"Lack of transport facilities." "Transport was promised but not provided." "Transportation issues caused dropouts."
Recommendations	Program expansion need	"Such programmes should continue." "There is strong encouragement to restart." "More centres should be established."
	Improved outreach	"Awareness campaigns should be launched." "Posters and orientations are needed." "Without promotion, participation remains low."
	Hybrid learning preference	"Hybrid (blended) learning was preferred." "A combination of online and physical sessions would be best.""Both modes are useful."
	Post-training mentorship	"After training completion, follow-up is needed." "Provide a platform for continued learning.""Mentorship gaps were identified."
	Provision of laptops/transport	"A laptop was promised to the topper, but no one received it" "Certificates and results are still pending even after 4 months of course completion" ""Provide laptops and technical equipment." "Ensure proper transport facilities." "Support for equipment is essential."

Source: Authors own compilation based data.