



كلية الدراسات العليا والبحث العلمي

برنامج إدارة الأعمال

مهارات التوظيف لخريجي علوم الحاسوب في فلسطين: الاحتياجات والتوقعات.

Employability Skills of Computer Sciences Graduates in Palestine: Needs and Expectations

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Dedication

I dedicate this MBA thesis with profound gratitude and heartfelt appreciation to the pillars of my life—my mother, Sisters, Brother, Wife, and Children. Your unwavering support, boundless encouragement, and enduring understanding have been the driving force behind my academic journey. This accomplishment is as much yours as it is mine, and I am eternally grateful for the sacrifices you have made to see me succeed.

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This thesis stands as a tribute to the collective strength and encouragement provided by my family and professional connections. Each of you has played a vital role in my journey, and I extend my deepest appreciation for your unwavering belief in my abilities and aspirations.

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Abstract

Software development has become an integral aspect of contemporary life, with technology maintaining every facet of our existence. Consequently, there is a burgeoning demand for software developers both locally in Palestine and globally. The cornerstone for success in this field lies in the acquisition of essential skills, encompassing both soft and hard skills.

This research endeavors to illuminate and identify disparities between the employability skills possessed by computer science graduates and the expectations of employers. It aims to uncover the graduates' perceptions of their skills and contrast them with employers' expectations, particularly concerning the importance of these skills in the software development domain.

The data collection involved the administration of two questionnaires—one targeting graduates and the other aimed at employers. These questionnaires explore various aspects to determine the gaps between the expectations of employers and the perceptions of graduates. Additionally, questions were designed to assess graduates' employability across six dimensions: Technical, Creative, Personal, Social, Generic, and Self-Perceived employability skills. Data was collected through Google Forms and analyzed using SPSS version 26.0.

The findings suggest that personal, social, and generic skills significantly influence graduates' employability, whereas there appears to be less correlation between technical and creative thinking abilities and employability. This disparity in evaluation between employers and graduates specifically technical and self-perceived employability skills underscores a perceptible gap.

Moreover, the research underscores that technical expertise, critical thinking skills, personal attributes, and self-perceived competencies collectively constitute crucial employability skills. Proficiency in these skills augments graduates' prospects of securing employment. Technical skills were deemed the

most imperative, accounting for 45% of importance, followed by creative thinking (27%), personal skills (19%), social skills (15%), generic skills (10%), and self-perceived skills (17%).

The study's findings illuminate a perceptual gap between employers and graduates, particularly in the realms of personal, social, and generic skills. To bridge this gap, the research recommends collaboration with market experts and employers in designing university curricula, integrating more real-world practical projects, and fostering partnerships between universities and companies to offer software development activities aligning with market needs, both locally and internationally.

Keywords: Software, Technical Skills, Soft Skills, ICT, Palestine, Outsourcing, Employers, Expectations.

ملخص الدراسة

المهارات الوظيفية لخريجي علوم الحاسوب في فلسطين: الاحتياجات والتوقعات

أصبح تطوير البرمجيات جزءاً لا يتجزأ من الحياة المعاصرة، حيث تحافظ وتساعد التكنولوجيا كل جانب من جوانب وجودنا. ونتيجة لذلك، هناك طلب متزايد على مطوري البرمجيات سواء على الصعيد المحلي في فلسطين أو عالمياً. تكمن ركيزة النجاح في هذا المجال في اكتساب المهارات الأساسية، التي تشمل كل من المهارات التقنية والمهارات الشخصية.

تسعى هذه الدراسة إلى توضيح وتحديد الفجوات بين المهارات القابلة للتوظيف التي يمتلكها خريجو علوم الحاسوب وتوقعات أصحاب العمل أو المشغلين. وتهدف هذه الدراسة إلى كشف إدراك الخريجين لمهاراتهم ومقارنتها بتوقعات أصحاب العمل، خاصة فيما يتعلق بأهمية هذه المهارات في مجال تطوير البرمجيات.

جمع البيانات شمل توزيع استمارتين، الأولى موجهة للخريجين والثانية موجهة لأصحاب العمل. تتحرى هذه الاستمارات جوانب مختلفة لتحديد الفجوات بين توقعات أصحاب العمل وإدراك الخريجين. بالإضافة إلى ذلك، تم تصميم الأسئلة لتقييم قابلية توظيف الخريجين من خلال ستة أبعاد: المهارات التقنية، الإبداعية، الشخصية، الاجتماعية، العامة، والمهارات القابلة للتصور الذاتي. جمعت البيانات من خلال نماذج Google Forms وتم تحليلها باستخدام SPSS الإصدار 26.0.

تشير النتائج إلى أن المهارات الشخصية، الاجتماعية، والعامة تؤثر بشكل كبير على قابلية توظيف الخريجين، في حين يبدو أن هناك علاقة أقل بين المهارات التقنية والتفكير الإبداعي وقابلية التوظيف. تؤكد هذه الفجوة في التقييم بين أصحاب العمل والخريجين، وخاصة فيما يتعلق بالمهارات التقنية والمهارات القابلة للتصور الذاتي، على وجود فجوة ملموسة.

علاوة على ذلك، تؤكد الدراسة أن الخبرة التقنية والقدرة على التفكير النقدي، والصفات الشخصية، والكفاءات المتصورة ذاتياً تشكل معاً مهارات قابلية التوظيف الحاسمة. تعزز الاجتياز في هذه المهارات فرص توظيف الخريجين في مجال شركات البرمجة. اعتبرت المهارات التقنية الأكثر أهمية، حيث تمثل 45% من الأهمية، يليها التفكير الإبداعي (27%)، والمهارات الشخصية (19%)، والمهارات الاجتماعية (15%)، والمهارات العامة (10%)، والمهارات القابلة للتصور الذاتي (17%).

تضيء نتائج الدراسة الفجوة الإدراكية بين أصحاب العمل والخريجين، خاصة في مجالات المهارات الشخصية، الاجتماعية، والعامّة. لتقليل هذه الفجوة، توصي الدراسة بالتعاون مع خبراء السوق وأصحاب العمل في تصميم مناهج الجامعات، ودمج المزيد من المشاريع العملية من السوق، بالإضافة الى تعزيز الشراكات بين الجامعات والشركات لتقديم أنشطة تطوير برمجيات او مناهج تتماشى مع احتياجات السوق، سواء على الصعيدين المحلي والدولي.

الكلمات المفتاحية: برمجيات، مهارات تقنية، مهارات شخصية، تكنولوجيا المعلومات والاتصالات، فلسطين، الاستعانة بمصادر خارجية (outsourcing)، أصحاب العمل، المشغلين، التوقعات.

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Table of Abbreviations

Abbreviation	Definition
DAI	Development Alternatives, Inc
FRJ	Finance For Jobs
GDP	Gross Domestic Product
GSG	Gaza Sky Geeks
ICT	Information Communications Technology
IPSD	IPSD (Innovative Private Sector Development)
IQ	Intelligence quotient
IT	Information Technology
IUG	Islamic University Gaza
MBA	Master of Business Administration
MENA	Middle East and North Africa
MTIT	Ministry of Telecom & IT Palestine
NA	Not Applicable
PALTEL	Palestine Telecommunications Company
PCBS	Palestinian Central Bureau of Statistics
PITA	Palestinian Information Technology Association
PPU	Palestine Polytechnic University
PTUK	Palestine Technical University “Kadoorie”
SPSS	Statistical Package for the Social Sciences
TAP	Talent Acceleration Platform
TQM	Total Quality Management
UNDP	United Nations Development Programme

Chapter 1: Introduction

Chapter One: Introduction

This chapter overviews and discusses the Palestinian computer's sciences graduates' employability skills in the same way the employers' expectations in the software market, locally and internationally, therefore the existing gap between parties (Craig et al., 2018). The chapter introduces the research problem, purpose, significance and discusses it by reading the market's status and importance of the results.

The chapter will highlight and discuss the following main topics:

1. Overview
2. Research Problem
3. Research Questions
4. Research Hypotheses
5. Research Scope
6. Research Significance
7. Research Objectives
8. Research Structure

1.1 Overview

Software Development refers to the process of designing, coding, programming, testing and maintaining computer Software. Through the last decades the software development and its tools has expanded and grown to almost every industry and almost every device we use contains a technological solution embedded rather than the software applications we use including Sales points, Administration applications, Mobile applications and the list goes long(Arvanitou et al., 2021).

In the midst of these rapid and dramatic changes in the global market, it was a must to check; Are the Palestinian graduates taking the advantage of the growing opportunities? Correctly after noticeable easier access to the global employers through international companies doing head hunting in the middle east including Palestine through outsourcing where companies hand over some or complete business process activities to some outside manufacturer.

To be successful in the field of software development, computer science graduates need to have a solid understanding of programming languages and gain practical experience in using them. However, the skills required to work as a software developer go beyond technical knowledge. Effective communication skills, the ability to work well in teams, and strong problem-solving abilities are also essential.

The question arises: are graduates fully prepared to enter the job market immediately after completing their studies? In order to bridge the gap between universities and the industry, many companies provide in-house training for their employees, including newly hired graduates. However, this option may not be viable for all parties involved, as it requires allocation of resources, including time and money, by the employers.

For fresh graduates, the hiring process can be quite challenging, involving various assessments such as cohesive tests, difficult IQ tests, software engineering evaluations, as well as assessments of soft

skills and psychometric tests. On the other hand, universities need to stay updated with rapidly changing technologies and trends. They must adopt effective strategies to keep their courses and staff training up-to-date in order to meet industry demands and prepare their graduates accordingly(Lundberg et al., 2020)

Soft skills refers to the skills that are not related to the technical knowledge , but more into the personality, the way of communication, self-confidence, way of thinking, attitude and attributes, “Soft skills are also mentioned in the literature as "non-technical skills", "people skills", “transferable skills”, "social skills", or "generic competencies"(Matturro et al., 2019). These skills usually assist graduates and employees to interact efficiently and professionally, accept, understand and work within different teams and cultures. Software employers usually look for software graduates and developers with high set of soft skills, having the soft skills maintains the culture of the company and results in an easier boarding process and eventually higher performance indicators.

Software Development depends also on a range of solid know-how skills, to design, develop, test and maintain software applications and programs. These technical skills differ depending on the type of the application and the software development language used which enable the graduate or employee to write functional and efficient software application code, furthermore to project manage the software application development life cycle(Dash & Bose, 2020; Mangiza & Brown, 2020a).

1.2 Research Problem

Recent years, IPSD (Innovative Private Sector Development), UNDP (United Nations Development Programme), Gaza Sky Geeks, AXSOS, Talent Acceleration Platform (TAP), Dual studies programs and several other training programs have been working and still to train students and fresh graduates to evolve graduates in the software industry and improve employability skills to ultimately get them placed in software companies.

Training programs' intentions is mainly to boost employment rates among computer science graduates, nonetheless, Palestinian companies' talent acquisition specialists reported a limited number of developers (aka resources) in Palestine and internationally likewise; the institutes state that working remotely with local or international clients (Employment Opportunities) may lead to misunderstanding requirements, doing job wrong or lead to failure in application development. To solve or minimize the effect of misunderstanding issues there is a real and well-structured system to produce graduates armed with the matching and qualified hard and soft skills ready for employment in the market (Khader & Zein, 2019) (الزور, 2018).

Researchers view the Palestinian universities are not aligned with the local and international software market demand, in addition there is no research (to the researcher best knowledge) and development activities which improves the quality of the education for the IT- Related studies therefore graduates technical and soft skills is not with the highest relevance between market (local and international) and universities (PITA & PALTEL Group, 2014).

Hence, the research problem pertains to identifying the disparity in soft and technical skills between the requirements of graduates and the expectations of employers.

This research examines the graduates' soft and technical skills. From the employer's perspective, it examines what are the required soft and technical skills needed for graduate's work in the software development companies.

1.3 Research Questions

To accomplish the goal of this research, the research should answer the following questions:

Main Question: "To what extend there is gap between software employers and graduates"? To answer this, the following other questions should be answered:

RQ1) What are the market skills (Soft and Technical) expectations (software employers) from computer science's graduates.

RQ2) To what extent do graduates exhibit proficiencies in technical skills?

RQ3) To what extent are graduates equipped with up-to-date technical competencies in relation to contemporary technological frameworks upon completion of their education?

RQ4) What are the market expectations and employer requirements regarding the soft and technical skills of graduates?

RQ5) Which soft and technical skills are deemed most crucially deficient among graduates from their perception?

1.4 Research Hypotheses:

The research tested three main hypotheses:

1. H₀₁: The Higher the graduates possess technical and soft skills; the graduates are more likely to be employed
2. H₀₂: There is a significant difference between graduates' evaluation and employers' evaluation of employability skills (Technical and soft) among Computer Sciences graduates in Palestine.

1.5 Research Scope:

The research is examining the computer sciences graduates' needs and market (Software employers' companies) expectations in Palestine and internationally, the research is not covering all technical and soft skills but the most important (based on the literature review). This study excludes the software developers who work in the IT departments which are not in software houses.

This research investigates the employability skills by focusing on two factors: the perspectives of companies and employers, and the technical and soft skills of graduates, while excluding any other factors that may potentially influence employability.

1.6 Research Significance

By understanding what is the gap between the software development market needs and computer Sciences graduates' expectations, universities and graduates would know what is lacking in terms qualification (soft and technical skills). Graduates will focus on effective training based on market demand and trends, universities will maintain their curriculums and employers will work and focus their efforts to empower the graduates with the required skills. Furthermore, the universities and employers will figure out courses or skills are not needed anymore therefore universities consequently focus on the vital soft and technical skills.(Mustafa et al., 2020)

Palestinian IT sector is a fast growing, for example, the number of employees in the sector has doubled from 2010 to 2020 in numbers from 4,377 employees working in the software field to 8,736 (*PCBS / Main Economic Indicators for Information & Communications Activities in Palestine, (2010- 2020)*, 2021). The outcomes of this research, along with other studies within the same field, are anticipated to contribute towards the increased employment prospects of graduates and engineers through the implementation of the research recommendations.

Currently, the Palestinian market is witnessing significant efforts aimed at training graduates and involving them in the software development industry. These efforts include various initiatives such as training programs, train-to-hire programs, and other similar endeavors. However, it is essential to conduct research to assess whether these initiatives are effectively aligned with the desired goals and objectives. The purpose of this research is to gain a comprehensive understanding of whether these efforts are on the right track or require further adjustments for optimal outcomes. (European Training Foundation, 2022)(USAID, 2024)

1.7 Research Objectives

The aim of this research is to evaluate the congruence between the skills acquired by university graduates and the expectations of employers. The specific objectives are outlined as follows:

1. Investigate the impact of the employability skills, both soft and technical, on employability.
2. Determine the extent of the employability skills gap between the market's expectations and the skills possessed by graduates.
3. Identify the soft and technical skills that recent graduates possess upon finishing their studies.

To measure these objectives, the research will assess the percentage of graduates who secure employment based on their possession of the skills deemed necessary by employers

2.1 Palestinian Echo-System and Exposure to Market

The Information and Communication Technology sector (ICT) offers a multitude of opportunities for developers, and several factors contribute to the availability of these opportunities. Many software

companies recognize the benefits of outsourcing development projects due to various reasons. These include the high cost associated with hiring experienced in-house developers, tight project schedules, and a lack of knowledge in the technology demands of certain complex software systems (Haider et al., 2016). As a result, small companies or startups often turn to freelancing platforms to post job vacancies and find freelancers or freelancer teams who can deliver short to medium-term

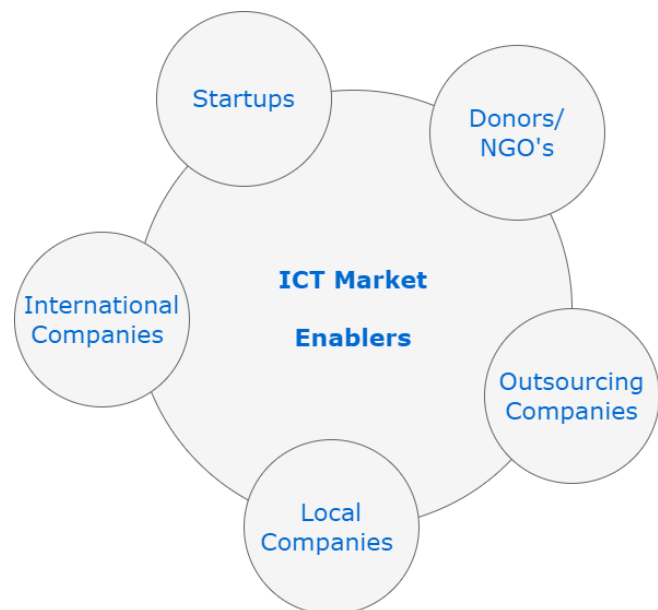


Figure 1 The Palestinian Echo System Mapping (prepared by the researcher).

projects within defined budgets and delivery times(Gupta et al., 2020). This type of freelancing work has the potential to expand, with some companies even establishing branches in Palestine and hiring freelancers as full-time employees. Notable freelancing platforms where such opportunities can be found include Fiverr, Upwork, and Toptal.

Considering the global market landscape, which encompasses in-house development, outsourcing companies, multinational corporations (MNCs), and freelancing platforms, Palestinians have a greater chance to get involved in the software development industry (Burke & Cowling, 2020). This presents an excellent opportunity for graduates of computer science programs to enter the field and contribute their skills. Furthermore, the post-Covid-19 market situation has created a significant demand for software development and developers. The increasing need for technological software solutions and the rise of remote work opportunities in software development companies have fueled this (Gupta et al., 2020). (Gupta et al., 2020). With the shift to remote work and the availability of mature online conferencing solutions and meeting applications, the potential for developers to find employment and engage in software development projects has expanded even further (Juárez-Ramírez et al., 2023)

Palestinian digital infrastructure has grown quickly to enhance and empower the internet including 3G and fiber internet connectivity services and networks in West Bank and Gaza which results in an increase in the Palestinian information and communication Technology (ICT) contribution up to \$493 Million (3.2 Percent) into the Palestinian GDP in 2020 (Reva et al., 2021). Employment rates almost doubled between 2008 and 2018 and the ICT exports rose from \$2 million in 2000 to \$85 million in 2017. The availability of educated talents, the language accent, location and time zone make the Palestinian market as the target for the companies in the region to outsource or nearshore to Palestine (Reva et al., 2021)

The Palestinian startup ecosystem is currently in its early stages, comprising of 102 startups, 38 enablers, and a limited number of investors (World Bank, 2018) Despite the relatively small number of startups and the ecosystem being in its early development phase, these startups have managed to create employment opportunities for approximately 8,500 individuals directly involved in software development and business roles. In addition to the startups themselves, various investors, such as Ibtikar (backed by the International Finance Corporation), Sadara venture capital (previously),

IGNITE program by IPSD Palestine, Oasis 500 from Jordan, and Raed Ventures (a Saudi corporate venture capital firm), play a crucial role in supporting these startups. These investors not only provide financial backing but also assist startups in accessing co-investors to expand their businesses. Moreover, these investments contribute to the hiring of new employees and recent graduates, not only in Palestine but also in the broader region, facilitating the startups' entry into international markets.(Reva et al., 2021).

In terms of graduate recruitment, there are several initiatives aimed at incentivizing employers to hire and involve fresh graduates in the field. These initiatives include Finance for Jobs (F4J, 2024) , the Innovative Private Sector Development Project (IPSD, 2024), and Tech Start (Palestine Technology for Youth and Jobs Project). These programs are designed to facilitate the hiring of fresh graduates by providing financial support. Specifically, they cover the salaries of these graduates for an initial period of at least six months and even offer training opportunities for senior students lasting up to two years. Funding for these programs is provided by various entities, including the World Bank, the European Union, the Swiss Agency for Development and Cooperation, and the Government of the Kingdom of Netherlands. Implementation of these initiatives is carried out by(DAI, 2024), under the supervision of the Ministry of Telecommunications and Information Technology (MTIT).

The British Consulate General in Jerusalem has launched a recent program called "Iktashif UK" with the aim of facilitating business matching and investment opportunities for tech companies. This initiative brings delegations of tech companies to the United Kingdom, providing them with the opportunity to explore potential collaborations and partnerships. Similarly (previously), MENACATALYST, an organization dedicated to supporting software startups, has been delegating startups to various locations including Dubai, Chile, and London. These programs aim to connect startups with valuable business opportunities in different international markets.

Participating in these programs and achieving successful business matching can greatly benefit companies by helping them establish a stable foundation and scale their business operations. By connecting with potential investors, partners, and customers, startups and outsourcing companies can unlock growth opportunities and expand their market presence. As a result, these companies are more likely to create new job opportunities and hire graduates and employees, contributing to the overall development of the tech ecosystem.

In the Palestinian market, there is a new player called Manara.tech that has been making employment contributions. Manara.tech focuses on attracting and connecting top talents in the Middle East and North Africa (MENA) region with leading companies worldwide. Positioned as the community of top computer scientists in the MENA region, Manara.tech offers skill-building opportunities and facilitates connections to world-class job opportunities, whether remote or on-site. (Manara, 2024)

Manara.tech introduces a new model to the Palestinian market, enabling top talents to be recruited by prestigious companies such as Google, noon.com, and others. This presents an exciting opportunity for graduates in the software field to engage with world-class companies, either by working on-site or remotely, provided they possess the necessary qualifications.

By bridging the gap between exceptional talent and renowned organizations, Manara.tech opens doors for Palestinian graduates to access global employment opportunities and contribute to high-profile projects. This initiative not only enhances career prospects for graduates but also strengthens the reputation of the Palestinian ICT sector on an international scale.

For individuals who have little to no coding or programming experience, bootcamps present a valuable opportunity for skill development. Bootcamps are intensive training courses designed to equip participants with the necessary coding skills and soft skills required in the field of software development. These programs are suitable for fresh graduates or individuals without a technical background who are eager to enter the ICT sector

Bootcamp participants engage in full-time training, dedicating approximately 40 hours per week for a period of 12 to 16 weeks. During this time, they attend lectures, receive hands-on coding practice, and immerse themselves in the world of software development. These bootcamps act as a catalyst for hiring opportunities, both locally and internationally, enabling participants to access a wide range of job prospects. (Hendricks, 2023)

In the Palestinian context, notable bootcamps include AXOS, GAZA Sky Geeks, and Anira bootcamps. These initiatives play a crucial role in accelerating skill development and providing individuals with the necessary foundation to pursue careers in the software industry. By offering intensive training and focusing on practical skills, bootcamps contribute to the growth of the local talent pool and enhance employment prospects for participants in both the local and international job markets.

Research Structure:

This research consists of five chapters; the first chapter briefs introductions and general information about all related concepts and terms of the software development industry, graduates and employers in Palestine and the affective factors, the second chapter gives a background about the software industry, related skills, concepts in addition to the literature review. The second part of this research is about the research methodology, the research process followed by chapter four and five in which they analyze and discuss the research results.

Chapter 2: Literature Review

Chapter Two: Literature Review

This chapter provides an introduction to the thesis theoretical background. It draws upon previous research, both local and international, which addresses the computer-related graduates' employability skills, encompassing both soft and hard skills, as well as the expectations of employers. Additionally, the chapter highlights the research methods employed in numerous studies, which serve as a guide for the methodology utilized in this thesis. The main objectives of this chapter are to justify the research theory and identify research gaps by examining relevant scholarly literature.

The chapter is divided into the following sections:

1. Total Quality management Concept
2. Palestinian Echo-System and Exposure to Market
3. Employability
4. Technical Skills
5. Soft Skills
6. Artificial Intelligence Tools

2.2 Total Quality Management Concept

The employability of graduates has become a crucial concern in today's competitive job market, particularly in the field of computer sciences (Osmani et al., 2019). As the demand for skilled professionals continues to rise, understanding the employability skills required by computer sciences graduates becomes imperative. In the context of Palestine, where efforts are being made to enhance the capabilities of graduates and bridge the gap between academia and industry, it is essential to investigate the needs and expectations of employers regarding the employability skills of computer

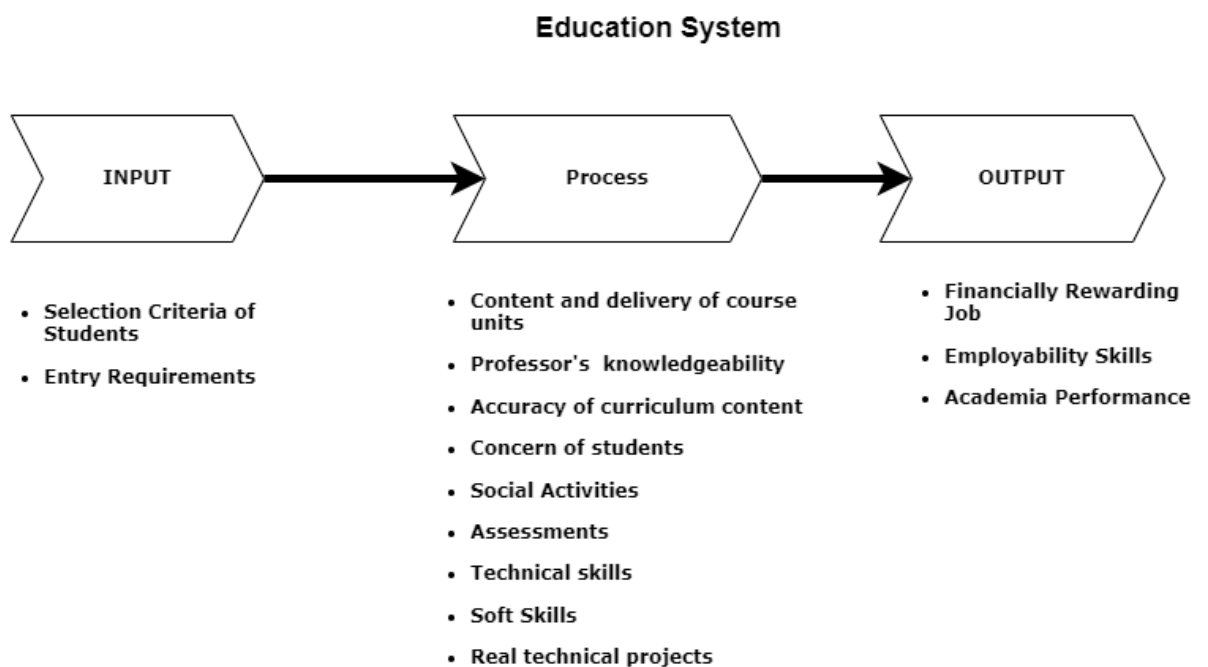


Figure 2 The input -Process-Output framework of quality Classification.

sciences graduates

Total Quality Management (TQM) is applicable to the field of education and the workplace; It involves meeting employer expectations and ensuring customer satisfaction, which translates to the quality of skills exhibited by graduates. Quality in this context is the outcome of years of study and the personal development of graduates, which is a result of a comprehensive framework encompassing input, process, and output (Owlia & Aspinwall, 1997). Students are the primary input; The process refers to

the education or training. The output can be seen in the form of financially rewarding jobs, successful placements, or academic performance(Chua, 2004).

Perception and expectation play significant roles for both computer sciences graduates and field industry employers in the context of the job market and professional interactions.

For software engineering graduates, perception refers to how they perceive their own skills, capabilities, and career prospects. It encompasses their understanding of their technical competencies, problem-solving abilities, and potential for growth in the field. On the other hand, expectations represent the anticipated outcomes or desired attributes that software engineering graduates have in mind for their career. This can include expectations about the type of work they will be involved in, the level of compensation and benefits and other job-related aspects.

For employers, perception is related to how they perceive software engineering graduates as potential employees. It includes their understanding of the graduates' technical skills, problem-solving abilities, adaptability, and communication skills. On the other hand, expectations from employers' perspective revolve around what they desire and anticipate from software engineering graduates in terms of their performance, contributions, and professional conduct.(Obioha & Sotshangane, 2022)

It is essential for both software engineering graduates and employers to be mindful of their perceptions and expectations. Graduates should strive to enhance their skills, stay updated with industry trends, and maintain a realistic understanding of the job market.

The chapter will start by discussing the concept of employability skills and their significance in today's dynamic work environment. It will delve into the evolving nature of computer sciences careers and the specific skill sets demanded by employers in this rapidly changing field. The chapter will also examine the broader socio-economic context of Palestine and the unique challenges faced by computer sciences graduates in terms of employability.

By consolidating and synthesizing the existing literature, this chapter will provide a foundation for understanding the current landscape of employability skills for computer sciences graduates in Palestine. It will inform subsequent chapters of this research study, which will focus on empirical investigations and propose recommendations to bridge the gap between the skills possessed by graduates and the expectations of employers.

Ultimately, the insights gained from this literature review will contribute to enhancing the employability prospects of computer sciences graduates in Palestine. It will offer valuable guidance for educational institutions, policymakers, and stakeholders in aligning educational programs with the evolving needs of the labor market, facilitating a smoother transition from academia to employment for computer sciences graduates in the region.

2.3 Resource-Based Theory (RBM) and Employability Skills

Within the realm of strategic management, Resource-Based Theory (RBT) remains a prominent framework. This theory emphasizes the critical role of a firm's internal resources in achieving and sustaining a competitive advantage. This review specifically explores the recent advancements in RBT research, particularly within the context of employability skills. These skills encompass essential non-technical abilities such as communication, teamwork, problem-solving, and adaptability. Employability skills are increasingly recognized as vital for both individual career success and organizational performance. By focusing on studies published since 2020, this review examines the intersection of RBT and employability skills, with a particular interest in recent developments and their implications.

2.4 Key Concepts and Recent Developments

RBT posits that a firm's competitive advantage is derived from its unique resources, which must be valuable, rare, inimitable, and non-substitutable (VRIN criteria) (Barney, 1991). Recent research has continued to explore and refine these concepts, with a focus on integrating dynamic capabilities and addressing the rapidly changing business environment.

- **Dynamic Capabilities:** (Teece, 2019) highlights the importance of dynamic capabilities, which are the firm's abilities to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. These capabilities are essential for sustaining competitive advantage in a volatile market.
- **Digital Transformation:** The integration of digital technologies has emerged as a critical area in RBT. Firms that effectively leverage digital resources and capabilities can enhance their competitive position (Verhoef et al., 2021). This includes investments in digital skills and infrastructure, which are becoming essential resources.

2.5 Types of Resources

Recent studies emphasize the significance of intangible resources, particularly in the context of knowledge-based economies.

- **Human Capital:** Human capital remains a focal point, with an increased emphasis on the skills and competencies required in the digital age. Skills such as digital literacy, data analysis, and advanced problem-solving are increasingly recognized as critical (Cascio & Montealegre, 2016).
- **Relational Capital:** The value of relational capital, which includes relationships with customers, suppliers, and partners, has been highlighted. Effective management of these relationships can lead to better resource utilization and innovation (Yu et al., 2013)

2.6 Employability Skills

Definition and Contemporary Relevance

Employability skills are essential non-technical skills that enable individuals to secure employment and excel in their careers. These skills include communication, teamwork, problem-solving, self-management, and adaptability. In the post-pandemic era, the importance of these skills has been magnified due to changes in work environments and the increased prevalence of remote work.

- **Remote Work:** The shift to remote work has underscored the need for digital communication skills, self-management, and adaptability. Employees must navigate new tools and technologies while maintaining productivity and collaboration (Carnevale & Hatak, 2020)

- **Lifelong Learning:** The rapid pace of technological change has made lifelong learning an essential component of employability. Individuals must continuously update their skills to remain relevant in the labor market (Van der Heijde, 2014)

2.7 Development of Employability Skills

The development of employability skills is influenced by various factors, including education, training, and work experience.

- **Higher Education:** Higher education institutions are increasingly integrating employability skills into their curricula through experiential learning opportunities, internships, and industry partnerships (Jackson, 2017).
- **Corporate Training:** Organizations are investing in continuous learning and development programs to enhance employability skills among their employees. This includes both formal training and informal learning opportunities (Noe et al., 2014).

2.8 Employability Skills and Organizational Performance

Employability skills contribute to organizational performance by enhancing innovation, teamwork, and adaptability. Teams with strong employability skills are better equipped to handle complex problems and drive organizational success (Andrews & Higson, 2008)

2.9 Intersection of RBT and Employability Skills

Human Capital as a Strategic Resource

From an RBT perspective, human capital is a crucial strategic resource. Employees with strong employability skills contribute to a firm's competitive advantage by driving innovation, operational efficiency, and adaptability (Barney, 1991)

- **Skill Development and Competitive Advantage:** Firms that invest in developing employability skills among their workforce can create a sustainable competitive advantage. This includes fostering a culture of continuous learning and providing opportunities for skill enhancement (Lepak & Snell, 2008)

2.10 Organizational Practices and Skill Development

Organizations can leverage RBT by implementing practices that enhance employability skills. This includes providing continuous learning opportunities, fostering a supportive work environment, and encouraging knowledge sharing(Barney, 1991)

- **Digital Skills and Transformation:** In the context of digital transformation, firms that prioritize the development of digital skills can better navigate technological changes and maintain competitive advantage(Verhoef et al., 2021).

2.11 Measuring the Impact

Recent research indicates that firms emphasizing employability skills tend to perform better across various metrics, including innovation, customer satisfaction, and financial performance (Cascio & Montealegre, 2016)

2.12Employability

Employability is "Enabling students to acquire the knowledge, personal and professional skills and encourage the attitudes that will support their future development and employment (Sheffield Hallam University, 2023) or " A set of attributes, skills and knowledge that all labor market participants should possess to ensure they have the capability of being effective in the workplace – to the benefit of themselves, their employer and the wider economy(Industry, 2009) .

Employability definition can vary from researcher to a researcher, below is a table for Employability definitions.

Table 1 Definitions of employability in chronological Order

Author/s	Definition
(Hillage & Pollard, 1998)	Employability is the capability to move self-sufficiently within the labor market to realize potential through sustainable employment. For the individual, employability depends on the knowledge, skills and attitudes they possess, the way they use those assets and present them to employers and the context (personal circumstances and labor market environment) within which they seek work
Hinchcliffe (2001, 8) cited in (Dacre Pool & Sewell, 2007)	Having a set of skills, knowledge and personal attributes that make a person more likely to secure, and be successful in their chosen occupation
(De Grip et al., 2004, P. 76)	The capacity and the willingness to be and to remain attractive in the labor market, by anticipating changes in tasks and work environment and reacting to those changes in a proactive way
(Dacre Pool & Sewell, 2007,P.)	Having a set of skills, knowledge, understanding and personal attributes that make a person more likely to choose and secure occupations in which they can be satisfied and successful
(Hogan et al., 2013)	The ability to gain and retain employment (including finding new employment when necessary)

Skills play a vital role in employability, serving as the driving force that attracts employers and fosters successful collaborations between graduates/employees and organizations. Employability skills can be broadly categorized into two main types: soft skills and technical skills (Nghia, 2019)

These skills could be categorized and defined as:

1. Technical skills
2. Soft Skills (this set of skills adopted by this Misra & Khurana, 2017)
 - I. Higher order thinking skills
 - II. Personal skills

- III. Social skills
- IV. Generic skills
- V. Self-perceived employability skills.

* Soft skills are Higher-order thinking, Personal skills, social skills, Generic kills. Self-perceived employability Skills. Hard skills are technical skills or know how skills, i.e., programming languages, server maintenance.

2.13 Technical Skills

As mentioned earlier, the unemployment rates among IT graduates in Palestine in ICT sector is 30% (Palestinian Central Bureau of Statistics, 2022). Only a small percentage of graduate's secure direct employment immediately after graduation. In order to improve their employability, it is crucial for graduates to invest in enhancing t. They need to continuously update their understanding of the latest technologies and industry trends. (Zorzetti et al., 2022)

Moreover, graduates should actively cultivate their creativity and innovation skills. It is important for them to consistently put effort into developing and refining their creative abilities. By nurturing their creative thinking and problem-solving skills, graduates can differentiate themselves in the competitive job market and increase their chances of securing employment opportunities(Devambatla & Nalla, 2015) (YOUNIS, 2022). Currently Universities and NGOs operating in Palestine are actively addressing this gap by providing supplementary training and organizing events to raise awareness among fresh graduates. These initiatives aim to showcase the potential of the local and international market and spread the message that pursuing a career in the field is indeed feasible.

Startups are dynamic organizations that operate in an environment of high uncertainty, aiming to create innovative products or services. Some prominent examples of successful software startups include

Facebook, Instagram, WhatsApp, Airbnb, and Amazon (Rafiq et al., 2021) It is projected that in 2023, more than half of the global GDP will be driven by startups, reflecting their significant impact on transforming various aspects of our lives (Startup Genome LLC, 2022)

However, despite the immense potential for success, it is important to acknowledge that a significant number of startups, approximately 90 percent, ultimately fail. There are various factors contributing to this high failure rate, and one critical factor is the technical capabilities of the team leading or operating the startup. The technical expertise and competence within the team play a pivotal role in overcoming challenges, adapting to market demands, and ensuring the successful execution of the startup's vision.

Popular startups such as Facebook, Snapchat, Spotify, Pinterest, Instagram, Dropbox, Netflix, and Airbnb have established their presence in the market and employ a significant number of software developers globally. These startups prioritize hiring individuals who possess the necessary technical qualifications and skills without providing extensive training. They seek out talent that can quickly adapt and enhance their technical and managerial capabilities.

In this context, startups value candidates who demonstrate not only the required technical qualifications but also the ability to rapidly improve their technical skills. These learning skills enable candidates to quickly onboard and contribute to the company's success. Startups rely on the agility and adaptability of their employees to navigate the fast-paced and ever-evolving landscape of the industry. (Devadiga, 2017a)

2.14 Soft Skills

The market landscape has experienced significant transformations due to globalization, the Covid-19 pandemic, and the Ukrainian-Russian war and other factors have introduced rapid changes, instability, and heightened competition. As a result, the market demands a greater depth of knowledge and a

broader range of skills. In response, universities and institutes are investing in enhancing the quality of education to equip students and graduates with long-term employability skills. This focus on employability skills aims to facilitate quicker and easier access to employment opportunities.

Employability skills encompass a range of achievements, understandings, and personal attributes that enhance a graduate or student's likelihood of securing employment within the market. By cultivating these skills, individuals not only increase their prospects of finding employment but also contribute to the broader community, ecosystem, and economy. The emphasis on developing employability skills reflects a commitment to preparing individuals for the evolving demands of the job market and fostering positive societal and economic impact (Cranmer, 2006)

The acquisition of soft skills, whether acquired through formal or informal means, plays a crucial role in enabling graduates to secure their initial employment successfully. These cognitive and noncognitive skills have a significant impact on employment outcomes and are considered essential for career advancement. While technical qualifications are important, it is not guaranteed that all graduates will be hired solely based on their technical expertise. The presence of strong soft skills can differentiate applicants and influence employers' decisions on whom to invest in and hire (Succi & Canovi, 2020)

Recognizing the importance of soft skills, universities typically incorporate courses that focus on developing these skills into their program curriculums. However, it is imperative to assess whether the skills gained through university education align with the expectations of employers. Employers often prioritize soft skills over technical skills when evaluating potential candidates. Therefore, it is essential to examine the relevance and effectiveness of the soft skills acquired during university education in meeting the demands and expectations of employers (Nghia, 2019)

The disconnect between graduates' expectations and the actual demands of the job market can often come as a surprise and shock. This discrepancy further exacerbates the challenges within the

ecosystem, as it becomes crucial to assess the strengths and weaknesses of graduates' soft skills accurately (Itani & Srour, 2016).

To address this issue, there is a growing need for effective methods and tools to measure the soft skills of graduates. These assessments should provide insights into the specific strengths and weaknesses of individuals, enabling them to identify areas for improvement and enhance their employability. By gaining a clear understanding of their soft skills profile, graduates can better align themselves with the requirements and expectations of employers (Noah & Abdul Aziz, 2020).

The development of reliable and comprehensive assessment mechanisms can aid graduates in self-assessment and help universities and institutions tailor their educational programs accordingly. It allows for a more targeted approach in bridging the gap between graduates' skill sets and the market demands, ensuring that the ecosystem is equipped with competent and job-ready individuals to overcome this gap between market and universities the Australian implemented a program to bridge it (Barton et al., 2013)

Soft skills encompass a wide range of adaptable abilities, such as trustworthiness, reliability, motivation, effective communication, a willingness to learn, and the ability to collaborate in teams. These skills can be influenced by various factors, including social aspects like gender, age, race, and marital status, as well as social capital such as relationships and organizational culture. While age and gender may have some impact on success, it is the development and application of soft skills that often serve as the primary determinants, even surpassing the significance of technical skills ((Nghia, 2019)

Soft skills also consists of various aspects of communication, including spoken skills, writing skills, and professional communication skills. Additionally, interpersonal skills, organizational skills, teamwork skills, and both transformable and non-transformable communication skills are considered part of the broader category of soft skills (Azmi et al., 2018)

Soft skills are integral components of an individual's personality, encompassing inner motivations and personal preferences that employers actively seek. These characteristics play a crucial role in enhancing job performance and efficiency (Heckman & Kautz, 2012). Furthermore, soft skills are vital for successful study and learning within university settings, highlighting the importance of developing and honing these skills among students (Yorke & Knight, 2007). Universities have a significant role in cultivating and refining soft skills to empower students for their future careers.

Concerning computer related graduates who crave to work as software developers or junior software developers; soft skills are also essential for employment and career path growth. Software developers in software startup companies must possess the problem-solving skills, team work, self-motivation, and learning agility (Mangiza & Brown, 2020b)

It is hypothesized that the higher the graduate possesses skills, he/she is more likely to be employed

CHAPTER 3: Research Methodology

Chapter Three: Research Methodology

This chapter presents both the research methodology and the research plan, encompassing various aspects. It delves into the research design, population, and research sample, while also addressing data analysis, scope, assumptions, and limitations. Additionally, the chapter introduces the research tool and its design, covering the following key elements:

1. Introduction
2. Conceptual Framework
3. Research Design.

3.1 Introduction

Skills and employability are currently prominent subjects that have garnered significant attention among researchers and scholars. The focus primarily lies on the employability aspect, which holds immense importance, particularly in fields where extensive investments may not be required, but the development of mindsets, skills, and aptitude becomes crucial. When comparing employability skills between computer science programs and sales/business development profiles, the former tends to have a relatively lower emphasis. This discrepancy can be attributed to the technical nature of computer science studies and subsequent work roles. It is worth noting that aptitude plays a vital role, accounting for 80% of the variation in employability rates among graduates. This highlights the significance of possessing the necessary technical qualifications to meet the demands of the field (Dash & Bose, 2020).

The concept of employability goes beyond its impact on individuals and employers; it extends to the broader social fabric and ecosystem, encompassing families, universities, and the entire community structure. Consequently, universities have a responsibility to equip their students and graduates with the necessary skills and knowledge through tailored training programs that align with market needs (GALIȚA et al., 2021).

3.2 Conceptual Framework:

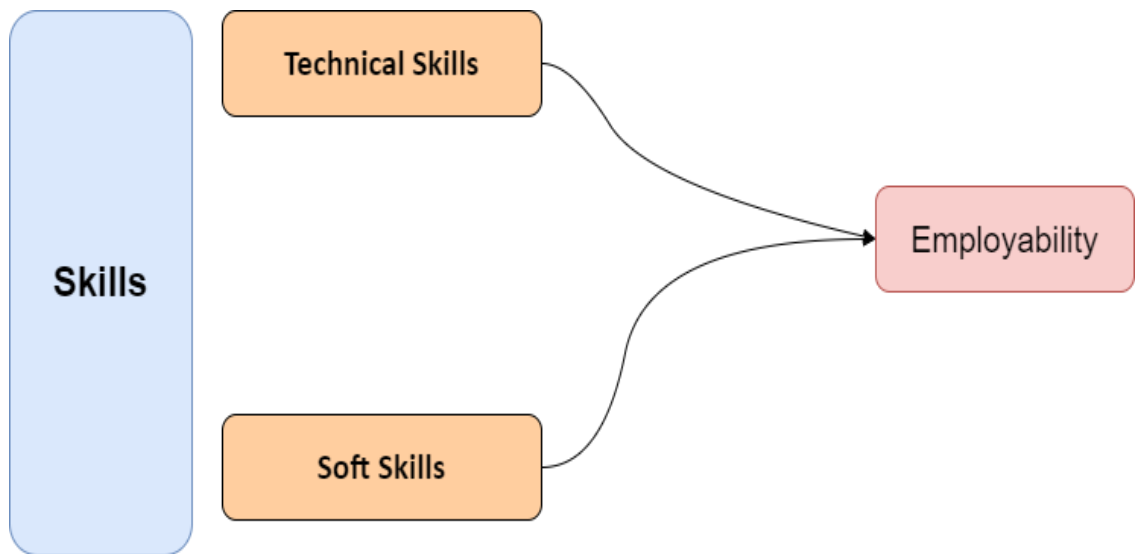
The literature review section presents an overview of the employability of computer science graduates, highlighting the crucial skill set required for students and fresh graduates to compete effectively in job markets. This skill set encompasses technical skills, higher-order thinking skills, personal skills, social skills, generic skills, and self-perceived skills.

Figure 3 illustrates the skills, both soft and technical, which serve as the

independent variables (IDs).

Figure 3 Conceptual Framework

Employability is identified as the dependent variable (DV). The hypothesis posits that higher levels of skills possessed by



graduates correspond to an increased likelihood of employment which will be checked during study. Figure 3 demonstrates that both technical and soft skills have a significant impact on the probability of employability. As a graduate's skill level increases, the employability likelihood is higher and this is where the search is focuses on.

In other words, higher levels of skills directly correlate with higher employability prospects.

3.3 Research Design

Research is "something that people undertake in order to find out things in a systematic way, thereby increasing their knowledge"(Saunders et al., 2007), to the best of the researcher's knowledge, there has been a lack of scientific research conducted in Palestine to examine the skills of IT-related graduates and the market's expectations. Consequently, it becomes imperative to undertake scientific research in order to shed light on this area and draw logical and scientifically grounded conclusions.

In addressing the research questions, the researcher can adopt either a deductive or an inductive approach, or a combination of both. The deductive approach involves utilizing existing literature to identify theories and concepts that will be tested using collected data. On the other hand, the inductive

approach involves developing a theoretical and conceptual framework based on the analysis of data (Saunders et al., 2007). The researcher is employing the deductive approach.

This chapter outlines the study's action plan, including the research design, strategy, population, data collection, and analysis methods. The researcher has opted for an Explanatory Quantitative approach to explore the causal relationship between skills and employability.

3.1 Validity and Reliability:

3.1.1 Validity

Validity is "do the items measure the content they were intended to measure", "do scores predict a criterion measure? Do results correlate with other results?", "do items measure hypothetical constructs or concepts?" (Creswell & Creswell, 2018)

The significance and relevance of the topic have been established by the researcher through thorough market analysis, a comprehensive literature review, and a review of existing articles. The evident demand for answers and conclusions on this subject is reflected in numerous studies and a clear need expressed by both the market and universities. To ensure validity, the researcher has meticulously chosen the participant groups, including computer science students, computer engineering students and graduates, whether employed or not, and employers with at least one customer and a workforce of three or more software developers. Employing survey validation techniques and carefully constructing response options, the research aims to produce valid results.

3.1.1.1 Graduates/Employee Questionnaire:

Content Validity

The questionnaire's validity was assessed by submitting it to three academic supervisors and specialists in the study's field. Their feedback indicated that the questionnaire is valid and well-suited for achieving the study's objectives.

Second: Structural validity

Structural validity was assessed by calculating the Pearson correlation between each section in the questionnaire and its overall score. If the sections exhibited correlation with the total score, they were considered valid. The results revealed that all correlations were statistically significant, with P-values less than $\alpha=.05$. This suggests a strong internal consistency among the questionnaire paragraphs, affirming the instrument's ability to measure its intended constructs. The details are presented in the tables below.

Table 2 Pearson Correlations between questionnaire's sections and the total degree of questionnaire

Section's Number	Section's Title	Pearson correlation	Sig.
Section 2: Learning during the computer-related studies degree/curriculum			
1	Technical Questions	.642**	.000
2	Creative Thinking	.632**	.000
3	Personal skills	.677**	.000
4	Social skills	.748**	.000
5	Generic skills	.774**	.000
6	Self-Perceived skills	.655**	.000

3.1.1.2 Employers Questionnaire:

Content validity:

The questionnaire's validity was confirmed by submitting it to an academic supervisor and experts in the study's field. Their feedback indicated that the questionnaire is valid and suitable for fulfilling the study's objectives.

Structural validity:

Structural validity was assessed by calculating the Pearson correlation between each section in the questionnaire and its overall score. Sections that exhibited correlation with the total score were considered valid. The findings revealed that all correlations were statistically significant, with P-values less than $\alpha=.05$. This implies a strong internal consistency among the questionnaire sections, affirming the instrument's capability to measure its intended constructs. The details are presented in the tables below.

Table 3 Pearson Correlations between questionnaire's sections and the total degree of questionnaire.

Section's Number	Section's Title	Pearson correlation	Sig.
Section 2: Learning during the computer-related studies degree/curriculum			
1	Technical Questions	.668**	.000
2	Creative Thinking	.786**	.000
3	Personal skills	.723**	.000
4	Social skills	.719**	.000
5	Generic skills	.409*	.047
6	Self-Perceived skills	.596**	.002

3.1.2 Reliability

Reliability refers to whether scores to items on an instrument are internally consistent (i.e., Are the item responses consistent across constructs?), stable over time (test-retest correlations), and whether there was consistency in test administration and scoring (Creswell & Creswell, 2018)

To establish the reliability and validity of the questionnaire, the researcher engaged the expertise of three Ph.D. academics from universities and an additional market expert. Their insights were crucial in evaluating the accuracy and appropriateness of the questionnaire's questions. Additionally, a pilot survey involving 12 participants was conducted, and their responses were analyzed using the SPSS tool. The questionnaire's reliability was assessed, resulting in a satisfactory Cronbach's alpha (α) value of 0.78 for the graduate survey.

However, for the Employers survey, adjustments were made based on feedback from Judges and the market expert, contributing to the validation and assurance of the survey's validity and reliability. It's noteworthy that the limited number of companies involved in the pilot could impact the number of responses considered in the subsequent data analysis.

3.1.2.1 Graduates/Employee Questionnaire:

The questionnaire's reliability was assessed using internal consistency testing, and the extraction reliability coefficient (Cronbach's alpha) was computed for each section and the overall instrument, yielding a highly favorable coefficient of .897. The table below clearly indicates that the reliability coefficients for all sections are deemed acceptable, aligning with the study's objectives.

Table 4 Reliability coefficients of questionnaire's sections.

Section's Number	Section's Title	Reliability coefficient
Section Two: Learning during the computer-related studies degree/curriculum		
1	Technical Questions	.86
2	Creative Thinking	.80
3	Personal skills	.74

4	Social skills	.63
5	Generic skills	.73
6	Self-Perceived skills	.65
	Total Degree	

3.1.2.2 Employers Questionnaire:

The questionnaire's reliability was assessed through internal consistency testing, and the extraction reliability coefficient (Cronbach's alpha) was calculated for each section and the entire instrument, resulting in a commendable overall coefficient of .824. The subsequent table demonstrates that the reliability coefficients for all sections are satisfactory, aligning with the study's objectives.

Table 5 Reliability coefficients of questionnaire's sections.

Section's Number	Section's Title	Reliability coefficient
Section Two: Learning during the computer-related studies degree/curriculum		
1	Technical Questions	.86
2	Creative Thinking	.82
3	Personal skills	.61
4	Social skills	.69
5	Generic skills	.32
6	Self-Perceived skills	.55

	Total Degree	.82
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3.2 Normality:

3.2.1 Graduates/Employees Questionnaire:

Normality test (Kolmogorov-Smirnov) was conducted to test the data distribution normality

- Hypothesis of Normality Test:
 - a. **H₀**: The sample data are not significantly different than a normal population (*the data is normal*).
 - b. **H₁**: The sample data are significantly different than the normal population (*the data isn't normal*).

Table 6 Kolmogorov-Smirnov Normality test

		Technical skills	Creative thinking	Personal skills	Social skills	Generic skills	Self-Perceived skills
N		107	108	108	107	108	105
Normal Parameters ^{a,b}	Mean	2.78	3.08	3.9	3.6	3.8	3.3
	Std. Deviation	.79	.71	.69	.44	.53	.67
Most Extreme Differences	Absolute	.094	.087	.142	.099	.136	.160
	Positive	.093	.087	.068	.047	.063	.073
	Negative	-.094-	-.059-	-.142-	-.099-	-.136-	-.160-
Test Statistic		.094	.087	.142	.099	.136	.160

Asymp. Sig. (2-tailed)	.020 ^c	.043 ^c	.00 ^c	.01 ^c	.00 ^c	.00 ^c
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The results shows that the data in all sections are not normally distributed. with P-Values less than .05, so we reject the H0.

3.2.2 Employers Questionnaire:

Normality test (Kolmogorov-Smirnov) was conducted to test the data distribution normality

○ Hypothesis of Normality Test:

- c. **H0**: The sample data are not significantly different than a normal population (*the data is normal*).
- d. **H1**: The sample data are significantly different than the normal population (*the data isn't normal*).

Table 7 Kolmogorov-Smirnov Normality test

		Technical skills	Creative thinking	Personal skills	Social skills	Generic skills	Self-Perceived skills
N		24	24	24	24	24	24
Normal Parameters ^{a,b}	Mean	2.95	2.7	2.74	3.04	3.2	3.2
	Std. Deviation	.67	.65	.63	.54	.46	.53
Most Extreme Differences	Absolute	.16	.14	.160	.098	.10	.10
	Positive	.16	.137	.160	.098	.10	.095
	Negative	-.16	-.09	-.09-	-.09-	-.10-	-.10-

Test Statistic	.16	.137	.160	.098	.107	.100
Asymp. Sig. (2-tailed)	.091 ^c	.200 ^{c,d}	.114 ^c	.200 ^{c,d}	.200 ^{c, d}	.200 ^{c, d}

The results shows that the data in all sections are normally distributed. with P-Values more than .05, so we accept the H0.

However, as the number of respondents is less than 30, then the researcher considers the data is not normally distributed based on this the researcher is following non parametric analysis.

3.3 Population and Sample:

The study population consists of two categories: students/graduates who are currently studying or have studied computer-related disciplines in Palestinian universities working or not yet working, and employers from software companies located in west bank, and Gaza.

3.3.1 Data collection resources:

3.3.1.1 Graduates:

Primary Data: The primary data was collected using a research tool in the form of a questionnaire. The questionnaire was distributed among the participants, and the collected data was subsequently analyzed.

The researcher has examined the number of computer science and computer engineering graduates to specify the population as the following:

The Palestinian software developers have no Association in Palestine which we can head and get the number and contact information from, so the researcher has tried to distribute the questionnaire to all known addresses in the market and ecosystem.

3.3.1.2 Population:

All software Engineers with software development experience less than 5 years, Senior students, or graduates who are employed or non-employed.

3.3.1.3 Access to the population

The researcher distributed the questionnaire through various online channels, including:

1. Universities and their respective Facebook or internal groups.
2. Bootcamps, such as Anira, TAP, and GazaSkyGeeks. (Approximately 1500 graduates)
3. Facebook Palestinian Groups, such as PalGeeks and Peek.
4. Personal contacts on LinkedIn.
5. Personal and direct emails to over 900 developers.
6. Software companies.

Table 8 Computer related studies graduates

Year	Number of Computer sciences graduates
2017 - 2018	717
2018 - 2019	1591
2019 - 2020	1482
2020 - 2021	1059
2021- 2022	1065
TOTAL	5914

(PCBS Graduates Sciences segmentation, 2023)

3.3.1.4 Characteristics of the study's sample (Graduates)

The table below illustrates the attributes of the study's sample based on their current employment status, years of experience, company type, gender, and specialization.

Table 9 Characteristics of the study's sample (N=123)

Variable		Count	Percentage
are you currently employed	Unemployed	69	62.2%
	Employed	23	20.7%
	Student	17	15.3%
	Self employed	2	1.8%
	Total	111	100.0%
Years of experience	Less than 1 year	36	34.0%
	1-2 years (junior)	34	32.1%
	3-4 years	19	17.9%
	4 years	17	16.0%
	Total	106	100.0%
Type of company you are working for	Local company	10	11.4%
	Startup company	32	36.4%

	Out sourcing /offshoring company	39	44.3%
	Government	2	2.3%
	NGO's	5	5.7%
	Total	88	100.0%
Gender	Male	66	59.5%
	Female	45	40.5%
	Total	111	100.0%
you are a student /graduate of	Computer Engineer	59	54.1%
	Computer Science	26	23.9%
	Software Engineer	8	7.3%
	Information Technology	4	3.7%
	Information systems	3	2.8%
	others	9	8.3%
	Total	109	100.0%

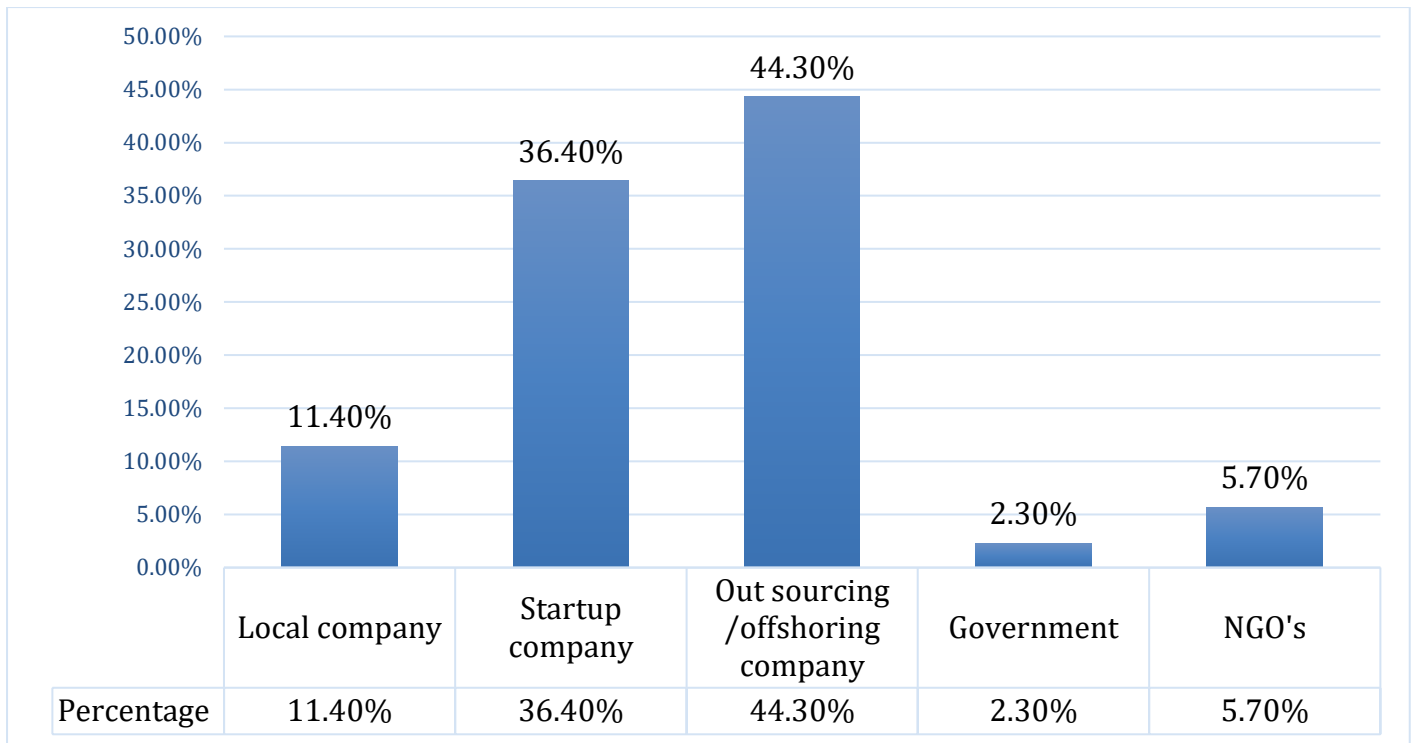


Figure 4 Sample distribution according to the type of company

3.3.2 Employers:

- Data collection involved obtaining feedback and input from 10 individuals within the study sample through the Palestinian Information and Technology Association (PITA) and the Ministry of Telecommunication and Information Technology (MTIT).
- Secondary Data: Supplementary secondary data, including the count of graduates and company details, was acquired from PITA and PCPS.
- Via PITA, information was gathered on companies engaged in the software industry and software outsourcing. After filtering companies based on their involvement in outsourcing and software, a total of 49 companies were identified.
- The researcher further refined the list of outsourcing companies through MTIT and cross-referenced it with the information available in the PITA list.

To reach the target population, the researcher distributed the questionnaire through various online channels:

- Facebook Palestinian Groups, such as PalGeeks and Peeks.
- Team leads within companies.
- Utilizing the PITA List and MTIT List, which have contact information.
- Requesting other companies to share the list with additional companies.

3.3.2.1 Characteristics of the study's sample:

The below table showed the Characteristics of the study's sample, according to: currently job status, years of experience, type of the company, gender and specialty.

Table 10 Characteristics of the study's sample

Variable		Frequency	Percentage
Company size	1-10 Employees	8	33.3%
	11-50 Employees	9	37.5%
	51-200 Employees	2	8.3%
	Above 200 Employees	5	20.8%
	Total	24	100.0%
Company's Age	Less than 1 year	0	0.0%
	1-2 Years	2	8.3%
	3-5 Years (Junior)	9	37.5%
	Above 5 Years	13	54.2%
	Total	24	100.0%

Type of Organization	Local company	2	8.3%
	Startup company	7	29.2%
	Out sourcing /offshoring company	15	62.5%
	Government	0	0.0%
	NGO's	0	0.0%
	Total	24	100.0%
Employer's Gender	Male	22	91.7%
	Female	2	8.3%
	Total	24	100.0%

Despite all these endeavors, achieving 100% accuracy in defining the population for this study proved challenging due to the absence of a comprehensive association encompassing all employees and employers in the market. Nevertheless, the researcher is reasonably confident that the questionnaire reached over 90% of the companies operating in the software field in Palestine. This confidence stems from reaching out to all active companies, distributing the questionnaire via emails, and utilizing social media platforms where these businesses engage in their activities.

3.4 Research Tool and Data Analysis

Data collection and result compilation will involve utilizing a questionnaire tailored for employers and students/graduates. The questionnaire will be designed with clear and interconnected questions, aimed at maximizing response rates. (Saunders et al., 2007)

The design of this questionnaire has been informed by a thorough review of previous papers and a comprehensive literature review. Many of these studies, albeit in different geographical locations and with distinct populations, have employed questionnaires in the same area of study.

3.4.1 Method Correction

Certain results were generated using the Likert scale method, and the subsequent distribution was applied in the refinement of the questionnaire's sections:

Table 11 Likert scale

Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
5	4	3	2	1

Table 12 Correction Key for Likert scale

Mean	Degree
Less than 1.8	Very low
1.8 – less than 2.6	Low
2.6 – Less than 3.4	Moderate
3.4 – Less than 4.2	High
4.2 - 5	Very High

3.4.2 Statistical Analysis

Data analysis was executed using Statistical Package for Social Science (SPSS) version 20. The process involved coding the responses and inputting them into the program, followed by:

- Frequencies and percentages were computed for all categorical variables based on the demographic variables of the research.
- Mean and standard deviation were employed as measures of central tendency for Likert-scale variables.
- • Calculation of the extraction reliability coefficient (**Cronbach's alpha**) for each section and the entire questionnaire to assess reliability.
- • Measurement of **Pearson correlation** between indicators for each section in the questionnaire to evaluate validity.
- • **Kolmogorov-Smirnov** test was implemented to examine the normality of the data distribution.
- • For non-normally distributed data, the **Kruskal–Wallis** test was conducted to assess differences between means (non-Parametric).
- • For normally distributed data, the **One-Way ANOVA** test was conducted to evaluate differences between means for employers.
- • **The significance level** is set at 5%, with a P-value less than 0.05 considered statistically significant.

3.4.3 Questionnaire:

The construction of questionnaire questions took into account the primary technical and soft skills highlighted in studies by researchers within the same field and for similar purposes, conducted in various samples and countries. The skills being tested in the research mainly include:

- Technical Skills
- Soft Skills (Misra & Khurana, 2017)

The questionnaire is designed to assess the following skills:

1. Technical skills

2. Higher order thinking skills
3. Personal skills
4. Social skills
5. Generic skills
6. Self-perceived employability skills.

3.4.3.1 Technical Skills

The researcher has formulated a series of questions rooted in the literature review to gauge the technical skills necessary for graduates or new employees entering the software industry. Additionally, the researcher has aligned the questionnaire with technologies highly sought after in the market, drawing insights from sources such as (StackOverflow, 2023), (Devadiga, 2017b), and (Kenayathulla et al., 2019). Stack Overflow, for instance, conducted a research survey involving over 90,000 software developers to identify the technologies and tools they commonly use:

- 1- Programming Languages.
- 2- Databases
- 3- Cloud Platforms
- 4- Web Frameworks
- 5- Integrated Development Environment
- 6- Operating Systems

The questionnaire primarily inquires about technologies, frameworks, as well as implementation tools, frameworks, and development languages. The following represent the top four programming languages:

1. Scripting and markup languages: JavaScript, HTML/CSS/SQL
2. Python

3. Databases, MYSQL, PostgreSQL, SQLite, MongoDB,
4. Cloud platforms: AWS, Google Cloud Platform, Microsoft Azure, Heroku
5. Web frameworks: React Js, jQuery, Express and Angular
6. Frameworks and Libraries: Net, NumPy and, net Core/Net5 and pandas.
7. Repositories management: Git, Docker, Yam, Kubernetes and
8. Integrated development environment Visual Studio code, visual Studio, Notepad++ and IntelliJ
9. Operating systems Linux and Windows are the top two one.

Furthermore, the researcher sought the expertise of three Ph.D. doctors in computer engineering and computer sciences, along with feedback from the market. Their evaluations contributed to refining the questions and the overall survey (Mangiza & Brown, 2020a)

3.4.3.2 Soft Skills

Higher-order thinking or critical thinking

will be analyzed through questions. Even though there is no direct or exact definition for critical thinking however the researcher tries to define this through previous studies and has chosen some of the items related to software development, these questions would focus on the areas related to the problem solving, negotiation, imagination, research skills, attention to details (GALIȚA, SAVIN, NEDEFF “, et al., 2021)(Mangiza & Brown, 2020a) (Kenayathulla et al., 2019)

Personal Skills

Are usually related to teamwork, respecting, others, working within a team, negotiation and discussion solutions, self-management, thinking and solving problems of own and others, and very well communicating and being accepted and working with employees or colleagues. In addition to English skills (Varava et al., 2021)(GALIȚA, SAVIN, NEDEFF “, et al., 2021)(Kenayathulla et al., 2019)

Social Skills:

This is basically the harmony between the team member and others within the team, these skills consist of promoting a positive attitude, empathy, negotiation, communicating well, joining the team with all activities whether good or bad working hard of vacations, generous and helpfulness and problem skills. (Varava et al., 2021)(GALIȚA, SAVIN, NEDEFF “, et al., 2021)(Mangiza & Brown, 2020a)

Generic Skills:

These consist of learning how students or persons acquire skills, how to teach others and knowledge transfer skills, problem-solving skills, generating creative thoughts in addition to being initiative, and the ability to undertake many different tasks. Communication skills, problem-solving, analysis, and teamwork.(Varava et al., 2021)(GALIȚA, SAVIN, NEDEFF “, et al., 2021) (Kenayathulla et al., 2019)

Self-Perceived Skills:

Which is the concept of how much the graduate thinks he is qualified to get employed, how much confident of interviewing for jobs, exams and take assignments and the willingness to finish within the deadline. How much the graduate is self-confident of technical knowledge and expertise(Varava et al., 2021) Discipline (Rombach et al., 2008) (GALIȚA, SAVIN, NEDEFF “, et al., 2021)

Table 13 Skills definition summary (keywords)

Skills	Definition (Keywords)
Higher-order thinking or critical thinking	problem solving, negotiation, imagination, research skills, attention to details(GALIȚA, SAVIN, NEDEFF “, et al., 2021)(Mangiza & Brown, 2020a) (Kenayathulla et al., 2019)
Personal Skills	teamwork, respecting, others, working within a team, negotiation and discussion solutions, self-management, thinking and solving problems and speaking English Language. (Varava et al., 2021)(GALIȚA, SAVIN, NEDEFF “, et al., 2021)(Kenayathulla et al., 2019)

Social Skills:	Positive attitude, empathy, negotiation, communicating
Generic Skills:	Communication skills, problem-solving, analysis, and teamwork (Varava et al., 2021)(GALIȚA, SAVIN, NEDEFF “, et al., 2021) (Kenayathulla et al., 2019)
Self-Perceived Skills:	Confidence, discipline, technical knowledge, self-confidant (Rombach et al., 2008) (GALIȚA, SAVIN, NEDEFF “, et al., 2021)

3.5 Research Assumptions:

The primary Assumption encountered by the researchers was:

- 1- The quantity of respondents is sufficient for data analysis and obtaining meaningful results.
- 2- The questions are suitable for both employers and graduates and are well-understood.
- 3- Respondents will provide honest and truthful responses when filling out the questionnaires.
- 4- Participants are submitting questionnaires with valid and accurate data.

Chapter Four: Results and Conclusions

Chapter Four: Results and Discussion

This chapter will present the findings of the study, encompassing significant discoveries and conclusions, as well as variations in responses between two groups of respondents: employers, students, graduates, and employees.

Furthermore, this chapter will delve into the questions and responses pertaining to each skill dimension, encompassing both soft and technical skills. Additionally, a dedicated section will explore the importance of employability skills, highlighting their significance and outlining the minimum skills required for employment in the software development field.

Regarding hypotheses, this chapter will also address the hypotheses formulated and the statistical tests conducted to validate them, along with their respective outcomes.

The sections of this chapter include the following:

1. Introduction
2. Research Questions and Objectives
3. Skills Importance
4. Hypothesis Tests

Chapter Four: Introduction

This chapter presents the study results, including the main respondents' answers both graduates and employers in addition to the employers, the average percentages of positive responses for all survey's items and dimensions for both graduates' responses and employers' responses.

To summarize and show the results, the researcher has done cross tabulations for specific dimensions in the questionnaire which will be also elaborated at chapter Five (appendix)

In this chapter, the researcher will address the following question based on the analysis of survey results.

- Question One: what is the level of graduate's skills that learned during their study in the university, according to employers' perspective, In Palestine.?
- Question Two: what is the level of graduate's technical skills that learned during their study in the university, according to employer's perspective, In Palestine.?
- Question Three: what is the level of graduate's soft skills that learned during their study in the university, according employer's perspective, In Palestine.?
- Question Four: What is the level of importance of the skills, according to employer's perspective?

4.1 Research's Questions and Objectives (graduates' questionnaire):

Research Question 1: What is the level of graduate's skills that learned during their study in the university, according graduates and employers' perspective, In Palestine?

To answer this question the researcher calculated the means and the standard deviation for each dimension of the skills.

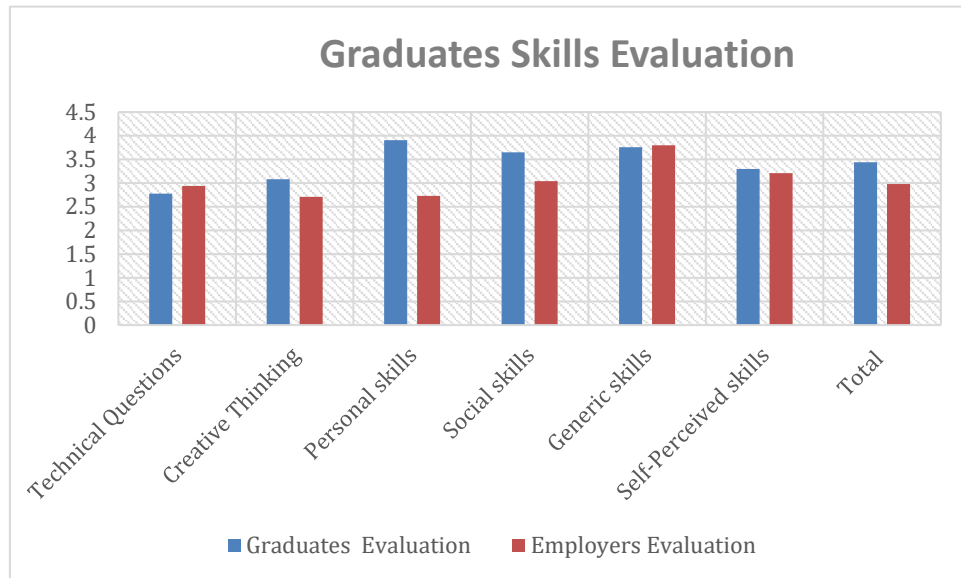
The below table describes the means and standard deviation of the total degrees of the level of graduate's skills that Learned during their study in the university, according graduates and employer perspectives In Palestine combined in one table.

Table 14 Means and St. Deviation of level of employability skills that Learned during the study (From graduates and employers' perspectives)

No	Section	Graduates			Employers		
		Mean	Level	Std. Dev	Mean	Level	Std. Dev
1	Technical Questions	2.78	Moderate	.80	2.94	Moderate	.67
2	Creative Thinking	3.08	Moderate	.71	2.71	Moderate	.65
3	Personal skills	3.91	High	.70	2.73	Moderate	.63
4	Social skills	3.65	High	.45	3.04	Moderate	.54
5	Generic skills	3.76	High	.53	3.80	Moderate	.46
6	Self-Perceived skills	3.3	Moderate	.68	3.21	Moderate	.53
	Total	3.44	High	.34	2.98	Moderate	.38

The graduates identified that the areas they perceived the most significant improvement in during their studies were Generic Skills and Social Skills. Conversely, they reported the least development in Technical Skills and Creative Thinking.

Figure 5 Graduates employability skills evaluation



The employers identified that the areas they perceived from students and fresh graduates that are lowest with are the personal skills and creative thinking followed by Technical Skills. On the other hand, the employers determined

that social, generic and self-perceived skills are at moderate level.

Second Question: what is the level of graduate’s technical skills that learned during their study in the university, according graduates and employers’ perspective, In Palestine.?

The below table describes the means and standard deviations of the criteria of graduate’s technical skills that Learned during their study in the university, according graduates and Employers’ perspectives. In Palestine.

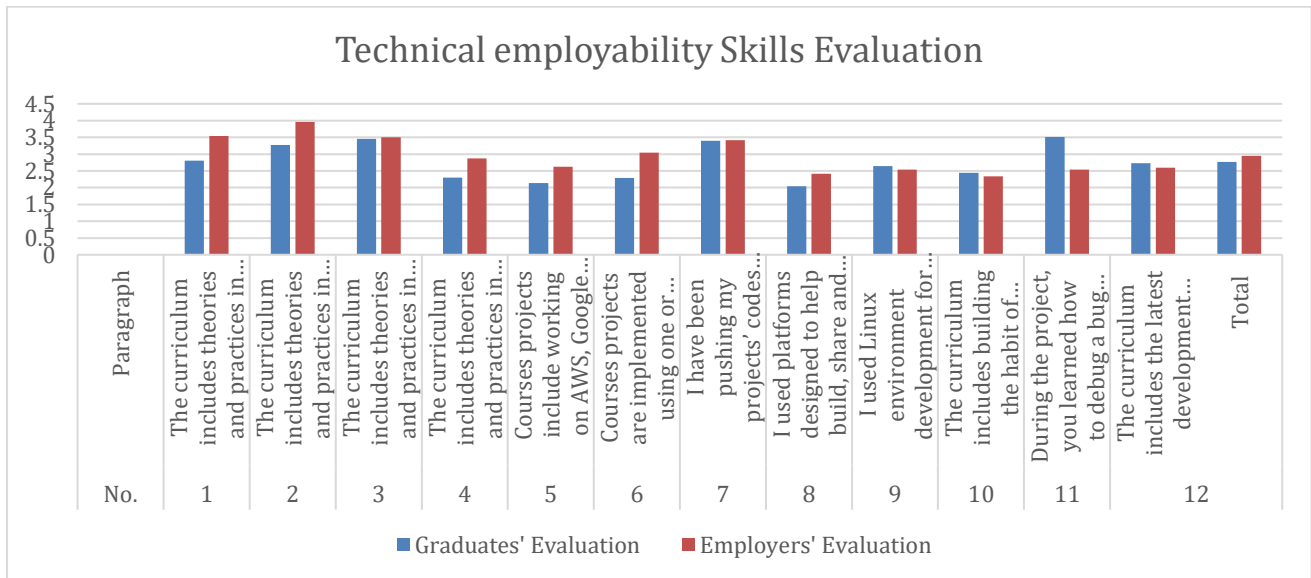
Table 15 Means and St. Deviation of level of graduate’s technical Employability skills (graduates and employers’ perspective).

No.	Paragraph	Graduates			Employers		
		Mean	Level	Std. Dev.	Mean	Level	Std. Dev.

1	The curriculum includes theories and practices in JavaScript or Python	2.81	Moderate	1.22	3.5417	High	.93
2	The curriculum includes theories and practices in CSS/HTML	3.27	Moderate	1.19	3.9583	High	.81
3	The curriculum includes theories and practices in RDBM like MySQL/Postgres/SQLite	3.45	High	1.11	3.5000	High	.88
4	The curriculum includes theories and practices in NoSQL DBs MongoDB	2.30	Low	1.20	2.8750	Moderate	1.29
5	Courses projects include working on AWS, Google Cloud, Microsoft Azure, or Heroku App.	2.14	Low	1.35	2.6250	Moderate	1.01
6	Courses projects are implemented using one or more of the following frameworks: React JS, Angular JS, Vue JS, jQuery, TypeScript, NodeJS or Express JS.	2.29	Low	1.39	3.0417	Moderate	.99
7	I have been pushing my projects' codes to Git repositories like GitHub, Bitbucket, or private source control provider	3.40	High	1.45	3.4167	High	1.10
8	I used platforms designed to help build, share and run the modern applications like Docker, or Kubernetes	2.04	Low	1.12	2.4167	Low	1.21
9	I used Linux environment development for at least 2 projects?	2.64	Moderate	1.42	2.5417	Low	1.10
10	The curriculum includes building the habit of following the latest development technologies and best practices.	2.44	Low	1.20	2.3333	Low	1.09
11	During the project, you learned how to debug a bug and fix it	3.51	High	1.24	2.5417	Low	1.06

12	The curriculum includes the latest development methodologies for example Agile, Programming Scrum, or Kanban	2.73	Moderate	1.32	2.6	Moderate	1.10
Total		2.77	Moderate	.79	2.95	Moderate	.67

Figure 6 Graduates Technical employability skills evaluation



In terms of technical skills, the graduates have answered the survey with some skills high and others Moderate as shown in table 15.

Graduates are encouraged to continually improve their skills, stay abreast of industry trends, and maintain a realistic understanding of their field (Obioha & Sotshangane, 2022; Zorzetti et al., 2022). However, both employers and graduates have given low ratings to this area.

According to (StackOverflow, 2023), there is a high demand for JavaScript proficiency and adaptability to new technologies, making it one of the most important frameworks in software development. However, employers rate software developers as moderate, and graduates' rate themselves as low in this regard. It is crucial for both parties to assess themselves more accurately in this context.

The analysis also reveals low ratings for cloud computing principles and Linux proficiency. (Mangiza & Brown, 2020a) emphasize that these skills are vital, especially for working in software development companies, particularly startups.

In summary, there is a disparity between the perceived importance of certain employability skills and the self-assessment of graduates and employers. It is imperative for both parties to align their evaluations with the industry demands for a more accurate representation of their employment capabilities .

The responses and analysis unequivocally indicate that universities have not been proactive in modernizing their curricula. Instead, they continue to rely on courses that impart fundamental skills for aspiring software developers. This encompasses fields that have lagged behind in adopting modern technologies, and universities have yet to develop appropriate curricula or equip their instructors with the necessary expertise.

Moreover, instructing these employability skills necessitates substantial, hands-on experience gained from both startups and established companies with ample resources to invest in these tools and experiences.

Third Question: what is the level of graduate's soft skills that learned during their study in the university, according graduates/employers' perspective, In Palestine.?

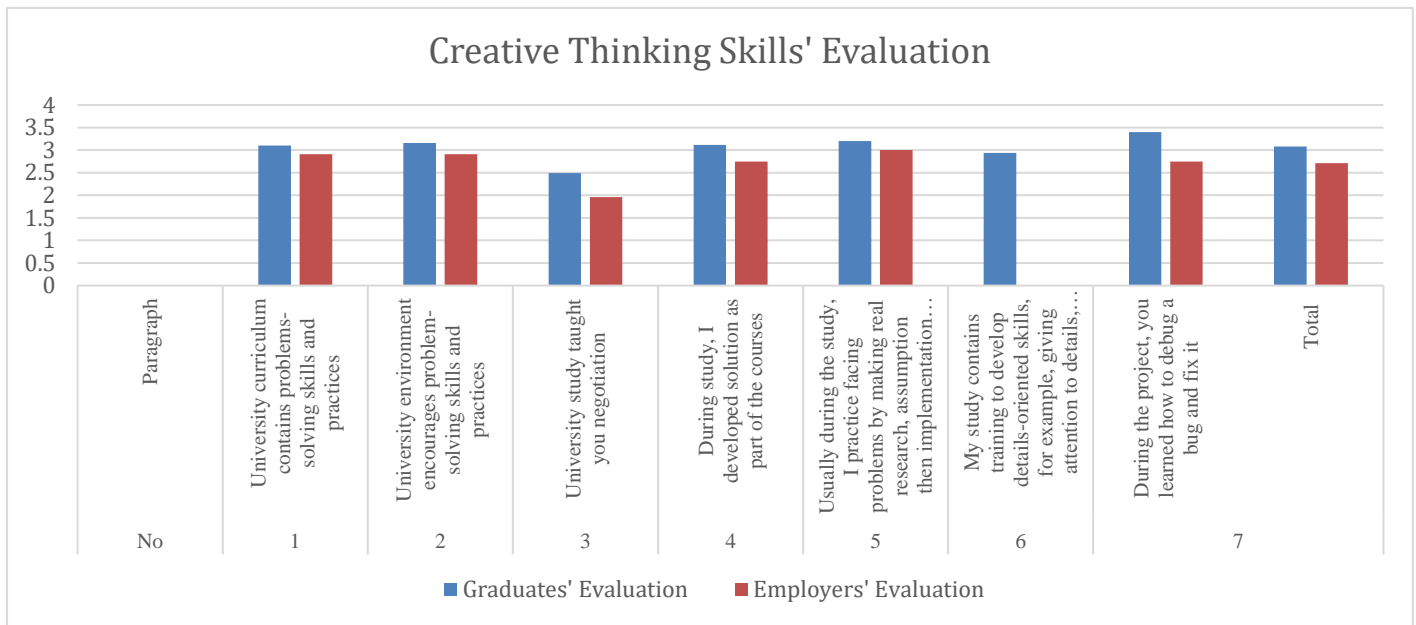
4.1.1.1 - Higher order Thinking/Creative Thinking:

Table 16 describes the means and standard deviations of the criteria of graduates **Creative Thinking** skills that Learned during their study in the university, according graduates perspective. In Palestine.

Table 16 Means and Std. Deviation of level of graduates' creative thinking employability skills (graduates and employers' perspectives).

No	Paragraph	Graduates			Employers		
		Mean	Level	Std. Dev.	Mean	Level	Std. Dev.
1	University curriculum contains problem-solving skills and practices	3.10	Moderate	1.08	2.91	Moderate	.83
2	University environment encourages problem-solving skills and practices	3.16	Moderate	1.20	2.91	Moderate	1.01
3	University study taught you negotiation	2.49	Low	1.12	1.96	Low	.75
4	During study, I developed solution as part of the courses	3.12	Moderate	1.14	2.75	Moderate	.89
5	Usually during the study, I practice facing problems by making real research, assumption then implementation and eventually imagine results in	3.20	Moderate	1.01	3.00	Moderate	.88
6	My study contains training to develop details-oriented skills, for example, giving attention to details, writing clean code, and noticing /fixing bugs.	2.94	Moderate	NA	NA	NA	NA
7	During the project, you learned how to debug a bug and fix it	3.40	High	1.11	2.75	Moderate	1.03
	Total	3.0833	Moderate	.71	2.71	Moderate	.65

Figure 7 Graduates Creative Thinking Employability Skills Evaluation



The table above illustrates a moderate level of higher-order thinking among graduates and employees in companies. However, negotiation skills are notably low, while debugging and fixing bugs are high.

This analysis reveals that creative thinking skills among graduates and newly employed engineers are either moderate or low. Elevating these skills is seemingly essential to increase the likelihood of employability. (Devambatla & Nalla, 2015) (Mangiza & Brown, 2020a; YOUNIS, 2022)

The table above indicates a moderate level of higher-order thinking among graduates and employees in companies. However, it also highlights exceptionally low negotiation skills and a high proficiency in debugging and resolving software bugs.

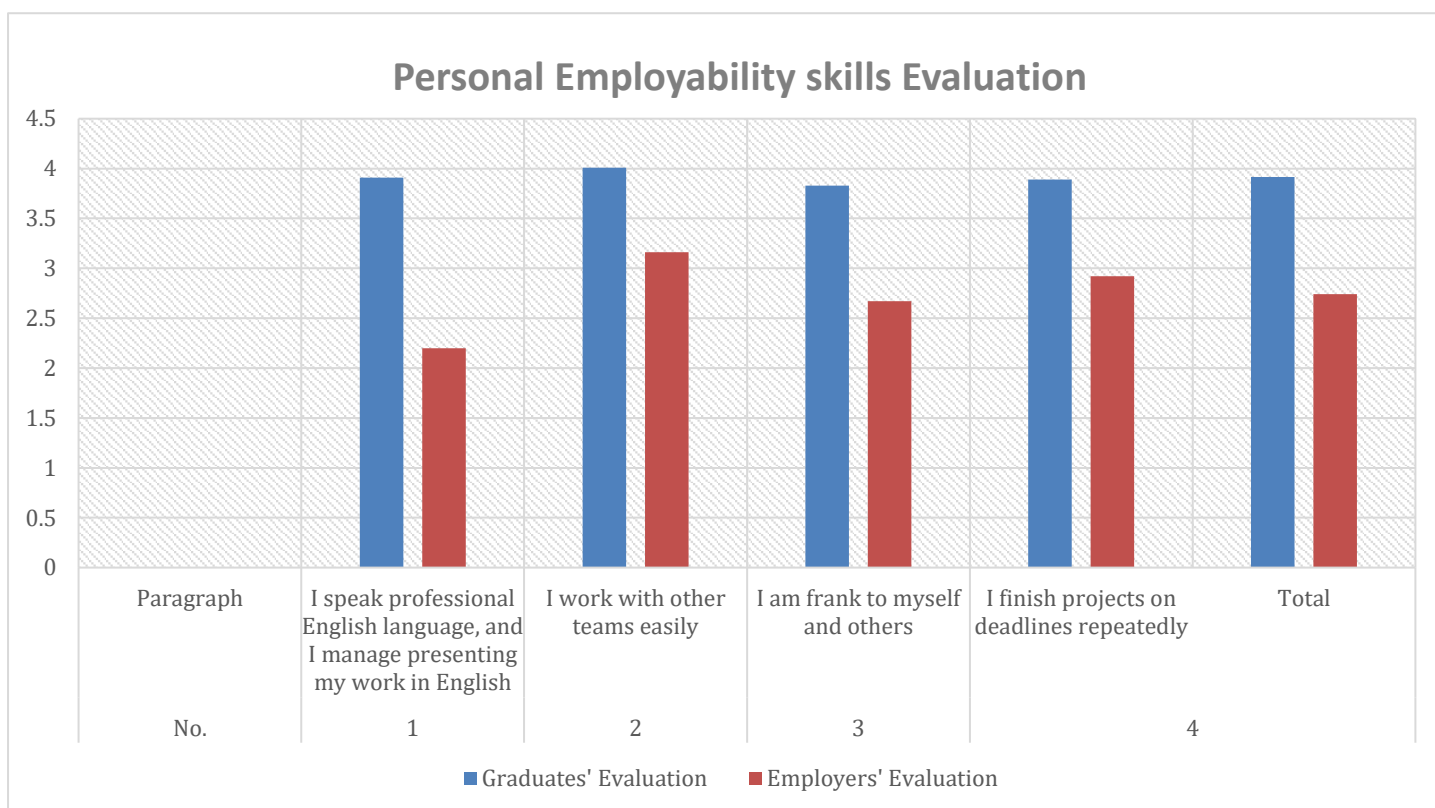
4.1.1.2 - Personal Skills:

The below table describes the means and standard deviations of the criteria of graduate's **Personal skills** that Learned during their study in the university, according graduates and employers' perspectives in Palestine.

Table 17 Means and St. Deviation of level of graduate's personal employability skills (graduates and employers' perspectives).

No.	Paragraph	Graduates			Employers		
		Mean	Level	Std. Dev	Mean	Level	Std. Dev
1	I speak professional English language, and I manage presenting my work in English	3.91	High	.91	2.20	Low	.88
2	I work with other teams easily	4.01	High	.89	3.16	Moderate	.81
3	I am frank to myself and others	3.83	High	1.04389	2.67	Moderate	1.01
4	I finish projects on deadlines repeatedly	3.89	High	1.07071	2.92	Moderate	.97431
Total		3.9144	High	.69474	2.7396	Moderate	.62762

Figure 8 Graduates Personal employability skills Evaluation



The analysis indicates that employers are assigning a moderate employment skills rating to graduates or employees. However, there exists a noticeable disparity between the employers' assessments and

the self-ratings of graduates/employees regarding their employability personal skills. Proficiency in personal skills is crucial for employability, market understanding, and navigating the post-graduation job market. It is imperative that employers assign higher ratings, ideally at a high level, to enhance the employment rate in various software development markets. (Mangiza & Brown, 2020a)

It is crucial to note that employers rate the English skills of graduates and employees as low, revealing a significant and broad gap between employers' and graduates' assessments. The researcher emphasizes that this is a pivotal skill that should be taught and practiced thoroughly. It is considered the foundational skill that unlocks opportunities in various work areas, given that technology, language, and trends predominantly rely on English. Additionally, working in freelance and outsourcing often involves interactions with foreign-language clients who require proficiency in English for effective communication. This goes in line with previous studies (Abdurakhimovich, 2023)

4.1.1.3 - Social Employability Skills:

The below table describes the means and standard deviations of the criteria of graduate's **social skills** that Learned during their study in the university, according graduates and employers' perspective. In Palestine.

Table 18 Means and St. Deviation of level of graduate's social employability skills (graduates and employers' perspective).

No.	Paragraph	Graduates			Employers		
		Mean	Level	Std. Dev	Mean	Level	Std. Dev
1	I have no fear or hesitancy to speak in front of others	3.65	High	1.06	3.00	Moderate	.72
2	I like to work within teams	3.81	High	1.08	3.41	High	.78
3	I often introduce myself professionally and build networks	3.71	High	.97	3.08	Moderate	1.10

4	I do not shy to share my ideas even it is unacceptable	3.72	High	1.08	3.17	Moderate	.92
5	I motivate others and I get motivated by others	4.06	High	.89	NA	NA	NA
6	I perform better when I work lonely	3.35	Moderate	1.10	2.79	Moderate	1.06
7	I avoid being aggressive when I get stressed	3.79	High	.95	2.67	Moderate	.96
8	I am confident that most of the development tasks can be developed by myself without the help of others	3.18	Moderate	.93	3.16	Moderate	.817
Total		3.65	High	.44	3.04	Moderate	.54

Figure 9 Graduates Social Employability skills Evaluation

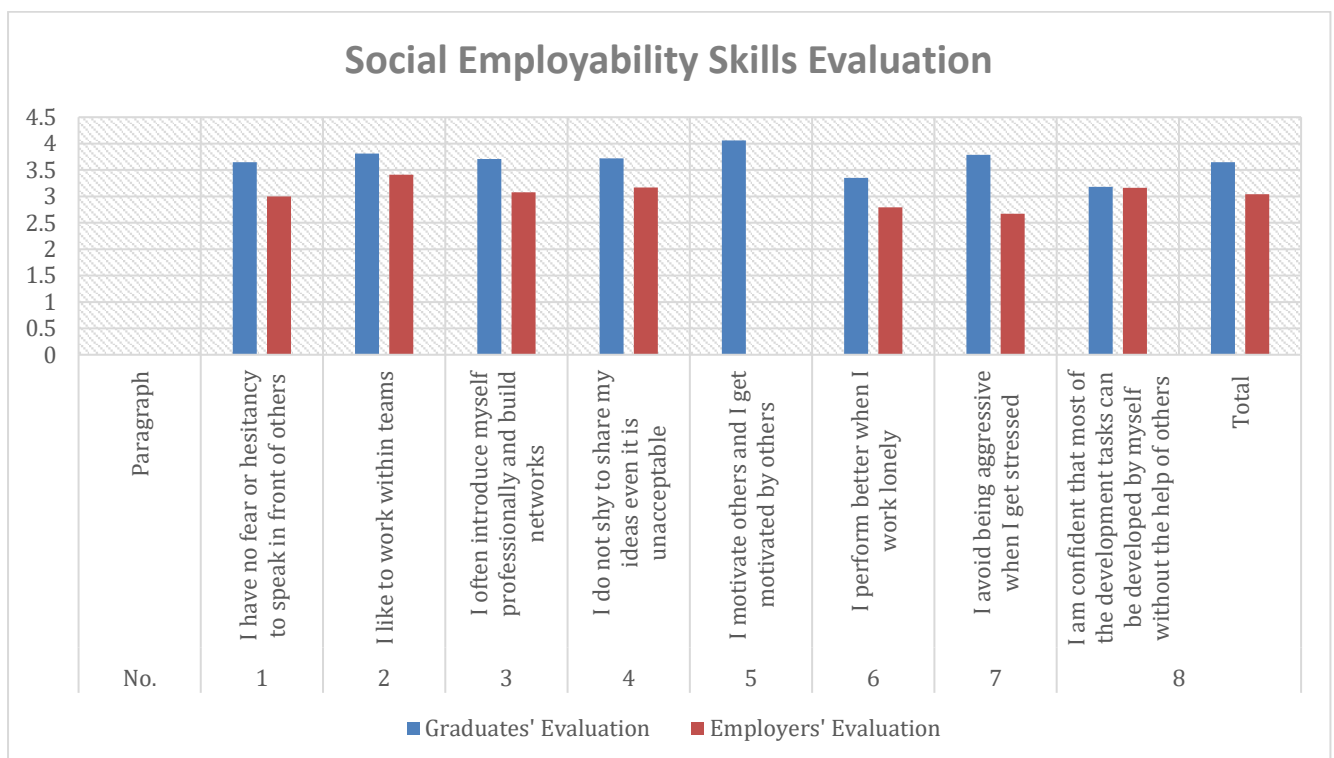


Table 21 depicts that graduates typically assess their social employability skills as high, except for a moderate rating in situations requiring independent work, suggesting a perception of themselves as adept team players.

Proficient social employability skills empower employees and graduates to effectively communicate, forge connections within the workplace, and successfully complete tasks (Chua, 2004). The noticeable contrast between a moderate employer rating and a high self-rating underscores a clear gap. Elevated social employability skills in employees contribute to smoother transitions for graduates during training, internships, or onboarding, streamlining the work path. Enhanced social employability skills facilitate more efficient communication with graduates or employees, fostering a cohesive work process and collaborative teams.(Wallin, 2023)

4.1.1.4 - Generic Skills:

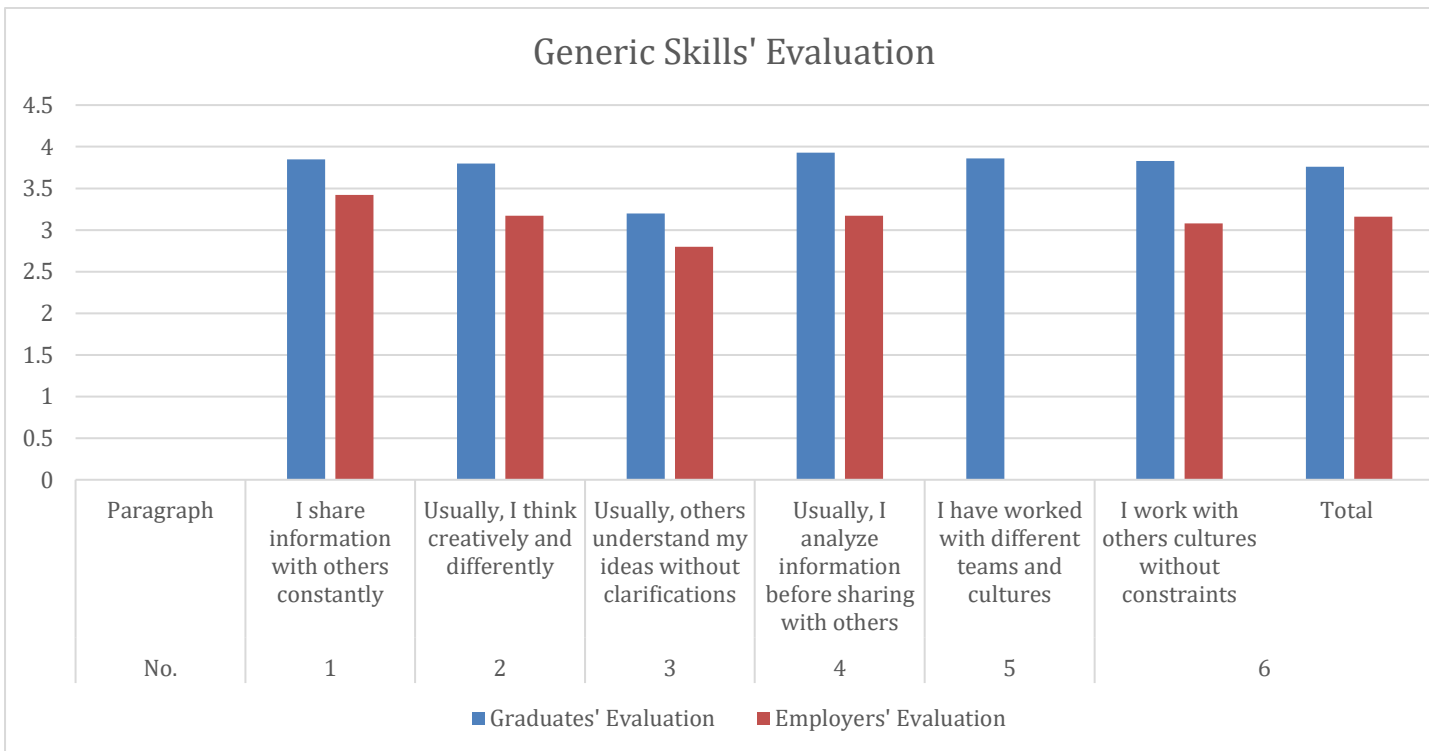
The below table describes the means and standard deviations of the criteria of graduate’s **Generic employability skills** that Learned during their study in the university, according graduates and employers’ perspectives. In Palestine.

Table 19 Means and St. Deviation of level of graduate’s Generic Employability skills (graduates and employers’ perspective).

No.	Paragraph	Graduates			Employers		
		Mean	Level	Std. Dev	Mean	Level	Std. Dev
1	I share information with others constantly	3.85	High	.88	3.42	High	.97
2	Usually, I think creatively and differently	3.80	High	.79	3.17	Moderate	.76
3	Usually, others understand my ideas without clarifications	3.20	Moderate	.93	2.8	Moderate	.91

4	Usually, I analyze information before sharing with others	3.93	High	.78	3.17	Moderate	.82
5	I have worked with different teams and cultures	3.86	High	1.07	NA	NA	NA
6	I work with others cultures without constraints	3.83	High	.93	3.08	Moderate	.93
Total		3.76	High	.53	3.16	Moderate	.46

Figure 10 Graduates Generic Employability Skills Evaluation



The table above indicates that generic skills are rated as high by the graduates/employees, with the exception being the ability to communicate ideas clearly without the need for additional clarifications. Conversely, employers perceive the generic skills of employees/students to be at a moderate level, which includes their proficiency in effectively conveying ideas to others and finding jobs.

Employability Skills such as job searching and effective team communication are recognized as distinct competencies. Consequently, the greater the proficiency in these generic skills, the better equipped graduates are to navigate the job market, leading to increased employability prospects. (Clokje & Fourie, 2016; Galster et al., 2023)

4.1.1.5 - Self – Perceived Employability Skills (Graduate’s Perspective)

The below table describes the means and standard deviations of the criteria of graduates **Self – Perceived skills** that Learned during their study in the university, according graduates perspective in Palestine.

Table 20 Means and St. Deviation of level of graduate’s Self – Perceived Employability skills (graduates’ perspectives).

No.	Paragraph	Mean	Level	Std. Deviation
1	I pass software development jobs interviews/training	3.69	High	1.22
2	I can solve job required exams and tasks	3.66	High	1.09
3	I Understand the development tech stacks	3.88	High	.75
4	My background is strong enough to get hired	3.83	High	.92
5	Compared to other Information Technology specialties i.e., Graphics, what do you think your probability to get employed?	3.62	High	.98
6	I struggled with many job applications until I got employed as a software developer?	2.48	Low	1.57
7	I believe it is a matter of luck I got employed?	2.29	Low	1.28
8	I am satisfied with my current job in terms of environment, job type and compensations	2.93	Moderate	1.79

	Total	3.2988	Moderate	.67615
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The table above indicates that a moderate self-perceived skill, indicating that moderate satisfaction with their jobs and they got hired by their competences.

4.1.1.6 - Self – Perceived Employability Skills (Employer’s Perspective)

The below table describes the means and standard deviations of the criteria of graduates **Self – Perceived skills** that Learned during their study in the university, according employer’s perspective in Palestine.

Table 21 Means and St. Deviation of level of graduate’s Self – Perceived Employability skills (employer’s perspective).

No.	Paragraph	Mean	Level	Std. Deviation
1	Usually graduates can pass employment/training interviews	2.88	Moderate	.85
2	Graduates solve Job requirements (exams and tasks) successfully	3.00	Moderate	.88
3	Graduates recognize they don’t know how to develop a software	2.79	Moderate	.88
4	Graduates do not quantify objectively their competences against salaries	3.67	High	.92
5	Graduates underestimate their needs for improvement	3.58	High	.93
6	Graduates are over confident to get hired for the software development opportunities as their background and study is strong enough	3.33	Moderate	1.20
	Total	3.21	Moderate	.53

Analysis of employer and graduate responses reveals a notable disparity between how employers assess graduates and how graduates' rate themselves, with employers generally offering moderate ratings and graduates consistently rating themselves higher.

However, graduates emphasize that their hiring was based on specific standards rather than luck. Both graduates and employers report that the hiring process involved a predetermined number of interviews, which were perceived as relatively easy to navigate.

Fourth Question: What is the level of importance of the skills, according to employer's perspective?

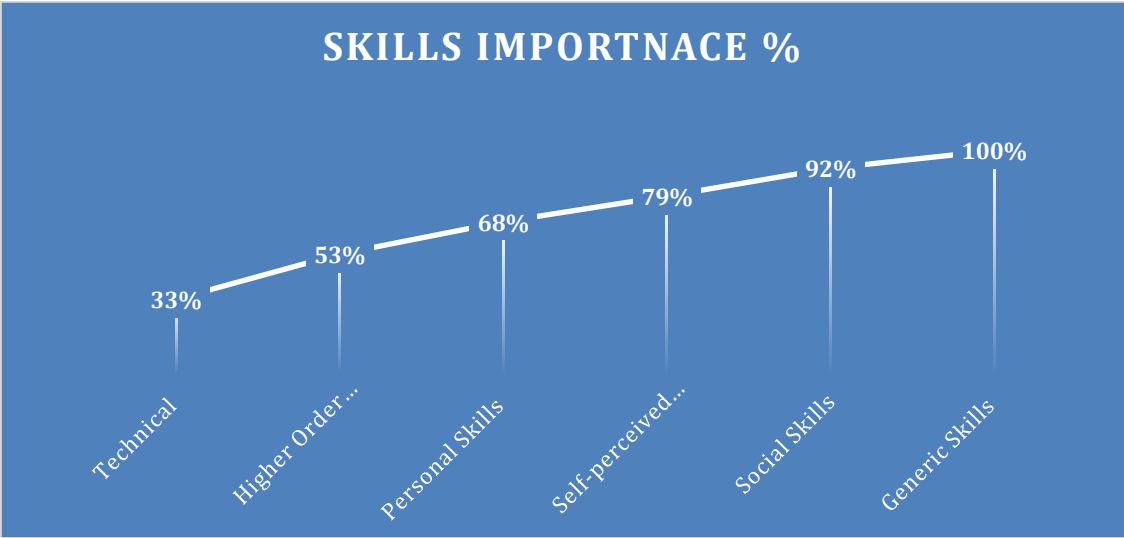
The below table shows the level of importance of the employability skills, according to employer's perspective.

Table 22: The level of importance of the employability skills, according to employer's perspective.

No.	Skills	Mean	Std. Deviation
1	Technical %	45.4%	17.83
2	Higher Order Thinking/Creative Thinking %	27.95%	23.43
3	Personal Skills %	19.78%	19.97
4	Social Skills%	15.86%	14.11
5	Generic Skills %	10.57%	15.50
6	Self-perceived skills %	17.26%	24.58

7	To what extent are you satisfied with the university graduate's employability skills? ____ out of 100 (for example 20 out 100, 90 out 100).	50.0%	19.93
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Figure 11: Employability Skills Importance



The researcher observes that technical expertise, higher-order thinking abilities, personal skills, and self-perceived competencies constitute employability skills. A greater proficiency in these skills enhances graduates' likelihood of employment, a principle exemplified by the 80/20 Pareto principle (Persson & Nicklasson, 2022)

Significantly, technical skills rank as the foremost factor influencing employers in their hiring decisions, followed by creating/high-order thinking. Personal skills and other skill sets are then considered, each with varying levels of importance.

Moreover, employers express a 50% confidence level in graduates' employability skills. This implies that the selection criteria effectively screen out half of the candidates. Consequently, graduates and job seekers should prioritize honing their technical skills, given their paramount importance. However,

other factors such as high-order thinking, self-perceived skills, and the mentioned skill sets also play a crucial role in convincing employers of their suitability.

Table 23 Employability Skills Gap and Employability skills importance

No.	Skills / graduates	Graduates Estimation Level	Employer Estimation Level	Skills Importance	Gap exist
1	Technical	Moderate	Moderate	45%	
2	Creative Thinking	Moderate	Moderate	27%	
3	Personal Skills:	High	Moderate	19%	Yes
4	Social Skills	High	Moderate	15%	Yes
5	Generic skills	High	Moderate	10%	Yes
6	Self-Perceived Skills	Moderate	Moderate	17%	

4.2 Hypotheses

Hypothesis H01: The Higher the graduates possess technical and soft skills; the graduates are more likely to be employed

The Spearman correlation was employed to assess the relationship between the skills of graduates (both Technical and Soft) and their employability.

Table 24 Table No.: Results of Spearman correlation between graduates' skills and employability.

			Technical Skills	Creative Skills	Personal Skills	Social Skills	Generic Skills
Spearman's rho (ρ)	Employability	Correlation Coefficient	.109	.032	.245*	.273*	.382**

		Sig. (2-tailed)	.342	.781	.032	.016	.001
		N	78	78	77	77	78

The findings revealed a noteworthy correlation between Employability and Personal, Social, and Generic skills, as indicated by the respective P-values of .032, .016, and .001, all falling below the significance threshold of $\alpha=.05$.

Conversely, there was no discernible association between employability and Technical or Creative skills, with P-values of .342 and .781, respectively, exceeding the significance level of $\alpha=.05$.

H02: There is a significant difference between graduates' evaluation and employers' evaluation of employability skills (Technical and soft) among Computer Sciences graduates in Palestine.

To check this hypothesis the Relative Importance Index (RII) was calculated for graduates' evaluation and employers' evaluation of technical and soft skills.

The below table showed the values of RII for employability skills (Technical and soft).

Table 25 The values of RII for employability skills (Technical and soft)

No	Section	RII	
		Graduates	Employer
1	Technical Skills	0.56	0.59
	Soft Skills		
2	Creative Thinking	0.67	0.54
3	Personal skills	0.79	0.55

4	Social skills	0.73	0.61
5	Generic skills	0.75	0.63
6	Self-Perceived skills	0.66	0.64

The findings indicate a disparity between the evaluations of employability skills among Computer Science graduates in Palestine, as perceived by graduates themselves and by employers. Specifically, the Relative Importance Index (RII) for technical skills is rated higher from the employer's perspective compared to the graduates' perspective. Conversely, for soft skills, the RII is higher from the graduates' perspective than from the employer's perspective.

The below figure showed the differences of the employability skills evaluation between graduates and employers.

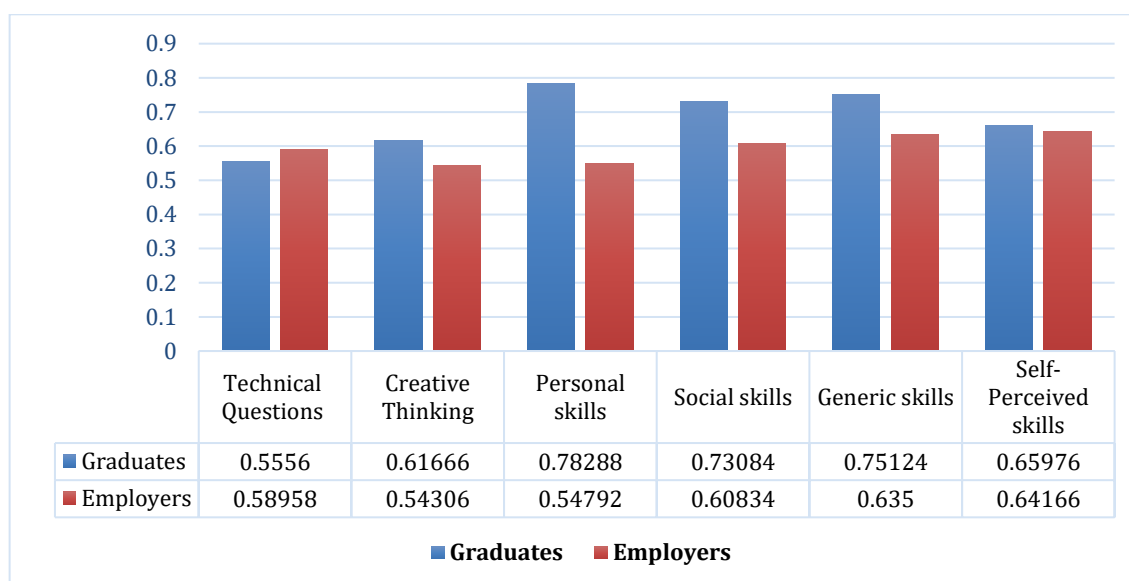


Figure 12 The differences of the employability skills evaluation between graduates and employers.

Mann-Whitney test was conducted to check the differences of the evaluation of the graduates' skills between employers' perspective and graduates' perspectives.

Table 26 Skills Rank

	Category	N	Mean Rank	Sum of Ranks
Technical Skills	Employers	24	73.38	1761.00
	Graduates	107	64.35	6885.00
	Total	131		
Creative Skills	Employers	24	51.13	1227.00
	Graduates	108	69.92	7551.00
	Total	132		
Personal Skills	Employers	24	25.00	600.00
	Graduates	108	75.72	8178.00
	Total	132		
Social Skills	Employers	24	32.54	781.00
	Graduates	107	73.50	7865.00
	Total	131		
Generic Skills	Employers	24	32.46	779.00
	Graduates	108	74.06	7999.00
	Total	132		
Self-perceived Skills	Employers	24	56.17	1348.00
	Graduates	105	67.02	7037.00
	Total	129		

Table 27 Mann-Whitney Test Result

Test Statistics						
	Technica l skills	Creative skills	Personal skills	Social skills	Generic skills	Self- perceived skills

Mann-Whitney U	1107.000	927.000	300.000	481.000	479.000	1048.000
Wilcoxon W	6885.000	1227.000	600.000	781.000	779.000	1348.000
Z-Value	-1.054-	-2.181-	-5.907-	-4.790-	-4.840-	-1.286-
Asymp. Sig. (2-tailed)	.292	.029	.000	.000	.000	.198
a. Grouping Variable: category						

The findings indicate a notable contrast between graduates' and employers' assessments concerning creative, personal, social, and generic skills, as evidenced by the P-values: .029, .000, .000, .000, respectively. These values fall below the predetermined significance level of $\alpha=.05$, suggesting a statistically significant distinction.

However, there is no significant disparity between graduates' and employers' evaluations concerning technical and self-perceived skills, as indicated by the P-values: .292 and .198, respectively. These values exceed the significance level $\alpha=.05$, implying a lack of statistical significance in the differences observed.

Chapter 5: Findings and Conclusions

Chapter 5: Introduction

This section delves into the significance of the generated information and findings. Utilizing surveys, valuable insights have been obtained from software developers, software employers, and universities offering computer-related sciences programs. The chapter comprehensively outlines the skills evaluation disparity between employees and employers.

This chapter will cover the following topics:

- 1- Surveys analysis findings.
- 2- Surveys key findings.
- 3- Recommendation
- 4- Future work.

5.2 Research findings

5.2.1 Graduate Skills

The analysis indicates that Technical Skills and Creative Thinking exhibit the lowest mean values, suggesting a moderate level of proficiency in these domains. It is evident that universities should prioritize improving technical skills, given their pivotal role in recruitment within software companies. Both employers and graduates self-assess their skills at a moderate level, revealing a notable gap in personal skills, social skills, and generic skills. Graduates tend to rate themselves higher, while employers assign a moderate rating to the graduates.

In addition, employers acknowledged that none of the skills demonstrated by graduates exhibited a significantly high mean value. However, it is crucial to emphasize their observations, particularly regarding technical, creative, and personal skills. In essence, employers evaluate students and recent graduates as having a moderate overall skill level. To address this, both universities and employers should focus their efforts on enhancing the aspects they consider most critical for hiring.

5.2.2 Technical Skills:

The responses and analysis unequivocally indicate that universities have not been proactive in modernizing their curricula. Instead, they continue to rely on courses that impart fundamental skills for aspiring software developers. This encompasses fields that have lagged behind in adopting modern technologies, and universities have yet to develop appropriate curricula or equip their instructors with the necessary expertise.

Moreover, instructing these skills necessitates substantial, hands-on experience gained from both startups and established companies with ample resources to invest in these tools and experiences.

The analysis shows the following Key low rating by the graduates and employers as follows:

1. Cloud Computing.
2. Linux operating systems.
3. Following best Practices, following latest tech stacks and technology updates related.

Graduates demonstrate reduced confidence in SQL, JavaScript, and scripting, which are essential elements of modern development frameworks. Equally critical is a proficient grasp of continuous integration and continuous development (CI/CD) fundamentals, along with expertise in the agile development methodology.

Conversely, employers assign a moderate rating to graduates/employees in database skills, Java scripting, and cloud computing, highlighting a noticeable disparity between employer and graduate/employee evaluations. Simultaneously, both employers and graduates rate skills in Development Operations (DevOps) and technologies best practices as low. Additionally, employers indicate a low rating for graduates/employees in debugging and fixing, a sentiment echoed by the graduates/employees themselves. The researcher posit that this gap may stem from differing expectations, with employers anticipating a more mature understanding of functional features without bugs, while graduates are still in the process of refining the details of functionality and determining when it is deemed complete or stable.

Universities and graduates should place significant emphasis on the critical assessment of cloud computing, Linux operating systems, and staying updated with the latest technology stacks. These aspects hold paramount importance for both educational institutions and graduates entering the workforce.

The analysis of graduates' technical skills reveals an intriguing pattern. Those who pursued studies in computer engineering, computer science, and software engineering consistently rated themselves highly when freshly graduated, but their self-assessment tends to decrease with more experience. This

trend suggests that these graduates are attuned to emerging technologies and recognize the ongoing learning curve in their field.

Conversely, the researcher observes lower and very low self-ratings among graduates in information technology and information systems. This can be attributed to deficiencies in their university curricula, lacking essential materials and courses that would empower them to effectively navigate the software industry or these curriculars are not designed to produce software developers. Consequently, their self-assessment reflects a perceived absence of experience and foundational knowledge in comparison to their counterparts.

Universities should aim to equip students and graduates to thrive in both national and international markets by fostering exposure and connectivity. This can be achieved by hosting a multitude of Boot Camps and Hackathon activities, facilitating interactions and learning opportunities among students. Additionally, universities, particularly those focusing on software development, should integrate workshops and projects into their curriculum, leveraging the expertise of technical leads from national or international companies to enhance practical skills and industry relevance.

It's remarkable that Technical Employability skills aren't considered among the major employability skills. Researcher's attribute this to the existing gap between employers' and graduates' evaluations. Out of twelve specific topics, evaluations differ on seven, while only matching on five.

5.2.3 Creative thinking:

It is clear that universities should prioritize addressing low negotiation skills in their curriculum, given the critical role these skills play for software developers in numerous areas. Negotiating project scope, selecting optimal programming languages, promoting effective teamwork, and handling other daily challenges faced by software developers emphasize the significance of enhancing negotiation skills.

Both graduates and employers have acknowledged that their creative thinking is at a moderate level. Graduates should actively work on improving these skills to reach a higher rating, and universities should contemplate incorporating creative thinking into their curriculum and course implementations.

When addressing universities and graduates, it's crucial to integrate creative thinking into curricula. This means not only nurturing creative activities but also promoting participation and mentorship from leaders in both local and international markets to enhance students' learning experiences. Emphasizing practical projects and labs allows students to implement what they have been taught effectively.

5.2.4 Personal Skills:

Both graduates and employees have evaluated personal skills, indicating high ratings for competencies such as English language proficiency and timely project deadline fulfillment. However, when employers were asked the same questions, their assessment, especially regarding English proficiency, was considerably lower. This incongruity highlights a noticeable disparity between the perceptions of students/employees and those of employers. It is evident that there exists a gap in the self-evaluation of personal skills between graduates and employers. Universities should focus on instructing and enhancing graduates in alignment with market expectations while concurrently refining their skills accordingly. Furthermore, universities should actively involve graduates and students in learning the professional language of software development. This can be achieved through training programs within both national and international markets and companies, as well as by enhancing English courses tailored specifically for software developers. For software developers. Or by developing cross culture programs.

5.2.5 Social Skills

It becomes apparent that graduates regard their social skills highly; nevertheless, employers generally assess these skills as moderate, with the exception of teamwork, where graduates receive high ratings.

In all other aspects of social skills, graduates/employees rate themselves highly, whereas employers assign a moderate rating. This discrepancy underscores a clear gap between employer and graduate ratings for social skills.

5.2.6 Generic Skills:

According to graduates/employees, generic skills are generally rated as high. However, an exception arises when it comes to the ability to convey ideas clearly without requiring further clarifications. In contrast, employers perceive the generic skills of employees/students to be at a moderate level, encompassing their proficiency in effectively communicating ideas to others.

5.2.7 Self-Perceived Skills:

Employers have expressed those self-perceived skills among graduates are at a moderate level, a sentiment echoed by the graduates themselves. However, employers have also noted that graduates tend to underestimate their need for improvement. Additionally, graduates often fail to objectively assess their competencies when it comes to salary negotiations.

Given the noticeable gap between employer perceptions and those of employees/graduates/students, universities should take on the responsibility of instructing and coaching graduates, encouraging them to adopt a more realistic approach in terms of salary expectations and self-assessed knowledge. Furthermore, researchers believe that this gap is linked to graduates' underestimation of the need for improvement, which, in turn, results in their lack of awareness about emerging technologies and limited exposure to experiences that would otherwise warrant higher salaries based on their competencies.

Hence, given the current disparity, self-perceived skills fail to stand out as significant employability assets. This highlights the imperative for heightened focus and dedication from universities and graduates in tackling this challenge. Notably, researchers in Chapter 2 have underscored the

importance of self-perceived skills among software developers. Universities should prioritize training graduates and students in interview techniques, problem-solving, defining job requirements, and related skills.

5.2.8 Skills Importance

Employers emphasize that technical skills are a crucial factor in hiring, but they also recognize that it's not the sole determinant. Higher order thinking skills, personal skills, and self-perceived skills are identified as the top four crucial attributes for students/graduates to secure employment in software companies.

The analysis indicates a lower evaluation of technical and creative thinking skills in companies where female employers are present. The researcher attributes this observation to a potentially lower representation of engaged technical women at the business level. These skills are deemed crucial and often develop through technical experience gained in the workplace.

This suggests that the hiring process is not arbitrary, and within software development companies, employment decisions are not solely determined by skills and competencies. Notably, respondents who were not employed did not provide answers to this question.

Despite self-employed and employed individuals rating their skills as low and High, there is a concern regarding the perception of the unemployed, who rate their creative thinking as moderate. This discrepancy highlights the likelihood of inaccurate perceptions, given that employed individuals are typically more attuned to their strengths and weaknesses, leading them to assess themselves as moderate.

Additionally, universities should prioritize and focus on improving self-perceived skills, considering that students have rated themselves as low. It seems inconsistent that the unemployed and self-

employed rate themselves as high, contrary to the understanding demonstrated by students and employed graduates regarding the importance of such skills in the working environment.

The researcher posits that Bethlehem University is perceived as having a lower rating in the field of Software Engineering, possibly due to its relatively new status compared to other universities. This disparity is evident in the limited access to the market and connections with companies.

Interestingly, Al-Quds Open University has received a high ranking for creative thinking, a phenomenon that the researcher finds perplexing. This aspect is identified as an area for future investigation to understand the underlying reasons.

An intriguing observation arises from the fact that graduates of Hebron University tend to rate themselves lower in social skills, contrary to graduates from most other universities who rate themselves as moderate, high, or very high. The researcher attributes this trend to factors such as a lower number of graduates securing employment, the non-technical nature of the university, and the recent establishment of computer science branches compared to other institutions. This pattern extends to generic skills, where Hebron University graduates' rate themselves as moderate, while others rate themselves as high or very high.

In terms of self-perceived skills among computer science graduates, those from Palestine Polytechnic, Hebron, and Bethlehem universities rate themselves as moderate, whereas graduates from other universities rate themselves as high. The researcher attributes this difference to the geographical location of these universities, being farther away from the IT hub in the West Bank, making access more challenging. The concentration of software companies in Ramallah and Nablus places a spotlight on these cities. Additionally, the Gaza market is noted for having more IT resources, companies, and market enablers compared to other regions.

5.3 Summary

A notable observation is that, in general, students tend to rate their skills higher than the self-assessments provided by employers, thereby highlighting a discernible gap between the expectations of market-ready graduates and the evaluations from employers. Furthermore, it is worth mentioning that employers consistently rated most skills at moderate or low levels, with none of the assessments falling into the high or very high categories.

The researcher notes that employers consistently rate employees with various tasks, assigning either moderate or low ratings. This highlights a distinct gap between the employers, who represent the market, and the perceptions of graduates/employees.

While hiring is not a random process, there is a need for alignment between graduates, employers and universities, especially in terms of technical skills, which are pivotal in the employment process.

It is evident that graduates would benefit from exposure to real market expectations, and this exposure can be facilitated through various means such as training, workshops, and local training programs offered by universities. Such initiatives are essential in providing graduates with insights into the expectations of the market, particularly in the field of engineering.

The significance of the skill importance percentages highlighted in the preceding Chapter Four underscores a critical aspect that graduates should pay close attention to and align their efforts accordingly. These percentages represent key areas where every student, graduate, and employee should concentrate their focus, considering that employers make hiring decisions based on the importance and emphasis assigned to these factors.

The research study concentrates on two primary dimensions: soft and technical skills. The analysis and findings indicate that both of these skill sets hold significance, albeit with varying levels of importance.

Nevertheless, these skills are crucial and indispensable for every software developer, serving as pivotal factors in the hiring process for graduates.

Following a comprehensive discussion on the significance and ratings of each skill from the perspectives and expectations of both graduates and employers, it becomes evident that a higher proficiency in skills correlates with an increased likelihood of employment specifically creative skills, personal skills, social skills and Generic skills. Surprisingly, the type of company does not appear to be linked to the acquired skills. The research findings reveal no significant difference in skills ratings between different types of companies. This is unexpected, as the literature review suggests that outsourcing and startup companies typically demand a higher skill set.

Regarding employability skills, it's apparent, following the Pareto principle, that technical skills, higher-order thinking skills, personal skills, and self-perceived skills collectively constitute 80% of these skills. Meanwhile, social skills and generic skills are viewed as advantageous for any graduate or employee.

5.4 Recommendations:

The recommendation is aimed at two primary stakeholders: universities and graduates, outlined as follows:

Universities:

Universities should reassess their curriculum to incorporate creative thinking, technical proficiency, and generic skills. Additionally, they should forge partnerships and actively involve themselves in the software market to ensure graduates are equipped with the necessary competencies. The goal is to achieve high proficiency across all discussed aspects and dimensions. Universities should remove courses not directly relevant and replace them with modern software development courses, prioritizing mastering fundamental concepts over chasing trending technologies and concepts they may not fully understand.

The Ministry of IT and Telecommunication, in collaboration with the Ministry of Higher Education, can significantly contribute by incorporating mandatory courses into university curriculums. This initiative is expected to enhance the quality of graduates and foster increased engagement from employers.

Universities ought to prioritize the development of soft skills, particularly focusing on creative thinking, social, general, and self-perception abilities. These skills will equip graduates with the capability to craft compelling and accurate CVs, enhancing their employability rates.

Guest lectures play a crucial role as they expose students to the realities of the job market, familiarizing them with professional language and industry jargon.

It appears that English courses offered in universities fall short in preparing graduates with the necessary language skills for the workplace. Therefore, universities should consider hosting native English speakers and integrating more practical English courses into their curriculum.

Emphasizing communicative and teamwork projects should be a top priority, providing graduates with opportunities to practice and enhance their collaborative skills.

Graduates:

Graduates and employees should actively participate in and familiarize themselves with technical and behavioral interviews, treating them as essential homework assignments. Engaging in these interviews allows individuals to refine and showcase their skills with greater accuracy and realism. Presently, the internet offers abundant resources comprising technical and behavioral interview questions.

Encourage employers to collaborate with universities by expanding internship programs within academic institutions, fostering the production of highly capable and skilled graduates. Furthermore,

advocate for universities to recruit part-time or full-time industry and technical leaders to ensure a balanced blend of theoretical knowledge and practical experience and skills.

Graduates and employers should have a formal association where they can have active meetups and workshops repeatedly to raise the awareness and expose the graduates and students to new insights.

While there is a predominant emphasis on technical training and focus, this research highlights those soft skills should not be overlooked or underestimated. The study suggests that soft skills are not less important than technical skills; rather, when combined, they collectively hold even greater significance.

5.5 Future researches:

- While this research clarifies the skills essential for software developers and gap between employers and students/employees, future studies in this field should delve into university curricula and courses. The focus should be on determining the necessity of all adopted courses in the software industry and assessing their contribution to the profiles of software developers.
- Another aspect worth further investigation is understanding the persistent disparities in perception and expectations between students/graduates and employers, particularly where graduates rate themselves higher than employers rate them.
- MTIT and other software development enablers in Palestine are encouraged to concentrate on building communities for software developers.

5.6 Research Limitation:

- There is no comprehensive association that encompasses all software developers and companies within a single framework. This posed a significant challenge during survey distribution, given the absence of a specific directory for companies in Gaza and Ramallah,

apart from PITA and MTIT, which do not maintain a complete list of companies, and there is no centralized address for software developers.

- There is a low response rate among computer related students and graduates.
- There are numerous software developers in Gaza and the West Bank, and these developers don't have interactions with universities and local communities which are not reached here nor into the universities and local market.
- A very limited number of scientific papers or research available on the field of software developers' skills.

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Appendices

Cross Tabulations:

The researcher conducted cross-tabulation analysis to gain a deeper understanding of response patterns. Furthermore, this analysis was employed to clearly identify gaps in specific areas.

Cross Tabs: Employers/companies

- Company size versus skills required.

The below table showed the level of graduate’s skills according to **Company size**, from employers’ perspective. The researcher has categorized the companies as the following category:

Sizes

- 1- Micro (1-10 employees)
- 2- Small (11-50 employees)
- 3- Medium (51-200 employees)
- 4- Medium to Large (> 200 employees)

Table 28 The level of graduate’s skills according to Company size.

		N	Mean	Level	Std. Deviation
Technical Questions	1-10 Employees	8	2.9271	Moderate	.76950
	11-50 Employees	9	2.8148	Moderate	.62051
	51-200 Employees	2	3.0000	Moderate	.94281
	Above 200 Employees	5	3.2000	Moderate	.65511
	Total	24	2.9479	Moderate	.66974
Creative Thinking	1-10 Employees	8	3.0417	Moderate	.73328

	11-50 Employees	9	2.6667	Moderate	.58333
	51-200 Employees	2	2.4167	Low	.11785
	Above 200 Employees	5	2.4000	Low	.67289
	Total	24	2.7153	Moderate	.65475
Personal skills	1-10 Employees	8	2.9688	Moderate	.69997
	11-50 Employees	9	2.5556	Low	.59658
	51-200 Employees	2	2.3750	low	.53033
	Above 200 Employees	5	2.8500	Moderate	.60208
	Total	24	2.7396	Moderate	.62762
Social skills	1-10 Employees	8	3.2679	Moderate	.51472
	11-50 Employees	9	2.7460	Moderate	.42725
	51-200 Employees	2	2.7857	Moderate	.10102
	Above 200 Employees	5	3.3143	Moderate	.66548
	Total	24	3.0417	Moderate	.54354
Generic skills	1-10 Employees	8	3.2500	Moderate	.47509
	11-50 Employees	9	3.3556	Moderate	.39721
	51-200 Employees	2	2.9000	Moderate	.42426
	Above 200 Employees	5	2.8400	Moderate	.43359

	Total	24	3.1750	Moderate	.45802
Self-perceived skills	1-10 Employees	8	3.4792	High	.51515
	11-50 Employees	9	3.1111	Moderate	.47140
	51-200 Employees	2	2.9167	Moderate	.82496
	Above 200 Employees	5	3.0667	Moderate	.53489
	Total	24	3.2083	Moderate	.52762

The analysis indicates a decline in creative thinking within companies with more than 50 employees. Companies with 11 to 200 employees exhibit lower levels of personal skills. Evidently, organizations with a larger workforce should prioritize addressing these skills.

Nevertheless, the analysis reveals that the majority of skills fall within the moderate range, except for self-perceived skills in small companies (1-10 employees), which exhibit a high mean. The remaining skills, whether low or medium, demonstrate a different distribution.

Type of organization and skills required.

The below table showed the level of graduate's skills according to **Type of organization**, from employers' perspective

Table 29 The level of graduate's skills according to Type of organization.

		N	Mean	Level	Std. Deviation
Technical Questions	Local company	2	3.4167	High	.82496
	Startup company	7	2.8333	Moderate	.79057

	Out sourcing /offshoring company	15	2.9389	Moderate	.61839
	Total	24	2.9479	Moderate	.66974
Creative Thinking	Local company	2	3.5833	High	.58926
	Startup company	7	2.9524	Moderate	.78004
	Out sourcing /offshoring company	15	2.4889	Low	.47754
	Total	24	2.7153	Moderate	.65475
Personal skills	Local company	2	3.1250	Moderate	1.23744
	Startup company	7	2.8929	Moderate	.62678
	Out sourcing /offshoring company	15	2.6167	Moderate	.56590
	Total	24	2.7396	Moderate	.62762
Social skills	Local company	2	3.5000	High	.70711
	Startup company	7	3.1633	Moderate	.56200
	Out sourcing /offshoring company	15	2.9238	Moderate	.51186
	Total	24	3.0417	Moderate	.54354
Generic skills	Local company	2	3.6000	High	.56569
	Startup company	7	3.0571	Moderate	.62944

	Out sourcing /offshoring company	15	3.1733	Moderate	.34531
	Total	24	3.1750	Moderate	.45802
Self-perceived skills	Local company	2	3.7500	High	.35355
	Startup company	7	3.1905	Moderate	.47559
	Out sourcing /offshoring company	15	3.1444	Moderate	.55229
	Total	24	3.2083	Moderate	.52762

The majority of mean values for all skills reflect a moderate evaluation, prompting the need to comprehend why local companies perceive their skills as high across all categories. The most plausible interpretation is a distorted perception among employers in the local market. However, in the earlier studies cited in Chapter 2, it was anticipated that the highest skills—specifically creative thinking, technical proficiency, and self-perceived skills in startup companies—should receive high ratings, but employers in these companies offered moderate evaluations.(Mangiza & Brown, 2020a)

Furthermore, it is noteworthy that creative thinking in outsourcing companies is notably low, consistent with previous studies. This aligns with the typical hiring approach of outsourcing companies, where employees are recruited for specific technologies, and over an extended duration, their role is more focused on implementing solutions rather than generating them.

-Employer's gender and the skills required.

The below table showed the level of graduate's skills according to **employer's gender**, from employers' perspective

Table 30 The level of graduate's skills according to employer's gender.

	Employer's Gender	N	Mean	Level	Std. Deviation
Technical Questions	Male	22	3.0114	Moderate	.66184
	Female	2	2.2500	Low	.23570
Creative Thinking	Male	22	2.7576	Moderate	.62726
	Female	2	2.2500	Low	1.06066
Personal skills	Male	22	2.7045	Moderate	.58572
	Female	2	3.1250	Moderate	1.23744
Social skills	Male	22	3.0519	Moderate	.53187
	Female	2	2.9286	Moderate	.90914
Generic skills	Male	22	3.1909	Moderate	.47600
	Female	2	3.0000	Moderate	.00000
Self-perceived skills	Male	22	3.2273	Moderate	.54565
	Female	2	3.0000	Moderate	.23570

The analysis reveals a lower assessment of technical and creative thinking skills in companies where the employers are female. Although the number of female employers is only two, it is essential to note that their evaluations differ from those of male employers. The researcher perceives this discrepancy as a consequence of fewer actively involved female employers in the design of solutions, particularly in startup companies.

Different perceptions of Graduates or Employees based on the demographic characteristics

- Skills versus the type of company.

Table 30 showed the level of graduate's skills according to the type of company, from graduates' perspective

Table 31 The level of graduate's skills according to the type of company.

		N	Mean	Level	Std. Deviation
Technical Questions	Local company	10	3.1667	Moderate	1.00154
	Startup company	31	2.5457	Low	.86785
	Out sourcing /offshoring company	38	2.7390	Moderate	.79582
	Government	2	3.0417	Moderate	.41248
	NGO's	5	3.1000	Moderate	.40995
	Total	86	2.7471	Moderate	.83817
Creative Thinking	Local company	10	3.4000	High	.68611
	Startup company	32	2.7813	Moderate	.81055
	Out sourcing /offshoring company	37	2.9382	Moderate	.54350
	Government	2	3.8571	High	.20203
	NGO's	5	3.6286	High	.41157

	Total	86	2.9950	Moderate	.70853
Personal skills	Local company	10	3.7250	High	.60610
	Startup company	32	3.9063	High	.82733
	Out sourcing /offshoring company	37	3.9459	High	.59842
	Government	2	3.2500	Moderate	.35355
	NGO's	5	4.4000	Very High	.69821
	Total	86	3.9157	High	.70253
Social skills	Local company	9	3.5833	High	.37500
	Startup company	32	3.6719	High	.53952
	Out sourcing /offshoring company	38	3.5197	High	.41460
	Government	2	3.6875	High	.26517
	NGO's	5	3.9500	High	.27386
	Total	86	3.6119	High	.45899
Generic skills	Local company	10	3.6667	High	.59835
	Startup company	32	3.8385	High	.57810

	Out sourcing /offshoring company	38	3.7763	High	.53310
	Government	2	3.5000	High	.23570
	NGO's	5	3.9333	High	.30277
	Total	87	3.7893	High	.53944
Self-perceived skills	Local company	9	3.5000	High	.37500
	Startup company	30	3.3917	Moderate	.57210
	Out sourcing /offshoring company	39	3.6218	High	.44100
	Government	2	3.0625	Moderate	.97227
	NGO's	5	3.2500	Moderate	.40505
	Total	85	3.4926	High	.50273

It is noteworthy that technical skills are emphasized for graduates employed in startups. The researcher contends that this emphasis is connected to the unique exposure and environment of startups, coupled with the technological and modern demands of organizations. Consequently, employees in this setting consistently perceive their skills as falling short of the required standards, leading them to actively seek opportunities for skill enhancement.

Skills versus Gender.

The below table showed the level of graduate's skills according to gender, from graduates' perspective

Table 32 The level of graduate's skills according to gender.

Group Statistics						
	Gender	N	Mean	Level	Std. Deviation	Std. Error Mean
Technical Questions	Male	63	2.7897	Moderate	.78600	.09903
	Female	44	2.7614	Moderate	.81384	.12269
Creative Thinking	Male	63	3.0794	Moderate	.71924	.09062
	Female	45	3.0889	Moderate	.70795	.10554
Personal skills	Male	64	3.8867	High	.65908	.08238
	Female	44	3.9545	High	.74956	.11300
Social skills	Male	63	3.6429	High	.42113	.05306
	Female	44	3.6705	High	.48080	.07248
Generic skills	Male	65	3.7385	High	.53275	.06608
	Female	43	3.7829	High	.52646	.08028
Self-perceived skills	Male	64	3.3672	Moderate	.65423	.08178
	Female	41	3.1921	Moderate	.70384	.10992

5.1.1.1.1

Skills versus Employment Status.

The below table describes the cross tabs of the skills according to the employment status

Table 33 .: Skills and employment status

Skills		Mean	Level	Std. Deviation
Technical Questions	unemployed	2.7304	Moderate	.82886
	Employed	2.8452	Moderate	.73328
	Student	2.8333	Moderate	.74710
	self employed	3.6667	High	.
	Total	2.7780	Moderate	.79387
Creative Thinking	unemployed	3.0021	Moderate	.71059
	Employed	3.2922	Moderate	.69774
	Student	3.2101	Moderate	.67973
	self employed	2.4286	Low	.80812
	Total	3.0833	Moderate	.71124
Personal skills	unemployed	3.9590	Moderate	.66372
	Employed	3.8523	Moderate	.70988
	Student	3.8824	Moderate	.73483
	self employed	3.3750	Moderate	1.59099
	Total	3.9144	High	.69474
Social skills	unemployed	3.5802	High	.47209

	Employed	3.7440	High	.40210
	Student	3.7941	High	.34500
	self employed	4.0000	High	.00000
	Total	3.6542	High	.44463
Generic skills	unemployed	3.7770	High	.57779
	Employed	3.7197	High	.37931
	Student	3.6667	High	.50918
	self employed	4.1667	High	.23570
	Total	3.7562	High	.52824
Self-Perceived skills	unemployed	3.5970	High	.41103
	Employed	2.9500	Moderate	.71681
	Student	2.4609	Low	.64018
	self employed	3.5000	High	.88388
	Total	3.2988	Moderate	.67615

The responses indicates that both employed and non-employed graduates, as well as employees, exhibit high levels of social and generic skills, reflecting the overall perception of these individuals.

Nevertheless, self-employed graduates and students receive lower ratings in the aspect of creative thinking. This may be attributed to the fact that universities typically play a role in enhancing such skills among students and graduates.

Conversely, the self-perceived skills among students are rated as low, whereas the employed individuals rate themselves as moderate.

Skills versus University.

The analysis indicates that Islamic University Gaza, Al-Azhar University, Eastern Mediterranean University, and Jordanian universities are highly ranked for technical skills. In contrast, Bethlehem University and Cyprus University are considered weak, with the remaining institutions receiving a moderate rating.

In terms of creative thinking, Al-Quds Open University and Eastern Mediterranean University receive high ratings, while Cyprus University is rated low.

When it comes to personal skills, Hebron University and IUG are rated low, while Eastern Mediterranean University and Jordanian universities receive a very high rating. Other universities generally receive high ratings.

For social skills, Hebron University is rated low, PPU is considered moderate, and the others are rated high.

In the domain of generic skills, Hebron University is rated as moderate, Eastern Mediterranean universities receive a very high rating, and the rest are rated high.

Regarding self-perceived skills, Hebron, PPU, and Bethlehem universities are rated as moderate, while the remaining institutions receive high and very high ratings.

Table 34 Skills versus University

Skills	Mean	Level	Std. Deviation
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Technical skills	PPU	2.5020	Moderate	.76675
	Hebron university	2.5833	Moderate	.
	Al-Najah University	2.6410	Moderate	.75637
	Islamic university Gaza	3.9167	High	.23570
	Palestine Technical University “Kadoorie” (PTUK)	2.7222	Moderate	.87665
	Al-Azhar university Gaza	3.3611	High	.99675
	Bizet university	2.9808	Moderate	.73846
	Al-Quds open university	2.4306	Moderate	.63117
	Arab American university	3.0833	Moderate	.74068
	Bethlehem university	2.2778	Low	1.38778
	Eastern Mediterranean university	3.6667	High	.
	Jordanian University	3.5000	High	.
	IUG	2.9167	Moderate	.
	Cyprus university	2.4167	Low	.
	Total	2.7016		.80668

Creative Thinking	PPU	2.7630	Moderate	.72447
	Hebron university	2.5714	Moderate	.
	Al-Najah University	3.0635	Moderate	.80162
	Islamic university Gaza	3.4286	Moderate	1.41421
	Palestine Technical University “Kadoorie” (PTUK)	3.2857	Moderate	.71714
	Al-Azhar university Gaza	3.1905	Moderate	.43954
	Birzeit university	3.1648	Moderate	.72573
	Al-Quds open university	3.5238	High	.66189
	Arab American university	3.1905	Moderate	.21822
	Bethlehem university	2.8095	Moderate	1.35023
	Eastern Mediterranean university	4.0000	High	.
	Jordanian University	3.1429	Moderate	.
	IUG	2.4286	Low	.
	Cyprus university	2.1429	Low	.
	Total	2.9963		.75627

Personal skills	PPU	3.4944	High	.78785
	Hebron university	2.2500	Low	.
	Al-Najah University	4.0185	High	.65752
	Islamic university Gaza	4.1250	High	.17678
	Palestine Technical University “Kadoorie” (PTUK)	4.0000	High	.41833
	AlAzhar university Gaza	4.3333	High	.97040
	Birzeit university	4.0417	High	.52042
	Al-Quds open university	3.4583	High	.53424
	Arab american university	4.0833	High	.38188
	Bethlehem university	4.2500	High	.66144
	Eastern Mediternian university	5.0000	Very High	.
	Jordinian University	4.7500	Very High	.
	IUG	2.2500	Low	.
	Cyprus university	3.7500	High	.
	Total	3.7935		.76538

Social skills	PPU	3.3324	Moderate	.60035
	Hebron university	2.5000	Low	.
	Al-Najah University	3.6683	High	.48855
	Islamic university Gaza	3.5000	High	.35355
	Palestine Technical University “Kadoorie” (PTUK)	3.4375	High	.53473
	AlAzhar university Gaza	3.8750	High	.50775
	Birzeit university	3.6250	High	.46211
	Al-Quds open university	3.8125	High	.49844
	Arab American university	3.7083	High	.26021
	Bethlehem university	3.9583	High	.26021
	Eastern Mediterranean university	4.1250	High	.
	Jordanian University	4.0000	High	.
	IUG	3.7500	High	.
	Cyprus university	3.3750	High	.
Total	3.5376		.55044	

Generic skills	PPU	3.4167	High	.64860
	Hebron university	2.8333	Moderate	.
	Al-Najah University	3.7037	High	.62247
	Islamic university Gaza	4.0000	High	.70711
	Eastern Mediterranean University	3.7500	High	.49160
	AlAzhar university Gaza	3.9444	High	.64693
	Birzeit university	3.8056	High	.37493
	Al-Quds open university	3.5556	High	.63828
	Arab American university	4.1667	High	.16667
	Bethlehem university	3.7778	High	.34694
	Eastern Mediterranean university	4.8333	Very High	.
	Jordanian University	4.3333	Very High	.
	IUG	3.6667	High	.
	Cyprus university	3.8333	High	.
Total	3.6351		.61735	
Self-Perceived skills	PPU	3.3352	Moderate	.98380

	Hebron university	3.0000	Moderate	.
	Al-Najah University	3.8241	High	.61946
	Islamic university Gaza	4.2500	Very High	.70711
	Khadar	3.6667	High	.51640
	Al-Azhar university Gaza	4.0000	High	.61237
	Birzeit university	4.0577	High	.73707
	Al-Quds open university	3.7917	High	.43060
	Arab American university	4.2500	Very High	.25000
	Bethlehem university	3.2500	Moderate	.50000
	Eastern Mediterranean university	3.7500	High	.
	Jordanian University	4.2500	Very High	.
	IUG	4.0000	High	.
	Cyprus university	4.0000	High	.
	Total	3.6652		.81035

Table 33 shows rich information as the following:

- Regarding creative thinking, graduates from Islamic University Gaza and Al Azhar, Mediterranean universities self-evaluate at a high level, while Jordanian universities are also considered high. In contrast, graduates from Bethlehem and Cyprus universities rate themselves lower, with others falling into the moderate category.
- In terms of creative thinking, Al-Quds and Mediterranean universities are rated as high, whereas Bethlehem is considered low. Other institutions fall into the moderate range.
- For personal thinking, Hebron University is perceived as low, while Mediterranean and Jordanian universities are seen as high.
- In the realm of social skills, Hebron University graduates' rate themselves as low, whereas others are considered high.
- In terms of generic skills, Hebron University is viewed as moderate, while Mediterranean and Jordanian universities are considered very high. Other institutions fall into the high category.
- Regarding self-perceived skills, Hebron and PPU are considered moderate, while Islamic University of Gaza and Arab American University are rated as very high. Bethlehem falls into the moderate range, with others considered high.

Skills Vs Years of experience and Major

Table 35 skills and major and years of experience.

			Years of experience							
			Less than 1 year		1-2 years (junior)		3-4 years		4 years	
			Mean	Level	Mean	Level	Mean	Level	Mean	Level
Technical skills	you are a student /graduate of	computer engineer	2.77	Moderate	2.60	Low	2.42	Low	2.59	Low
		computer science	2.84	Moderate	2.63	Low	2.54	Low	2.90	Moderate

		software engineer	3.75	High	3.88	High	2.96	Moderate	.	NA
		Information Technology	2.42	Low	1.83	Very Low	3.22	Moderate	.	NA
		Information systems	.	NA	1.83	Very Low	.	NA	.	NA
		others	2.71	Moderate	1.92	Very Low	2.69	Moderate	.	NA
Creative thinking	you are a student /graduate of	computer engineer	3.34	Moderate	2.79	Moderate	3.04	Moderate	3.08	Moderate
		computer science	2.86	Moderate	2.80	Moderate	2.64	Moderate	3.02	Moderate
		software engineer	3.64	High	2.86	Moderate	2.96	Moderate	.	NA
		Information Technology	2.43	Low	2.00	Low	3.05	Moderate	1.86	Low
		Information systems	2.43	Low	3.86	High	.		.	NA
		others	2.29	Low	2.00	Low	3.05	Moderate	.	NA
Personal Skills	you are a student /graduate of	computer engineer	3.87	High	3.79	High	4.11	High	3.89	High
		computer science	3.69	High	3.83	High	3.25	Moderate	3.82	High
		software engineer	4.50	Very High	2.92	Moderate	4.42	Very High	.	NA
		Information Technology	3.00	Moderate	2.75	Moderate	3.25	Moderate	2.25	Low
		Information systems	3.00	Moderate	3.75	High	.		.	NA
		others	3.19	Moderate	5.00	Very High	4.58	Very High	.	NA
Social skills	you are a student /graduate of	computer engineer	3.63	High	3.58	High	3.45	High	3.68	High
		computer science	3.25	Moderate	3.60	High	2.81	Moderate	3.86	High
		software engineer	4.00	High	2.81	Moderate	3.75	High	.	

		Information Technology	3.25	Moderate	2.75	Moderate	3.33	Moderate	4.00	High
		Information systems	2.25	Low	3.75	High	.	NA	.	NA
		others	3.19	Moderate	4.19	High	3.79	High	.	NA
Generic skills	you are a student /graduate of	computer engineer	3.51	High	3.67	High	3.91	High	3.91	High
		computer science	3.37	Moderate	3.80	High	3.17	Moderate	3.95	High
		software engineer	4.50	Very High	2.94	Moderate	4.04	High	.	NA
		Information Technology	2.92	Moderate	2.83	Moderate	3.28	Moderate	4.00	High
		Information systems	2.83	Moderate	3.67	High	.	NA	.	NA
		others	3.21	Moderate	3.92	High	4.17	High	.	NA
Self-perceived skills	you are a student /graduate of	computer engineer	3.47	High	3.81	High	4.07	High	4.13	High
		computer science	3.25	Moderate	3.50	High	3.50	Moderate	4.43	Very High
		software engineer	3.75	High	3.42	High	4.31	Very High	.	NA
		Information Technology	2.63	Moderate	3.00	Moderate	3.42	High	2.50	Low
		Information systems	2.25	Low	3.25	Moderate	.	NA	.	NA
		others	3.92	High	3.25	Moderate	4.00	High	.	NA

In assessing skills relative to experience levels, the following notes and findings emerge:

Information Technology (IT):

Software development skills are notably low, attributed to a lack of focus in the study curriculum. Notably, there is an absence of software developers or individuals from IT and information systems employed in software development roles after two years of study.

First Year in Software Development:

Employees in the software development field often realize the substantial workload and recognize the need for continuous learning within the first year of work. Consequently, employees initially rate their skills as low, which later transitions to a moderate level.

Creative Thinking:

Similar to technical skills, the observations regarding creative thinking skills align, especially for specialized areas like Information Technology, information systems, and related disciplines.

General Skill Trend with Experience:

Across various skills, the analysis indicates a positive correlation between experience and skill level. Typically, as employees gain more experience, their skills improve, and their self-perception of competence becomes higher. However, a notable exception is observed in information technology specialties.

Information Technology Specialties:

In contrast to the general trend, analysis reveals that fresh graduates in information technology specialties initially have high perceptions of their skills. This perception then declines after working for a few years before showing an upward trajectory again.

These patterns underscore the unique dynamics in skill development and perception within the information technology domain, emphasizing the need for targeted interventions and adjustments in educational and professional contexts.

Employability skills among Computer Sciences graduates in Palestine: needs and expectations

This questionnaire is part of a Master's thesis titled Employability Skills of Computer Sciences graduates in Palestine: Needs and Expectations. The research purpose is to understand what are the missing computer sciences graduates' employability skills (specifically software developers) among Palestinian graduates alongside with employers (locally and internationally). Graduates are asked to give their opinion about the gained employability skills from universities. The researcher is following the quantitative deductive approach to collect answers about six main employability dimensions (Misra & Khurana, 2017)

- Technical skills (Stack Overflow(Stack Overflow Developer Survey 2021, n.d.))
- Higher order thinking skills
- Personal skills
- Social skills
- Generic skills
- Self-perceived employability skills
- Research Objectives

The objective of this research is to evaluate university graduates' skills , The specific objectives of this research are:

- To assess what are the soft and technical skills the fresh graduates possess when they graduate.
- To investigate the expectations of employers among fresh graduates.
- To locate gaps in employability skills based on expectations versus available skills.

The two objectives will be achieved through analyzing the responses of two surveys that target graduates and employers by specifying the percentage of employment through who possesses the required skills from employers. The survey employs two versions of a questionnaire designed to achieve these objectives.

Employability skills among Computer Sciences graduates in Palestine: needs and expectations

melqaisi@gmail.com [Switch account](#)



Not shared

Part One: General Information about graduates

Are you currently employed?

- Unemployed
- Employed
- Student
- Self Employed

If working, Your current job is:

Your answer _____

Years of experience in the field is

- Less than one year
- 1-2 Years (Junior)
- 3-4 Years
- 4 Years +

The university you graduated from

Your answer _____

Type of company you are working for

- Local Company
- Startup Company (International or Local) * Startup: Software product being built
- Outsourcing / Offshoring company
- Government
- NGO's

Gender

- Male
- Female

You are a student/graduate of?

- Computer Engineering
- Computer Science
- Software Engineering
- Information Technology (IT)
- Information Systems
- Other: _____

Employability skills among Computer Sciences graduates in Palestine: needs and expectations

melqaisi@gmail.com [Switch account](#)



Not shared

Part Two : Learning during the Computer-related studies degree /curriculum

-----Technical Questions-----

Please
answer each question below with one of the below options

The curriculum includes theories and practices in JavaScript or Python

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

The curriculum includes theories and practices in CSS/HTML

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

The curriculum includes theories and practices in RDBM like
Mysql/Postgres/SQLite

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

The curriculum includes theories and practices in NoSQL DBs MongoDB.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Courses projects include working on AWS, Google Cloud, Microsoft Azure, or
Heroku App.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Courses projects are implemented using one or more of the following frameworks: React JS, Angular JS, Vue JS, jQuery, TypeScript, NodeJS or Express JS.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I have been pushing my projects' codes to Git repositories like Github, Bitbucket, or private source control provider

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I used platforms designed to help build, share and run the modern applications like Docker, or Kubernetes

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I used Linux environment development for at least 2 projects?

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

The curriculum includes building the habit of following the latest development technologies and best practices.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

During the project, you learned how to debug a bug and fix it

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

The curriculum includes the latest development methodologies for example Agile, Programming Scrum, or Kanban

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- Higher Order Thinking/Creative Thinking -----

Please answer each question below with one of the below options

University curriculum contains problem-solving skills and practices

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

University environment encourages problem-solving skills and practices

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

University study taught you negotiation

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

During study, I developed solution as part of the courses

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Usually during the study, I practice facing problems by making real research, assumptions then implementation and eventually imagine results in

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

My study contains training to develop details-oriented skills, for example, giving attention to details, writing clean code, and noticing/fixing bugs.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

During the project, you learned how to debug a bug and fix it

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- **Personal Skills** -----

Please answer each question below with one of the
below options

I speak professional English language, and I manage presenting my work in English.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I work with other teams easily

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I am frank to myself and others

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I finish projects on deadlines repeatedly

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- **Social Skills** -----

Please answer each question below with one of the below options

I have no fear or hesitancy to speak in front of others

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I like to work within teams

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I often introduce myself professionally and build networks

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I do not get shy to share my ideas even it is unacceptable

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I motivate others and I get motivated by others

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I perform better when I work lonely

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I avoid being aggressive when I get stressed

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I am confident that most of the development tasks can be developed by myself without the help of others.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- **Generic Skills** -----

Please answer each question below with one of the
below options

I share information with others constantly

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Usually I think creatively and differently

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Usually others understand my ideas without clarifications

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Usually I analyze information before sharing with others

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I have worked with different teams and cultures

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I work with other cultures without constraints

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- Self-Perceived Skills -----

Please answer each question below with one of the below options

I pass software development jobs interviews/training

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I can solve job required exams and tasks

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I understand the development tech stacks

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

My background is strong enough to get hired

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Compared to other Information Technology specialties i.e. Graphics, what do you think your probability to get employed?

- Very High
- High
- Normal
- Low
- Very Low

I struggled with many job applications until I got employed as a software developer?

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I believe it is a matter of luck I got employed?

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

I am satisfied with my current job in terms of environment, job type and compensations

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Any comments?

Your answer _____

Employer Survey

Part One: General Information about Employer



Description (optional)

Company Size?

- 1-10 Employees
- 10-50 Employees
- 50 -200 Employees
- + 200 Employees

Company Name

Short answer text

Company working in the field

- Less than one year
- 1-2 Years (Junior)
- 3-5 Years
- + 5 Years

Type of organization is a

- Local Company
- Startup Company (International or Local) * Startup: Software product being built
- Outsourcing / Offshoring company
- Government (i.e. Ministries)
- NGO's (i.e. Municipality, university...)

Employers' Gender

- Male
- Female



-----**Technical Questions**-----

Please answer each question below with one of the options below

Graduates can work and adopt easily JavaScript or Python

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates can work and adopt easily CSS/HTML

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates can work and adopt easily AWS, Google Cloud, Microsoft Azure, or Heroku App.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates can work and adopt easily: React JS, Angular JS, Vue JS, jQuery, TypeScript, NodeJS or Express JS.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates can work and adopt easily the RDBM like Mysql/Postgres/SQLite

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates can work and adopt easily NoSQL DBs MongoDB.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates can work and adopt easily with Git repositories like GitHub, Bitbucket, or private source control provider

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates can work and adopt easily platforms designed to help build, share and run the modern applications like Docker, or Kubernetes

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates can work and adopt easily Linux environment development for at least 2 projects?

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates are following the latest development technologies and best practices.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates know how to debug a bug and fix it

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates know and practiced on latest development methodologies for example Agile, Programming Scrum, or Kanban

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- Higher Order Thinking/Creative Thinking -----

Please answer each question below with one of the options below

Graduates can solve problems and they are trained in problems solving practices

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates do negotiations related to work, offers, or problems during daily work activities

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

University taught graduates negotiation

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates suggest solutions and have advanced thinking skills

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates, do assume, search and implement solutions and they imagine the results.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates are details oriented when they write code, fix bugs, and write/give reports

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- Personal Skills -----

Please answer each question below with one of the options below

Graduates speak and communicate English professionally

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates work within teams easily

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates are clear and frank with themselves and others

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates are accountable

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- Social Skills -----

Please answer each question below with one of the options below

Graduates speak in front of others and communicate ideas without problems

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates work within teams and they adopt new work environments quickly

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates are not shy to introduce themselves professionally and build networks always

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates motivate others and they get motivated by others

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduate's performance alone is better than working within teams

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates are aggressive

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates can develop most of the development tasks assigned to them

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- **Generic Skills** -----

Please answer each question below with one of the options below

Graduates share information with other peers

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates think creatively

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates communicate their ideas without additional clarification

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates are usually taking time to analyze their information/ideas before sharing

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates have no difficulty working with other cultures.

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Part Two : Learning during the Computer-related studies degree /curriculum

----- Self-Perceived Skills -----

Please answer each question below with one of the options below

Usually graduates can pass employment/training interviews

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates solve Job requirements (exams and tasks) successfully

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates recognize they don't know how to develop a software

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates do not quantify objectively their competences against salaries

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates underestimate their needs for improvement

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Graduates are over confident to get hired for the software development opportunities as their background and study is strong enough

- Strongly Disagree
- Disagree
- Normal
- Agree
- Strongly Agree
- N/A

Skills Importance

Please score the importance of every skills If total skills importance weight is equal to 100%.

For example:

Technical skills = 40% Higher Order Thinking/Creative Thinking = 10%, Personal Skills = 20%, Social Skills = Not Applicable (N/A), Generic Skills = 10%, self-perceived skills = 10%

Technical %

Your answer _____

Higher Order Thinking/Creative Thinking %

Your answer _____

Personal Skills %

Your answer _____

Social Skills%

Your answer _____

Generic Skills %

Your answer _____

Self-perceived skills %

Your answer _____

To what extent are you satisfied with the university graduate's employability skills?
____ out of 100 (for example 20 out 100, 90 out 100).

Your answer _____