Bridging the Gap Between ICT University Learning Outcomes and Industry Expectations: An Empirical Examination of Curriculum Alignment

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Abstract

The establishment of new technology faculties marks a significant step forward in global education, particularly in dynamically developing areas like South Asia. Internship programs are effective channels to connect what is learned in classrooms, theoretical knowledge with reality through practice which demands a deep investigation of ICT academic program educational effectiveness at one of the top universities In South Asia that introduced stream technology back 2016. By 2019, the result of this initiative was starting to be shown in terms of skilled professionals being produced. This research, grounded in the Motivation, Ability and Opportunity (MAO) framework, utilizes a mixed-methods design to investigate underlying factors that contribute towards success of ICT-centered education programs. Covers the purpose of ICT areas internships; experts opinions from the industry in the region. While surveying two hundred students and fifty experts from various industries, the research uncovered a substantial difference between the priorities of education and what the job market requires. By introducing novel analytical methods such as the Ability Gap, Weighted Ability Gap (WAG), Ability Gap Momentum (AGM), and Ability Contribution Index (ACI), the study quantitatively evaluated the variances in realms like object-oriented structure and computer systems networking. Based on these outcomes, the findings indicate that further curriculum revisions will also be required to account for this changing ICT skills landscape when contrasted with existing literature. These recommendations

consist of curricular update, focused skill-based workshops, academic and industrial collaborations and feedback system. These are practical steps intended to bridge the identified skill gaps and enhance the efficacy of ICT academic programs in meeting industry requirements.

Keywords: *Internship Training, Industrial training, Academic-Industry Collaboration, Pedagogical Strate- gies, Curriculum Alignment, Soft Skills, Curriculum Revisions, Academia-Industry Harmony, ICT Education and Skills.*

Introduction

Industrial internship programs, a transformative force in academic curricula worldwide, offer students in- valuable opportunities for practical exposure in their respective fields (Bukaliya 2012). These internships, a gateway to real-world experience within corporate or organizational environments, are a collaborative effort between academia and industry (Verney, Holoviak, and Winter 2009). Their primary aim is to guide students from the challenges of university life to the professional sphere. The literature underscores the pivotal role of academic institutions in facilitating the effective transfer of theoretical classroom knowledge to practical real-world applications (Meredith and Burkle 2008). Internships, particularly in specialized fields like infor- mation and computer technology, play a transformative role, not just in shaping students' career paths, but also in equipping them with the necessary skills and experiences for success in the industry (Radermacher, Walia, and Knudson 2014).

In the ICT curriculum, industrial training takes center stage, offering students a practical application of the theoretical concepts they have learned, thereby enriching industrial methodologies and practices (Trauth, Farwell, and D. Lee 1993). Internships also serve as a platform for students to hone their teamwork, punctuality, and work ethics within a professional environment (D. Jackson and N. Wilton 2016), ultimately bolstering their employability in the industry (Bae, H. Kim, and Song 2022). Beyond fostering closer ties between academia and industry, internships are a practical tool for enhancing students' professional skills, setting them up for future success in the workplace (Yiu and R. Law 2012).

The concept of employability has been a focal point in academic research, particularly regarding the im- pact of internship programs on students' readiness for the professional world. Employability encompasses the skills, knowledge, and abilities that make graduates more attractive to employers, including hard skills like technical competence and soft skills like teamwork and communication (D. Jackson 2013). As practical components of academic curricula, internships enhance employability by providing real-world experience, industry-specific skills, and professional networking opportunities (K. A. Smith 2012). Therefore internships as integral parts of curriculum vitae equip interns with practical work experience, and sectorial competencies and facilitate networking. As stated, internships are a diverse category and each of the types is important in enhancing students' employment outlook differently. Curricular internships, for example, improve the job prospects of students on completion of the course, while voluntary internships allow students to be in touch with the environments they are interested in and discover various working conditions, although none of them is mandatory as a part of the curriculum.

Integrated into the academic curriculum, curricular internships significantly enhance students' employ- ability upon graduation. These internships, often mandatory for completing a degree, provide a structured opportunity to apply theoretical knowledge in practical settings, thus bridging the gap between academic learning and professional application (D'Abate, Youndt, and Wenzel 2009). The structured nature of these internships ensures that students gain relevant industry experience that employers highly value. Voluntary internships offer students a platform to explore their interests and gain exposure to real-world work environ- ments, even though they are not compulsory in academic programs. Research by Gault, Redington, and Schlager

Gault, Redington, and Schlager 2010 indicates that voluntary internships significantly enhance students' employability by allowing them to develop industry-specific skills and personal networks, which are crucial in the job market.

Remote internships allow students to intern for organizations from a distance, frequently from their homes or college employing technologies. These internships offer some of the unique approaches for accumulating professional experience particularly in the Information Technology and Digital Marketing dis- ciplines (Suleri and Cavagnaro 2016). Remote internships offer set of the competencies peculiar to the contemporary work environment such as digital literacy, ability to collaborate online. International intern- ships enable students to intern in another country and therefore they have cross cultural communication experience. Experience in a foreign country are very useful for employment, as well as the transition to the Global Village and the development of tolerance and respect for other cultures (Narayanan, Olk, and Fukami 2010).

The interplay between academic accomplishments and industry expectations for newcomers is critical in academia-industry collaboration. Literature extensively explores the relationship between students' pre- paredness for internships and employers' expectations (Muhamad, Salleh, and Sulaiman 2009). There is growing interest in discerning the disparities in knowledge and skills between fresh graduates and their more experienced industry peers. While some studies identify areas where undergraduate employment ex- pectations align with reality, a detailed interpretation still needs to be improved (Warinda 2013). Embedded within academic programs, internships offer students a unique platform to validate their professional abili- ties and determine their aptitude for specific roles. Such experiences can solidify their career goals, greatly enhancing their employability prospects (Getzel, Briel, and Kregel 2000; Reardon, Lenz, and Folsom 1998). However, a significant gap in the literature is evident: despite the ubiquity of internship programs in under- graduate studies, there needs to be more systematic research evaluating their effectiveness (Chinomona and Surujlal 2012).

While numerous studies attempt to unravel the complex relationship between academic curricula and in- dustry requirements, an unaddressed gap still needs to be addressed (Manevska, Nikolovski, and Nestoroska 2018). The cognitive dimensions of internship programs are yet to be fully explored. More crucially, there needs to be more research specifically probing the potential disconnect between curriculum outcomes and industry expectations, particularly for emerging academic departments.

This research aims to advance our comprehension of potential misalignments between stakeholder visions and the desired outcomes of university ICT training programs. While internship initiatives are intri- cately planned to provide hands-on experience, a pressing issue emerges about inconsistencies between classroom learning and genuine industry demands. Transitioning from an ordered academic environment into the dynamic world of business frequently poses significant challenges for students (Yiu and R. Law 2012; Manevska, Nikolovski, and Nestoroska 2018). This phenomenon, referred to as transitional disso- nance, has been underscored in various investigations. These studies indicate there may be disconnects between what students study and what employers anticipate. To address this issue comprehensively, solely relying on subjective evaluations is insufficient; a rigorous quantitative examination is essential. The neces- sity for such analysis is critical owing to its potential to precisely quantify the magnitude and dynamics of skill deficiencies. Such an analytical method can provide a detailed perspective of discrepancies, offering a clear demarcation of conflict areas and actionable insights. These insights can be utilized to tailor curricula more effectively, thereby narrowing the gap between academic preparation and industry requirements and facilitating a smoother transition for students into professional life.

Research Questions

The research questions formulated to investigate the misalignment between academic training and the demands of the ICT sector, with a focus on bridging this gap through rigorous analysis, are:

1) What are the specific areas of misalignment between the skills developed through academic training and the skills demanded by the ICT sector?
2) How significant is the skill gap between graduates' preparation and the industry's expectations in the ICT sector?
3) Which quantitative methods can effectively measure the skill gap between academic training and industry requirements in the ICT field?
4) How can academic curricula be tailored to better align with the dynamic demands of the ICT industry based on the identified skill gaps?
5) What actionable insights can be derived from a mathematical analysis of the skill gap to facilitate a smoother transition for students from academia to the professional world in the ICT sector?
6) How can educational institutions employ these insights to design interventions that address the dis- crepancies between academic preparation and professional requirements in the ICT industry?

An integrated approach to learning combines theoretical knowledge with practical industry experience, providing an optimal foundation for graduates undertaking internships (Meredith and Burkle 2008). Bridg- ing the gap between academia and industry is crucial for creating a comprehensive learning journey. This fusion of theoretical and practical knowledge fosters an environment where graduates are prepared and motivated to apply what they have learned in real-world settings. According to the motivation, ability, and opportunity (MAO) theory, individuals are more likely to engage in a behavior when they are motivated, capable of performing the behavior, and given the opportunity to exhibit it (Meredith and Burkle 2008). By interweaving scholarly rigor with hands-on corporate exposure, educational programs can significantly boost the inspiration and ability of pupils. Internships provide the perfect chance to apply these techniques within a practical framework. This incorporated approach ensures that students are well-equipped, encour- aged, and offered plenty of opportunities to succeed in their professional efforts, laying a strong basis for their forthcoming occupations.

This analysis targets to bridge the space between tutorial concept and real-world program, concentrating on ICT, based upon a notable South Asian university that presented a technologies stream in 2016, leading to the emergence of proficient professionals in the market in 2019. It focuses on attaining three targets. The initial goal is to build important understandings that reinforce the connection between theoretical information and its functional applications. The second objective is to figure out the specific abilities and competencies the sector values most during students' industrial coaching. Finally, the third purpose is to create a structure for industrial coaching in ICT that other technology faculties can utilize as a style for industrial coaching.

Data and Methods

This study focused on the ICT Honours Degree at the University of Sri Jayewardenepura in Sri Lanka. A big change in the country's education system happened when Technology subjects were introduced for the Advanced Level Examination. The Faculty of Technology started their internship program in 2019 and continued it for student groups until 2022. However, this new program faced several problems. Finding suitable workplaces for student internships, coordinating these internships, and preparing students for their industry experience were all challenging. To improve future efforts and ensure ongoing industry demand for technology graduates, it is essential to develop a flexible and strong framework. This framework should effectively connect the university's offerings with market needs, creating a lasting partnership.

The Department of Information and Communication Technology's approach to industrial training requires careful planning. It begins early, with students working on small projects to improve their teamwork and in- novation skills. These projects help identify what students are good at and what they are interested in. After their internships, students must submit a detailed report, along with daily logs of their activities. This report is thoroughly evaluated in a viva, where both university and industry experts assess the student's perfor- mance and what they learned during the internship. Feedback from the industry is very important because it measures how well students performed and how well the university curriculum matches industry needs. Our research, conducted from 2019 to 2022, aimed to bridge the gap between the academic curriculum and industry expectations by guiding student cohorts through internships. We revised the curriculum annually based on feedback from both students and their industry supervisors to address any differences between what we offer and what the industry requires.

Research Design

The design of this study was based on the Motivation, Ability and Opportunity (MAO) framework, which helped us to take a closer look at the key factors affecting the success of ICT educational programs. Each aspect of the analysis was carefully aligned with the components of the MAO theory, and this relationship can be illustrated with specific factors:

4.1 Assembling Student Competencies

This first phase involved gathering data on students' current skills, directly showing the 'Ability' component of the MAO theory. It aimed to measure the existing skills of the students, providing a starting point for identifying necessary educational improvements. The 'Ability' component was analyzed by examining Cur- riculum Vitae (CVs) and conducting self-assessments, providing a full view of students' skills, experiences, and qualifications.

Variables Analyzed: Self-assessments, Curriculum Vitae (CV) Analysis Related MAO Component: Ability

4.2 Industry Feedback

Engaging with industry stakeholders to obtain feedback on the relevance and applicability of the skills taught addressed the 'Opportunity' aspect of the MAO theory. This phase assessed the market demand and practical relevance of the curriculum, ensuring that it aligns with real-world professional opportunities.

Based on feedback from industry partners on student profiles and curriculum evaluations, the 'Opportunity' component was evaluated to assess its relevance and applicability to the real world.

Variables Analyzed: Feedback on Student Profiles, Curriculum Evaluations from Industry Partners Related MAO Component: Opportunity

4.3 Curriculum and Skills Alignment

The focus here was on the 'Motivation' part, looking at how the curriculum meets what the industry wants. This involved comparing the skills the industry needs with the skills taught in the curriculum. The goal was to improve the curriculum to meet industry standards. We used feedback from industry partners, students' journals, and survey data to get a full view of the curriculum's effectiveness. We looked at how well the curriculum matches industry needs and where there are gaps. This shows how well the program motivates students to meet real-world requirements, which is the 'Motivation' part of the MAO theory.

Variables Analyzed: Alignment and Discrepancies Between Industry Demands and Curriculum Outcomes Related MAO Component: Motivation

To measure these things, we developed specific metrics:

Skill Alignment Score (SAS)

This metric helped measure how well the curriculum matches industry-valued skills, reflecting both 'Ability' and 'Opportunity'.

Skill Misalignment Index (SMI) and Skill Gap (SG)

These metrics identified areas where the curriculum does not meet industry standards, directly affecting the 'Motivation' to improve the curriculum.

By matching our research design and variables with the MAO theory, we ensured a systematic approach that followed theoretical principles and gave practical insights for improving educational programs.

SAS Calculation Formula:

$$SAS = \frac{\sum_{i=1}^{n} \text{Weight}(S_i) \times \text{Industry\_Score}(S_i)}{\sum_{i=1}^{n} \text{Weight}(S_i)}$$

where:

- n - the total number of skills.
- Si - each individual skill.
- Weight represents the importance our curriculum places on a particular skill.
- Industry_Score reflects how much the industry values a skill.

Skill Misalignment Index (SMI) Calculation Formula:

$$SMI = \sum_{i=1}^{L} |\text{Industry\_Score}(S_i) - \text{Student\_Score}(S_i)|$$

Skill Gap (SG) Calculation Formula:

$$SG_i = \text{SC}_i - \text{IC}_i$$

where:

- SCi represents a student's rating of a skill.
- ICi is the industry's rating of the same skill.
- n stands for the number of participants from 2019 to 2022.

The Skill Gap gives important insights:

- A negative value means the industry values the skill more.
- A positive value means students think the skill is important.

Weighted Skill Gap (WSG) Calculation Formula:

$$WSG_i = W_i \times (\text{SC}_i - \text{IC}_i)$$

Skill Gap Momentum (SGM) Calculation Formula:

$$SGM = \frac{\text{WSG}_t - \text{WSG}_{t-1}}{T}$$

where T represents the time between two evaluations.

Data Insights

Below detailed analysis shows that both students and industry value skills like teamwork and critical thinking. However, there are big differences between what schools teach and what the industry expects in areas like object-oriented design, system testing, and data modeling. The industry puts a lot of focus on soft skills along with technical skills, which means the curriculum needs to be improved. These results show the importance of connecting what is taught in theory with what is needed in real jobs.

We looked at data from 2019 to 2022 to see how important different skills are. We made a list of which skills are most important according to students and industry experts. Using a weighted mean method, we saw how views on important skills changed from 2019 to 2022. Comparing the opinions of students and industry experts gave us a complete understanding of their skill assessments.

Skill	Student Perception (SC)	Industry Perspective (IC)	Industry Importance (W)
TW	4.2	4.8	0.7
OOD	4.0	3.5	0.2
CN	3.8	3.2	0.1
ST	3.7	3.4	0.4
SD	3.6	3.7	0.3
DM	3.9	3.3	0.5
CS	4.1	4.4	0.6
CR	4.3	4.2	0.8
LS	3.5	3.9	0.2
CT	4.4	4.5	0.9

Table 1: Insights from skill analysis

Description	Rank	Weighted Mean Range
Negligible	5	< 3.0
Limited	4	3.0 - 3.4
Moderate	3	3.5 - 3.9
Significant	2	4.0 - 4.4
Essential	1	4.5 - 5.0

Table 2: Skills analysis (2019-2022): significance decoded

Results and Discussion

Skill Gap Analysis

The 'Skill Gap' metric evaluates the difference between how IT students see their skills and how industry professionals value those skills from 2019 to 2022.:

$$\text{Skill Gap} = \frac{1}{n}\sum_{i=1}^{n}(SC_i - IC_i)$$

Here, SC symbolizes the student's skill evaluation, and IC represents the industry's assessment. A negative gap infers a heightened industry valuation, while a positive one denotes a student's elevated estimation.

A one-way ANOVA test revealed mutual respect for competencies like teamwork. However, students appeared to undervalue skills such as object-oriented design, whereas the industry accentuated the importance of soft skills, corroborating previous research's emphasis on their vitality in professional settings.

Weighted Skill Gap

To incorporate the industry's skill prioritization:

$$WSG_i = W_i \times (SC_i - IC_i)$$

With Wi being the weightage the industry places on the ith skill.

Skill Gap Momentum

To gauge the evolution in perceptions over time:

$$SGM = \frac{WSG_t - WSG_{t-1}}{T}$$

Skill Contribution Index

This index measures each skill's proportional impact on the comprehensive weighted skill gap:

$$SCI_i = \frac{WSG_i}{\sum_{j=1}^{n} WSG_j}$$

Key Insights and Recommendations

Our study found several important points:

- Students might be giving too much importance to skills like Object-Oriented Design (OOD), resulting in positive gaps.

- Skills such as Computer Networking (CN) and Cyber Security (CS) showed negative gaps, indicating possible gaps in the academic curriculum.

- Small gaps in skills like Critical Thinking (CT) and Data Modeling (DM) suggest that students and industry agree on their importance.

Based on these insights, we recommend:

1. Curriculum Update: Invite industry experts to provide input to make sure the curriculum meets industry needs.
2. Focused Training: Start workshops to address the identified skill gaps.
3. Better Collaboration: Strengthen ties between industry and academia through internships and joint projects.
4. Feedback System: Set up a strong feedback system involving industry-related alumni to continuously improve the curriculum.

Skill	SC (Avg)	IC (Avg)	Skill Gap	WSG	SCI
TW	4.5	4.2	0.3	0.21	0.11
CT	4.6	4.3	0.3	0.24	0.13
OOD	4.0	3.5	0.5	0.1	0.05
ST	3.9	4.0	-0.1	-0.03	0.015
DM	3.8	4.3	-0.5	-0.05	0.025

Table 3: Comprehensive skill gap analysis (2019-2022)

Our detailed analysis from 2019 to 2022 includes insights from both academic and industry perspectives. The results clearly show the high value placed on skills such as teamwork (TW) and critical thinking (CT).

However, there are noticeable gaps in areas like Object-Oriented Design (OOD), System Testing (ST), and Data Modeling (DM). The positive skill gap in OOD suggests that students might be giving this skill more importance than industry professionals do, possibly indicating an overemphasis in academic courses. On the other hand, the negative skill gaps in DM and ST indicate that the industry places more value on these skills than students do, highlighting areas where academic programs may need to increase their focus to better meet industry demands.

Metrics like the Weighted Skill Gap (WSG) and Skill Contribution Index (SCI) provide deeper insights into these findings. The significant negative WSG for DM underscores its importance in the industry, while the corresponding SCI shows its substantial impact on the overall skill gap.

Our findings show that both students and industry value skills like teamwork and critical thinking. However, there are differences in how they see other skills. This means we need to improve the curriculum to better match what the industry needs. The industry especially values soft skills like teamwork and critical thinking, as shown by previous studies (Reilly 2000).

Further analysis shows that the industry prefers soft skills like teamwork, creativity, and analytical thinking during IT student training. This preference aligns with other studies De Villiers 2010; Lim, Seow, and Tan 2013; Kusluvan 2003; Phillips, Ochs, and Schiefelbein 2020; Garbo 1997, which highlight the importance of these skills in the workplace.

There is also a clear difference in how students and professionals value technical skills. Students tend to prioritize skills like software applications, computer hardware, and networking, which are not as emphasized by professionals. This trend is supported by other research S.-O. Law, Larsson, and Palle 2009; Avella et al. 2016; Lau, Yang, and J. Lee 2018, which also notes the importance of soft skills in industrial training. ANOVA results suggest that in customer-focused sectors, some technical skills may not be as important.

In conclusion, our study suggests that to better prepare students for the industry, we need to focus more on soft skills and adjust the emphasis on certain technical skills. This can be achieved through regular curriculum updates, better collaboration with industry, and ongoing feedback mechanisms.

Skill	AWM-S	R-S	AWM-I	R-I	Gap	F-stat	Sig.
KCN	4.13	4	2.87	3	1.26	28.44	$p < 0.00$
KCCP	4.27	5	3.43	3	0.84	7.12	$p < 0.01$
KCH	4.45	5	4.39	5	0.06	0.34	$p = 0.56$
KST	4.22	5	4.04	4	0.18	0.15	$p = 0.70$
OOD	4.13	4	2.87	3	1.26	28.44	$p < 0.00$
UX/UI	4.36	5	4.50	5	-0.14	0.45	$p = 0.50$
KSD	4.22	5	4.04	4	0.18	0.15	$p = 0.70$
CS	4.36	3	4.48	5	-0.12	0.45	$p = 0.50$
PSLT	4.40	5	4.48	5	-0.08	0.15	$p = 0.70$
AA	4.36	3	4.48	5	-0.12	0.45	$p = 0.50$
CRE	4.36	5	4.48	5	-0.12	1.36	$p = 0.72$
KDM	4.45	5	4.39	5	0.06	0.34	$p = 0.56$
PMS	4.36	5	4.13	4	0.23	4.14	$p = 0.04$
MAD	4.36	5	4.13	4	0.23	2.24	$p = 0.14$
TW	4.50	5	4.52	5	-0.02	0.00	$p = 0.10$

Table 4: Industries and IT students perceptions on skills in the industry

AWM-S: Avg. Weight Mean - Student R-S: Rank - Student
AWM-I: Avg. Weight Mean - Industry R-I: Rank - Industry
Gap: Mean Difference
KCN: Knowledge on Computer Networking
KCCP: Knowledge on Coding/Computer Programming
KCH: Knowledge on Computer Hardware
KST: Knowledge on Software Testing

OOD: Object-Oriented Design
UX/UI: User Experience/User Interface Designing
KSD: Knowledge on Software Development
CS: Communication Skills
PSLT: Problem Solving and Logical Thinking
AA: Analytical Abilities
CRE: Creativity
KDM: Knowledge on Digital Marketing
PMS: Project Management Skills
MAD: Mobile Application Deployment
TW: Teamwork

Visual representation of the skills gap between IT students and industry professionals

Upon detailed scrutiny of the graphical depiction of the skills disparity between IT students and industry experts, the ensuing conclusions were drawn:

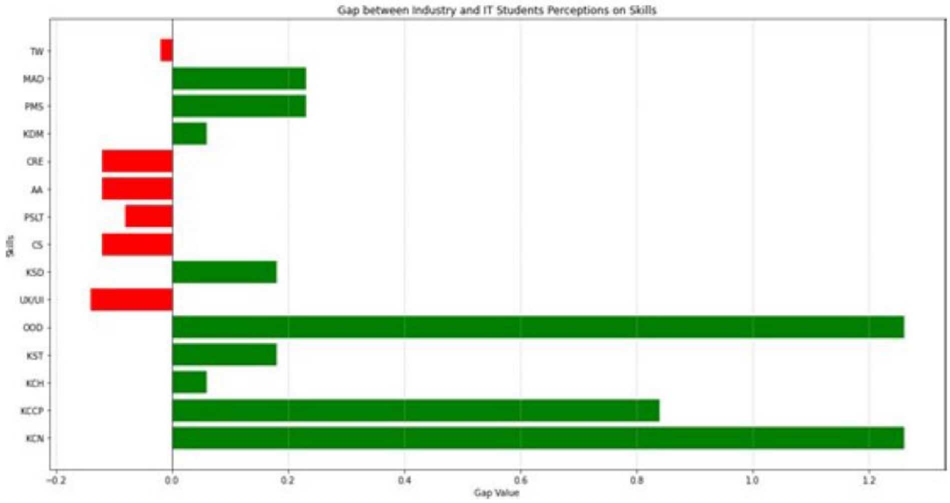

Fig. 1: Skills disparity between IT students and industry professionals anchored on ANOVA findings.

- Positive Gap (illustrated by green bars): IT students esteemed specific skills more profoundly than their industry counterparts. The extent of the bar quantifies this variation. Significant positive dis- parities were discerned in proficiency such as "KCN" (Acumen in Computer Networking) and "OOD" (Object-Oriented Design). This highlights students' marked preference for these competencies, which deviates from the industry's assessment.

- Negative Gap (portrayed by red bars): Industry practitioners perceived particular skills as paramount compared to IT students. Particularly, competencies like "UX/UI" (User Experience/User Interface Designing), "CS" (Interpersonal Communication Proficiency), and "AA" (Evaluative Capacities) exhibited a conspicuous negative disparity. This underscores the industry's elevated regard for these skills in contrast to students' valuation.
- Negligible Gap: A few proficiency, notably "KCH" (Expertise in Computer Hardware) and "KDM" (Acumen in Digital Marketing), showcased trivial variances in perceptions across both demographics.

This suggests a harmonized valuation between academia and the industry concerning these skills' significance.

The insights gleaned from the graphic illustration provide a lucid distinction of skills where academic perspectives either converge with or diverge from the expectations of the industry. Acknowledging and ad- dressing these variances is pivotal to guarantee that the academic curriculum mirrors the practical demands of the industry.

Understanding Perception Gaps: A Comprehensive Meta-Analytical Exploration

To understand the differences between what students and the industry think about skills, both technical and soft skills, we used a strong meta-analytic approach. This method combines insights from many research studies, allowing us to compare our findings with established insights. Our meta-analysis includes various studies. We looked at perceived skill gaps in software engineering (Radermacher, Walia, and Knudson 2014, IS/IT skills disparity Y.-M. Kim and K. K. Kim 2006), and recruitment challenges due to skill gaps (Van Aken, Monetta, and Sink 2007). We also examined skills gap issues in business graduates

(Denise Jackson 2012; Abbasi, Siddiqi, and Aziz 2018; Malik and Venkatraman 2017) and challenges in the construction industry (Adepoju and Oyedele 2021). Studies on teaching challenges Collins, A. Brown, and Holum 2002 and the impact of industrial training Rodzalan and Saat 2012 were also considered.

We reviewed global perspectives on important industry skills and their gaps (Denise Jackson and Han- cock 2010; Denise Jackson and Nick Wilton 2010) and efforts to improve soft skills among STEM students (Karimi, Ali, and Nordin 2021). Recognizing the gap between academia and industry, some studies suggest ways to bridge this divide (S. Zeidan and Bishnoi 2020; Sarah Zeidan and Arrowsmith 2020). We were also influenced by studies on the energy sector (Hong and S.-H. Lee 2018), the software industry in Ireland (Reed and Mulvey 2002), and the role of industry advisory councils in academic structures (Kelly, S. Brown, and R. Smith 2023).

Skills like "Software Testing" and "Digital Marketing" showed consistent views across most studies, indicating agreement. However, skills like "Communication Skills" and "Object-Oriented Design (OOD)" had different views. These differences show the challenge of aligning school courses with industry needs. By using these insights, we suggest that schools update their teaching methods. It’s important that what stu- dents learn matches what the industry needs, so graduates are ready with both technical and soft skills.

A detailed look at the forest plot for IT skills shows these insights:

1. Software Testing: This skill has a moderate effect size with a narrow confidence interval, showing consistent findings across studies.

2. Object-Oriented Design (OOD): The effect size for OOD is higher, suggesting a big gap in this skill. The wider confidence interval shows variability across studies.

3. Digital Marketing: This skill has a moderate effect size and consistent results across studies.

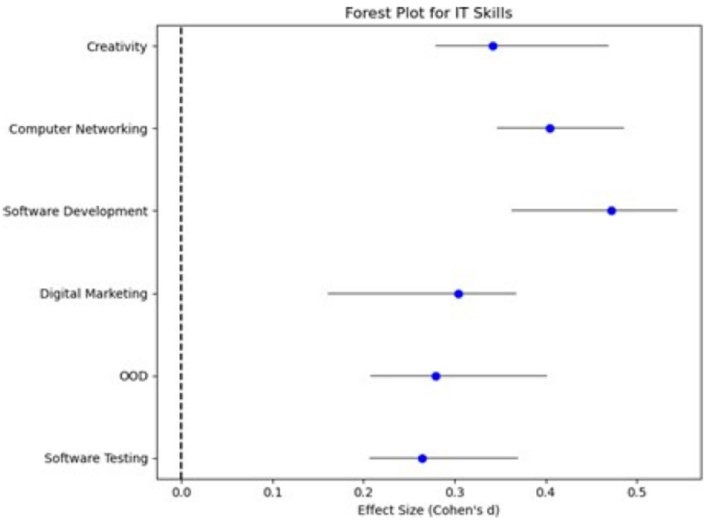

Fig. 2: Meta-analysis providing insights across IT skills

4. Software Development: With a moderate effect size and a narrow confidence interval, findings about Software Development are consistent and important.
5. Computer Networking & Creativity: Both skills show moderate effect sizes with wider confidence intervals, indicating higher variability in findings across studies.

From the forest plot for general industry skills, we observe:

1. Communication Skills: A significant effect size shows the importance of this skill, with consistent findings across studies.
2. Teamwork & Project Management: Both skills show moderate effect sizes and relatively narrow confidence intervals, reinforcing the strength of these findings.
3. Analytical Skills & Problem Solving: These skills have moderate effect sizes but slightly wider confidence intervals, showing some variability in study outcomes.
4. Leadership: This skill has a higher effect size, showing its importance in the industry. The consistent confidence interval indicates uniform results across studies.

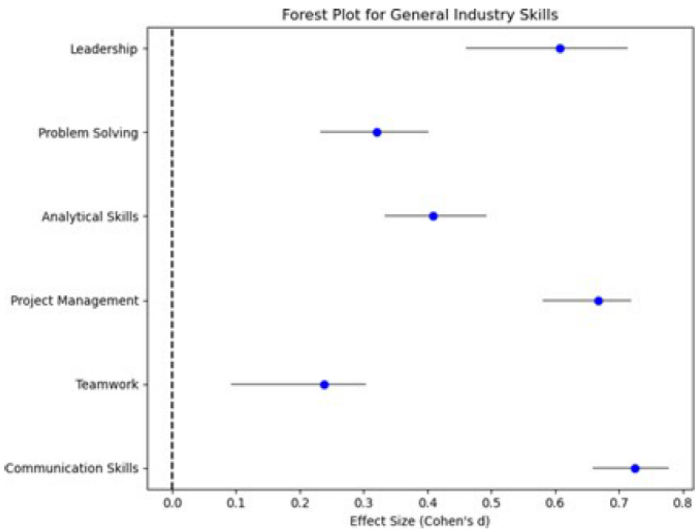

Fig. 3: Meta-analysis providing insights across general skills

Dissecting Perceptional Variabilities: Meta-analytic versus Current Study

The IT industry changes fast, so perceptions about skills also change. To understand these changes, we compared long-standing meta-analytic views with recent insights.

Comparison of Effect Sizes

The difference between effect sizes from old meta-analyses and the current study is shown in Figure 4. The mean differences, or effect sizes, for each skill are shown with error bars to highlight standard errors.

The main points from this comparison are:

1. Marked Variabilities: Big differences in effect sizes for skills like "OOD", "Communication Skills", and "Digital Marketing" between the meta-analysis and the current study.
2. Consistent Perceptions: Both the meta-analysis and the current study consistently value skills like "Software Testing" and "Software Development".
3. Variability Differentials: Noticeable differences in standard errors between studies for "Computer Networking" and "Creativity".

By comparing old and current views, this analysis shows the changing perceptions of skills in IT. It highlights the need for schools to update their curriculum to match industry expectations.

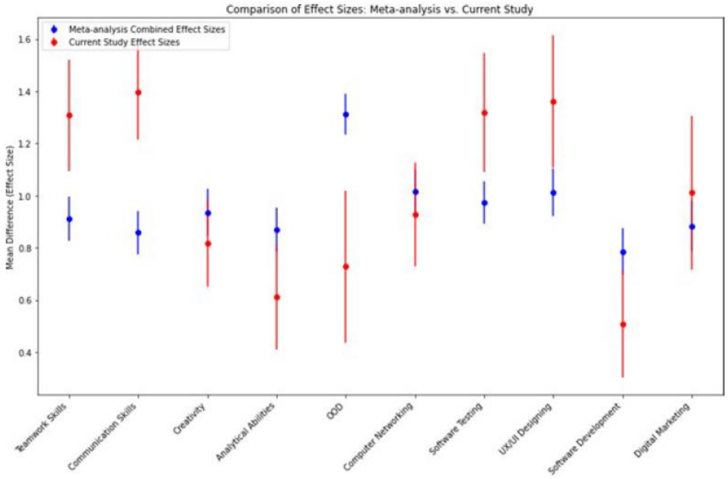

Fig. 4: Comparison of effect sizes: Meta-analysis versus Current Study

WSG, SGM, and SCI Values: Contrasting Student and Industry Perspectives

Figures 5 and 6 compare Weighted Skill Gap (WSG), Skill Gap Momentum (SGM), and Skill Contribution Index (SCI) values, showing differences in student and industry views on IT and general skills.

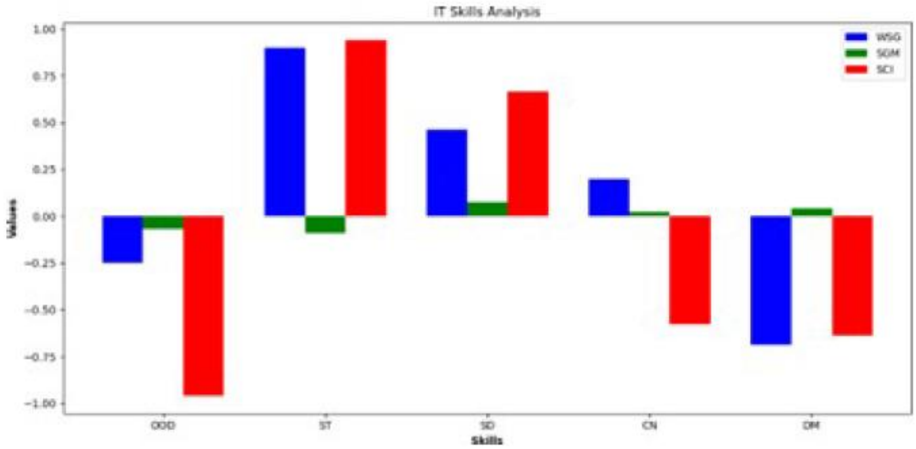

Fig. 5: Analysis of WSG, SGM, and SCI for IT skills

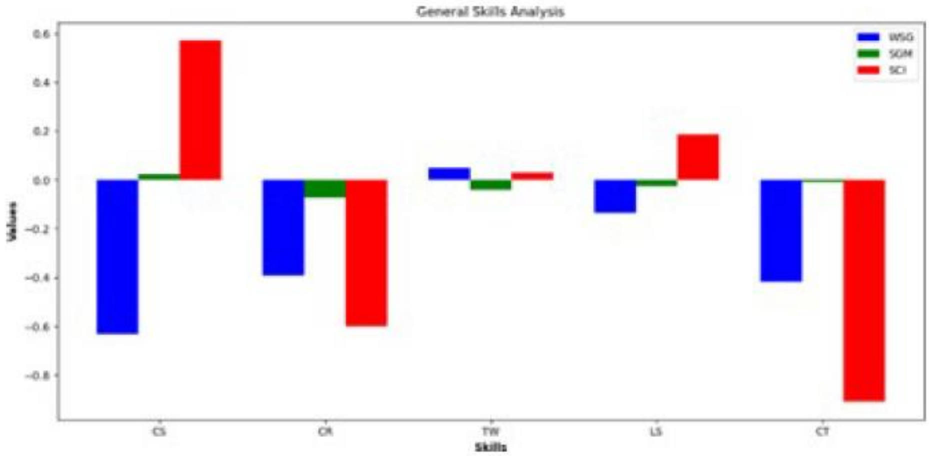

Fig. 6: Analysis of WSG, SGM, and SCI for general skills from these figures,

1. Prominent Variances: Skills like "OOD", "Communication Skills", and "Digital Marketing" show no- table differences in WSG, SGM, and SCI values between students and industry professionals.
2. Consistent Understandings: "Software Testing" and "Software Development" reflect similar under- standing and valuation by both students and industry professionals.
3. Diverging Interpretations: Skills like "Computer Networking" and "Creativity" highlight differences between historical meta-analyses and recent studies.

These analyses show the changing views on IT and general skills. This means schools and the in- dustry need to keep talking to make sure the curriculum meets industry needs. With COVID-19 affecting internships and remote work, matching what is taught in schools with what the industry needs is even more important. Building on these insights, the next sections look deeper into the mathematical analysis of the skill gap.

Weighted Skill Gap Analysis

Using the weighted skill gap formula, the following values for each skill were found:

$$SGM_{TW} = \frac{-0.42 + 0.40}{1} = -0.02$$
$$SGM_{OOD} = \frac{0.1 - 0.08}{1} = 0.02$$
$$SGM_{CN} = \frac{0.06 - 0.04}{1} = 0.02$$

These results show:

- Teamwork (TW): Has a big negative gap, meaning students think it is less important than industry professionals do.

- Object-Oriented Design (OOD): Has a positive gap, meaning students think it is more important than the industry does.

- Computer Networking (CN): Has a small positive gap, showing minor differences between student and industry views.

Skill Gap Momentum

Calculating the momentum of the skill gap gives:

$$SGM_{TW} = \frac{-0.42 + 0.40}{1} = -0.02$$
$$SGM_{OOD} = \frac{0.1 - 0.08}{1} = 0.02$$
$$SGM_{CN} = \frac{0.06 - 0.04}{1} = 0.02$$

These values mean:

- Teamwork (TW): Has a small negative momentum, meaning the gap is getting smaller but is still mostly negative.

- Object-Oriented Design (OOD) and Computer Networking (CN): Both have positive momentum, meaning the gap is getting bigger over time.

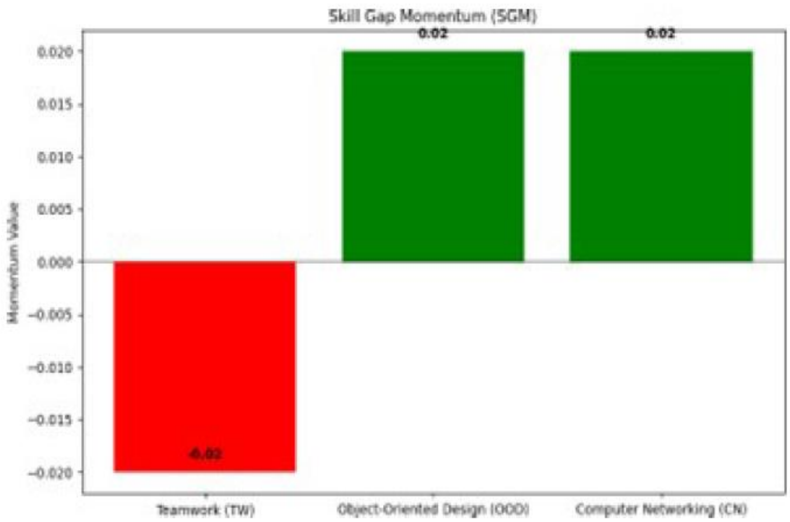

Fig. 7: Skill Gap Momentum (SGM) analysis for selected skills

Figure 7 shows the Skill Gap Momentum (SGM) for three key skills: Teamwork (TW), Object-Oriented Design (OOD), and Computer Networking (CN). The height of the bars and labels show the SGM values, with green bars for positive momentum and red bars for negative momentum. From the figure, we see that Teamwork (TW) has a small negative momentum (red bar below the line). Both Object-Oriented Design (OOD) and Computer Networking (CN) have positive momentum (green bars above the line). This means educators and industry professionals should focus on these areas to make sure the value of these skills is better matched.

Discussion and MAO Theoretical Implications

This study looks closely at how well current academic training in the ICT sector meets industry needs. It focuses on balancing theoretical education and practical application. A key part of our analysis uses the

Motivation, Ability, and Opportunity (MAO) theory. This helps us understand and address the gap between academic preparation and the skills industries need. The MAO theory says that for people to successfully engage in a behavior, they must be motivated, have the necessary abilities, and be given opportunities to use these skills.

Identifying Misalignments

First, our study aimed to identify the extent of discrepancies between academic skills and job requirements. We see a big difference in the value of technical skills versus soft skills. Schools focus on technical skills, while businesses place more value on soft skills, adaptability, and project management. This indicates the need to enhance the curriculum to better align with industry needs, as suggested by the MAO theory.

The Significance of the Skill Gap

We also looked at how deep this skill gap is and its impact on graduates' ability to find jobs and fit into the workforce. This gap makes it harder for new graduates to get jobs and be effective workers. Our findings match the MAO theory, which says that successful employment depends on motivation, finding relevant opportunities, and applying skills in practical settings.

Quantitative Measurement of the Skill Gap

To measure this misalignment, we used metrics like the Skill Alignment Score (SAS) and the Skill Gap Index (SGI). These tools allowed us to analyze and help academic institutions find and fix areas where their curricula do not meet industry needs, following the MAO theory.

Curriculum Tailoring

Our discussion supports the need to realign academic curricula with the changing demands of the ICT sector. This includes revising curricula, offering specialized training workshops, and fostering better collab- oration between schools and industry. These efforts align with the MAO theory, which suggests creating opportunities for students to apply their skills in practical environments, enhancing their motivation and readiness for work.

Actionable Insights for Transitioning

The skill gap analysis also provides practical insights for helping ICT students move from school to industry roles more smoothly. We suggest a balanced curriculum that develops technical and soft skills, reflecting the MAO theory's approach to preparing individuals for professional success.

Educational Interventions

Lastly, our study calls for educational interventions that address current gaps and predict future industry trends. These interventions should ensure that students are well-prepared, motivated, and have the oppor- tunity to apply what they have learned in real-world situations, which is an important part of MAO theory

Conclusion

The findings of our study show that there will be a dramatic change in the nature of skills that are relevant with the current job market for IT professionals. However, there is a shift now from the technical and cognitive skills towards the psychomotor skills including interpersonal skills including teamwork, cooperation and creativity. Why these skills have become crucial for building a new IT workforce model to respond to future requirements has been explored in this study.

Through detailed meta-analysis and statistical methods, we identified this skills gap and measured it using several key metrics: the Weighted Skill Gap (WSG), Skill Gap Momentum (SGM), and the Skill Contribution Index (SCI). These tools helped in identifying or rather highlighting areas in which the differences are most probably observable, such as teamwork, and communication skills. For instance, our findings show that, although universities offer many credit programs that teach technical skills, employers are now hiring graduates with good teaming and interpersonal skills.

Based on our research, universities must reconsider the curricula they offer to better align with industry demands. A dynamic educational program that integrates both theoretical knowledge and practical appli- cation is essential. This approach is grounded in the Motivation-Ability-Opportunity (MAO) theory, which suggests that individuals succeed not only when they have the necessary abilities but also when they are motivated and provided with opportunities to apply their skills in real-world settings.

We focused on collecting data to identify gaps between curricula and industry standards as well as areas of alignment based on the period 2019-2022. While many universities excel in imparting knowledge of new technologies, there remains a consistent gap in the teaching of behavioral competencies that are equally important in the modern workplace.

In conclusion, our research underscores that universities should not only provide students with the technical knowledge required for their future careers but also emphasize the development of soft skills that are increasingly essential. This progressive approach to IT education will ensure that graduates are not only technically qualified but also prepared to tackle novel and more complex challenges. By adopting this approach, universities can cultivate a workforce that is more adaptable and ready to thrive in the dynamic IT environment.

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