STAKEHOLDERS FEEDBACK ON THE INDUSTRY-ACADEMIA GAP

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ABSTRACT

This study aims to research the industry-academia gap by obtaining feedback from stakeholders (industry and academia). Results may be used to support Higher Education Institutions (HEI) in addressing the industry-academia gap. This is an interpretive study, as the aim is to gain understanding by analysing feedback from industry and academia participants. Quantitative and open questions were used to gather this feedback. Data was collected using online questionnaires, completed by 22 industry contacts, as well as 20 IT-lecturers at a HEI in South Africa. Results from this study confirmed results from previous studies, proofing that the industry-academia gap is still an issue, and emphasizing specific issues and skills that HEIs can try to address in teaching and learning, e.g. addressing the problem of poor-quality student intake, improving academic collaboration, students volunteering or working in industry during their studies to acquire the needed skills, including work-integrated learning in the curriculum and focusing on the development of soft skills of students.

KEYWORDS

Industry-Academia Collaboration, Industry-Academia Gap, Higher Education, Information Technology

1. INTRODUCTION

This study aims to research the industry-academia gap by obtaining feedback from stakeholders (industry and academia). The research aims to determine whether participants from industry as well as HEIs agree with aspects mentioned in existing literature, and to determine guidelines that can be used to address this gap. This research also investigates the importance and development of soft skills. Results may be used to support Higher Education Institutions (HEI) in addressing the industry-academia gap. The paper starts with the background and problem statement (section 2), followed by a brief description of the methodology (section 3), the results (section 4) and conclusion (section 5).

2. BACKGROUND AND PROBLEM STATEMENT

According to Abbas and Sagsan (2020) a considerable amount of literature is available on the quality of service of HEIs, but not enough attention has been given to employability of graduates. They define employability as "*the ability of a person, not only to find the job but to retain it by consistently complying with its changing requirements*". Horváth-Csikós et al. (2022) defined employability as "*the attainment of work-related skills and competencies useful in employment*".). HEIs are increasingly concerned with improving the employability of students (Andreas, 2018; Horváth-Csikós et al., 2022).

In a study in South Africa, by Taylor (2016), one response from the industry was: "…*we find well-qualified individuals battling with these basic skills on an ongoing basis. Graduates are immature when they arrive at the workplace and a lot more can be done at university to address this*." It is important to determine if what individuals are taught in higher education institutions will be beneficial for them when they enter the industry and to ensure that they will not struggle to adapt to the skills required (Benamati *et al.*, 2010; Foll *et al.*, 2018; Sahin & Celikkan, 2017). Academics must be guided in developing dynamic curricula that can be easily adapted to today's industry trends, with information that applies to students' careers (Sahin & Celikkan, 2020).

Studies suggest a gap between the needs of industry and the academic preparation or abilities of recently graduated students, affecting the employability of students. This is sometimes called a skills gap, an expectations gap or the industry – academia gap. In this paper the term industry-academia gap will be used. The industry-academia gap is the gap between the Information Technology education system and the industries' expectations from entry-level professionals (Bekkers & Bodas Freitas, 2008; Siegel *et al*., 2003). When the COVID-19 pandemic commenced, most researchers and practitioners were sent to work from home, relying on online collaboration with their peers, which might have given rise to an even wider industry-academia collaboration gap (Marijan & Gotlieb, 2021).

According to Kashupi (2021), reports show that some graduates struggle to get jobs in industry due to limited skills. Andreas (2018) writes in his study that both industry and graduates attribute the lack of soft skills to the inability of universities to prepare students. Vrat (2009) wrote that, if steps are not taken to bridge the industry-academia gap, industries will continue to get graduates that do not have the acquired skills to do the job. Beckman *et al.* (1997) wrote "*An approach to closing this gap could be that the two parties, namely the industry, and higher education institutions, work together on the education goals*". This will increase the proficiency of the higher education institutions to meet the industry's expected training goals. Collaboration between industry and academia may help in addressing this gap. The relationship between any part of the higher educational system and industry, focusing on encouraging knowledge and technology exchange, is referred to as university-industry collaboration (Bekkers & Bodas Freitas, 2008; Siegel *et al*., 2003).

Employers who participated in a study done by Hart Research Associates (2015) indicated that they are more likely to consider a job candidate who has participated in an internship, a senior project, a collaborative research project, a field-based project, or a community-based project (Hart research Associates (2015). The same recommendation was made in 2021 by the participants in a study by the Association of American Colleges and Universities, where representatives from companies indicated that completion of active and applied learning experiences gives job applicants an advantage, and internships lead the list of what makes employers more likely to consider hiring a candidate. Other advantages included experience that involved working in community settings with people from diverse backgrounds or cultures; work-study program or other form of employment during college; as well as a portfolio of work highlighting skills and experiences (AACU, 2021). In another study by Taylor (2019) recommendations were that students should work in the industry during holidays (exposure to work situations), collaboration with students from other programs or faculties, work on real-world projects, and include more teamwork in programs.

According to Pandi et al. (2012) the major factors that impact the quality of technical education negatively are outdated teaching-learning processes and curriculum, lack of management commitment, substandard computational resources, low level of research and development, inferior quality student intake, lack of academic collaborations, and poor alumni interactions.

HEI's need to know what skills are required to adjust the curriculum. According to Love *et al.* (2001), important personal attributes about graduates that employers pay the most attention to include flexibility, intelligence, adaptiveness, and the ability to deal with instantaneous transformation and uncertainty. They also argue that graduates need to have skills that allow them to work effectively with others to produce efficient results on time. The skills identified by Love *et al.* (2001) include communication, the ability to deliver what is required on time, academic achievement, acceptance of responsibility, adaptability to changing environments, problem-solving, time management, leadership, teamwork, and integrity.

Taylor (2016) argued that these personal attributes or soft skills (another term that is often used) are difficult to teach. This study also showed a difference of opinion on whether the development of these skills is the responsibility of the students, lecturers, or industry. Important soft skills that should be developed at Higher Education Institutions were identified as Communication skills, Interpersonal relations and teamwork, Leadership and Emotional intelligence, Professionalism and work ethic, Self-management, Conflict management, Critical thinking, and Multidisciplinary thinking (Taylor, 2019).

The following guidelines to address the industry-academia gap can be derived from this literature review:

- Collaborate with industry (Kashupi, 2021; Beckman et al., 1997).
- Update teaching and learning processes (Pandi et al., 2012).
- Frequently update the curriculum (Pandi et al., 2012).
- Use projects from the industry (Pandi et al., 2012).
- Work-integrated learning (Karim & Hasan, 2019).
- Develop personal attributes / soft skills of students (Love et al. 2001; Taylor, 2016).

3. METHODOLOGY

This is an interpretive study, as the aim is to gain understanding by analysing feedback from industry and academia participants. The study was done at a HEI in South Africa. Quantitative as well as open questions were used to gather this feedback. Data was collected using online questionnaires, completed by 22 industry contacts, as well as 20 IT-lecturers at a HEI in South Africa. The questions in the questionnaires were chosen after a literature study was done on the topic. The questionnaires and links to sources are available from the authors. An example is shown below:

Table 1

In your opinion what percentage of graduates is ready to enter the workforce immediately after graduation?	0-20% 21-40% 41-60% 61-80% 81-100%	Derived from comments by Mehra (2007), Mishra, 2016), Reddy (2012), and Vrat (2009).
The following aspects have been mentioned as possible reasons for the industry-academia gap. Indicate your agreement with each of these statements: a. The readiness of graduates to enter the workforce is impacted negatively by gaps or incompatibilities in the curriculum. b. The readiness of graduates to enter the workforce is impacted negatively by a lack of computational resources. c. The readiness of graduates to enter the workforce is impacted negatively by poor-quality student intake. d. The readiness of graduates to enter the workforce is impacted negatively by a lack of academic collaborations.	Strongly disagree / Disagree / Not sure / Agree / Strongly agree	Derived from comments by Pandi et al. (2012), and Kashupi (2021).
Please indicate your level of agreement with the following statements: a. Teaching and learning at Higher Education Institutions should focus more on theoretical content and less on practical content. b. Teaching and learning at Higher Education Institutions should focus more on practical content and less on theoretical content. c. Collaboration between Higher Education institutions and industry partners is essential to improve the readiness of graduates to enter the workforce. d. Students should work on projects from industry. e. Students should volunteer or work in industry during their studies to acquire the needed skills. f. Work-integrated learning is essential to improve the readiness of graduates to enter the workforce. g. Curricula in the fields of CS / IT should be changed frequently to keep up with the changing field. h. Technology education should be offered pre-tertiary as a compulsory subject. i. Students should create a portfolio of work during tertiary education that can be shown to prospective employers. j. Completing industry certifications would make students more employable.	Strongly disagree / Disagree / Not sure / Agree / Strongly agree	Derived from Beckman *et al.* (1997); Taylor (2016); Karim & Hasan (2019); Ankiewickz, 1995.

4. RESULTS

More information is provided on the participants in section 4.1, followed by description of the feedback received on specific issues in sections 4.2 to 4.7.

4.1 Participants

Responses were received from 22 participants from industry and 20 participants from academia. Participants from industry included one Business Intelligence Architect, one Business Consultant, two CEOs, one CIO, one Data Management Lead, three Directors, one General Manager, one Group IT Manager, one Head of Cloud, one Head of Applications, one head of CX, one MES Manager, one SAP Cloud Services Manager, one operations manager, one Principal Project Manager, two Senior BI Developers, one Senior Business Analyst, one Sessional Lecturer, and one VP Engineer. One respondent from the industry has 6-10 years of work experience, four have 11-15 years of work experience, five have 16-20 years of work experience, and fourteen have more than 20 years of work experience. The job titles as well as the years of experience show that the participants are mostly senior people in the industry with many years of experience. Results from the different questions will be discussed next.

Responses were received from 22 industry representatives, these consisted of one Business Intelligence Architect, one Business Consultant, two CEOs, one CIO, one Data Management Lead, three Directors, one General Manager, one Group IT Manager, one Head of Cloud, one Head of Applications, one head of CX, one MES Manager, one SAP Cloud Services Manager, one operations manager, one Principal Project Manager, two Senior BI Developers, one Senior Business Analyst, one Sessional Lecturer, and one VP Engineer. Based on the statistics, only one respondent from the industry has 6-10 years of work experience, four have 11-15 years of work experience, five have 16-20 years of work experience, and fourteen have more than 20 years of work experience. The job titles as well as the years of experience show that the participants are mostly senior people in the industry with many years of experience. Responses were also received from 20 lecturers, teaching at a Higher Education Institution (HEI) in South Africa. Results are reported in sections 4.1 to 4.5.

4.2 Percentage of Graduates Ready to Enter the Workforce Immediately After Graduation

Previous studies mention that low percentages of recent graduates are ready to enter the workforce (Mehra (2007), Mishra, 2016), Reddy (2012) and Vrat (2009). Participants in this study were asked to indicate their perception on the readiness of recent graduates in South Africa.

4.2.1 Industry

Based on the results in figure 1, a third (33.3%) of the industry participants think that very few graduates (0-20%) are ready to enter the workforce. A total of 62.5% (33.3% + 29.2%) think that less than 40% of graduates are ready to enter the workforce immediately after graduation. Only 12.5% of participants think that more than 80% of graduates are ready to enter the workforce immediately after graduation.

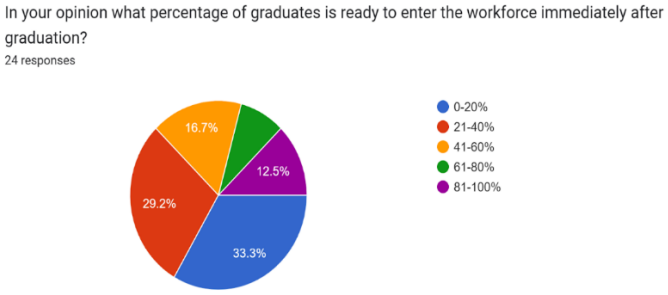

Figure 1. The percentage of graduates ready to enter the workforce (according to industry)

4.2.2 Lecturers

Based on the results in figure 2, a third (33.3%) of lecturers think that very few graduates (21-40%) are ready to enter the workforce. A total of 42.8% (33.3% + 9.5%) think that less than 40% of graduates are ready to enter the workforce immediately after graduation. None of the lecturers thinks that more than 80% of the graduates are ready to enter the workforce immediately after graduation.

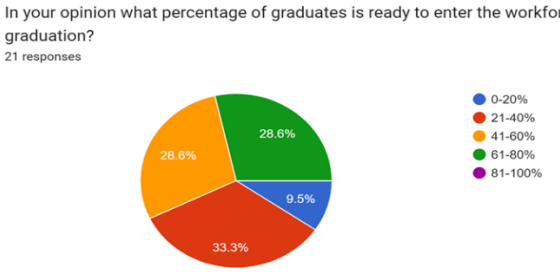

Figure 2. The percentage of graduates ready to enter the workforce (according to academia/lecturers)

4.2.3 Summary

These results show that most participants from industry and academia agree that many graduates are not ready to enter the workplace immediately after graduation. This is proof that the industry-academia gap exists.

4.3 Factors Impacting the Readiness of Graduates to Enter the Workforce

Four factors were identified during a literature review that may impact the readiness of graduates to enter the workforce (Pandi et al., 2012; Kashupi, 2021). The relevance of these factors was evaluated by asking participants to indicate their agreement with each statement. Participants from industry as well as lecturers mostly agreed with all four statements (mean of 3 to 3.85 on a scale of 0-4). Participants from industries strongly agreed that the readiness of graduates to enter the workforce is impacted negatively by a lack of academic collaborations (3.66), followed by gaps or incompatibilities in the curriculum (3.52). Lecturers agreed most strongly with the statement that the readiness of graduates to enter the workforce is impacted negatively by poor-quality student intake (3.85). These results can be seen in table 2.

Table 2. Factors impacting the readiness of graduates to enter the workforce (according to industry and academia/lecturers)

Statement	**Industry**	**Lecturers**
The readiness of graduates to enter the workforce is impacted negatively by gaps or incompatibilities in the curriculum.	3.52	3.2
The readiness of graduates to enter the workforce is impacted negatively by a lack of computational resources.	2.76	3.05
The readiness of graduates to enter the workforce is impacted negatively by poor-quality student intake.	3	3.85
The readiness of graduates to enter the workforce is impacted negatively by a lack of academic collaboration.	3.66	3.2

These results are also depicted in graphical format in figure 3.

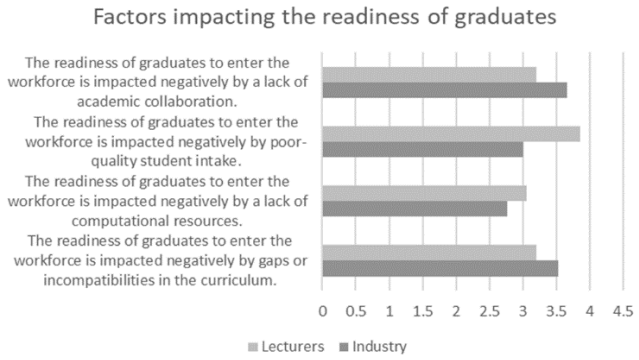

Figure 3. Factors impacting the readness of graduares to enter the workforce

Participants were also given the opportunity to list other aspects that have a negative impact on the readiness of graduates to enter the workforce. Feedback from industry will be described first, followed by feedback from lecturers and a summary.

4.3.1 Industry

As can be seen in table 3, practical / technical experience and understanding of how organizations operate were each mentioned by several participants from industry. Three participants from industries mentioned graduates' willingness to learn (or lack thereof), and 2 participants felt that lecturers are removed from the reality of the working world. One participant felt that specialization happens too late.

Table 3. Reasons that have a negative impact on the readiness of graduates to enter the workforce (according to industry)

Aspect	**Number**
Practical Experience	6
Understanding how organizations operate	5
Willingness to learn	3
Lecturers are removed from the reality of the working world	2
Specialization happens too late	1

4.3.2 Lecturers

Five lecturers pointed out that one of the aspects that negatively impact the readiness of graduates to enter the workforce is the willingness of students to take responsibility for their own studies. The second dominant aspect mentioned was the failure to incorporate various industry certifications into University curriculums, which was pointed out by four lecturers. Two lecturers also mentioned lack of practical experience. These results can be seen in table 4.

Table 4. Reasons that have a negative impact on the readiness of graduates to enter the workforce (according to academia/lecturers)

Aspect	**Number**
Most students do not take responsibility for their studies	5
Failure to incorporate various industry certifications into University curriculums	4
Not enough practical experience and problem-solving applications	2
Primary and Secondary schooling directly influence Tertiary education student quality	1
The speed at which technology changes	1
Covid-19	1
Work-ready skills, also known as employability skills, soft skills, and work-readiness skills	1

4.3.3 Summary

The aspects mentioned by both industry and lecturers were the unwillingness of students to learn and take responsibility for their own studies, as well as lack of practical experience. However, lecturers strongly felt that an important aspect is that more students should take responsibility for their own studies. More can be done at HEI to ensure that lecturers stay up to date with what is happening in industry,

4.4 Reasons for the Industry-Academia Gap

Possible reasons for the industry-academia gap were identified during a literature review (Beckman et al., 1997; Taylor, 2016; Karim & Hasan, 2019; Ankiewickz, 1995). Participants were asked to indicate their agreement with each of these statements. From the information in table 5, the participants from industries as well as lecturers mostly do not agree with the statement that teaching and learning at Higher Education Institutions should focus more on theoretical content and less on practical content. They both mostly agree with all the other statements (mean of 3 to 4.52 on a scale of 0-5). Participants from industries feel most strongly about the statement that collaboration between Higher education institutions and industry partners is essential to improve the readiness of graduates to enter the workforce (4.52) and that students should volunteer or work in industry during their studies to acquire the needed skills (4.42). Lecturers also feel most strongly about the same 2 statements, that collaboration between Higher Education institutions and industry partners is essential to improve the readiness of graduates to enter the workforce (4.3) and that students should volunteer or work in industry during their studies to acquire the needed skills (4.25), as well as the statement that work-integrated learning is essential to improve the readiness of graduates to enter the workforce (4.25).

Table 5. Level of agreement with specific statements (according to industry and academia/lecturers)

Statement	Industry	Lecturers
Teaching and learning at Higher Education Institutions should focus more on theoretical content and less on practical content.	2.14	2.75
Teaching and learning at Higher Education Institutions should focus more on practical content and less on theoretical content.	3.57	3
Collaboration between Higher Education institutions and industry partners is essential to improve the readiness of graduates to enter the workforce.	4.52	4.3
Students should work on projects from industry.	4.23	4.05
Students should volunteer or work in industry during their studies to acquire the needed skills.	4.42	4.25
Work-integrated learning is essential to improve the readiness of graduates to enter the workforce.	4.47	4.25
Curricula in the fields of CS / IT should be changed frequently to keep up with the changing field.	4.09	3.75
Technology education should be offered pre-tertiary as a compulsory subject.	3.66	4.1
Students should create a portfolio of work during tertiary education that can be shown to prospective employers.	4	4.1
Completing industry certifications would make students more employable.	3.80	4.05

Nine participants from industries agreed that Covid-19 and its challenges had a negative impact on the readiness of graduates to enter the workforce. All lecturers who participated in the study agreed that Covid-19 had a negative impact on the readiness of graduates to enter the workforce. Lecturers feel more strongly about the negative effect of Covid-19 and its challenges on the readiness of graduates. Since this study was done while many of the students effected by Covid-19 are still busy with their studies, it is possible that the effect will still be seen by those in industry. However, half of the participants from industry already agree with the negative effect. Academia as well as industry will need to put steps in place to address this.

4.5 Specific Areas/Topics Where Recent Graduates Lack Important Knowledge

Several topics were mentioned by participants as specific areas that recent graduates lack important knowledge in. Feedback from industry will be described first, followed by feedback from lecturers and a summary.

4.5.1 Industry

The areas or topics mentioned by participants from industry can be seen in table 6.

Table 6. Specific areas/topics where recent graduates lack important knowledge (according to industry)

Area	Number
Basics of computer programming	3
ERP and Cloud Integration platforms	2
Interpersonal skills, other soft skills	2
Lack of theoretical approach to systems design, development and problem-solving	2
Basic computer networking knowledge	2
Source control, architecture, advanced programming, communication, and client relations	2
Business skills	1
Real-life examples or situations / practical experience	1
How businesses work and their internal processes	1
DevOps	1

Participants from industry mentioned several topics that should be included in the curriculum. These topics can be seen in table 7.

Table 7. Important topics that should be included in the IT/CS/IS curriculum at the tertiary level (according to industry)

Topic	Number
Logic	1
Planning and estimating	1
Digital transformation	1
How a solution can meet business needs	1
DevOps	1
Work-integrated learning module	1
Ethical hacking	1
Conflict management, critical thinking, troubleshooting-when to ask for help	2
Cloud computing and presenting	2
Business Process Management	3
Data management and data warehousing	3

4.5.2 Lecturers

Five lecturers responded that graduates lack problem-solving, critical thinking, communication skills, and application of knowledge, and three that graduates lack practical understanding and applied knowledge. Other areas mentioned by lecturers can be seen in table 8.

Table 8. Specific areas/topics where recent graduates lack important knowledge (according to academia/lecturers)

Area	Number
Soft skills (e.g., Problem-solving, critical thinking, communication skills, time management, teamwork)	10
Lack of practical understanding and applied knowledge / A balance between learning and experience / Applying knowledge and skills to previously unknown scenarios	4
Programming Skills	2
The 4th Industrial Revolution	2
Cloud, cyber security, SAFE practices, portfolio generation, networking	1

Feedback from industry is mostly business specific, while lecturers mostly mention soft skills.
Topics that can be added according to the curriculum according to lecturers are listed in table 9.

Table 9. Important topics that should be included in the IT/CS/IS curriculum at the tertiary level (according to academia/lecturers)

Topic	Number
Data structures and algorithms (Object-oriented programming)	1
A solid foundation in programming, architecture knowledge that is applicable to cloud and not just desktop applications, cyber security especially as it relates to making applications safe, artificial intelligence and automation, git culture and the creation of your portfolio of work, marketing of yourself as a knowledge worker	1
Human behaviour - including psychology may be good, legal issues and IT, governance, and IS /IT management	1
AI, IoT & Blockchain	1
Integrated learning and workplace environment. Transforming the developed skills for real-world practical application. Integrated learning curriculum for the workplace environment	1
Collaborative working tools, source code management, more practical application of database, and problem-solving skills	2
Being open to adaptability and being able to solve problems	2
Communication and Interpersonal skills	2

4.5.3 Summary

Participants from industry as well as lecturers mentioned that additional certifications are highly dependent on the industries graduates are interested in. Industry participants mentioned RPA, SAP, BPM, Java, DMBOK, Data Analysis, DevOps, SQL, C#, Angular, Microsoft, Google, and AWS Cloud, Python and Cloud certifications. Specific certifications mentioned by lecturers were Data Engineering, Advanced programming courses, UiPath developer certification, Microsoft developer certifications, Certified Ethical Hacker, Java certifications, Micro-credentials and other certificates issued by trusted organizations (i.e., LinkedIn), Scrum/Agile chat, Project Management, Security certification of some sort.

4.6 Other Comments/Suggestions

Participants were given the opportunity to add any other comments or suggestions. Comments from industry included:

Computer Science Graduates who understand the business context, are strong code developers, are familiar with systems integration, and can work independently researching topics they need to do their work are most valuable.

General IT skills will give a great head-start. Nevertheless, graduates must expect to continue their learning from day one in a career.

There should be a compulsory basket of about twenty-five common patterns that students master before they leave university.

We need more General Training in the first 2 years of the Degree and then choosing a specialization field where the Students need some real-world intern experience based on their selection.

Let companies participate in the success of our students- grad programs do not do much, what they need is a mentor- let people in companies volunteer to mentor 1 or 2 students once a week on soft workforce.

Comments from lecturers included:

We should not only give students qualifications, but we should also make sure we have projects with companies to enhance their learning in preparation for the workplace, business, etc. Is not only about learning but how can we perform the implementation.

Introduce the students to multiple different technology stacks.

4.7 Important Personal Attributes of Graduates

During the literature review, possible important personal attributes or soft skills were identified. These were Interpersonal relations and teamwork, Leadership and emotional intelligence, Professionalism and work ethic, Self-management, Conflict management, Critical thinking and Multi-disciplinary thinking (Love et al., 2001; Taylor, 2019). In this research, the participants from industries as well as lecturers agreed that all these skills are important (3 = of average importance, 4 = very important, 5= absolutely essential).

Table 10. Importance of different soft skills (according to industry and academia/lecturers, scale1-5)

Soft skill	**Industry**	**Lecturers**
Interpersonal relations and teamwork	4.28	4.4
Leadership and emotional intelligence	3.61	4.1
Professionalism and work ethic	4,57	4.65
Self-management	4.28	4.35
Conflict management	3.47	3.65
Critical thinking	4.19	4.75
Multi-disciplinary thinking	3.85	4.25

The results can be seen in table 10. According to the participants from industries, professionalism and work ethic is most important, followed by interpersonal relations and teamwork, as well as self-management, and critical thinking. According to lecturers, critical thinking is most important, followed by professionalism and work ethic, and interpersonal relations and teamwork. This means that both groups rated the same 4 soft skills as most important.

According to a literature review, the important soft skills of graduates are not develop as expected (Love et al., 2001; Taylor, 2019). Participants in this study were asked to indicate their perception on the level of the development of these skills in recent graduates. As can be seen in table 11, both groups rated the soft skills of graduates low (3 = Average, 2 = Below average). Participants from industries rated leadership and emotional intelligence as the lowest, followed by conflict management. They also rated all the skills below 3 except Communication and Interpersonal relations and teamwork. The lecturers also rated Leadership and emotional intelligence as the lowest, followed by self-management, conflict management, and critical thinking. The lecturers rated all the soft skills below 3.

Table 11. Rating of different soft skills of graduates (according to industry and academia/lecturers, scale1-5)

Soft skill	**Industry**	**Lecturers**
Communication	3.19	2.65
Interpersonal relations and teamwork	3.09	2.85
Leadership and emotional intelligence	2.57	2.45
Professionalism and work ethic	2.76	2.75
Self-management	2.80	2.5
Conflict management	2.71	2.5
Critical thinking	2.90	2.5
Multi-disciplinary thinking	2.76	2.65

Participants were asked to mention other skills (not included in the above list) that they deemed as important. Participants from industry mentioned the following additional soft skills as also important: Commitment, Maturity, Loyalty, Problem-solving, Willingness to succeed, Creativity, Self-empowerment, Self-development, Confidence, Respect, Curiosity (mentioned by 3 participants). Participants from academia also mentioned problem solving, self-development and creativity, as well as the following additional soft skills: Marketing and self-promotion, Self-awareness, Eagerness to learn.

5. CONCLUSION

Results show that most participants from industry and academia agree that many graduates are not ready to enter the workplace immediately after graduation. This is proof that the industry-academia gap exists. Aspects impacting the readiness of graduates to enter the workforce mentioned by both industry and lecturers were the unwillingness of students to learn and take responsibility for their own studies, as well as lack of practical

experience. The participants from industries agreed most strongly with the statement that the readiness of graduates to enter the workforce is impacted negatively by a lack of academic collaborations, followed by gaps or incompatibilities in the curriculum. Lecturers agreed most strongly with the statement that the readiness of graduates to enter the workforce is impacted negatively by poor-quality student intake. The difference in opinion shows where the main concern of the industry is versus the issues academia faces.

Participants from industries as well as lecturers did not agree that teaching and learning at higher education institutions should focus more on theoretical content and less on practical content. Participants from industries felt most strongly about the statement that the collaboration between higher education institutions and industry partners is essential to improve the readiness of graduates to enter the workforce and that students should volunteer or work in industry during their studies to acquire the needed skills. Lecturers also felt most strongly about the same two statements, that collaboration between Higher Education institutions and industry partners is essential to improve the readiness of graduates to enter the workforce and that students should volunteer or work in industry during their studies to acquire the needed skills, as well as the statement that work-integrated learning is essential to improve the readiness of graduates to enter the workforce.

Nearly half of the participants from industry and all the participants from academia agreed that Covid-19 had a negative effect on the readiness of graduates. All stakeholders (academia as well as industry) will need to put steps in place to address this.

Participants from industry as well as academia felt that various certifications can be used to address the industry-academia gap. The lists of topics that should be included in the curriculum, as well as certifications deemed valuable for students to obtain, and additional comments reported on in this study can be used by academic institutions to address the industry-academia gap.

In section 2 of this paper, guidelines for addressing the industry-academia gap were derived from the literature review. These were:

- Collaborate with industry.
- Update teaching and learning processes.
- Frequently update the curriculum.
- Use projects from the industry.
- Work-integrated learning.
- Develop personal attributes / soft skills of students.

These guidelines were confirmed by the feedback received during this study. Guidelines that can be added to these from the results of this study include:

- Add more practical experience and understanding of how organizations operate to the curriculum.
- Consider incorporating industry certifications into curriculums.
- Add more emphasis on knowledge in the basics of computer programming.
- Ensure that lecturers stay up to date with what is happening in industry.
- Students should be motivated to take responsibility for their own studies and to realize the importance of life-long learning in the IT-environment.
- Academia as well as industry need to put steps in place to address the negative effect of Covid-19 on the readiness of graduates.

These guidelines, together with the lists of certifications and topics, can be used when evaluating or updating the curriculum, to address the industry-academia gap and deliver students ready to enter the workplace.

Participants from industries as well as lecturers indicated that all the mentioned soft skills are important. According to the participants from industries, professionalism and work ethic is most important, followed by interpersonal relations and teamwork, as well as self-management, and critical thinking. According to lecturers, critical thinking is most important, followed by professionalism and work ethic, and interpersonal relations and teamwork. This means that both groups rated the same 4 soft skills as most important.

Both groups rated the soft skills of graduates low. Participants from industries rated leadership and emotional intelligence as the lowest, followed by conflict management. Lecturers also rated Leadership and emotional intelligence as the lowest, followed by self-management, conflict management, and critical thinking.

Results from this study mostly confirmed results from previous studies, proofing that the industry-academia gap is still an issue. Results emphasized specific issues and skills that HEIs can try to address in teaching and learning, e.g., addressing the problem of poor-quality student intake, improving

academic collaboration, students volunteering or working in industry during their studies to acquire the needed skills, including work-integrated learning in the curriculum, and focusing on the development of soft skills of students.

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