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An Effective Framework for Bridging the Gap between Industry and Academia

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ABSTRACT: The main aim of this paper is to investigate any gaps between academia and industry readiness and to identify skills and abilities organizations look for in terms of assessing Industry 4.0 readiness. The study investigates skills that are essential for 21st century workforce employability and takes into account the perspectives of alumni, university professors and employers. Data for this study was collected using surveys from undergraduate students, and focus groups comprising of Industry professionals, academics and alumni. Until today, there is a lack of consensus in the literature as to what the fundamental components for evaluating industry 4.0 readiness include. This study fills this gap by combining the perspectives of industry leaders/advisors, academic faculty, alumni and undergraduate students. Thus a triangular design approach is taken by considering the opinions of all parties involved to improve the validity of the results. It also provides a more holistic view of what can be improved on when it comes to the competences provided by universities. The results of the study showed that a gap exists between graduates' skills and competencies required by the industry. The results are significant as they have practical implications for both employers and academia in bridging the skills gap.

Keywords: Industry 4.0; Graduates' Readiness, Academia, Soft Skills, Hard Skills.

I. INTRODUCTION

Industry 4.0, also termed as the Fourth Industrial Revolution or IR 4.0 signifies the change that renders it viable to collect, evaluate and explore data across machines facilitating faster, more adaptable, and cost-effective processes that would allow organizations to produce higher-quality goods at lower costs. It signifies a set of technological transformations like Internet of Things, Big Data Analytics, simulation, and cloud computing. It is essential for employees now to acquire new skills and abilities including the use of hi-tech devices, the use of which has amplified in everyday life.

The conversion of organizations to the digital form has brought about many changes in manufacturing and a range of other undertakings that take place within a specific industry and externally [1]. Some researchers argue that industry 4.0, focused on digitization of corporations, brings about many changes to the business environment and to customers wants and expectations [2, 3].

It is significantly important for employees to be able to utilize high-tech devices and applications, and to keep themselves upgraded with all the latest technologies and gadgets. It is consequential for employees and workers to enhance and acquire their skills and use of such technologies, which has been amplified in recent years as an effect of transiting into the all-new digital era of trade and industries. It is also crucial for Academia to prepare students with these skills before they graduate.

Academia and industry are two different worlds running on different accords and motives. However, the symbiotic relationship does exist between both worlds. On the one hand, academia produces graduates who are absorbed by the various industries in one way or another. Furthermore, the research work facilitated by institutes and universities is taken up by industries for producing various goods and services, and industries tend to provide solutions to their problems and concerns. Often new topics for research arise as an outcome of the interaction that is eventually beneficial for both the enterprises [4].

Bongomin, *et al.*, (2020) suggest that the current university education framework finds context in the preceding three industrial revolutions. Demand for 'generalists' is likely to be higher than that of 'specialists' in most industries making it imperative for academic institutions to produce graduates with deeper learning prepared to be effective in a rapidly changing 'labour landscape' [5]. "To survive in the job market of industry 4.0, there is a need to nurture human skills such that the AI is unable to replicate" [6]. Furthermore, shortcomings in academic curriculum that fails to train graduates with the necessary skills to allow them to easily adapt to the work environment have been widely discussed in the literature [7-9]. Malik & Venkatraman (2017) also stated that employers who visit universities conduct job fairs in them for recruitment purposes specified that students do not have the vital skills needed for the job market [10]. There is a very clear gap between academia and industry due to lack of consensus in literature and theory that comprehensively identifies the fundamental components towards examining 'industry 4.0' readiness. Alshare and Sewailem (2018) confirm that a gap exists between the skills needed for business students in the job market and the competencies and skills they have upon graduation. They further stated that the relative importance of these skills also differ between employers and educators [11].

Nonetheless, the rapid pace of outside world is compelling these two sectors to come together as a whole in terms of addressing and solving the real-world problems and challenges lying ahead [12]. Researchers have made several recommendations for dealing with this gap. Larkin (2014) have suggested the use of collaborative projects and internship as an effective means of bridging the gap between academia and industry [13].

In summary, this research is performed with the endeavor to answer the subsequent research questions: – What are the vital requirements for evaluating Industry 4.0 readiness for organizations?

– What should be done to bridge the gap between Industry and Academia?

II. LITERATURE REVIEW

A. Industry 4.0

The fourth industrial revolution brought a significant change and advancement in the world of business and trade through various inventions, and data facilitated exploring machines that are adaptable, faster, and more cost-effective to allow industrial associations to produce greater quality products at lower costs. Industry 4.0 manifests a set of modern technology transformations including large data analytics, internet, cloud computing, artificial intelligence, nanotechnology and 3D printing among others [14-16].

IR 4.0 is growing at a rapid geometrical pace relative to the arithmetic growth of its predecessors. Amongst all unpredictability, the only predictable thing is that skill and aptitude will outpace capital as the 'critical factor of production' [17].

IR 4.0 is anticipated to disrupt not only businesses but also employment markets and opportunities anticipating tremendous changes in employee skill sets to survive in a technologically transformed environment. "By one popular estimate 65% of children entering primary schools today will ultimately work in new job types and functions that currently don't yet exist. Technological trends such as the Fourth Industrial Revolution will create many new cross-functional roles for which employees will need both technical, social, and analytical skills. Most existing education systems at all levels provide training and continue a number of 20th century practices that are hindering progress on today's talent and labour market issues" [18].

Transition of organizations to the digital platforms have brought about numerous changes not only in the manufacturing practices of industries but also in a range of other internal as well as external practices. Focusing on the digitalization of corporations and organizations, the nature of the needs and wants of the customer is also altering at a fast pace. Furthermore, researchers argue that the reason behind the changing business environment and customers' expectations is 'industry 4.0' [19].

B. Twenty-First Century Workforce Readiness Skills

Corporations around the world have amplified their assessment of the skills that they require from recruits. Hurrell (2016) argues that in addition to various technical skills, workers are also expected to have soft skills [20]. In agreement, Kleckner and Marshal (2014) also stress on the importance of recruits having strong interpersonal skills [21]. Besides talent and expertise with technical skills, employees must be prepared and able to work with coworkers from different backgrounds. Following an extensive review of the literature, we were able to identify a range of skills deemed necessary for Business graduates prior to joining the workforce. These skilled are grouped into two categories: hard skills and soft skills. The next sections will discuss these skills in more details.

***Hard Skills*:** Hard skills relate to technical skills. 'Technical Skills' can be classified as technology based or 'discipline -based knowledge' and characteristics including abilities in "computer use, programming languages, database management, optimization and the major areas of managerial accounting, finance and operations management." P.44 [22]. Data handling proficiency and data-based decision making are also projected to become increasingly important with employers seeking manpower savvy in 'data analysis and presentation'. Many core technical activities are envisaged to seek 'creative and interpersonal skills' [18]. Aasheim *et al.,* (2009) argued that technical skills are very highly sought after in the new payroll [23].

According to the Boston Consulting Group Report, Industry 4.0 employees would be required to affect diverse "hard" skills for an effectual output [24]. Workers "will have to combine the know-how related to a specific job or process, such as techniques of working with robots or changing tools on machines with IT competencies that range from basic (using spreadsheets and accessing interfaces) to advanced (applying advanced programming and analytical skills). The need for multiple hard skills and the unprecedented scope of changes on the shop floor mean that "soft" skills will become more important than ever. Employees will have to be even more open to change, possess greater flexibility to adapt to new roles and work environments and get accustomed to continual interdisciplinary learning." Hecklau *et al.,* (2016) summarize the identified competencies in the form of a visualized competence model for Industry 4.0, mapping "state of the art knowledge, technical skills, coding skills, process understanding, media skills and understanding IT security" within the cluster of "technical competencies" [25]. The cluster of 'methodological competencies' include "entrepreneurial thinking, problem solving, conflict solving, decision making, analytical skills, research skills, efficiency orientation and creativity."

Kinkel *et al*., (2017) draw upon a study undertaken on 335 German mechanical and plant engineering companies to suggest that digital changes are likely to happen across disciplines thereby seeking interdisciplinary and collaborative competencies [26]. They identify 'clusters of competencies' contingent to the success of companies including 'innovation' (of products & processes) competencies that generate novel knowledge; 'networking' (with customers, suppliers or research institutes) competencies; 'creative problem solving capabilities' that produce new solutions aided by technical knowledge; 'overview and integration competencies'.

Alshare and Sewailem (2018) divide these skills into three categories, including (1) Basic/fundamental skills, which include technical skills and knowledge in specialized area (2) conceptual/thinking skills, which include critical thinking/problem solving, analytical thinking, planning and organizing, decision making and IT related skills (3) business skills which comprise dealing with real world problems, creative thinking (innovation), global business and multicultural awareness" [11]. Azmi *et al*., (2018) argue that the most important skills demanded by organizations in the IR 4.0 age are "communication skills, computer skills, teamwork and entrepreneur skills" [27].

Soft Skills: Alshare and Sewailem (2018) distinguish between hard and soft skills by explaining hard skills as context specific and soft skills as transferable across different job types and not specific to a particular job. In addition, they state that hard skills are easy to learn through training, whereas soft skills primarily develop through experience in a collaborative professional setting and are tougher to train. They grouped soft skills into two categories: (1) People-related skills, which include interpersonal skills, communication and collaboration/teamwork;" and (2). Personal skills, which contain adaptability and flexibility, leadership,

professionalism, work ethics, voluntarism and social responsibility" [11].

Patacsil & Tablatin (2017) reported in their study that while students viewed hard skills as very crucial, employers only viewed them as somewhat significant [28]. Kinkel *et al.,* (2017) report that organizations identified "three non-technical competencies as most valuable: (1) the ability to quickly grasp the business models and potential problems of customers, (2) to solve those problems creatively and (3) the ability to think and work using systematic and holistic ways of thinking" [26]. Rao (2014) state that "people rise in organizations because of hard skills and fall due to dearth of soft skills." He maintains that while the hard skills comprise of the core skills and technical skills, the soft skills, are social skills, people skills and interpersonal skills. He further states that though hard skills explain 15 percent of the basis why an employee gets recruited and maintains the job and gets promoted within the organization, whereas, the soft skills get credit for the remaining 85 percent of an employee's success on the job [29]. Roepen (2017) argue that gaps in non-technical skills have an impact on efficiency and productivity [30]. Despite this knowledge, most practitioners seem to defy the curriculum reforming strategy and appear to resist aligning the university curriculum with industry needs and requirements [31].

Strebler (1997) found that Academia perceives soft skills as less significant than hard skills, in finding a job [32]. In contrast, Crebert *et al.*, (2004) found that the Industry places higher importance on the soft skills (for e.g., teamwork) [33]. Hence, there is a dire need for both Industry and Academia to collaborate to better ensure students Industry readiness upon graduation.

C. Gap between University Curriculum and Industrial Needs

McGuinness & Ortiz (2016) define skills gap as inadequate or unsatisfactory skill levels among recruits or employees to be in accord with the prerequisites of their current job [34]. Over the years, a steady gap has appeared between university curriculum and industrial needs, which has, in certain instances, led to graduates being less ready for industry. Furthermore, there is a lack of consensus in the literature and theory that properly identifies the fundamental components for analysing industry 4.0 readiness. The necessary skill sets needed specifically for industry are sometimes missing when students complete their university degrees and enter the labor force. Researchers indicate that there is a lack of cooperation and partnership between academia and industry to ensure students are effectively prepared for industrial needs [35]. To meet the gaps in the current academic learning, some industries are forced to provide on board training before the graduates are ready for employability. This is a rather expensive and unsustainable practice given that the additional training costs and time invested are prohibitive. There is a felt gap in practice based learning and methodological competencies. Training in 'problem solving skills', 'social skills' 'methodological competencies' 'applied knowledge' and 'communication skills' have been identified as areas around which programs need to be built in [36].

Manevska *et al*., (2018) argue that despite the avalanche of technology, specific 'social skills' and 'interpersonal skills' such as negotiation, effective communication, leadership and training & development skills are considered necessary to gain employment [37]. The gap between industry expectations and university education is identifiable. The current academic curriculum and training is restricted in providing specialized interpersonal skill training to enable graduates to apply knowledge to practice and rise to stressful work environments.

This gap is resulting from the discrepancy between industry anticipations and preparations that university students receive from universities during their years of studies. While industry views interpersonal skills from a 'practical perspective' viz: 'interaction', 'adaptability', 'confidence', academia continues to apply the approach of delivering knowledge [37].

The rapid pace of the outside world is compelling the academia and industry to come together as a whole in terms of addressing and solving the real-world problems and challenges lying ahead. Companies are increasingly focused on finding the "right person." Academia and Industry have been operating in siloes for a long time. Academic institutions have an increasing recognition of this gap, yet there a long way to go [38]. Shahroom & Hussin (2018) find that universities would not survive in the IR 4.0 if higher education was not personalized to conform to an ecosystem that fitted to institutional contexts and enhanced "human focussed qualities" [39]. University curriculums ought to be designed to converge with the technical and non-technical skills and abilities sought by industry.

Several studies across eras of technology development and across discipline boundaries have mapped 'graduate competencies. These studies have increasingly identified similar gaps in the 'transferable' employment readiness skills set across disciplines including communication, team-working, problem-solving, leadership, self-confidence, willingness to learn and flexibility [36, 37, 40-46]. Some of the reasons identified for the gap between academia and industry include treatment of education as a final learning activity as distinct from a life - long evolutionary process; communication gap between institutes of higher education and industry; lack of planning and clear expression of the skilled candidate by the industry and perceived threat of loss of academia's autonomy [22].

There has been a deluge of deliberation on the need for making higher education more progressive, practical and aligned to industry goals for it to remain relevant and fruitful. There has also been a realization of the mutual dependence of academia and industry not only from the perspective of employability but for the overall sustainable functioning of an economy and nation. Practical relevance of university education is a requirement in the 'knowledge economy' presenting novel and complex challenges demanding divergent skills from university graduates joining liveware. "With the university sticker price continuing to rise dramatically, selecting a field of study with plentiful job opportunities can benefit the graduating student financially as many students finance the tuition through student loans" [47].

Industry expects skilled and professional graduates. From the academia's side, collaboration with industry is met with certain challenges including Faculty's reluctance to upskill and lack of knowledge of industry practices and recognition. Industry on the other hand is hindered in its initiatives by business compulsions of proportionate returns [38]. Academia and industry both need to be creative. Educational institutes must train students in 'life- long learning skills' as well impart training in in some of the 'specific applications of technical communication skills'. Universities and corporations can have a constructive partnership where

industry personnel are regularly invited into the classroom: 'to lecture, mentor and review written work and watch student presentations.' Faculty should also expand their wings by regular visits and interactions with the corporates. "The only limit to the ways businesses and universities can work together is in our mind" [42].

Meredith and Buckle (2008) found that bridging this gap can be done through ensuring full learning not just by teaching graduates theories but by allowing them to have some industrial experience along the way to better equip them and ensure they are a good fit to industry requirements [48]. Kaur (2017) recommends the following measures towards increasing collaboration between the two sectors: tax holidays to the academia and industry on R&D projects; recognition of academia for its contributions; structured and mandatory internship programs; focused peer discussions; alumni mentorships; guest lectures; establishing R&D and incubation centres, entrepreneurship cells; common certification programs and bilateral interactions through visiting faculty [38]. Buth *et al.*, (2017) identify 'Problem-based' and competency-based and activity-based methods of learning as methods to bridge these gaps.

Academia and industry need to recognize each other's strengths and strive towards greater trust and communication [36]. Development of skills should also be brought to the forefront in addition to focus on higher technical education. In agreement, Tessema and Abejehu (2017) emphasize the need for "strong collaboration" between academia and industry to produce graduates that demonstrated "professional attributes" and fit in workplace environments [49]. The following sections will analyze data collected for this study and give recommendations on how to bridge the gap between industry and academia.

III. METHODS

Data for this study was collected using a mixed methodology. Both quantitative and qualitative data were collected using questionnaires and focus groups. These are discussed in details in the following sections.

A. Questionnaires

Survey research was utilized to collect data for this study. This method was deemed useful since the purpose of the study was to identify the employability skills and readiness of undergraduate students across selected non-engineering/non-technical disciplines based on their internship experiences. The study further aims to undertake a gap analysis of the students' expectations from the university curriculum viz a viz industry expectations from them. Along these lines, a self -designed questionnaire consisting of approximately 10 questions and 5 sub questions was circulated to last year undergraduate students across several programs including Commerce, Business Management, Fashion and Tourism, at a University in the UAE. These questions were aimed to gather data about industry requirements with respect to employment readiness skills of non-engineering undergraduates and to identify the gaps if any, between the industry and academia with respect to industry 4.0 readiness of graduating students' across the disciplines above enumerated, basis their internship experiences. The total sample size of this research is 110 respondents which is equivalent to the number of questionnaires that were distributed. The survey was administered in class. The respondents were required to finish answering the queries within 60 minutes. Help was given with the sole purpose of clarifying the question to prevent any element of bias prior to the administration of the questionnaire, informed consent was sought from the participants.

B. Focus Groups

Hughes and DuMont (1993) define focus groups as "in-depth group interviews employing relatively homogeneous groups to provide information around topics specified by the researchers" [50]. Data for this study was also collected from six focus groups, each consisting of 6 to 7 participants. This is in line with Krueger and Casey (2000) recommendation of having 5 -12 people in a focus group were followed. Each group included several industry leaders, one or two faculty members, and one alumni that had recently graduated from a University in the UAE. The faculty member (s) played a moderator role in an effort to keep the group focused and to generate a productive discussion [51].

IV. RESULTS AND DISCUSSION

Questionnaires: The results of our questionnaire showed that students believed it was hard to relate theory and application during internship. Results also demonstrate that even for the purposes of 'internship readiness', the respondents were expected to have knowledge of latest applicable software and techniques applicable in the industry that did not form part of the current course curriculum. Moreover, only 22% of the undergraduates believed that industry expectations could be met based on current course curriculum, whereas, 78% stated otherwise. Commerce undergraduates opined that their existing knowledge of accounting methods was outdated, while the Business administration undergraduates felt their knowledge of marketing theories was outdated. These respondents hoped to make up for the gap in curriculum content either through self- funded external training programs, more internships or possibly though further higher education degrees.

Therefore, there is a requirement of alignment of academic curriculum with industry, in keeping with its pace and demands. Sobaih and Jones (2015) emphasize on building skills for IR 4.0 through collaboration between academia and industry which "is critical in developing knowledge-based economy & creating sustainable competitive advantage" [52-56].

Although, witnessing changes in almost every sector, educational institutes are still inflexible with their courses and pattern of teaching and research work. There is a need for implementing practical knowledge rather than theoretical, which provides futuristic solutions to various industry needs. Collaborating with industry through continuous interaction is one of the measures. Furthermore, Academia must stress on skill-based curriculum with emphasis on developing soft skills such as "interpersonal skills, leadership capability, attitude, communication skills and team spirit." There is a requirement of "co-creation of knowledge" by academia together with industry. In agreement, Gleason (2018) finds that the collaboration of higher education institutes with industry and governments should be more intense than it is at present. University education needs to step up and respond to the pace of IR 4.0 in more ways than one. Curriculum revamping 'to match the rapid tempo of scientific and technological advances' and develop graduates who can constantly reinvent themselves and exhibit creativity are imperative to 'sustain the relevance of' university education [57]. These findings are

congruous with those in the cited literature that university curriculums incorporating employment readiness skills by converging the technical and non- technical skills are likely to significantly increase the employability of graduates in the IR 4.0 employment landscape [5, 37-39, 49].

Twenty percent of the respondents also stated that they could align with the industry expectations during the internship program only due to the short- term extra courses/trainings undertaken by them or due to on-the-job training received in family business or prior internship programs. According to the survey results, almost all the respondents identified a gap in the current curriculum with respect to up-to-date technical tools and methods. Current prospectus concentrated on customary techniques. There was much room for incorporating present day software and techniques. There is a need for the education system to innovate and reform.

The survey further found that approximately 25% of the respondents highlighted industry's expectation of excellent communication and presentation skills in a cross-cultural environment even as internees. A similar percentage of respondents expressed that the industry expected internees to be abreast with current affairs and global issues. 90% of the respondents stressed on the importance of 'Skill Enhancement' including time management; team work and collaboration; communication and presentation skills, formal emails/professional oral and communication; interpersonal skills and people engagement; self -confidence building, interpersonal skill development as their key takeaways from the internship program on which they would like to develop themselves for industry readiness. These respondents further stated that current syllabi need to be updated to be more industry relevant; training that is more practical should be given, for instance, to finance students more financing and accounting software training should be introduced to increase employability; reasonable and relevant courses should be taught; More number of guest lectures from the Industry should be introduced. Almost all the respondents felt that employment readiness soft skills as identified above should be a part of the curriculum. The skill gaps identified by the respondent undergraduate students in comparison to employment readiness skills required by industry 4.0, categorized into 'hard skills' and 'soft skills' have been summed up in Table 1.

A significant observation that came from majority of the respondents was regarding the period of internship. Most of the Corporates offered 3-month internship programs. The respondents felt that the period of internship should be minimum 3 to 6 months for the same to be more meaningful and increase both the employability readiness and employment opportunities for the respondents. Majority of the students observed that attendance requirements should be made flexible to accommodate genuine longer internships and academic pressure on the students should be eased to accommodate the same. Chea *et al.*, (2019) argue that Education 4.0 framework is poised to address the challenges of IR 4.0 suggests an evaluation as against examination of student learning through field work and projects to develop 'organizational, collaborative and time management skills' preparing undergraduates for the environment they graduate into [58]. University curriculums need be re-engineered to include more time distribution to 'internships, mentoring and collaborating projects' to provide opportunities to undergraduates to attain IR 4.0 'job representative skills' through 'real-world' experiences. Abu Hanieh *et al.*, (2015) propose that the integration of learning hours spent by an understudy in field, that is, hours engaged in internship programs/practical training/project work, with the in-class learning hours along with joint evaluation systems can be effective tools for greater industry-academia partnerships [55].

Table 1: Skill gap analysis as per survey results.

Category of Skills	Skill gaps		
	Employability readiness Skills required by Industry 4,0 across disciplines	*Skill Gaps /Training areas as per survey results*	*% of undergraduates identifying the skill gaps as per survey results*
Hard Skills	Technical Skills Discipline Based Knowledge Specific job know-how IT competencies (basic & advanced) Programming & coding Data handling, analysis, handling & presentation Interdisciplinary learning Managerial accounting, finance & operations management	IT competencies (basic & advanced) Programming & coding Data handling, analysis, handling & presentation Managerial accounting, finance & operations management (Commerce Undergraduates)	78%
Soft Skills	Applied knowledge project management entrepreneurial thinking problem solving, decision making, analytical skills research skills, creative thinking (innovation), multicultural awareness effective communication skills (virtual & real) socio-communicative skills emotional intelligence persuasion, presentation skills, interpersonal skills collaboration/teamwork leadership qualities networking skills	applied knowledge multicultural awareness effective communication skills (virtual & real) presentation skills interpersonal skills collaboration teamwork leadership qualities	90%

About 65% of the respondents felt that the university should support the students in getting internship that matched with the course. Internship period felt to be too short to be able to maximize for self-learning and skill enhancement. Internships are a very valuable training and development opportunity for future employees and/or entrepreneurs. To maximize upon this opportunity, students require sufficiently justifiable tenure. Likewise, industry also looks at 'Internships' as an opportunity for scouting talent and cast a plausible future employee in the organization. Manevska *et al.,* (2018) aptly argue that Internships can be made more effective in the 'form of assessment tool' made in collaboration with industry, is built in. It could be a potentially beneficial situation both for the academia and the industry in as much as such as, the assessment could serve as a feedback and preparatory tool for graduates to assess themselves, while employers could identify areas of strengths and developments of an incumbent employee and universities could improve students' skills through counselling [37].

Hopkins (2017) contend that student internships are a means of better connection between academia and industry not only for employment opportunities but also for inspiring them undertake business ventures [47]. Internship has become a significant training and development tool for corporations. Training and

development portray the formal, progressing endeavors organizations make to improve the exhibition and self-satisfaction of their workers through an assortment of instructive techniques and projects. In the advanced work environment, these endeavors have taken on an expansive scope of use—from guidance in exceptionally explicit job skills to long haul professional development.

Focus Groups: The six focus groups for this study were all organized on the same day in a University in the UAE. Each focus group session took 1-1.5 hours to complete. A standardized procedure was provided for the focus groups before the discussions began in order to ensure the findings can be compared. Each focus groups included industry professionals, academic faculty, and alumni. The industry professionals in the different focus groups included CEOs and senior managers that belonged to different industries including the manufacturing, electronics, financial, apparel, cosmetics and beauty products, and hospitality industry. These managers were chosen because they have an inclusive knowledge about the topic and are more familiar with requirements of Industry 4.0, skills, and knowledge they value and require from new recruits.

The industry professionals were asked to reflect on a range of topics related to Industry 4.0 readiness. They were given sample curriculum to review and to comment on the skills most required. Alumni were also asked to comment on whether they were well prepared upon graduation and on which skills they believed were missing and needed to be included in the curriculum.

The data which emerged from the six focus groups was then coded by the researchers and the analysis was divided into the following two sections, one relating to future skills required to reduce the gap between academia and industry, and the other to discussing possible strategies and collaborations that could help reduce the gap,

The results showed that various industries are progressing towards Blockchain, AI, technology and robotics. These changes are expected to generate many jobs, which require a focus on skills related to these factors and a focus on interdisciplinary skills. As these sectors are expected to grow even more in the next decade, graduates need to be digitally savvy, innovative, creative and should have data science skills. Experts believe that extra-curricular knowledge related to technology and cyber risks must be included in the curriculum. Extra focus must also be given to improving presentation skills of students. Students must also be trained on how to write technical reports. Some experts also stressed on the need of having personality behavior training. They stressed the importance of field work, job shadowing and personal branding. These results are consistent with findings in the literature that graduates with well-developed soft skills will be better prepared and equipped at finding new work opportunities and adapting at the workplace [59-61].

Some experts suggested that students should have activities like 'One week in a professional's life" to help them know more about the work-life. The need for interdisciplinary courses was echoed in all focus groups. Most experts also stressed on the importance of having students complete research projects that can help them integrate technology with their subjects.

Professionals in the focus group also stressed on the importance of collaboration between Industry and Academia. They suggested several ways to collaborate. One of their recommendations revolved around the significance of R&D projects by Academia in collaboration with Industry. Further collaborations could be in terms of Industry providing information for case study research and academic research by helping Academia with data collection. Industry professionals also stated that they are open to being guest lectures to share insights that would helpful to students, and to taking on more interns and organizing industry visits. These findings are in line with previous studies [11,13, 53, 63].

V. CONCLUSION

The study examines employability skills needed for the 21st century employees from the standpoint of students, alumni, industry advisors and employers and academics. It emerged from the study results that university undergraduates find the current academic curriculum insufficient in meeting the goal of employability readiness on the counts of practical applicability and relevance, technical skill updating, soft skill competences and overall skill development for industry 4.0 readiness. Increased guest lectures from industry and 'internships' were identified as significant steps towards skill enhancement, industry visibility and employment readiness The practical implications of the this study based on survey results and focus group discussions emphasize on the need for creating an ecosystem for: assessment of current curriculum to keep pace with the current technological developments, project work and internships being made mandatory and important assessment tools through well aligned and institutionally planned industry partnerships. A 'soft skill development program' should be embedded in the curriculum to yield productive graduates with synergized combination of 'hard skills' and 'soft skills' This study highlights that today, when academia and industry are poised for a technological renaissance of sorts with the fourth industrial revolution, a siloed existence of academia and industry is unaffordable and sure needs linking measures to tap human capital in a potentially evolving environment.

Collaboration between universities and industry through well-structured internships, live projects, discussions corporate interactions are some of the further practical highlights of this study. Moreover, students could enhance their skills and knowledge through part-time projects and internships, which facilitate in obtaining practical insight into the operational practices and functioning of the industry While, these internships might not necessarily provide a job assurance to the intern but they would equip and prepare him for dealing with the requirements industry and making choices for himself viz a viz his future options and goals.

Thus, the gap analysis between the industry and academia undertaken in this study depicts the existence of dichotomy in academic goals and industry aspirations from university graduates as prevalent across sectors and fields of study undertaken. The emerging consensus focuses on the overall skill deficiency for employability, which extends from amendments in core curriculums to fluid and interpersonal skill trainings across courses of study. In the 21st century, when the economy and industry is at the cross-roads of the fourth industrial revolution, it is high time that industry and academia work hand-in-hand in order to achieve the objective of improved employability.

VI. LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Although our study shows that there is a gap between Academia and Industry in terms of industry readiness skills and provides practical implications, it is not without limitations. A major limitation of the study is that data was collected from only one university and this will limit the generalizability of the results. It is recommended that future research replicates this study by collecting data from a range of universities in the region in order to improve the scope of this study. Also, while the sample size was more than one hundred participants, it is recommended that future research attempts to collect data from a larger sample size across a range of majors. Research on collaborations that take place between industry and academia is also required especially in the form of empirical research as this will provide solutions to the issue of graduates' employability.

Conflict of Interest. There is no conflict of interest to be declared.

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