SKILLS 4.0: UNVEILING RELATIONS BETWEEN HIGHER EDUCATION AND PROFESSIONAL PROFILE

SKILLS 4.0: DESVENDANDO AS RELAÇÕES ENTRE O ENSINO SUPERIOR E O PERFIL PROFISSIONAL

HABILIDADES 4.0: DESVELANDO LAS RELACIONES ENTRE LA EDUCACIÓN SUPERIOR Y EL PERFIL PROFESIONAL

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ABSTRACT

The fourth industrial revolution brought skilled labor at social, methodological, emotional, and technical human resources. Considering the relevant workforce volume in Brazil, it is still unknown if these skills are being formed by the academy or by professionals. For that, we related skills 4.0 of literature with those identified in Brazilian human resources through a netnographic study. The results show dissociations between the framework variables. Technical skills are most often cited in professional curricula, while social, personal, and methodological skills are more present in the pedagogical projects of business schools. Findings imply that the complete professional enabled the skills 4.0 is scarce on the Brazilian market. Also, higher education has not kept the pace of digital transformation, evidenced by the low adherence to technology management skills.

Keywords: Skills 4.0. Netnography. Higher Education. Business Schools. Industry 4.0.

RESUMO

A quarta revolução industrial trouxe mão de obra qualificada em recursos humanos sociais, metodológicos, emocionais e técnicos. Considerando o volume relevante de força de trabalho no Brasil, ainda não se sabe se essas habilidades estão sendo formadas pela academia ou por profissionais. Para isso, relacionamos as habilidades 4.0 da literatura com aquelas identificadas em recursos humanos brasileiros por meio de um estudo netnográfico. Os resultados mostram dissociações entre as variáveis do framework. As habilidades técnicas são mais citadas nos currículos profissionais, enquanto as habilidades sociais, pessoais e metodológicas estão mais presentes nos projetos pedagógicos das escolas de negócios. Os achados implicam que o profissional completo habilitado para as habilidades 4.0 é escasso no mercado brasileiro. Além disso, o ensino superior não acompanhou o ritmo da transformação digital, evidenciado pela baixa adesão às habilidades de gestão de tecnologia

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Palavras-chave: Skills 4.0. Netnografia. Ensino Superior. Escolas de Negócios. Indústria 4.0.

RESUMEN

La cuarta revolución industrial trajo consigo la formación de mano de obra calificada en los ámbitos social, metodológico, emocional y técnico de los recursos humanos. Considerando el volumen relevante de la fuerza laboral en Brasil, aún se desconoce si estas habilidades están siendo formadas por la academia o por profesionales. Para ello, relacionamos las habilidades 4.0 de la literatura con las identificadas en los recursos humanos brasileños a través de un estudio netnográfico. Los resultados muestran disociaciones entre las variables del marco de referencia. Las habilidades técnicas son las más citadas en los currículos profesionales, mientras que las habilidades sociales, personales y metodológicas están más presentes en los proyectos pedagógicos de las escuelas de negocios. Los hallazgos implican que el profesional completo habilitado para las habilidades 4.0 es escaso en el mercado brasileño. Además, la educación superior no ha seguido el ritmo de la transformación digital, evidenciado por la baja adhesión a las habilidades de gestión de la tecnología.

Palabras clave: Habilidades 4.0. Netnografía. Educación Superior. Escuelas de Negocios. Industria 4.0.

INTRODUCTION

Present challenges for organizations include globalization, physical space, technology, and staff. With Industry 4.0, the triad of physical objects, their representation, and virtual services and applications will make the human-machine interactions are more frequent and may result in paradigm shifts of different natures. The digital transformation modifies products, processes, business models breaking paradigms towards operational efficiency, marketing, and sustainable development (Drath; Horch, 2014; Asuncion, 2016; Becker; Stern, 2016; Stock; Seliger, 2016; Calitz; Poisat; Culle, 2017; Kergroach, 2017; Unido, 2017).

Technological development brings an ambivalent social change: on the one hand, very beneficial consequences, particularly for the increase in income and consumption potential, but on the other hand, it also brings some tough challenges in terms of track changes in economic structures and work (Hirsch-Kreisen, 2016). intensive discussions on Industry 4.0 have globally occurred (Hirsch-Kreisen, 2016; Kim, Kim, 2016; Kuruczleki *et al*., 2016; Wef, 2018). Compared to other countries such as Germany, South Korea, United States, and France (BMUB, 2014; Liao *et al*., 2017; Kingdom, 2017; Wef 2018), Brazil remains a phased state (Cezarino *et al*., 2019.).

In studies of this transformation, some gaps are found as the ratio of scanning with cleaner production and green technologies (Liao *et al*., 2017, Farias *et al*., 2013.); and, in addition, the bottlenecks of production factors that the industry may face 4.0 (Burritt, CHRIST, 2016 Alcacer & Cruz-Machado, 2019). Professionals who perform industry 4.0 automatically are looking for cleaner production, industrial processes, and products with less negative externalities (STOCK; SELIGER, 2016), which requires specific qualifications and training.

Meanwhile, one of the most critical factors identified in these gaps is the qualification of human resources (Jabbour *et al*., 2018 Liboni *et al*., 2019). In the literature, some frameworks describe the technical and human skills (Hecklau *et al*., 2016 Liboni, 2019), representing the qualifying paths that this professional must go to meet new labor market requirements in the digital transformation.

Aiming to fill the gaps left by Jabbour *et al*. (2018) related to the specific role of the critical factors of human resources in the implementation of Industry 4.0 technologies to sustainability-oriented, the main question that policymakers face is: what skills will be needed in the future work? (Unido, 2017). From this perspective, the main question that policymakers and researchers face is: Do Brazilian professionals have the skills required by industry 4.0? And yet, business schools in Brazil are concerned with the formation of these skills?

In this sense, this research aims to relate the skills required for Industry 4.0 in the literature, based on Hecklau *et al*. (2016) and Liboni (2019), with the skills identified in the Brazilian human resources and administration higher education. For this, we used netnography technique. In the first phase we sought professional profile information from Brazilians from LinkedIn, listing keywords such as "Industry 4.0", "sustainability", "innovation", "technology (s) green (s)", "circular economy" , "plant (s) digital (s)", "manufacturing (s) digital" and "city (s) smart (s)." Later also chose it by analyzing the skills and skills defined in the pedagogical projects of the course of administration of the four best Brazilian higher education institutions. We adopted the netnography technique, i.e., the HEI websites' secondary data collection available on the internet. We then compared the professional profiles of the candidate with the content present in the curriculum of the best 10 Brazilian business schools as the Ministry of Education ranking.

THEORETICAL FOUNDATION

The Advent of Industry 4.0 and Green Technologies

Industry 4.0 was first presented at the fair in Hanover, Germany, in 2011 and used as a competitive strategy to use intelligent monitoring production processes to aid in decision making and maintenance of machines to reduce the German industry costs (Drath ; HORCH, 2014; MORRAR; ARMAN; Mousa 2017). Only in 2013, the vision, integration of resources, priority action areas, and applications were presented in a report to demonstrate more fully the technological advances Industry 4.0 can bring (Liao *et al*., 2017).

More incipient is the production of research on the sustainability of production networks in the context of Industry 4.0 yet. Many gaps are found and have not yet been analyzes about productivity and resource efficiency, regulatory frameworks for adaptation of innovations with existing legislation (Liao *et al*., 2017), government actions to enable the sustainable production allowance of green products (Farias *et al*, 2013.) and the broader context of corporate sustainability (Burritt, Christ, 2016).

The study of Liao *et al*. (2017) inferred that Industry 4.0 deals with five main points: smart technology manufacturing and automation; enabling technologies for future plants; industrial computing and its applications; advanced information systems and; manufacturing to a sustainable economy. On the elements that make it up, you can list as a priority the Internet of Things, Artificial Intelligence, Big Data, and cloud storage systems, and Cyber-Physical

The Fourth Industrial Revolution comes on the back of the Internet of Things (IoT), transforming plants into smart factories where production is controlled based on exchanging information and intelligence between the different elements involved. The "smart parts" guide and support the production processes and documentation communicating their status (which stage of the production process are) and what parameters were set for them, and where to deliver. This represents a transition from the current central control system in the factories to a decentralized local control system (BMUB, 2018).

The Digital factories are only possible by connecting the resources, machinery, and logistics systems online way to quickly and automatically, favored by the emergence of wireless technology (European Comission, 2010; BMUB, 2014). The basal idea of IoT is to make the diffuse presence of things around us to communicate with each other to achieve common goals. In turn, Artificial Intelligence (AI) is a technology that has been used to simulate the human process of thinking and behaving. To allow the computer to get a high-level application, it manufactures machines or intelligent systems like the human brain (Brazil, 2018).

Already through Big Data, it is possible to design architectures that balance data latency with application data requirements and decision cycles, i.e., to structure supply chain information as the actual demand. Cyber-Physical Systems (CPS), in turn, synthesize the fusion between the physical and digital, the "digitization." The term, also on the rise, describes the intelligent interconnection of product value chains and real-time services and applying an end-to-end solution using information and communication technologies (Stock; Seliger, 2016).

Implementation of Industry 4.0 leads to a new supply chain paradigm based on complex networks and interwoven manufacturing with different functions for physical products suppliers,

customers, and logistics service providers, enabling to identify and track individual products throughout their production cycle (Stock; Seliger, 2016; Prause; Atari, 2017). This will allow the products to organize and find their way through the production process and final distribution channels for the customer, dynamic and intelligent based on open production and logistics networks, Industrial production becomes more flexible and transparent (Beier; Niehoff; Xue, 2018),

Sustainable development becomes the background of this change, given that industrial production in smart factories is integrated and promotes green solutions. At the same time, there is a plan that involves several actions aligned to change, such as strategic planning, teamwork, communication. As mentioned, the smart factories also offer opportunities to strengthen the role of renewable resources in industrial production, which includes improvements regarding production efficiency on the circular economy of production (Stock; Seliger, 2016).

Despite the growing adoption of actions relating to green technologies for Industry 4.0, the term revolution is not about technical achievement but the ability to meet current and future challenges (Drath; Horch, 2014). Therefore, even with the increasing pressure to meet the changing demands of customers and employ advanced technologies brought by the Fourth Industrial Revolution, it is clear that sustainable, timely innovation, and support facilities, still need to evolve (Li; Hou; Wu, 2017).

HR Management and Skills 4.0

Approaches and ideas in the context of Industry 4.0 are located at the interface of disciplines electrical engineering, business administration, computer science, engineering of business and information systems and mechanical engineering, as well as the related segments (Lasi *et al* .; 2014), so the agenda 4.0 Brazil, following these recommendations, will act in the "[...] mapping skills, understanding of market demands, retraining workers and preparing new generations for the world 4.0" (Brazil, 2018) working mainly in education with a focus on technology, allowing supply and demand for courses offered in both public and private educational facilities, as well as provide training to teachers who educate students of the federal network of vocational and technological education.

Once in Industry 4.0, people will continue to have a key role in creating value in companies (Hecklau *et al*., 2016; Becker, 2016). This requires human resources increasingly skilled, able to monitor and participate in this trend. Currently, efficient and high-quality training

skills and the cultivation of innovative talents are becoming increasingly urgent since innovative human capital is still scarce (Li; Hou, Wu, 2017). New jobs will be more complex and intensely connected to computing devices while automated, simple, repetitive tasks (Becker; Stern, 2016). For Li, Hou, and Wu (2017), governments should take steps to accelerate the elimination of extensive manufacturing mode, which depends solely on human labor,

Whereas these proposals relate to education to the formation of entrepreneurial skills, it is essential to describe the concepts of competence and their management models by Personnel Management. In the Brazilian context, the movement towards HR management and focus on skills is given in 1950 with the business entry permit automakers in the country. The functions employed in factories required the worked expertise and specific training for machine operation and maintenance, which resulted in the expansion of vocational schools. Skills then begin to be analyzed in procurement procedures and maintenance of positions to contribute to organizational growth (Asuncion, 2016).

The Competency Management System can be seen in two different perspectives, such as strategic philosophy, which seeks to maximize productivity through a set of interlinked policies and organizational guidelines; and how HR management tool that aims at obtaining financial gain (Sarsur, 2007). Strategically, companies define and formalize a set of skills they expect from their employees, according to its objectives, and, therefore, use the Management Skills (Fernandes, 2013).

Sustainable Human Resources Management brings results and economic, social, and ecological results as internal and external interconnectivity of the organization, promoting a higher quality of life at work and in society (Kramar, 2014). Whereas the increasing amount of data will increase the demand for system and cloud services, in general, powers and duties are expected to increase massively in importance and merge with other technical skills of existing production (Hirsch-Kreisen, 2016). Information Technology, which has a key role in integrating the companies, despite being an area seen only as support for other sectors, now has greater importance in Industry 4.0 (Wef, 2016), being at the heart of health promotion vocational training.

The professionals involved in the production of components and machinery, usually engineers (mechanical, electrical, production, etc.) should also have the power of computing professionals (systems analysts, computer scientists, software developers, and programmers) for digital factories (Benesova; Tupa, 2017). Capabilities such as self-organization, management, teamwork, and communication skills are increasing in the emerging world (Kergroach, 2017), complementing the skills of emotional intelligence, social and cognitive that are effective in

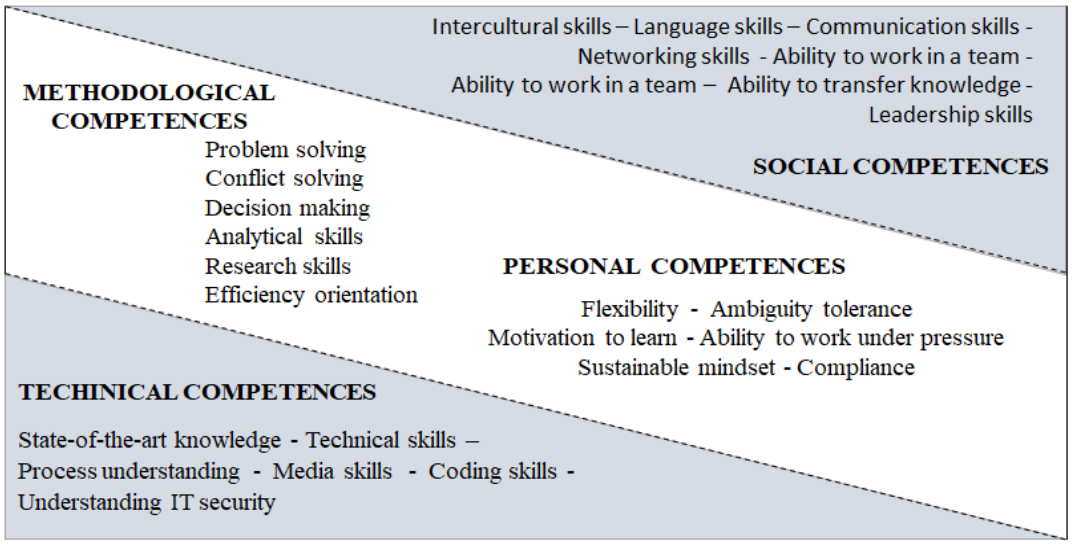
professional roles, management, and leadership in many sectors of society (Boyatzis, 2008).

The main challenges for the workers in the new technological scenario, such as redundancy, restraint, and rising unemployment, can be addressed through education and training (Calitz; Poisan; Cullen, 2017). innovative methodological approaches will be needed to plan and develop manufacturing systems in the digital industry and, therefore, the creation, management, and sharing of knowledge become key (LASI *et al*., 2014).

The frameworks presented by Hecklau *et al*. (2016) and Liboni *et al*. (2019) are displayed visually in Figure 1. The model their contributions converge, only differing methodological skills of issue that Liboni *et al*. (2019) merges with personal skills.

Figure 1

Powers industry Framework 4.0 seconds Hecklau et al (2016) and Liboni et al (2019).



Source: Hecklau *et al* (2016) and Liboni *et al* (2019)

To Sivathanu and Pillai (2018), from the technological innovations, the industry is witnessing changes in employees and the generations who join organizations, and it is expected that by 2020, half of the workforce will consist of employees of Generation Y or generation Y (born between 1980 and 2000). The Y and Z generations (born after 2000) grew up in the Internet age, social and smartphone media, and had different expectations of their employers, as at any time and anywhere, considering more forceful elements such as collaboration, instant feedback, open and data-driven decision culture. Smart Human Resources (SHR 4.0), or Smart Human Resources, are powered by emerging technologies and new employees.

Capabilities as self-organization, management, teamwork, and communication skills should also grow in importance in the emerging world (Kergroach, 2017), complementing the

skills of emotional intelligence, social and cognitive that are effective in professional roles, managerial and leadership in many sectors of society (Boyatzis, 2008).

METHOD

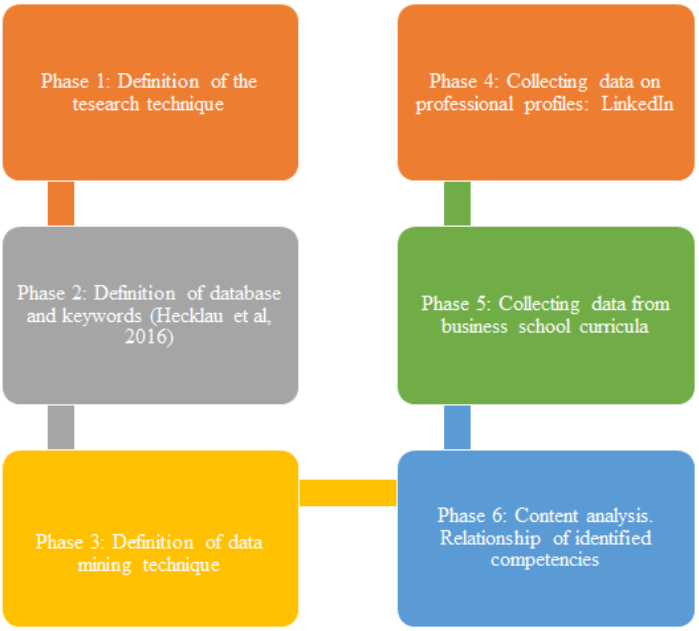
Returning to the general objective "relate the skills required for the Industry 4.0 in the literature, based on Hecklau *et al*. (2016) and Liboni *et al*. (2019), with the skills identified in the Brazilian human resources and advanced training in management," the present study falls as exploratory research, qualitative. Often, to get a more specific analysis of a phenomenon described as the one proposed in this paper, a data survey is more appropriate (Marconi; Lakatos, 2002).

For the development of the research were used netnography techniques for data collection. Netnography keeps relation with the ethnographic method that is characterized by an attempt to study the behavioral spheres, communication and attitudes of groups and cultures, not only in the virtual world, but also in the real as the former is able to mirror the second (Novelli 2010). The method was introduced at a time when the internet was heavily based on textual content and allows new ways to explore the daily life of specific groups or cultures (Novelli, 2010), in this case, the social network for business purposes "LinkedIn.

The nethnographic search occurred as the following steps:

Figure 2

Methodological steps.



Source: own authorship (2023)

The search engine were used keywords related to the topic of work proposals from the working Hecklau *et al* (2016) and Liboni *et al* (2019). sought were the terms "Industry 4.0", "sustainability", "innovation" technology (s) green (s) "," circular economy "," plant (s) Digital (s) "," manufacturing (s) Digital " and town (s) smart (s) "in Portuguese and English languages, both individually and combination of terms. The period of collection of data netnográficos occurred in late 2018 and early 2019.

The netnográfica search occurred as the following steps:

1. the search engine were used keywords related to the topic of work, that is, the development of green technologies in Industry 4.0. We searched the terms "Industry 4.0", "sustainability", "innovation", "technology (s) green (s)", "circular economy", "plant (s) Digital (s)", "manufacturing (s) Digital "and" town (s) smart (s) "in Portuguese and English languages, both individually and combination of terms;
2. from the results obtained, there was a huge amount of curriculum to be worked and the diversity of profiles found, fleeing the objective of this research;
3. we conducted a new search with only "4.0 industry" in which it was collected information of profiles of individuals, such as training courses, specialization courses, work experience, experience abroad and knowledge of languages;

4. then the powers, called by Linkedin "skills" were highlighted in different sections: technical and interpersonal. The site proposes this division and the research followed this format to facilitate the analysis of data.

From the results obtained, there was a huge amount of curriculum to be worked and the diversity of profiles found, fleeing the objective of this research. So we opted for the consideration of the first ten curricula, who presented themselves as more adherent to the keywords according to the website of the seeker. Data were mined from the "skills" which were highlighted in different sections: technical and interpersonal. The site proposes this division and the research followed this format to facilitate the analysis of the data.

Once completed the collections and compilations of data, the processing and analysis took place, using the methodology proposed by Bardin (1977). To collect through netnográfica research, a survey of the frequency was performed by observing the occurrence of the terms used, the results of the training courses, languages, etc. Regarding the skills the words found in the professional profile of the skills list Administrator of the top four undergraduate courses in Higher Education Institutions Brazilian, established by the University of Leaf Rank in the year 2017, were evaluated considering the categories proposed by Hecklau *et al* . (2016), through exploratory evaluation.

In studies Hecklau *et al*. (2016) the main categories that characterize the skills required are: technical, methodological, social and personal. Technical skills are related to skills involving expertise in technology and information security, as well as encoding and use of media. The methodological refer to skills management and solution of problems and conflicts, involving decision making, creativity and entrepreneurship. Social skills involve the ability to work in teams, leadership, cooperation, commitment and the use of communication tools (including between different cultures). Finally, personal skills are said to relate to flexibility, tolerance, motivation for learning, compliance, ability to work under pressure and sustainable thinking.

RESULTS

The results suggest that, despite technical qualification, indicate the development of several skills criticaç to Industry 4;0, not all of them were cited, such as commitment, cooperation, working under pressure, flexibility, understanding of security technology, coding, and social media. The emphasis on technical skills is evidence, and socio-emotional skills are scarce and represented as a secondary competency.

Of the top ten list, there is only one woman. All individuals possess an undergraduate degree. The areas range from electrical engineering, production to business administration, the latter with five representatives. Only two have undergraduate in private universities (Getulio Vargas Foundation) and trained abroad at the University of Cologne, Germany. Four candidates have MBAs in different areas: Administration, Production Engineering, Information Systems, and Information Technology. Three of them have master's degrees in renowned universities in Brazil, including a master's degree at Harvard.

On skills, LinkedIn has a section in which the individual skills and their own points will allow you to get recommendations from other individuals in your network (endorsements). In Table 1 presents the skills and recommendations for each researched profile:

Table 1

LinkedIn skills.

Skills	technical	Personal	social	methodological
Declared - professionals	870	351	72	103
Recommended - professional	564	105	76	77

Source: own authorship (2023)

Among the primary technical skills identified in Linkedin are programming activities, software development, and architecture, *business intelligence*, Automation, data analytics, process control, quality control, agile management (and derivatives). Already in the pedagogical projects of the administration courses come scarcer concepts like "technical skill of the profession" and management process and state of the art knowledge adding eight representations. None of the projects examined detected an analogous term or precise specific technical expertise of industry 4.0, especially technology management. A more significant gap between the two bases is noticed when it comes to technical skills; professionals declare more aligned concepts and detailed their expertise while schools have few inserts and more semantic scope.

Regarding the methodological skills, the social network data point to the contrary. In this case are short declarations and recommendations of methodological skills with respective figures of 10 and 7. Already in the methodological teaching projects are most often cited, with 22 appearances. Hecklau *et al*. (2016) model are the most common skills: Have Creativity, thinking entrepreneur, problem solver, solver of conflicts, decision taker, and analytical skills.

Some candidates even mention interpersonal skills. Such emptying can be justified due to the lack of credibility that listing interpersonal skills on a Linkedin page can generate when the

individual is evaluated for a job or new job function. May justify that interpersonal skills are not considered crucial for highly qualified managers with the ten selected for the study.

Occasionally, the results confirm the dissociation of information between the two bases. In this case, the pedagogical projects contain more social skills than the declared professional profiles raised by LinkedIn. Only seven social skills were described by the professionals being the most cited communication skills and teamwork. By analyzing this data, you can see no evidence of cross between the profile characteristics and skills to industry 4.0 in Brazil raised with any mention of sustainability, sustainability management, eco-technologies, and sustainable technologies.

The implementation of technologies related to industry 4.0 will require a professional who knows how to work together, collaboratively, have good sociability communication, confirming that the 4.0 will be asked individuals to work in a team and knowledge to improve their knowledge by sharing and joint construction of knowledge (WEF, 2016). Again individuals who expose themselves as experts in industry 4.0 did not have such skills as the focus of their profile. There is a possibility that the making of the pages have not been accurate enough, or there is the possibility that candidates for possible vacancies in industry 4.0 do not have the skills suggested

Already in the educational projects of the schools studied, there was a greater depth of detail and comprehensiveness of all social skills cited in the model by adding a total of 15 attendances.

Table 2

Professional profile versus skills associated with Industry 4.0.

Educational institution Administration course	**Skills and Competencies Administrator Professional Profile**
ESI A and C These education institutions are	● Recognize and define problems, ● Consider solutions and think strategically, ● Introducing modifications in the production process, ● Act preventively, transfer and generalize knowledge and engage in varying degrees of complexity, the process of decision making; ● Develop expression and communication compatible with professional practice, including the negotiation and interpersonal or intergroup communications; ● Think and act critically on the sphere of production, including its position and function in the productive structure under its control and management; ● Develop logical, critical and analytical thinking to operate with values and mathematical formulations present in formal and causal relationships between productive, administrative phenomena and control as well as express themselves critically and creatively on the different organizational and social contexts ● Have initiative, creativity, determination, political and administrative will, willingness to learn, openness to change and quality awareness and ethical implications of their professional activity;

public (federal) and are in first and third place in the rankings, respectively.	● Ability to create, organize and transfer knowledge of life and everyday experience for the desktop and your professional field, in different organizational models, revealing autonomous and adaptable professional; ● Ability to design, implement and consolidate projects in organizations and develop new organizations; ● Ability to develop good social relations; ● Develop sensitivity to cultural differences regional, national and international; ● Develop a humanistic training necessary to exercise leadership; ● Have an ethical stance.
B HEI Raking second place in the Best Universities in the country. It is a private institution of higher education.	● Think important issues that contribute to the sustainable development of the country; ● Understanding the socio-political context in which it operates; ● Predict, understand and manage change; ● Having flexibility and suppleness to face uncertainties; ● Communicate and relate; strive for ethics, social commitment and citizenship; ● Solve problems in complex environments; ● Be creative to propose models that meet organizational demands; ● Understanding rapidly changing paradigm; ● Mastering technical and scientific tools and have analytical and critical skills; ● Develop entrepreneurial leadership to face the uncertainties and disruptions in the organizational environment; ● Predict trends, preparing to understand the changes that challenge their daily lives; ● Valuing the human being as creative element and holder of knowledge, giving education a more important role; ● Develop multicultural skills necessary for national and international action in complex environments ● Having proactive attitude, creativity, determination and political and administrative will, willingness to learn.
IES D public institution placed fourth in the Administration course evaluation ranking. Ma considered the largest public educational institutions of the country.	● Overview of the social, political, economic and cultural; ● humanistic; ● Technical training for financial analysis of organizations; ● Competence for market analysis; ● technical and scientific training to work in organizations; ● Competence to critically analyze business organizations; ● comprehension skills of the administrative whole; ● innovation ability; ● interpersonal communication skills; ● Ability of logical and analytical reasoning; ● strategies selection of skill; ● Ability to order activities in decision making. ● Undertake and innovate socio-environmental and ethical awareness ● Teamwork, promoting synergy of knowledge ● Lead, motivate and manage conflicts ● Manage projects, in terms of time, necessary activities and resources ● Learn, manage and share knowledge

Source: own authorship (2023)

Characteristics in table 2 reinforce that the Brazilian higher education institutions lay in their pedagogical projects a professional profile for human ability. They involved technical skills and the necessary conditions so that the administrator can develop actions enhancement of human knowledge and learning. According to Hecklau *et al*. (2016), the 4.0 industry faces several challenges related to digitalization and automation, economic, social, technical, environmental, and political. So it is necessary to develop skills associated with issues such as globalization,

innovation, collaborative work, demographic changes, and social values, virtual work, the complexity of processes, technology, and exponential increase of data usage,

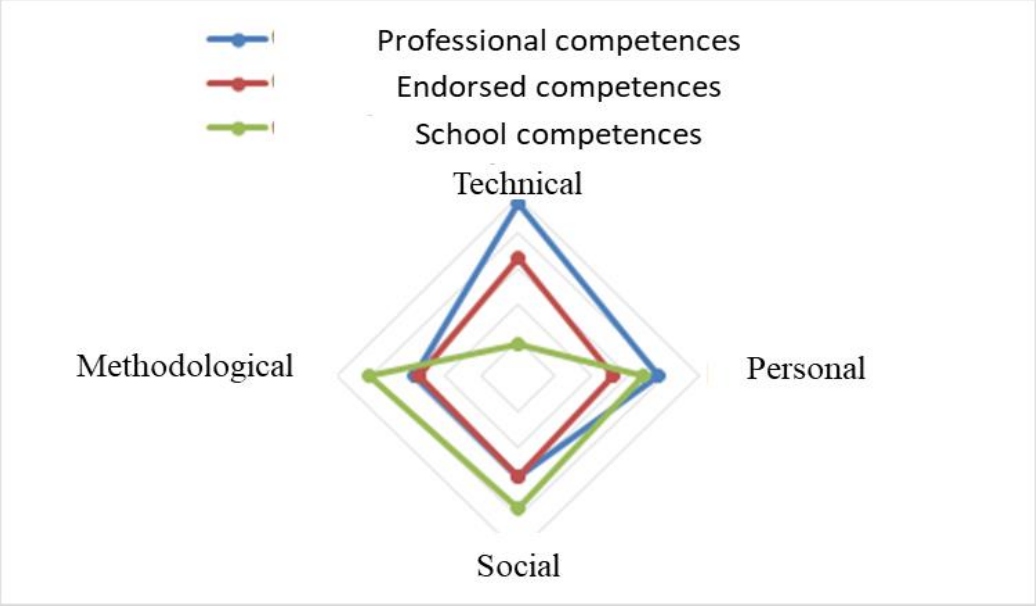
It stands out in the proposed profile in educational projects significant association between the competencies to be developed in graduation in management and methodological skills proposed by Hecklau *et al*. (2016), especially in terms of creative skills and analytical problem-solving and conflict, and still thinking entrepreneur.

However, there is a lack of technical skills focused on the issue of scanning processes and technological security and personal skills such as working under pressure skills, flexibility, and compliance with the rules of information technology security. These powers indicated by Hecklau *et al*. (2016) are rarely present in the administrator profile proposed by the management courses of the IES study.

Finally, we compared both data with the application of standardization of the Z score test for standard deviation, decreasing from 12.7 to 3.8. LinkedIn and the data that came from the site of the schools are scarce, as can be seen in Table 1. Figure 3 shows the difference in intensities of the skills addressed by comparing the two databases: schools and LinkedIn (declared and recommended).

Figure 3

Overlay of powers declared and recommended by professionals and schools.



Source: own authorship (2023)

The graph in Figure 3 shows the balance of the technical, methodological, social, and

personal skills considering those recommended by the theory (Hecklau *et al*. 2016). From the point of view of skills informed by the professionals surveyed on the LinkedIn site, you realize that the technical skills are more communicated and emphasized, and some personal to disclose an attractive professional profile to the business community. In relation skills declared by the pedagogical projects of note are stressed courses in social capacity, methodological and personal, with less rigor regarding the technical issues surrounding the knowledge and skill in information technology.

The digital transformation requires the development of skills involving knowledge and use of new technologies, the ability to adapt to changes, and therefore the need for flexibility. So the definition of competence involves elements such as skills, knowledge, and attitudes. This work takes up the concept of competence presented by Fernandes (2013, p. 48) as "a set of knowledge, skills, attitudes and values that an individual mobilizes and implements, repeatedly, within a professional context, adding value to the organization and yourself. "

Some important features to work in industry 4.0 are related to the individual's attitudes, which are not always developed in the academic environment.

According to research, employment is expected to grow 6% in 2020. This growth decade will increase consumption, and the economy will be affected. The presence of fitted elements in the installation and development of devices and systems will be crucial. With digital conversion, all processes and customer expectations will change. It will not be straightforward to find talent with the skills required to work within this new context. The definition of the workforce will change. Consultants, home office workers, freelancers, professionals in branding, and suppliers contribute to the regular advisory activities and companies based on projects (Bayraktar and Hvac, 2018).

The skills demanded by industry 4.0 seconds netnography and presented theoretical framework circulate the technical and interpersonal skills. The techniques can be described as knowledge in IT, production systems, and digital technologies of the intelligent factory. The more technologies are implemented, the more uses are discovered, resulting in the human labor force being applied differently. Human capital will not come to be wholly replaced by automated solutions but requires organizations and individuals to prepare so that plans for education and training are aligned among stakeholders and organizational needs.

With the digital transition, Information Technology (IT) has a crucial role in integrating the companies, not only as support for other sectors but performing greater importance in the Fourth Industrial Revolution. It is allowing the design of sustainable approaches to increase

production efficiency, causing increased demand for experts in data that exceeds both the current supply and the current capacity of education systems and training to provide this market (Drath; Horch, 2014; Asuncion, 2016; Becker; Stern, 2016; Stock; Seliger, 2016; Calitz; Poisat; Culle, 2017; Kergroach, 2017; Unido, 2017).

The issue of deficit qualification and no follow-up of Brazilian universities to train the new professional is also a significant point analysis, even making reservations a few isolated initiatives, as proposed by Dregger *et al*. (2016). To Li *et al*. (2017), innovative human capital is still scarce. According to Cardoso *et al*. (2017), which is taught in Brazilian universities does not apply to business contexts. Brazilian lags behind the developed countries are to a lack of investment in qualified professionals and cutting-edge technologies.

Liboni *et al*. (2019) and Cardoso *et al*. (2017) count on the development of skills 4.0 as an ample opportunity to discuss new work skills and education models. Also, we could conclude that universities need to reinvent methods for educating to digitalization. New research will reveal how universities will achieve market expectations and the new role of universities.

CONCLUDING REMARKS

The objective of this study was to compare the skills required for Industry 4.0 in the literature, based on Hecklau *et al*. (2016) and Liboni *et al*. (2019), with the skills identified in the Brazilian human resources and administration in higher education. The results showed significant differences between the appearances of the powers in the two databases. While personal profiles emphasize the technical skills to the detriment of social, methodological, and personal, business schools, in turn, emphasize the skills called soft and without emphasis on the technical variants.

One explanation for the result may have evidence in the absence of the applicant's credibility to "self-praise," i.e., in the Brazilian market, the duties of soft skills in the curriculum are seen as irrelevant information and without trust, leading professionals not to focus efforts to describe them. But when it comes to business schools' educational projects, the general profile of the courses dominates the narrative that prevents technical details of the knowledge from being acquired. The statement does not exempt schools from a lack of alignment with the digital transformation and necessary changes. Thus, among the range of the sample, the Brazilian professionals are not and are not prepared to work in industry 4.0.

Thus, human resources management and business schools are not immune to the challenges faced by the industry approach 4.0. However, significant changes are beneficial.

Sivathanu and Pillai (2018) suggest that organizations adopt SHR 4.0, i.e., Smart Human Resources (or Intelligent Human Resources), or HRM 4.0. A system that combines emerging technologies and a new generation of employees can transform HR processes end-to-end covering all aspects of the integration of talent to be hired, talent development, and talent that no longer belong to the Organization framework.

The main limitation of this study is the deduction that educational projects are up to date and that they run as present on the school website. Many complications occur, positive and negative, between what is planned and what was executed, obscuring initiatives applying for technical skills training, but not described in the project. A vital stakeholder to be heard in the continuity of this research is the company, as the managers themselves require these skills and how strongly they are requested from individuals seeking to operate within this new context of technological change.

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