

## **Significance of 21<sup>st</sup>-Century Skills for Enhancing Employability among Undergraduate Engineering Students**

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### **Abstract**

This research paper discusses the significance of 21<sup>st</sup>-century skills – communication, critical thinking, creativity, innovation, collaboration, leadership skills, problem-solving, lifelong learning, etc. – for undergraduate engineering college students. These students need to have a solid foundation in technical skills, such as mathematics, physics, and engineering domains. Nevertheless, these skills are not enough in the contemporary job market. Employers now require graduates to have the aforesaid 21<sup>st</sup>-century skills that are essential for their success in the workplace. The students must have employability skills, besides having their domain knowledge, to become employable for multinational corporations. This paper analyses how employability skills can be transferable skills that are required by engineering students to be industry-ready. Even after getting employed, the employees need to sustain their employment. It is possible when the employees are trained to effectively employ these skills to have a prosperous career. This research study is purely based on secondary sources gathered from various reliable sources. It analyses why the development of these skills is imperative for students to deal with the demands and challenges of their professional and general life.

**Keywords:** 21<sup>st</sup>-century Skills, Employability Skills, Multi-National Corporations, Engineering Students, Multinational Corporation, Technical Skills, Transferable Skills

### **1. Introduction**

21<sup>st</sup>-century skills are a set of competencies that are very important for undergraduate engineering students to possess to be competitive in the job market. These skills include communication, critical thinking, creativity, innovative thinking, problem-solving, collaboration, and global awareness. At the heart of today's job market is the need for employees who can think critically and solve problems creatively. Technical skills alone are no longer sufficient to succeed in the

engineering profession. Engineering students need to possess the aforementioned skills to stay competitive academically and industrially. These capabilities are considered critical for effective communication, problem-solving, and managing complex projects.

There is a lot of the significance of these employability skills in the engineering field. Firstly, undergraduate engineering students need to have an advanced understanding of how technology works to meet the technological demands of the modern workplace. They must be comfortable with new software programs and coding languages including those related to robotics and artificial intelligence. In addition, they must understand the importance of cybersecurity and how to protect valuable information and technologies. Lastly, the job market demands global awareness. The world is more connected than ever before and engineers must be aware of global issues and factors that may impact their projects and the communities they serve. Engineers need to think outside the box and consider the environmental and societal impacts of their projects.

## **2. Background**

Undergraduate engineering students should have a solid foundation in technical skills, such as mathematics, physics, and computer science. However, these skills are no longer enough in the current job market. Employers now require graduates to have non-technical skills that are essential for success in the workplace. Technical skills and non-technical skills are complimentary to each other. Primarily, these skills include critical thinking, communication, collaboration, and creativity.

## **3. Methodology**

Using the secondary data research or qualitative research method, this research paper has been drafted.

## **4. Literature Review**

Several research studies highlight the fact that the present-day professional graduates are unable to comply with the employment criteria of the industry. (Radermacher & Walia, 2014; Lakshminarayanan, Llorens, Llinàs-Audet, Ras, & Chiaramonte, 2013; Kumar & Ramanakumar, 2014). 21<sup>st</sup>-century skills are also known as transferable skills or employability skills that denote the hard skills and soft skills like personality skills, behaviour, attitudes, and knowledge required at the workplace. These skills are very vital for success at all levels of education and employment. Today, the job market is very challenging and dynamic for students graduating from different engineering institutions. The graduates with employability skills needed at workplaces always get very good employment opportunities. Several countries across the globe have started focusing

more on the development of the requisite skills to prepare graduates to make them suitably employable, as demanded by employers (Abelha et al, 2020).

It is generally perceived that the role of an engineer is confined merely to the acquisition of core skills with thorough knowledge of mathematical sciences. Be it as it may, Nguyen (1998) in her research paper disagrees to the aforesaid perceived notion and writes on the role of engineers by maintaining that

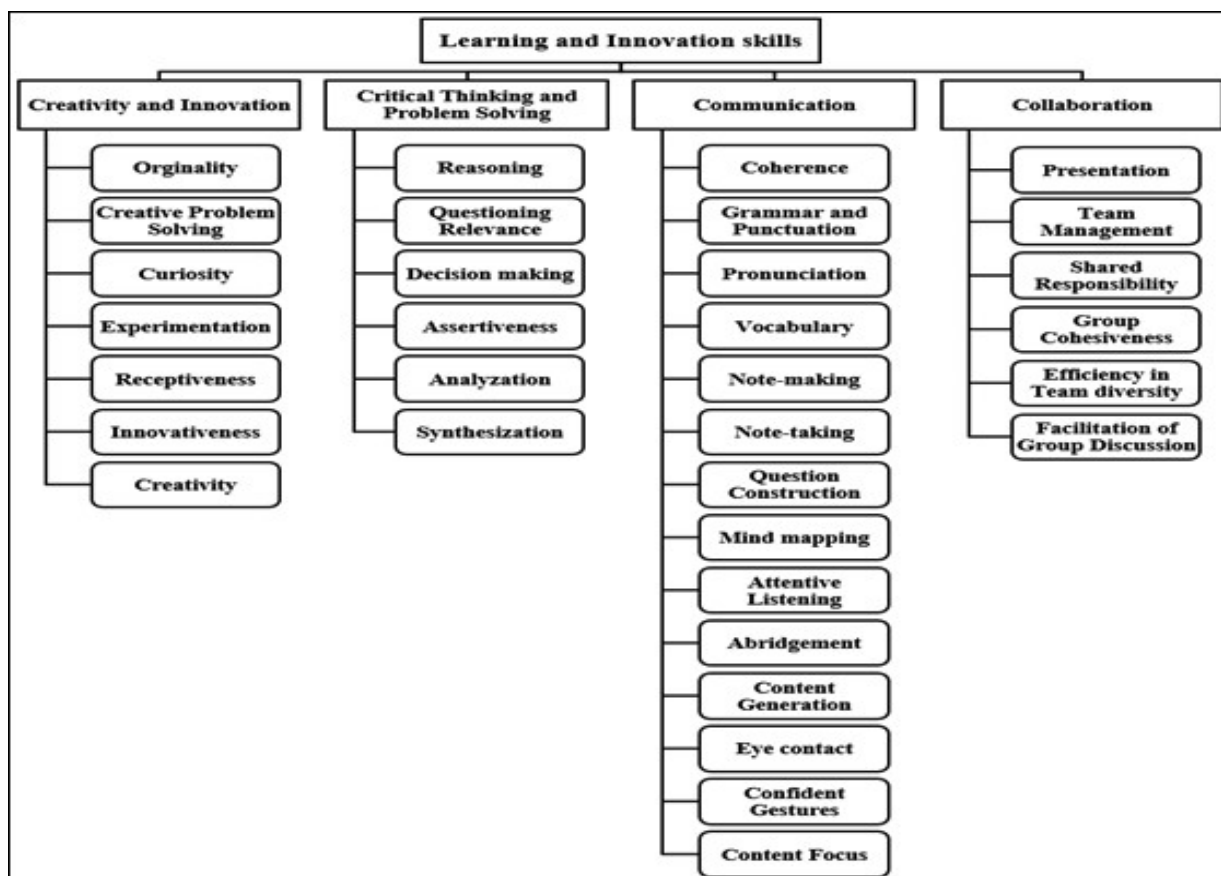
The dynamic world in which engineers operate presents them with new demands and provides new challenges in the diverse, profound and incessant changes which confront mankind as it heads towards the 21<sup>st</sup> century..... Engineers are involved in the implementation, application, operation, design, development and management of projects and processes, although the type of work that engineers do will vary depending on the chosen field of study. (pp. 65-66).

As stated by the experts of the American Management Association, employability skills such as problem-solving, critical thinking, innovation, creativity, effective communication skills, and collaboration have become more important in the contemporary world economy. Kaufman (2013) remarks that 21<sup>st</sup>-century skills include 'skills and competencies such as problem-solving, critical thinking, communication skills, digital literacy skills, and collaboration skills (p. 79). Teachers are supposed to combine these skills with their technical content to enable students to have an enriching professional learning experience.

Employability skills are a group of indispensable skills that encompass the development of a technical knowledge base, level of expertise, personality skills, and growth mindset that are quite significant for success at the present workplace. The establishment of multinational corporations (MNCs), the unprecedented development in technology, the increased employee mobility, and the revolutionary changes in the recruitment process are the important factors that have influenced the job market of the 21<sup>st</sup> century. Because of the process of internationalisation in all industrial sectors, today's engineering graduates are required to quickly gain employability skills to find a suitable job in their graduated domain of study and also to learn to remain lifelong learners to incessantly cater to the ever-changing needs of the job market (Cassidy, S., 2006; Yorke, M., 2006).

## 5. Discussion

This research paper explores the significance of 21<sup>st</sup>-century skills to enhance the employability of undergraduate students of engineering and technology. This research paper seeks to analyse the importance of employability skills such as effective communication skills, creativity and innovation, critical thinking, problem-solving, collaboration, teamwork, negotiation skills, adaptability or flexibility, and lifelong learning. Fig.1 explains Learning and Innovation skills as 21<sup>st</sup>-century skills, which have proved to be very important for undergraduate engineering students not only to enable them to become employable but also to sustain their employment in their multinational corporations. In Fig. 1 (cited from S. Mekala , C. Harishree , Geetha R, 2020, p.76), 21<sup>st</sup>-century skills such as creativity and innovation, critical thinking and problem-solving, communication, and collaboration with their sub-skills are indicated.



**Fig. 1: Tenets of Learning and Innovative Skills**

(Source: Cited from S. Mekala, C. Harishree, Geetha R, 2020, p.76)

Fig.2 defines soft employability skills such as communication skills, critical thinking, problem-solving, creativity, leadership skills, teamwork decision-making, and time management. These

skills are extremely important for all undergraduate students to get employment and sustain the same in multinational companies. These skills are very crucial for making their corporate communication effective. The Fig.2 table (Cited from Amirrudin & Salleh, 2016; Li et al, 2019; Ornellas et al, 2018; Sanyal & Hisam, 2018; Kashyap, 2019; Shivoro et al, 2017) with definitions of all these soft employability skills is as follows:

### **Soft Employability Skills**

<b>Skills</b>	<b>Definition</b>
Communication Skills/ Foreign Language	Understanding and performing in a language different from the mother tongue. It is the skill that helps in transmitting information and common understanding from one person to another. Good communication skill requires knowledge and understanding of social and cultural factors in a situation.
Problem-Solving	Engaging in the action or thoughts necessary to find a solution to a difficult or complex question or situation and resolve conceptual problems.
Leadership	The ability to motivate and positively influence others to achieve goals. It is a behaviour, role relationship, influence, and interaction pattern. Graduates should develop and lead individual or team activities, addressing challenging situations.
Critical Thinking	Gathering, analysing, and articulating information from different sources for solving problems and making decisions.
Creativity	Thinking outside the box to bring new ideas to solve problems.
Decision Making	Thinking of several choices, relevant information, and predicting the consequences.
Teamwork	Involves a set of interdependent activities performed by individuals who collaborate toward a common goal.
Time Management	The process of planning and exercising conscious control of the time spent on specific activities to work smarter than harder.

**Fig.2**

**Source:** Cited from Amirrudin & Salleh, 2016; Li et al, 2019; Ornellas et al, 2018; Sanyal & Hisam, 2018; Kashyap, 2019; Shivoro et al, 2017)

## **6. 21<sup>st</sup>-Century Skills as Employability Skills and their Significance**

The following are the most significant 21<sup>st</sup>-century skills regarded as employability skills that are mandatory for all undergraduate engineering students. The researcher has explored all these skills and has analysed them as to why these skills are crucial for enhancing the employability of engineering students. These skills enable students to adapt to a rapidly changing job market, where technology is continually evolving. Employers select graduates who can think critically and creatively to solve complex problems. They also look for graduates who can communicate effectively with clients, colleagues, and stakeholders. Collaboration is also essential, as it enables graduates to work effectively in teams and contribute to the success of the organisation. They are as follows:

### **6.1. Communication Skills**

A graduate's capability to write and speak succinctly and unambiguously is an important skill at corporate level (Shokri et al, 2014). All the students should be proficient in the use of four basic skills: Receptive skills (listening and reading) and productive skills (speaking and writing). Recruiters think that a prospective candidate having effective listening skills can convey his or her ideas and thoughts articulately. It will certainly increase the efficacy of the workforce (Ortiz, Region-Sebest, & MacDermott, 2016; Carnevale & Smith, 2013). It is noteworthy that an article was published in The Hindustan Times newspaper (Puranik, 2015) states that many engineering students have not acquired competence in the effective use of the English language. Moreover, Nguyen (1998) remarks, "The desirable skills and attributes for engineers include the ability to communicate effectively, both verbally and in writing, to peers, the employers, client and the community; engineers should be bilingual" (p. 73).

### **6.2. Teamwork**

Teamwork, as defined by E. Salas, D.E. Sims, and Klein (2004), teamwork is "a set of interrelated thoughts, actions, and feelings of each team member that are needed to function as a team and that combine to facilitate coordinated, adaptive performance, and task objectives resulting in value-added outcomes" (p. 562). Recruiters always select candidates who can work as a team and have collaborative understanding for the accomplishment of a common goal. Effective communication, critical thinking, mutual respect, and cooperation in a team are always considered important to achieve shared goals. Many engineering projects require teamwork with different individuals contributing their unique set of skills. The modern workplace is looking to hire people who are

comfortable working with others from diverse backgrounds, cultures, and skill sets. Candidates who are assertive, articulate, self-motivated, broad-minded, accommodative, empathetic, and happy to extend their due cooperation in a team certainly are the need of the hour to most employers across the globe.

### **6.3. Problem-Solving Skills**

Most of today's undergraduate students of engineering are not seen to possess the ability to think of problems, issues, and challenges logically and analytically. If the candidate can evaluate the situation or analyse it from various angles, he or she can resolve the issue objectively and acceptably. This problem-solving ability can also demonstrate the candidate's ability to communicate, take an initiative, and make decisions judiciously. It is to be noted that the most important feature of a true and enterprising leader is to take the initiative confidently and solve complex problems with an objective and unprejudiced bent of mind. As stated by the University of Leicester (n.d.): "Whatever you do, wherever you work, sooner or later a problem will present itself. If you can analyse the problem with a clear head, suggest a range of possible solutions, and then effectively judge the best path to take, your employer will know they have the right person on the job" (*Skills Employers Value*, n.d.). A candidate having excellent problem-solving skills is a unique mixture of critical thinking, leadership, creativity, and individuality. These skills are considered important that are needed by all academic institutions, research and development organisations, and multinational corporations.

### **6.4. Creativity and Innovation**

Creativity and innovation are treated as the most integral skills to be acquired by undergraduate students of engineering and technology to be called a true engineer. Engineering is undoubtedly a synonym for creativity and innovation. The passion to create and transform thoughts into actuality is the most pivotal feature for any academic institution or multinational corporation to be successful in its endeavours. Berger et al (2014) remark that "creativity is a core component for engineering, essential to innovation." Those who are highly creative and innovative can command respect in academia and industry.

### **6.5. Negotiation Skills**

Persuasive communication and the ability to convince others are important features of a focused, assertive, and confident person. Any person having the aforesaid capabilities are known to have very good negotiating skills. To be employed by any multinational corporation, all engineering

students are supposed to be good at these skills and prove their ability to persuade others in making a decision acceptable to everyone. In this regard, Fowler (1998) states that “influence is a broad concept, involving the effect on each person of the whole context in which the discussion takes place” (p. 3). Moreover, “persuasion involves all those skills of argument and discussion that can be used by one person to obtain another’s agreement” (1998, p. 3).

### **6.6. Adaptability**

An adaptable person is always open to new situations and ideas. Undoubtedly, “one of the greatest challenges presented to all employees today is dealing with uncertainty” (Veres & Sims, 1999, p. 228). As there is unprecedented development in technology, engineering students need to adapt to new ideas, technologies, and concepts to be successful in their chosen fields of endeavour. They must adapt themselves to new workplaces and learn intercultural communication to communicate effectively in the workplace with others hailing from different cultures.

### **6.7. Lifelong Learning**

Every undergraduate engineering student must learn the requisite skills to get a placement in the industry. Therefore, the students who show alacrity to learn new things surely demonstrate a mature and holistic attitude. A. Nainpally, H. Ramachandran, and C. Smith (2012) affirm that students should not simply “emerge from the academic setting with the competency to recognize a need for lifelong learning, but he or she should have the ability to actively pursue the acquisition of knowledge” (p. 9). An enthusiastic graduate who is curious to learn can effortlessly acclimatise to the requirements of the industry after getting employed. Hence, employers want their employees to be lifelong learners.

### **6.7. Planning and Organising Skills**

Unsuccessful people are those who work in a disorganised and unplanned way that leads to a confused state of affairs and a loss of time. Successful people always work in an organisation with thorough planning, preparation, and execution. Hansen, K, & Hansen, R. S (n.d.) explain that planning or organising “deals with your ability to design, plan, organize, and implement projects and tasks within an allotted timeframe. [It] also involves goal-setting” (p. 18). These people become a greater contributing factor to the growth of the organisation they are associated with.

### **6.8. Managerial skills and Leadership Skills.**

Managerial and leadership skills are of paramount importance in the workplace. The ability to allocate and delegate work by giving due motivation to employees in line with their competence



shows the true leadership qualities of the team leader. According to Kotter (2013), there is a difference between leadership and management. Kotter treats management as “a set of well-known processes, like planning, budgeting, structuring jobs, staffing jobs, measuring performance and problem-solving, which help an organization to predictably do what it knows how to do well” (2013, p. 8). But “leadership is about vision, about people buying in, about empowerment and, most of all, about producing useful change. Leadership is not about attributes, it's about behavior” (2013, p. 9). In either of the cases, employers always recruit undergraduate engineering students who are not only capable of working in a team but also motivating and leading others. In the present-day situation, engineers have to showcase their skill set beyond their regular academic learning. Their leadership skills can bring laurels to the multinational corporations.

### **7. Conclusion:**

To sum up, 21<sup>st</sup>-century skills are essential for enhancing the employability of undergraduate engineering students. These skills enable graduates to adapt to a swiftly changing job market and contribute to their professional and industrial success. Thus, all academic organisations need to include 21<sup>st</sup>-century skills in their syllabi to prepare undergraduates as employees of the future. This research paper has highlighted the fact that the gap between academia and industry should be bridged by enabling undergraduate engineering students to learn these employability skills and become industry-ready. These students will become a more competitive and skillful workforce of 21<sup>st</sup>-century industry. A blending of engineering and 21<sup>st</sup>-century skills can transform a professional student into a highly sought-after engineer at the contemporary workplace. To serve this purpose, training programs and workshops should be organised for engineering students to make them learn these crucial skills to be competent in getting the employment of their dreams and also sustain it successfully. This paper has also analysed why the development of these skills is necessary for students to deal with the challenges and demands of their professional and everyday life.

## References

- Abelha, M., Fernandes, S., Mesquita, D., Seabra, F., & Ferreira-Oliveira, A. T. (2020). *Graduate Employability and Competence Development in Higher Education: A Systematic Literature Review* Using PRISMA. *Sustainability Journal*, 12(15).  
<http://doi.org/10.3390/su12155900/>
- American Management Association (AMA). (2010). *Executives say the 21<sup>st</sup> century requires more skilled workers*. Retrieved on June 24, 2023. <http://www.p21.org/news-events/press-releases/923-executivessay-the-21st-century-requires-more-skilled-workers>.
- Amirrudin, S., & Salleh, N. (2016). Refusal Strategies in English among Malay ESL Students. *Infrastructure University Kuala Lumpur Research Journal*, 4(1).  
<https://iukl.edu.my/rmc/wpcontent/uploads/sites/4/2018/04/4.-Refusal-Strategies-in-English-Among-Malay-ESLStudents.pdf>
- Berger, K., Surovek, A., Jensen, D., & Cropley, D. (2014, October). Individual creativity and team engineering design: A taxonomy for team composition. In 2014 IEEE Frontiers in Education Conference (FIE) Proceedings (pp. 1-4). Madrid, Spain: IEEE.  
<https://doi.org/10.1109/FIE.2014.7044131>
- Carnevale, A. P., & Smith, N. (2013). Workplace basics: The skills employees need and employers want. *Human Resource Development International*, 16(5), 491-501.
- Cassidy, S. (2006). Developing employability skills: Peer assessment in higher education. *Education + Training*, 48(7): 508-517.
- Fowler, A. (1998). *Negotiating, persuading and influencing*. London, UK: Chartered Institute of Personnel and Development.
- Hansen, R. S., & Hansen, K. (n.d.). What do employers really want? Top skills and values employers seek from job-seekers. *Quintessential Careers*. Retrieved from [www.livecareer.com/quintessential](http://www.livecareer.com/quintessential)
- Kashyap, S. (2019). Importance of Time Management in The Workplace. ProofHub.  
<https://www.proofhub.com/articles/importance-of-time-management-in-the-workplace>
- Kaufman, J. K. (2013). *21 Ways to 21<sup>st</sup> century skills: Why students need them and ideas for practical implementation*. *Kappa Delta Pi Record*, 49(2), 78-83.
- Kotter, J. P. (2013, January 9). Management is (still) not leadership. *Harvard Business Review*. Retrieved from <https://hbr.org>

- Lakshminarayanan, R., Kumar, M., & Ramanakumar, K. V. P. (2014, May). *Six sigma methodology for addressing employability issue of engineering graduates*. International Journal of Modern Education Forum, 3(2), 59-66. [dx.doi.org/10.14355/ijmef.2014.0302.04](https://doi.org/10.14355/ijmef.2014.0302.04)
- Skills employers value.* (n.d.). University of Leicester. <https://le.ac.uk/study/undergraduates/careers/skills>
- Li, S., Ibrahim, F., & Mustapha, S. (2019). Factors Contributing to Organizational Climate: Evidence from Small Medium Enterprises in China. *Infrastructure University Kuala Lumpur Research Journal*, 7(2).
- Llorens, A., Llinàs-Audet, X., Ras, A., & Chiamonte, L. (2013). *The ICT skills gap in Spain: Industry expectations versus university preparation*. *Computer Applications in Engineering Education*, 21(2), 256-264.
- Mekala, S., Harishree, C., & Geetha, R. (2020). Fostering 21st century skills of the students of engineering and technology [Article]. *Journal of Engineering Education Transformations*, 34(2), 75- 88. [10.16920/jeet/2020/v34i2/150740](https://doi.org/10.16920/jeet/2020/v34i2/150740)
- Naimpally, A., Ramachandran, H., & Smith, C. (2012). *Lifelong learning for engineers and scientists in the information age*. Waltham, MA: Elsevier.
- Nguyen, D. Q. (1998). *The essential skills and attributes of an engineer: A comparative study of academics, industry personnel and engineering students*. *Global Journal of Engineering Education*, 2(1), 65-76.
- Ornellas, A., Falkner, K., & Stalbrandt, E. E. (2019). Enhancing Graduates' Employability Skills Through Authentic Learning Approaches. *Higher Education, Skills, and Work- Based Learning*, 9, 107-120. <https://doi.org/10.1108/HESWBL-04-2018-0049>.
- Ortiz, L. A., Region-Sebest, M., & MacDermott, C. (2016). Employer perceptions of oral communication competencies most valued in new hires as a factor in corporation success. *Business and Professional Communication Quarterly*, 79(3), 317-330. [http://dx.doi.org/10.1177/2329490615624108](https://doi.org/10.1177/2329490615624108)
- Puranik, A. (2015, August 8). 97% engineering graduates cannot speak English fluently: Survey. *Hindustan Times*. Retrieved from [www.hindustantimes.com](http://www.hindustantimes.com)
- Radermacher, A., Walia, G., & Knudson, D. (2014, May). *Investigating the skill gap between graduating students and industry expectations*. In Companion Proceedings of the 36th International Conference on Software Engineering (pp. 291-300). Hyderabad, India: ACM.

- Salas, E., Sims, D.E. and Klein, C. (2004), "Cooperation at work", *Encyclopedia of Applied Psychology*, Vol. 1, pp. 497-505.
- Sanyal, S., & Hisam, M, W. (2018). The Impact of Teamwork on Work Performance of Employees: A Study of Faculty Members in Dhofar University. *Journal of Business and Management*, 20(3), 15-22. <http://dx.doi.org/10.9790/487X-2003011522>.
- Shivoro, R., Shalyefu, R, K., & Kadhila, N. (2017). Perspectives on Graduate Employability Attributes for Management Sciences Graduates. *South Africa Journal of Higher Education*, 32(1), 216-232. <http://dx.doi.org/10.20853/32-1-1578>.
- Shokri, N. M., Lin, E. Y. E., Radzi, H. M., Mokhtar, R., Ghazali, F., Muslimen, M. A., & Tarmizi, M. A. A. (2014). "Communication skills: A-must-have skills for today's leaders". In *Proceedings of the 2nd Conference on Innovative Trends in Multidisciplinary Academic Research (ITMAR2014)*. Istanbul, Turkey: Global Illuminators.
- Veres, J. F. III, & Sims, R. R. (1999). Keys to employee success: What skills are really important for success in the future? In R. R. Sims & J. G. Veres. (Eds.), *Keys to employee success in coming decades* (pp. 223-245). Westport, CT: Quorum Books.
- Yorke, M. (2006). *Employability in higher education: What it is – What it is not*. York, United Kingdom: The Higher Education Academy.