

Bridging the gap between the world of education and the world of business via standards to develop competences of the future at universities

Pawel POSZYTEK, PhD, DSc
Nicolaus Copernicus University in Toruń
Toruń, 87-100, Poland

ABSTRACT

The author of this article has proven in a separate bibliometric analysis that in most cases the world of education and the world of business use different terminology when discussing the competences needed on the current and future labor market. The former tends to refer to competences of the future while the latter uses the term competences 4.0 more often, which results from binding this phenomenon with the digital transformation and current changes in industry generally called the 4th industrial revolution. The differences in terminology in this respect also refer to the way these competences are defined, although in most cases they refer to three main domains: (1) technical competences; (2) cognitive competences and (3) social competences.

On the basis of the above, the research group of the Polish NGO, The Platform for the Industry of the Future, designed the certification system for universities which would like to be labelled as universities that educate for the future and develop the competences of the future among their students. This certification system is based on the following standard: (1) curriculum; (2) internal ecosystem at a university; (3) cooperation with an external ecosystem; (4) the teaching staff and (5) infrastructure at a university. The certification system provides and defines detailed criteria for each element of the standard mentioned above, as well as indicators that measure the fulfilment of these criteria.

Keywords: 4th industrial revolution, 4.0 competences, certification system, competences of the future, future universities, labour market.

1. COMPETENCES OF THE FUTURE: TERMINOLOGY, DEFINITIONS AND THE MODELS

The bibliometric analysis [1] has proven that the world of business and the world of education use different terminology in reference to the competences and skills needed on the labor market. The current era of the the fourth industrial revolution whose start was announced in 2011 [2,3,4] brought about the introduction of the term: competences 4.0. The very term of the fourth industrial revolution refers, in turn, to industry 4.0 which is based on fully automated processes with the use of high

technology including artificial intelligence. Although the term of competences 4.0 is associated with this revolution, it does not stand for any revolutionary concept. In fact, it refers to the set of skills which have already been advocated for a relatively long time by the educational sector which has called them competences of the future. However, the world of business and the world of education do not only use different terminology and define the competences and skills in slightly different way, although some overlaps appear, but they also use various models of competences 4.0 or competences of the future. These differences are presented and discussed in detail in [5, 6, 7, 8, 9, 10, 11]. For the purpose of this discussion let us use the most common model of competences 4.0 or competences of the future which can be treated as an accepted compromise of both the world of business and the world of education in their definitions of what the competences needed on the current and future labor market should be. This model has been already extensively presented and discussed in [5, 6] and it is as follows:

- Digital and technical competences.
- Managerial competences: team management: team co-ordination or leadership, entrepreneurship.
- Cognitive and thinking competences: complex problem solving, creativity, critical thinking, adaptability.
- Social and psychological competences: team work, team collaboration, leadership, flexibility, adaptability, interdisciplinarity.

2. THE STANDARDS FOR THE DEVELOPMENT OF COMPETENCES OF THE FUTURE AT UNIVERSITIES

Having defined the competences of the future, the research group established by the Platform for the Industry of the Future, a Polish NGO, designed the certification system for universities which help the to see and reflect to what extent they develop the competences of the future among their students. This certification system presents and defines the standards which should be followed and respected by the universities of the future. These are: (1) curriculum; (2) internal ecosystem at a university; (3) cooperation with an external ecosystem; (4) the teaching staff and (5) infrastructure at a university. Additionally, the certification system provides and defines detailed criteria for all elements of the standards mentioned above. The system also includes indicators that measure the fulfilment of these criteria and it is as follows [12]:

Curriculum		
Criteria	Indicators of compliance	
1. The curriculum is oriented towards the goals of developing the competences of the future. (MANDATORY)	1.1. [D]	The learning objectives and learning content of the course syllabuses go beyond the knowledge of the subject and include most of the competences identified in Chapter 2 as the competences of the future.
	1.2. [D]	The individual courses combine the objectives of the knowledge of the subject and the competences of the future and enable them to be pursued in parallel.
	1.3. [O]	Students and educators spontaneously identify some of the competences of the future when describing the objectives of the courses they are taking.
2. The curriculum engages students in solving practical problems and supports them in finding the uses for the competences they acquire. (MANDATORY)	2.1. [D]	The curricula in the area covered by the Standard include a variety of forms that bring students into contact with the practical challenges of industry (e.g. internships, implementation projects, consultations, study trips).
	2.2. [O]	Students can see how the competences developed during their studies can be used and believe that these studies provide an opportunity to be in touch with the practical challenges of the economy of the future.
	2.3. [O/D]	Employers employing graduates of the course covered by the Standard are positive about their preparation to take on practical professional challenges OR the university has results of the track survey of the graduates that lead to such conclusions.
3. The curriculum is delivered in a way that fosters collaboration and communication.	3.1. [D]	The forms and methods of education included in the curriculum covered by the Standard provide numerous opportunities to work in task groups and project teams.
	3.2. [O]	Students in the courses covered by the Standard recognise that their studies provide them with numerous opportunities to communicate and collaborate on tasks related to their curriculum.
4. The curriculum is agreed internally and regularly updated.	4.1. [D]	The university monitors student satisfaction and regularly examines the results of the curriculum covered by the Standard.
	4.2. [D]	The area covered by the Standard includes courses that have been developed or significantly modified in the last 3 years as a result of evaluation or to better meet the needs of students and other stakeholders.
	4.3. [O]	Syllabuses for new courses are developed through consultation with other instructors and correspond with the rest of the curriculum.
Internal environment		
Criteria	Indicators of compliance	
5. The university provides an environment for students to develop their own potential and shape their individual development path. (MANDATORY)	5.1. [D]	Students have influence on the selection of a significant part of the courses and shaping the learning pathway.
	5.2. [D]	Students have access to educational offers that go beyond the strict course of study and help them develop the competences of the future (e.g. certification training, acquisition and validation of micro-qualifications, dedicated courses, study visits).
	5.3. [D]	There are numerous examples of university-supported activities that develop the individual potential of students (e.g. participation in competitions, conferences, development of prototypes and inventions) that took place during the last academic year.
	5.4. [D]	Students can benefit from individual support (e.g. counselling, coaching, tutoring) in shaping their course of study and career planning. Access to development services is simple and equal for all students interested in them.
	5.5. [O]	Students recognise the variety of development opportunities offered by the university and find them valuable.
6. The university teaches interdisciplinary collaboration and creates the conditions to develop it. (MANDATORY)	6.1. [D]	There are active academic clubs or other student organisations within the university providing opportunities for joint projects (including those related to the needs of the industry of the future).
	6.2. [D]	The university runs or supports and co-finances cyclical events that foster interdisciplinary collaboration between students (e.g. hackathons, workshops, do it yourself environment, business hubs, incubators and entrepreneurial academies).
	6.3. [O]	Students perceive the forms of collaborative activity available to them as part of their studies as diverse, valuable and supported by the university.

7. The university creates an environment that is open to diversity and encourages exchange and dialogue.	7.1. [D]	The university participates in student and faculty exchange programmes with foreign universities.
	7.2. [O]	Foreign students studying at the university (including international exchange students) perceive and positively evaluate the development opportunities provided by the university and the support in integrating into the academic community.
	7.3. [D]	The university takes active steps to promote student diversity and to counteract stereotypes or exclusion.
	7.4. [O]	Students believe that the university environment is safe and offers support for all, or perceive strong efforts on the part of the university to do so.

Cooperation with the surrounding environment

Criteria	Indicators of compliance	
8. The university supports the professional development of its students and graduates.	8.1. [D]	Student placements co-organised by the university are mostly carried out in organisations which provide opportunities for the development of competences in line with the field of study.
	8.2. [D]	The university maintains contact with its graduates, offering them further support in their professional development and inviting them to make contact and pass on their experience to students.
	8.3. [O]	Students declare that in the course of their studies so far they have had the opportunity to attend an event with graduates of the university.
9. The university acts for the benefit of its environment and provides opportunities for students to get involved.	9.1. [D]	The university collaborates with companies in the industrial sector (e.g. by conducting research and development projects or providing consultancy services) and provides students with the opportunity to participate in these collaborations.
	9.2. [D]	The university engages students in projects and events aimed at different groups from its social environment, using the available educational and creative infrastructure in a way that promotes the use and development of acquired competences.
	9.3. [O]	Students are able to list activities related to the university's cooperation with its environment, and know of opportunities to get involved.
10. The university tracks, anticipates and responds to changes in the world surrounding it. (MANDATORY)	10.1 [D]	The university has a mechanism or team in place to monitor and anticipate changes in the environment, diagnose the resulting needs and use the findings to develop the educational offer.
	10.2 [O]	Educators are able to point to an example of the use of the above mechanism to modify educational offers.

Educators

Criteria	Indicators of compliance	
11. The university employs people with the competences of an Educator of the Future	11.1. [D]	At least 30% of permanent teaching staff in the area covered by the Standard are certified as Educators of the Future or meet their criteria at the time of review of the Standard for institutions.
12. For its employees, the university is a place of real collaboration and mutual learning. (MANDATORY)	12.1 [D]	The university offers educators requirements and conditions that foster collaboration and information sharing within teams.
	12.2 [O]	Educators feel that they have peer support and the opportunity to share work-related information on a regular basis.
13. The university supports the development of its employees.	13.1 [D]	The university offers educators support in the development of competences that go beyond academic work activities, including the improvement of competences in methodology and the organisation of work in an educational-creative environment.
	13.2 (O)	Educators are able to identify examples of development activities that the university has offered them or enabled them to do.

Infrastructure

Criteria	Indicators of compliance	
14. A unit covered by the Standard has an educational and creative infrastructure for the competences of the future (hereinafter referred to as the infrastructure) or has access to it. (MANDATORY)	14.1 [D]	The infrastructure includes: specialised industrial equipment suitable for the specific nature of the studies, a multimedia projector or screen with touchscreen function, internet access with a minimum bandwidth of 300 MB/s and furniture to enable individual and group work in workshops.
	14.2 [D]	The infrastructure allows the interior to be freely arranged and adapted to changing forms of work, as well as giving users freedom of movement.
	14.3 [D]	The educational and creative infrastructure meets the conditions of Accessibility Plus specified by the Act on Ensuring Accessibility for Persons with Special Needs of 19 July 2019.

15. The unit covered by the Standard makes effective use of the infrastructure for teaching activities or additional learning activities related to the development of the competences of the future. (MANDATORY)	15.1 [D]	The unit has and implements a plan for the use of the infrastructure, making it available to students, academic staff and selected groups from the social environment.
	15.2 [D]	The infrastructure is used for purposes beyond the strict curriculum (e.g. to organise training courses, workshops, hackathons or industrial process demonstrations).
	15.3 [D]	The educational and creative infrastructure was used for min. 70% of the working days on which full-time teaching was conducted at the university during the last academic year.
	15.4 [O]	Students are able to list educational activities exploiting the infrastructure and indicate how their effectiveness has been affected.
16. The unit covered by the Standard monitors the use of the infrastructure and upgrades it regularly.	16.1 [D]	The unit has data to assess the effectiveness of infrastructure use.
	16.2 [D]	Over the past 3 years, the unit has upgraded selected elements of the infrastructure to match changing needs or to increase efficiency of use.

In order for an organisational unit of a higher education institution (e.g. an institute or a department) to meet the Standard, it must be demonstrated that it meets minimum 12 of the 15 criteria listed above, including all mandatory criteria. The fulfilment of individual criteria is determined qualitatively on the basis of an overall assessment of indicators related to each criterion.

The [D] indicators (documentation) are assessed on the basis of an interview with persons representing institution involved in the certification process on the basis of the documentation gathered by them. In the case of indicators concerning infrastructure, their verification may also be carried out by visual inspection. In most [D] indicators should not require the preparation of new material but only collection and analysis of existing material (e.g. course syllabuses).

The [O] indicators (opinions) are assessed on the basis of individual and group interviews with selected stakeholders (in particular students and educators). In principle, [O] indicators are used to check whether the solutions described in the documentation are actually implemented, as well as visible and positively evaluated by the audience. Therefore, a positive evaluation for indicator [D] and a negative one for indicator [O] means that the criterion is not fulfilled while an unequivocally positive result of [O] assessment when indicator [D] is not fulfilled suggests the need to complete the documentation. The [O] indicators are subjective in nature, therefore in the event of ambiguities or contradictions in the collected data, it is possible to repeat the interviews with other people.

3. FINAL REMARKS

The experience so far has proven that it is extremely difficult to encourage universities to undergo an official certification procedure like the one described above since they are already a subject to various certification schemes. Accordingly, it is suggested that they can use the proposed model informally as a self-evaluation tool. Additionally, it should be mentioned that the above model also reflects the idea of the future university whose definition can be found in [13, 14]. According to this definition, the future university is based on four pillars: competences of the future, networked university, flexible didactic offer and lifelong learning scenario. All these aspects find their reflection in the proposed certification standard.

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