EMDIGITAL INTO ACTION: AN OVERVIEW OF THE TOOL FOR ASSESSING THE DIGITAL ENTREPRENEURIAL COMPETENCES OF UNIVERSITY STUDENTS

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Abstract

Universities around the world teach their students digital entrepreneurship to make them more competent and better prepared for the contemporary labor market. Students acquire some levels of digital entrepreneurial competences (DEC) and enter the labor market, but the academic literature offers very limited evidence on the actual and/or perceived levels of DEC the students acquire during the course of their studies. This paper provides an overview of the DEC assessment tool (available at: www.dec-tool.com) which was developed under a research grant for the purpose of assessing the levels of actual and perceived DEC of the university students. The DEC tool was developed using DEC competence model called EmDigital as the conceptual framework, and it covers all four competence areas, 15 sub-competences and 45 specific indicators of EmDigital. The best practice of the relevant competence frameworks (DigComp, EntreComp) was used in developing the tool. The DEC tool had its first application on a sample of university students in Kuwait and Serbia during Spring semester of the academic 2022/2023 and some preliminary results and the characteristics of the study are also presented in this paper.

Keywords: Digital entrepreneurship, digital entrepreneurial competences, assessment tool, university students.

1 INTRODUCTION

Emerging technologies such as artificial intelligence, virtual reality, augmented reality, blockchain, cloud computing and the expansion of virtual market existing on the Internet, in combination with new business and revenue models and new means of delivering value to the users resulted in the huge popularisation of the digital entrepreneurship, which is known for its positive impact on job creation and economic growth [1].

The digital entrepreneur is characterised as having a tendency to take chances and to exhibit high degrees of independence, self-efficacy, and control [2], [3]. To be successful, a digital entrepreneur must possess, besides technical and financial resources, a certain levels of competences to start and develop a digital business.

Digital entrepreneurial competences (DEC) represent a specific combination of general digital and entrepreneurial competences [4] and a relatively new area of interest of the academic community, imposed by fast growth of digital entrepreneurship in the world, especially during and after Covid-19 pandemic [5]. One way to acquire the DEC is through formal education [6]. The implementation of the entrepreneurship education in schools, colleges and universities is one of the strategic interventions proposed by European Union's Entrepreneurship 2020 Action Plan [7].

The key challenge in regards to DEC is the absence of research aimed at measuring the levels of DEC for any target population. Especially interesting is the university students population, given the fact that the universities play a major role in creating the future digital entrepreneurs. There were some attempts to develop a scale for measuring the DEC of university students [8], but the academic literature does not provide evidence of its application.

The main purpose of this paper is to provide an overview of the DEC assessment toll which was developed under a research grant No.CN21-18IQ-1382 funded by Kuwait Foundation for the Advancements of Sciences (KFAS), for the purpose of tackling the stated challenge in the area of assessing DEC of university students, although the tool can be used with the same level of efficiency for any other user group.

2 METHODOLOGY

A research roadmap for this research was specified to result in development of the online DEC assessment tool which will serve for the purpose of assessing DEC of university students. The research roadmap for this research was specified as follows [9]:

- Mapping the existing knowledge in regards to digital and entrepreneurial competences, by analysing available competence frameworks, as a basis for the formulation of DEC framework.
- Formulating the DEC framework.
- Developing an assessment methodology upon associated DEC framework.
- Assessing the level of DEC of the university students using an online tool created for this purpose.
- Conducting a gap analysis of DEC of the university students.

The knowledge mapping revealed that, giving the fact that DEC represent a combination of general digital and entrepreneurial competences [4], DigComp and EntreComp represent the two main competence frameworks to follow in developing the DEC framework and the corresponding online assessment tool. Considering the fact that DigComp and EntreComp both have successful implementations in the form of online assessment tools (e.g. Digital Competence Wheel, GrowiNg) the direction was set to use their best practices in developing DEC framework and corresponding online DEC assessment tool.

In early 2021 there was a breakthrough in regards to DEC framework. A group of Spanish researchers [10] have developed a DEC framework (EmDigital) using DigComp and EntreComp as reference models. EmDigital framework is broken into 4 competence areas and 15 specific competences as shown in Table 1.

Table 1. DEC competence framework EmDigital

Competence area	***Specific Competence***
Identification of opportunities	1. Search of and analysis of information 2. Creativity and innovation 3. Prospecting
Action planning	1. Success orientation 2. Leadership 3. Planning and management of digital identity
Initiative and collaboration	1. Initiative 2. Communication and collaboration 3. Creation of digital value 4. Responsibility and commitment
Management and safety	1. Learning from experience 2. Problem solving 3. Planning and organization 4. Techno-ethical approach 5. Motivation and perseverance

Source: Prendes-Espinosa et al. 2021

For every specific competence, the authors have developed a set of specific indicators, resulting in 45 specific indicators for the entire framework. In designing EmDigital, Prendes-Espinosa et al. [10] have used qualitative methodology based on interpretative approach. Their work in creating EmDigital framework incorporated documentary analysis, focus groups and expert judgement. The fact that this DEC competence framework was developed using valid scientific approach and DigComp and EntreComp as reference models, resulted in our decision to accept EmDigital as DEC framework to be used as a conceptual framework in creating our DEC online assessment tool.

In the following step the assessment methodology was developed using the approach proposed by Kluzer and Priego [11]. Those authors have developed a tool for measuring the general digital competences of the adult population based on the DigComp framework. Their tool was based on the use of two types of questions: self-assessment (SA-Q) and knowledge and ability (KA-Q). Following this approach, we have developed a set of 90 questions for our DEC online assessment tool (1 SA-Q and 1KA-Q for every of the 45 specific indicators of EmDigital).

The validity of the instrument (online assessment tool) was tested by conducting a pilot test on a sample of 150 respondents prior to the main study to ensure question formulation that leads to similar comprehension levels for respondents from different countries, levels, and fields of the study. For testing Internal consistency reliability Cronbach's alpha coefficient was calculated. Value of Cronbach's alpha coefficient is 0.8575, indicating a reliable measurement tool. For the validity check we used Confirmatory factor analysis which showed that the scale has good fit values. Based on Kaiser-Meyer-Olkin test of sampling adequacy (0.804), and p-value along with Bartlett's Test of Sphericity (0.000), we can conclude that a reliable tool for measuring DEC has been developed.

3 RESULTS

The results part of this paper will cover two segments: an overview of the DEC online assessment tool and some preliminary results regarding university students DEC assessment.

3.1 Overview of the DEC online assessment tool

After the team of programers and designers did their part in developing the DEC online assessment tool it was hosted in the following address: www.dec-tool.com (Fig.1)

Figure 1. DEC online assessment tool

The homepage of the DEC online assessment tool contains the information about DEC and the tool. The tool is for now, available in two languages: English and Serbian. After clicking on the Start button, the participants are prompted to enter their socio-demographic data (age, gender, country, etc). In order to avoid the loss of interest among participants due to lengthy questionnaire as per Sharma [12] our instrument was divided into two sections - SA-Q test (Fig.2) and KA-Q test (Fig.3). Each section has 45 questions - one for every specific competence indicator of EmDigital.

SA-Q were formulated using the following criteria:

- SA-Q have a standard format. The introduction is always formulated as "We ask you to evaluate how do you ...".
- We now list some activities below and you have to grade them using the following scale: 1 = I have no skills at all; 2 = my skills are very poor; 3 = I have some skills, but not sufficient to operate on my own; 4 = I have sufficient skills to operate on my own".
- An answer is then provided for each of the SA-Qs as follows: "My ability to ... is:..." where the respondent must select the number from the above 4-point Likert scale.

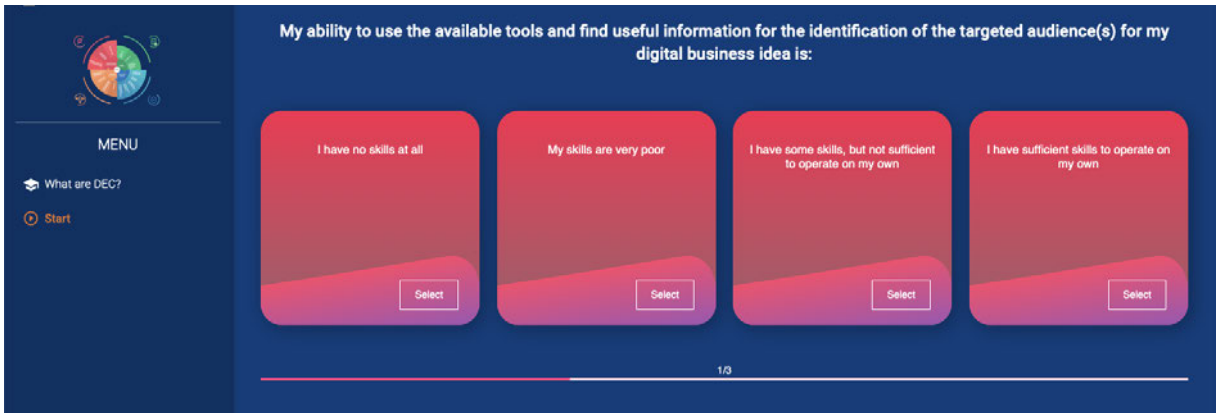

Figure 2. SA-Q section of DEC tool

The following criteria were used for the formulation of the KA-Q in the second part of the questionnaire:

- Four answer options for each question
- Four types of answers:
    - One correct statement that the respondent should indicate.
    - One wrong statement.
    - One distractor, i.e., an incorrect but plausible (not absurd) statement, which, if selected, highlights the respondent's inaccurate knowledge
    - Do not know the answer, an option that was introduced to minimize the guessing by respondents.
- Negative (e.g., "is not something"), ambiguous or vague statements are avoided, as well as any grammatical or logical "hook" that may easily lead to the correct answer, representing the qualitative measures to control method bias (suggested by Podsakoff et al., 2012) during the data collection.

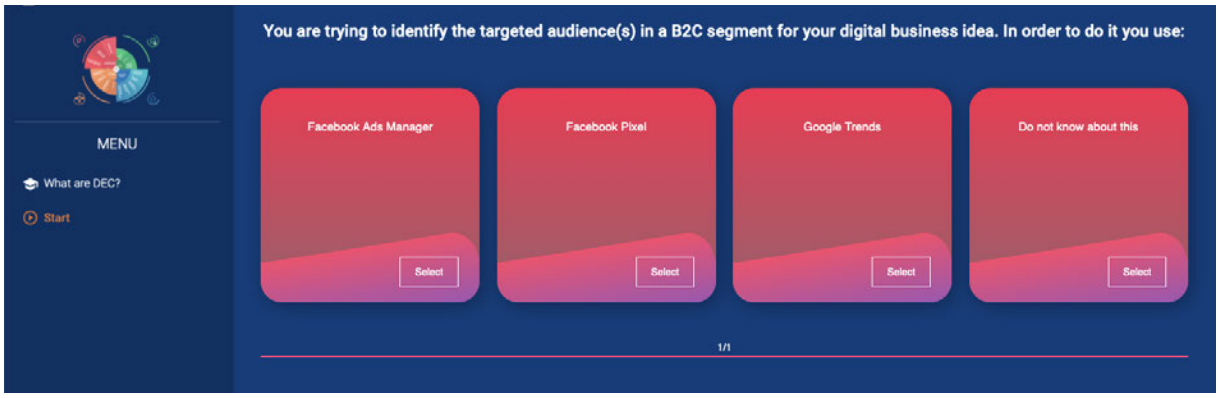

Figure 3. KA-Q section of DEC tool

The tool is set to alow participants to access only one section of the tool in one session. On completion of the assessment (both SA-Q and KA-Q assessment sections) the participants are presented with a chart with their overall results, as presented in Fig.4.

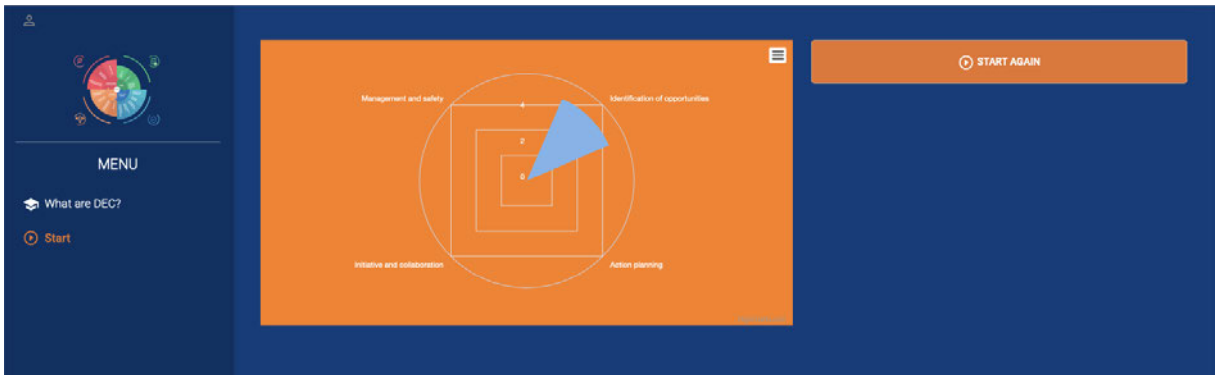

Figure 4. Results on completion of the assessment

Important assumption of the DEC online assessment tool is that the technologies and overall environment for digital entrepreneurship will continue to evolve, leading to changes of the competences needed for digital entrepreneurship and the mechanisms (SA-Q and KA-Q) for assessing them. Therefore, the DEC online assessment tool has the admin side for the administration of the SA-Q and KA-Q used in this tool, as well as for tracking the data on participants profiles and the data on the levels of their perceived and actual DEC (Fig.5).

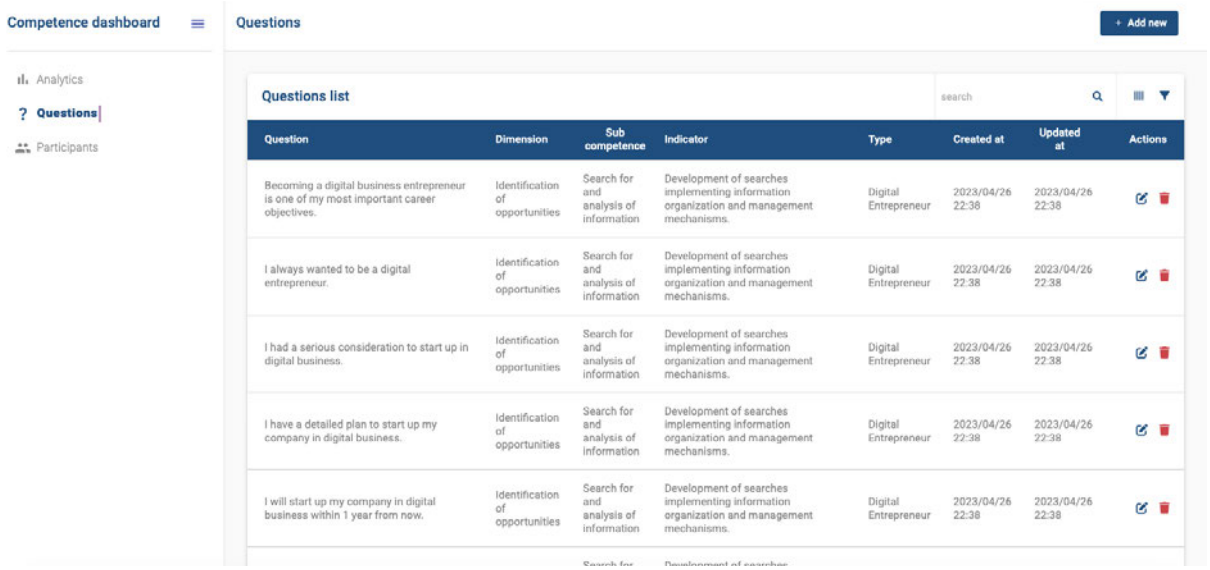

Figure 5. Admin dashboard of the DEC online assessment tool

3.2 Preliminary results on university students DEC assessment

This is an ongoing project and the tool presented in this paper is being used to conduct a large scale research on DEC of university students in Kuwait and Serbia, for the moment. The intention is to include other countries in the next stage of research as well, to enable cross country analysis between countries, even between different regions in the world.

The data from a pilot study conducted on a sample of 150 respondents reveal that the students perceive their overall DEC at a moderate level and that there are differences between different competence areas in EmDigital. For the KA-Q assessment the available data suggest that the level of the students DEC is low, again showing differences per different DEC competence areas.

More detailed specification of the results on perceived (SA-Q) and actual (KA-Q) levels of students DEC will be provided upon completion of the large scale data collection, along with gap analysis of the differences between the two, and their association with different socio-demographic characteristics.

4 CONCLUSIONS

This paper represents an overview of the DEC online assessment tool which was created under a research grant funded by Kuwait Foundation for the Advancements of Sciences (KFAS), and which was empirically tested for validity and reliability. The rationale for the DEC tool development and the need for DEC assessment is provided, along with the specifications of the methodological approach used in developing the DEC online assessment tool.

The contribution of this paper lies in providing theoretical background and technical specifications of the DEC online assessment tool, the first of its kind in this area, to the best of authors knowledge, thus contributing to the growing literature in the area of DEC, and providing mechanism for some future research aimed at assessing the levels of DEC for different targeted groups.

Future research in the area of DEC assessment should deploy this tool to investigate the levels of perceived and actual DEC of university students and/or any other targeted group in different countries and regions in the world, their association with different socio-demographic characteristics of the targeted groups as well as the gap analysis between perceived and actual levels of DEC.

A limitation of the preliminary results presented in this paper relates to the small sample size.

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