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# Educational fields of higher education graduates in European Union

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The processes of automation and globalization are resizing workplaces through their changes. A picture of the labor market can be provided by the educational fields of the graduates. Thus, depending on the educational field, the situation regarding the distribution of bachelor's graduates is analyzed in the article. The importance of the quality of the education and vocational training processes can be considered to be the basis of addressing the major challenges that are manifesting worldwide. Economic and social pressures influence the development of skills and competencies even for higher education. Training for the purpose of employment also contributes to increasing employability. The degree of access to jobs is higher when the level of education is higher. For the age group 15 to 64, this article presents the share of graduates having an education level between 5 and 8. Quality education can contribute to sustainable development. Thus, to identify solutions to problems that may arise in a community, the contribution of education can increase by increasing the life quality of the members from that community. In this context, for the 30–34 age group, at European level, the evolution of graduates with a tertiary level of education is analyzed. For employers, it is very important to know both the level of education and especially the fields in which they are trained. This is one of the reasons why the authors of the study carried out this analysis. Taking into account the classification of graduates according to the educational field, the research presents the situation for each of the five fields for which in 2020 there were the most numerous bachelor's graduates.

## KEYWORDS

tertiary education, graduates, European Union, higher education, globalization

## 1 Introduction

A flexible learning process can influence employability. Technological changes require periodical updates of knowledge, skills, and abilities (Angheluță et al., 2021). At the same time, the chances of graduates getting a job increase if the studies completed are at tertiary level (Burlacu et al., 2021). Their employment rates are higher than those of graduates with lower training levels (European Commission, 2019).

Education is an essential tool for achieving sustainability goals (Goritz et al., 2019). Furthermore, the 2030 Agenda for sustainable development, through the fourth objective,

foresees the need to ensure quality education, including tertiary education (United Nations, 2015).

It is believed that the economic growth of a society is stimulated by graduates with higher education. Several disciplines and educational fields are considered with regards to the labor force integration (Rădulescu et al., 2020). How students adapt to the academic requirements, as well as their psychological and sociocultural adaptability, is very important for their educational process (Han et al., 2022). The inconsistencies between graduates' skills and the labor market requirements lead to demands for new skills (OECD, 2016). Thus, the acquisition of new knowledge and skills can lead to the decrease of these inconsistencies (European Commission, 2018a).

Acquiring the values, attitudes and behaviors that lead to sustainable behaviors during academic studies has a social, economic and environmental impact (Sonetti et al., 2019). Universities can develop certain processes of organizational change by integrating sustainable development in all their fields of activity (Vargas et al., 2019). Thus, emphasizing initiative and adaptability in educational programs implies certain structural and systematic changes (Lambrechts et al., 2018).

Companies can become more competitive if they support employees in their efforts to develop competencies (European Centre for the Development of Vocational Training (Cedefop), 2019). Academic training needs to be continued by acquiring a postgraduate qualification (Androniceanu and Burlacu, 2017). The ongoing challenges lead to an increased level of expertise among graduates of higher education (Mateos-González and Wakeling, 2022). The efficient use of company resources, as well as the creation of green jobs, can lead to an increase in turnover and profit (Luca et al., 2019).

The changes brought to educational practices and policies have led to higher interest in sustainable development education (O'Flaherty and Liddy, 2018).

Quality education can lead to sustainable development (Alpopi et al., 2022). Adapting to labor market changes is a necessity for educational systems (Profiroiu et al., 2020). Automated and digitized production processes put pressure on the education level of workers (Burlacu et al., 2018). Thus, the educational field is influenced by transformations occurring in the economical, technological and social fields (Burlacu et al., 2013).

Both the level of education, and especially the fields in which the graduates are trained, are very important for employers. Labor mobility is high at European level. Thus, the study contributes to the knowledge of these indicators, coming to the support of employers in the respective fields.

## 2 Results

Investments in new competencies allow an increasing capacity for professional insertion (European Commission, 2018b). Partnerships between academia and companies lead to an increased number of jobs performed by highly qualified workers (European Commission, 2017).

For the member countries of the European Union, the article presents an analysis of the situation regarding the distribution of bachelor's graduates, based on the educational field. Thus, at the

level of the European Union, for the year 2020, the distribution of level 6 graduates according to the educational field is shown in Figure 1.

From the previous figure one can observe that, for the year 2020, the majority of graduates come from the fields of business, administration and law (24.0%). This is followed by engineering, manufacturing and construction (13.8%), health and welfare (12.3%), education (10.7%), arts and humanities (10.6%).

Considering the classification of graduates by their educational field, the research continues with a presentation of the situation for each of the five fields for which in 2020 there were the most numerous bachelor's graduates. Thus, at the level of the European Union, in 2020, 534,289 people are graduates of business, administration and law. The most graduates were from: Germany (105,053 people), France (91,957 people), Poland (69,100 people), Spain (41,703 people).

For the field of engineering, manufacturing and construction, in 2020, there were 307,718 people who graduated with a bachelor's degree. The countries that produced the most graduates in this field are: Germany (94,747 people), Poland (31,724 people), Italy (31,650 people), France (21,079 people).

In 2020, in the field of health and welfare, 273,432 people are graduates. Most graduates come from: Poland (43,271 people), France (39,292 people), Spain (24,081 people), Italy (23,326 people).

In the field of education, the number of graduates for the year 2020 was 237,871. The countries with the most graduates were: Italy (46,755 people), Germany (40,850 people), Poland (39,566 people), Spain (34,663 people).

In 2020, 235,742 people are graduates in arts and humanities. The number of graduates was high in: Italy (48,145 people), France (45,112 people), Spain (25,202 people), Germany (22,664 people).

In 2020, the countries that had more than 250,000 bachelor's graduates were: Germany (363,667 graduates), France (290,533 graduates), Poland (275,930 graduates), Italy (264,990 graduates).

Therefore, in 2020, in Germany, the distribution of bachelor's graduates according to educational field is shown in Figure 2 (graduates).

From this figure it can be observed that 79.4% of the graduates graduated from: business, administration and law (105,053 graduates); engineering, manufacturing and construction (94,747 graduates); education (40,850 graduates); social sciences, journalism and information (23,807 graduates); arts and humanities (22,664 graduates).

The distribution of bachelor's graduates according to educational field, in 2020, for France, is shown in Figure 3.

It is noted that 81.3% of the graduates graduated from: business, administration and law (91,957 graduates); arts and humanities (45,112 graduates); health and welfare (39,292 graduates); natural sciences, mathematics and statistics (29,254 graduates); social sciences, journalism and information (30,013 graduates).

The distribution of bachelor's or equivalent graduates according to educational field, for Poland, in 2020, is shown in Figure 4.

It is noted that 67.7% of the graduates graduated from: business, administration and law (69,100 graduates); health and welfare (43,271 graduates); education (39,566 graduates); engineering, manufacturing and construction (31,724 graduates).

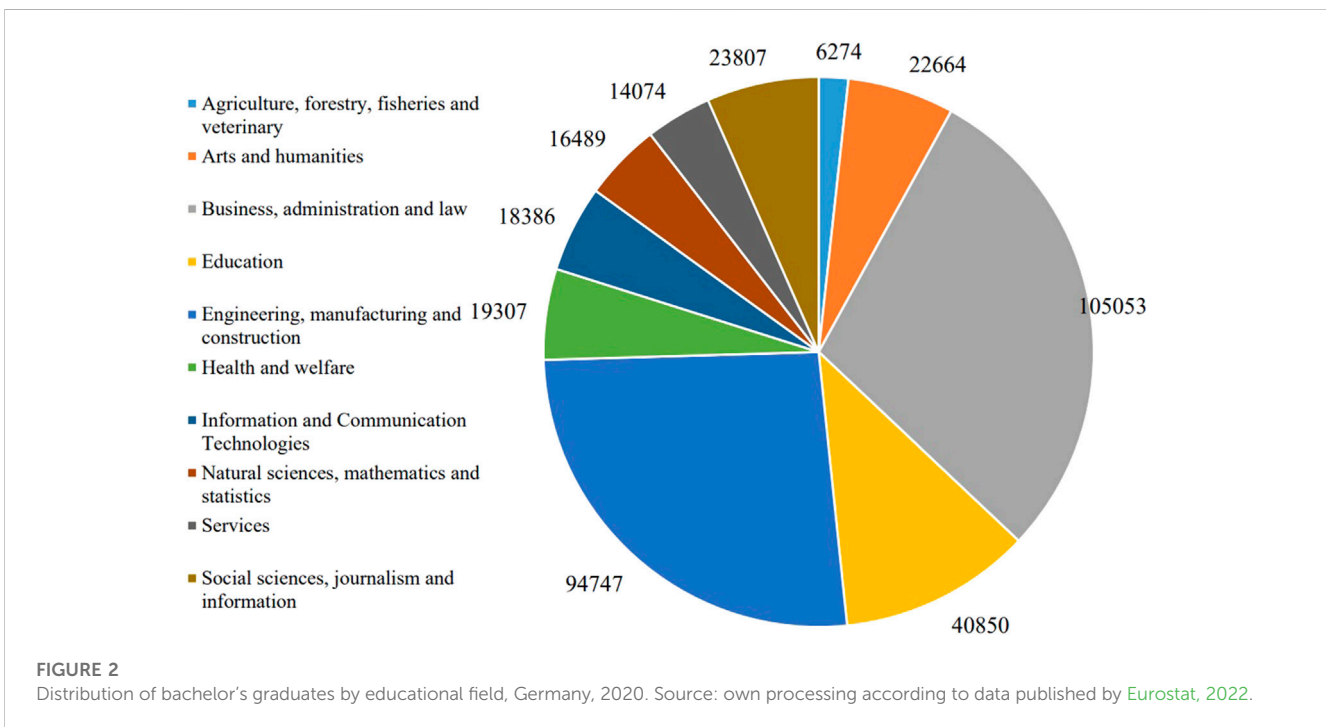
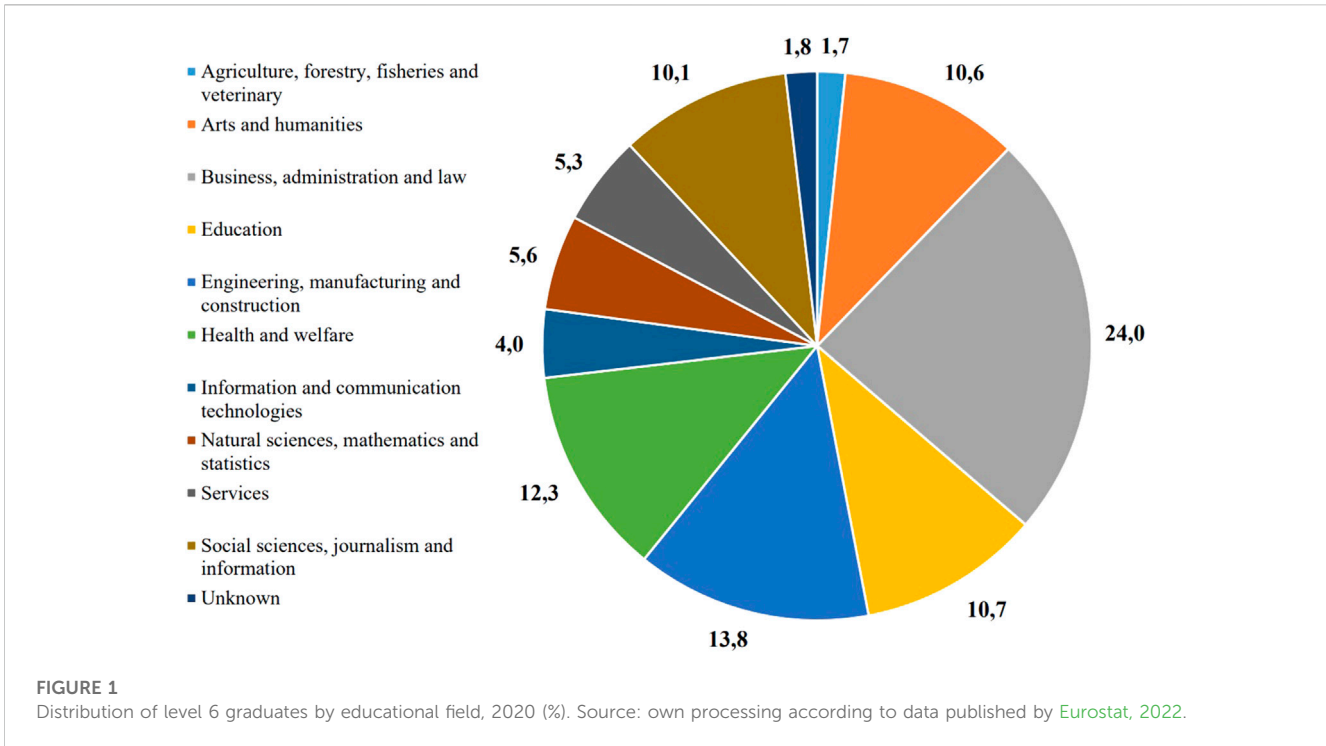
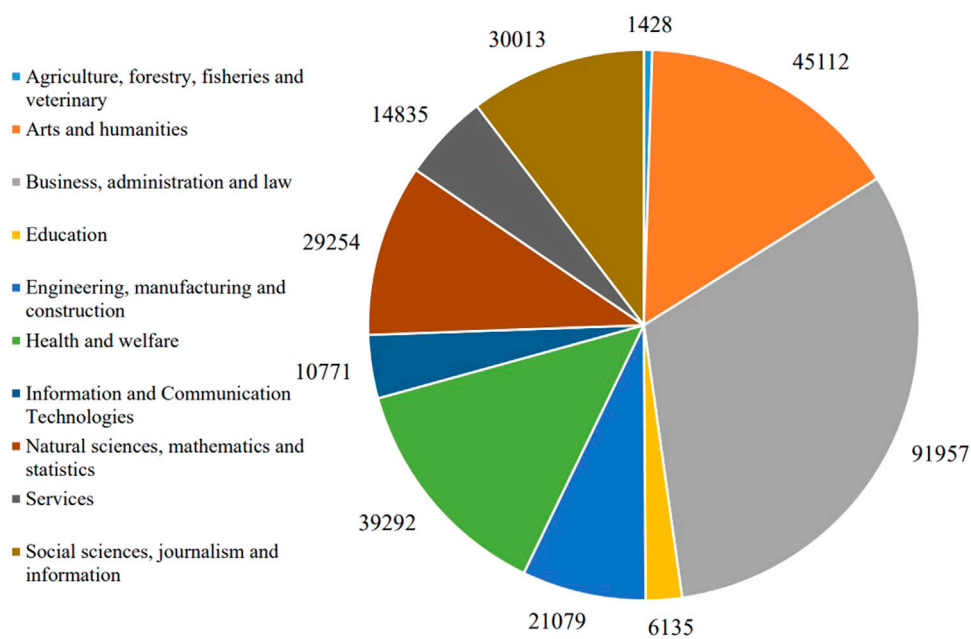


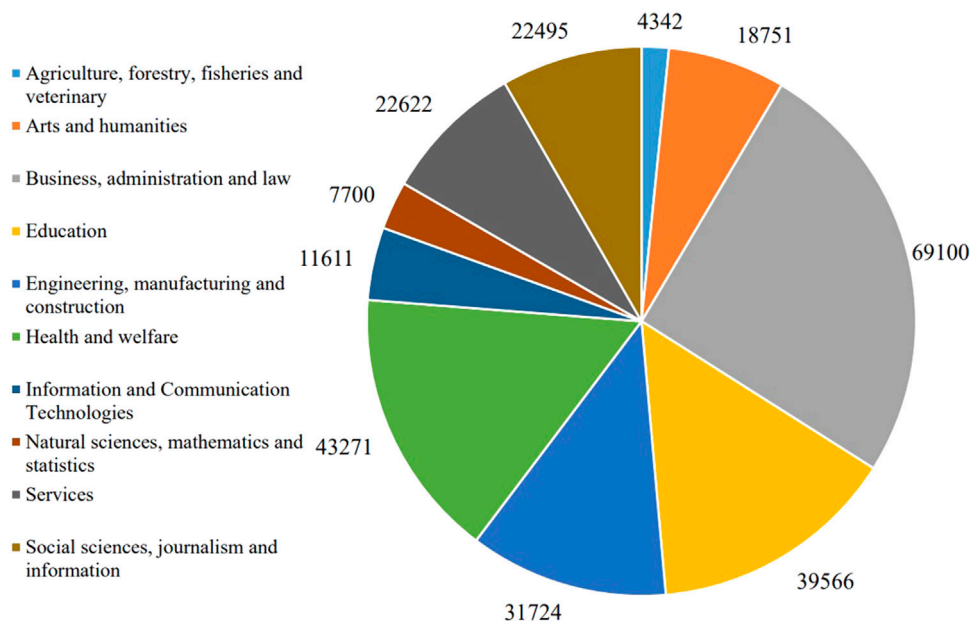
Figure 5 shows the distribution of bachelor's graduates according to the educational field for Italy, in 2020. It is noted that 77.0% of the graduates graduated from: arts and humanities (48,145 graduates); education (46,755 graduates); business, administration and law (38,796 graduates); social sciences, journalism and information (38,779 graduates);

engineering, manufacturing and construction (31,650 graduates).

The creation of new jobs contributes to an increased quality of life. At the same time, production and consumption methods can change the consumption behavior of the population (Luca et al., 2019).



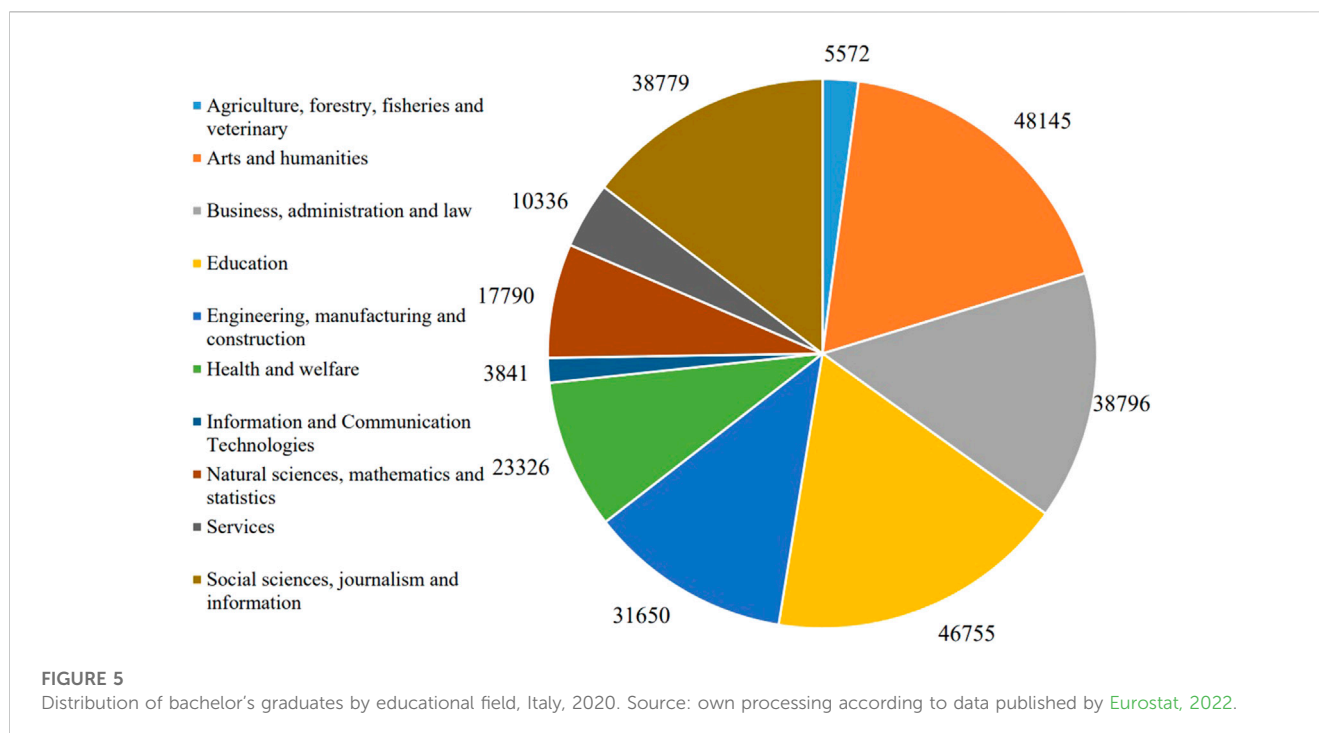
**FIGURE 3**  
Distribution of bachelor's graduates by educational field, France, 2020. Source: own processing according to data published by Eurostat, 2022.



**FIGURE 4**  
Distribution of bachelor's graduates by educational field, Poland, 2020. Source: own processing according to data published by Eurostat, 2022.

Table 1 shows the 2012–2021 comparative situation of the share of people in the 15–64 age group, graduates of the tertiary level of education (levels 5–8).

From the data presented, it can be observed that, at the European level, the share of people in the age group of 15–64 years, graduates of the tertiary level of education, increased from 23.2% (in 2012) to



29.5% (in year 2021). The most significant increases were in: Austria (+14.9%), Malta (+12.7%), Slovenia (+12.4%).

In 2021, the countries with the highest shares of people in the 15–64 age group, graduates of the tertiary education level, are: Ireland (45.2%), Luxembourg (44.5%), Cyprus (41.9%), Lithuania (39.8%), Belgium (39.7%), Sweden (39.7%). Also, the countries with the lowest shares are: Romania (16.4%), Italy (17.8%), Croatia (21.8%), Czech Republic (23.4%), Slovakia (24.7%). Thus, in 2021, in three-quarters of the European Union member countries, at least one out of four people in the 15–64 age group is a tertiary education graduate. The highest values are observed in Ireland, Luxembourg and Cyprus, where approximately one in two people in the 15–64 age group has completed tertiary education. The lowest values are found in Romania, where approximately one in six people in the 15–64 age group is a tertiary education graduate.

Another aspect related to the sustainability of universities derives from the share of tertiary education graduates for the 30–34 age group. Thus, from the data presented in the previous table, it can be concluded that, compared to 2012, the most significant increases in 2021 were registered in: Malta (+17.4%), Austria (+16.9%), Slovakia (+16.5%), Portugal (+15.9%), Greece (+13.1%).

Also, in 2021, the highest values are observed in: Luxembourg (62.5%), Ireland (62.0%), Cyprus (61.5%), Lithuania (60.2%), the Netherlands (53.4%), Denmark (52.8%), Sweden (51.9%). At the same time, for the 30–34 age group, it is observed that in 2012 only Ireland (52.2%) had a percentage of over 50% of the population graduating from the tertiary education level.

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significant increases were registered in: Malta (+17.4%), Austria (+16.9%), Slovakia (+16.5%), Portugal (+15.9%), Greece (+13.1%). Also, in 2021, the highest values are observed in: Luxembourg (62.5%), Ireland (62.0%), Cyprus (61.5%), Lithuania (60.2%), the Netherlands (53.4%), Denmark (52.8%), Sweden (51.9%). At the same time, for the 30–34 age group, it is observed that in 2012 only Ireland (52.2%) had a percentage of over 50% of the population graduating from the tertiary education level.

In 2012, values below 25% were registered in: Romania (21.7%), Italy (21.9%), Croatia (23.1%), Slovakia (23.7%), the Czech Republic (25.6%). In 2021, values below 25% were recorded only in: Romania (24.8%). This means that approximately one person in four in the 30–34 age group has completed tertiary education. At the same time, in 2021, for seven countries in the European Union, approximately one person out of two in the 30–34 age group is a tertiary education graduate (Luxembourg, Ireland, Cyprus, Lithuania, Holland, Denmark, Sweden).

### 3 Discussion

Sustainable development takes into consideration both the social, and the economic and environmental domains. They are interconnected and equally important. The sustainability of an institution refers to its role in protecting the environment, ensuring social justice and supporting economic growth. Thus, sustainable development requires an integration between society, economy and environment. Sustainable universities can use this approach (Lukman et al., 2010; Ragazzi and Ghidini, 2017).

In terms of sustainability, universities can make their mark right from the teaching and learning process. The focus of teaching and learning methods on different types of learning—experiential, active,



**TABLE 1** Comparative situation 2012–2021 of the share of people in the age group 15–64 years, respectively 30–34 years, graduates of the tertiary education level (levels 5–8) (%).

Countries	Age group 15–64 years				Age group 30–34 years			
	2012	2015	2018	2021	2012	2015	2018	2021
European Union	23.2	25.2	27.1	29.5	34.5	37.3	39.4	41.6
Belgium	31.3	32.7	36.0	39.7	43.9	42.7	47.6	49.9
Bulgaria	20.7	24.1	24.8	25.9	26.9	32.1	33.7	32.7
Czechia	17.0	19.8	21.7	23.4	25.6	30.1	33.7	36.5
Denmark	28.5	30.2	32.6	34.9	43.2	45.7	48.7	52.8
Germany	24.9	23.8	25.2	27.0	31.8	32.3	34.9	37.8
Estonia	32.1	32.0	34.1	36.0	39.5	42.7	44.6	43.1
Ireland	35.7	39.0	40.5	45.2	52.2	53.8	56.3	62.0
Greece	22.9	25.4	27.7	30.1	31.2	40.4	44.3	44.3
Spain	30.0	32.1	34.0	36.5	41.5	40.9	42.4	46.7
France	27.7	30.5	32.8	36.3	43.3	45.1	46.2	49.5
Croatia	15.8	19.7	22.0	21.8	23.1	30.8	34.1	33.7
Italy	13.9	15.5	17.1	17.8	21.9	25.3	27.8	26.8
Cyprus	35.0	36.4	39.4	41.9	49.9	54.5	57.1	61.5
Latvia	25.2	28.1	30.1	34.2	37.2	41.3	42.7	47.7
Lithuania	28.6	33.2	36.1	39.8	48.6	57.6	57.6	60.2
Luxembourg	33.4	35.2	38.3	44.5	49.6	52.3	56.2	62.5
Hungary	19.0	20.9	21.7	25.4	29.8	34.3	33.7	35.5
Malta	16.6	19.9	24.6	29.3	26.3	29.1	34.8	43.7
Netherlands	28.6	30.5	33.0	37.5	42.2	46.3	49.4	53.4
Austria	16.9	28.1	30.1	31.8	26.1	38.7	40.7	43.0
Poland	21.5	24.4	27.2	29.1	39.1	43.4	45.7	45.9
Portugal	16.7	20.7	22.5	28.3	27.8	31.9	33.5	43.7
Romania	13.5	15.0	15.5	16.4	21.7	25.6	24.6	24.8
Slovenia	23.0	26.6	28.7	35.4	39.2	43.4	42.7	49.2
Slovakia	17.0	18.9	22.0	24.7	23.7	28.4	37.7	40.2
Finland	32.8	35.5	37.3	35.5	45.8	45.5	44.2	44.9
Sweden	30.1	34.0	37.1	39.7	47.9	50.2	51.8	51.9

Source: own processing according to data published by Eurostat, 2022.

participatory, reflective, based on practice—can lead to the acquisition of competencies for sustainable development. Also, in order to evaluate these skills, teaching and learning methods should take into account a transdisciplinary approach, a problem-solving approach, a creativity approach. In this way, the link between skills and competencies, and sustainability can be justified (Wals and Jickling, 2002; Sterling, 2004; Wals, 2010; Lambrechts and Van Petegem, 2016; Fuertes-Camacho et al., 2019). Introducing such different teaching and learning methods can ensure that the skills students acquire are those that future jobs will demand.

A sustainable and qualitative teaching can make educational activities contribute to the sustainability of a university. The application and development of innovative forms of learning can introduce changes in higher education (Fülöp et al., 2022). In recent period, it is observed that the competencies related to sustainable development are increasingly integrated into study programs (Watson et al., 2013; Robina-Ramírez et al., 2020; Estrada Guillén et al., 2022).

The transition to sustainability is one of the responsibilities that universities can assume. Knowledge that students acquire during their studies can enable them to act and think in sustainable ways. During their professional career, graduates can approach solving

tasks through the lens of sustainable development. Thus, it can be considered that the whole society benefits from this approach (Xue, 2022).

Increased learning mobility, as well as increased academic cooperation, can contribute to the acquisition of skills that allow easy access to the labor market (Burlacu and Grosu, 2009; Ladaru et al., 2022).

From the analysis carried out, it can be observed that the first three fields for which the number of graduates in 2020 was the most numerous are: business, administration and law (24.0%), engineering, manufacturing and construction (13.8%), health and welfare (12.3%). In 2020, at the level of the European Union, graduates of these three fields represented approximately half of all graduates (50.1%). Also, the field of business, administration and law was in first place for three of the four analyzed countries, and for Italy (for which the field of Arts and Humanities was in first place) this field was the third. At the level of the European Union, most graduates came from Germany, France and Poland.

From the data presented, it can be observed that at the European level, the share of people in the age group of 15–64 years, graduates of the tertiary level of education, increased from 23.2% (in 2012) to 29.5% (in year 2021). In 2021, the countries with the highest shares of people in the 15–64 age group, graduates of the tertiary education level, are: Ireland (45.2%), Luxembourg (44.5%), Cyprus (41.9%), Lithuania (39.8%), Belgium (39.7%), Sweden (39.7%). Also, the countries with the lowest shares are: Romania (16.4%), Italy (17.8%), Croatia (21.8%), Czech Republic (23.4%), Slovakia (24.7%).

Regarding the tertiary level of education for people in the 30–34 age group, in 2021, an annual share of graduates higher than 50% was found for the following countries: Luxembourg, Ireland, Cyprus, Lithuania, the Netherlands, Denmark, Sweden. In 2021, only in Romania approximately one out of four persons in the age group 30–34 years will graduate from the tertiary level of education. At the same time, for seven countries in the European Union, approximately one person out of two in the 30–34 age group is a tertiary education graduate (Luxembourg, Ireland, Cyprus, Lithuania, Holland, Denmark, Sweden).

Dynamic, intercultural and transnational work environments enable recent higher education graduates to respond to sustainability challenges. The development and application of new cutting-edge technology will only be possible with the help of graduates who have acquired high-level skills (Burlacu and Jiroveanu, 2009).

However, we can consider that career guidance activities had prior to accessing higher education can be useful for future students. Changes in production processes due to automation means that new jobs require higher training. The implementation of high manufacturing technologies can be achieved through highly skilled personnel. However, for some jobs, the tasks will not require high level skills. Even if the trend in the shares of tertiary education graduates is increasing, it will also be necessary to cover jobs with low levels of training. At the same time, the influence on jobs that artificial intelligence will have in the future should not be excluded.

Regarding graduates by educational fields, one of the limitations of the analysis carried out may be the existence on the website of the European Commission that deals with statistics (EUROSTAT, 2022) of information relative to the year 2020. Another limitation is the presentation of the situation only for five educational fields for which there were the most numerous bachelor's graduates. Also, future studies may take into account an analysis over time of the weight of graduates according to educational fields. Further research may consider both country-level comparative assessments of educational fields and the extent to which recent tertiary graduates initiate business start-ups.

It can be concluded that there is a major interest in completing the highest possible level of education. Over the course of a lifetime, upskilling leads to higher employment rates. Thus, participation to continuous professional education and training programs contributes to employability (European Commission, 2022). The fields in which the graduates are trained, as well as the level of education, are benchmarks that employers take into account. This especially in the context where the workforce is increasingly mobile.

## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Author contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The reviewer MA declared a shared affiliation with the authors to the handling editor at the time of review.

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