Harnessing AI for ISCED Labelling of ODL Courses

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Abstract: At the University of Bologna, one of the pioneers of higher education in Europe and the institution that inspired the name of the Bologna Process, courses are labelled according to the International Standard Classification of Education (ISCED), a statistical classification of vocational fields. In Open and Distance Learning (ODL), where the number of programmes is high in parallel with the number of learners, determining the fields of courses taught is crucial not only for measurement and evaluation processes but also for a detailed examination of statistical information in processes such as enrolment and graduation. Processes such as data classification according to specific categories can be rapidly carried out with the help of artificial intelligence (AI) and can be utilised in administrative processes. This study investigated whether ChatGPT-4, one of the AI applications, could classify 1135 courses taught at Anadolu University's Open Education System (AUOES), which is part of the Bologna Process, according to ISCED fields, considering the content of the courses. In this study, document analysis was applied to the data analysis. According to the results, the highest number of courses in AUOES were in business, administration, and law (386), while the fewest courses were in education (27). These results indicate that courses related to white-collar professions are taught frequently and are influenced by the programmes at AUOES. This study suggests that AI can be used in administrative processes and to classify courses according to ISCED fields. Categorising all courses according to ISCED or a similar standard could enable the analysis of courses in vocational fields. Determining the fields of courses according to certain standardisations in ODL could allow the courses, and consequently, the books and materials, to be handled by subject matter experts. Decision-makers in ODL could plan the teaching of courses in line with needs by considering the employment situation in vocational fields when launching new programmes or updating course lists. Researchers could investigate the accuracy of AI's processes in administrative tasks and gather the opinions of subject matter experts, opening up new avenues for further research and exploration in the field of AI in education.

Keywords: Higher education, Open and distance learning, Courses, ISCED, Artificial intelligence

1. Introduction

Although there are various claims about where, when, and how higher education began, people have shared their experiences since the first day they interacted. Over time, with the proliferation of places of worship in different cultures worldwide, communities began to receive education in structures similar to higher education in various fields. With the establishment and spread of universities, competent lecturers in specific fields started delivering courses within programmes to enable individuals to specialise. This process has become institutionalised today, with particular standards accepted and implemented by institutions regarding the content of courses taught in programmes and how the courses should be conducted. While different countries have varying standards for the execution of higher education, in European Union countries, the European Credit Transfer System (ECTS) criteria and the Bologna Process are considered important references for determining specific standards for conducting higher education activities. In 1997, in harmony with the Convention on the Recognition of Qualifications concerning Higher Education in the European Region, the Lisbon Recognition Convention was signed, representing a collective decision to recognise education obtained from European countries. With the Bologna Declaration, as part of the Bologna Process, standards encompassing the recognition of secondary education degrees, higher education, student mobility, lifelong learning, and the European Credit Transfer System for course credit counting were established (Kehm, 2010).

Open and Distance Learning (ODL) is also considered an effective method to increase higher education within the scope of lifelong learning. The oldest example of the world's first open and distance education is the delivery of weekly lessons via postal service in Boston, USA. It continued to be provided through various communication tools influenced by technology. The first electronic distance education began over the radio in the 1920s. In the 2000s, the widespread adoption of the Internet and technological developments enabled many educational institutions to offer distance education services and allowed students to access information easily through technological devices (Clark, 2020). By the 2020s, various studies on integrating artificial intelligence applications into ODL have emerged. Particularly with the rapid development of generative artificial intelligence, the size and diversity of synthetic data produced have increased, bringing various debates. However, when generative artificial intelligence is controlled correctly, it holds significant potential for accelerating academic, administrative, and managerial tasks (Bozkurt, 2024). Easy and understandable AI-supported systems provide practical benefits in rapidly executing processes (Pulist, 2022).

In Turkey, Anadolu University conducts higher education activities in a dual mode. It has facilitated the proliferation of higher education since 1982 through its open education system, consisting of associate and bachelor's degree programmes of the Open Education, Economics, and Business Faculties. Anadolu University's Open Education System (AUOES) has over one million registered students and conducts higher education activities in Turkey and abroad with nearly 100 offices (Koçdar et al., 2024). Anadolu University offers support services for registered student candidates and graduates under the name AOSDESTEK. Non-academic support services are provided online through applications like Ticket (Ask a Question), Frequently Asked Questions, and AI-supported Virtual Assistant available in AOSDESTEK (Anadolu University, 2023). However, although studies are being conducted for academic or administrative processes, there is not yet an AI-based system.

The management should consider academics' opinions regarding curriculum changes, but the support of administrative staff and field experts is essential (Law, 2024). However, the effective use of developing technology has become inevitable for institutions like AUOES, which have over a million students and teach thousands of courses in an academic year. Collaborating with machines according to specific standards can provide benefits in this context. European higher education institutions are adopting internationally standardised platforms to disseminate information about their programmes, going beyond traditional course lists, objectives, and outcomes in information packages aligned with the Bologna Process. The International Standard Classification of Education (ISCED), the standard used to determine which occupational fields the higher education institutions will be included in, was initially created to produce a statistical overview of study programmes following primary, secondary, and higher education. Later, following the Bologna Process in higher education, a new implementation was published in 2011. In the latest expanded ISCED codes, the first two digits represent broad fields. The newest version of ISCED, called ISCED-F, is provided below (Silvestru et al., 2018).

00. Generic programs and qualifications
01. Education
02. Arts and humanities
03. Social sciences, journalism, and information
04. Business, administration, and law
05. Natural sciences, mathematics, and statistics
06. Information and Communication Technologies (ICTs)
07. Engineering, manufacturing, and construction
08. Agriculture, forestry, fisheries and veterinary
09. Health and welfare
10. Services

By leveraging AI with ISCED data, institutions can provide workforce insights and employment opportunities connected to specific professional fields and can consider their programmes and even courses in this context. The University of Bologna sets a significant example by determining the ISCED fields of programmes and courses (Mondok, 2015). This process allows for tracking data related to professional fields at a micro level.

Although it is not precisely known when the idea of artificial intelligence first emerged, the foundations of AI were laid in real life in 1950 with Alan Turing's Turing Test through questions like "What if we asked machines questions?" and "Can machines think?" (Negnevitsky, 2005). The event that started artificial intelligence as a discipline is considered to be the Dartmouth Summer Research Project in 1956. McCarthy's proposal for automata to self-organise the external environment and adapt to it is known as the beginning of the project (Kline, 2011). Since 2020, generative artificial intelligence has rapidly gained momentum, becoming a powerful tool with solid data generation capabilities that can learn independently from complex data. Pre-trained AI language models that learn abstract information from raw data have extensive data generation capacities. One of the latest Natural Language Processing (NLP) models, OpenAI's ChatGPT, is among the most well-known applications (Goar et al., 2023). ChatGPT, through its paid version, allows individuals and organisations to create their GPTs with the MyGPT application. In this context, the MyGPT application of ChatGPT, one of the generative AI applications, was used in the research as AI.

When the literature is examined, it is seen that after the 2020s, there has been an increasing number of studies on the use of AI technology in higher education, and generally, research is not conducted in areas such as academic support, language learning, support services, etc. It is observed that there needs to be more studies on the use of AI in administrative processes, specifically in processes related to determining programs or courses. Noroozi et al. (2024) examine various applications and effects of AI tools, including ChatGPT, in education, emphasising their potential to enhance teaching and learning in multiple contexts. Watermeyer et al. (2024), in

their research on the use of ChatGPT in higher education institutions, reveal that AI helps reduce the intensive workload of employees. Kumar (2021) states that ChatGPT has initiated a transformation in content development and evaluation in higher education institutions and has the potential to add value, especially in administrative processes. Nikolopoulou (2024) expresses that integrating ChatGPT and other AI tools into higher education processes has implications for curriculum design and university policymakers. McDonald et al. (2024), in their research conducted across 116 universities in the USA, state that most universities support the use of AI, and more than half of the institutions use AI in curriculum development and determining the content of courses. Alali & Wardat (2024) state that after ChatGPT and similar tools were widely adopted. However, AI is revolutionary in educational practices, and its integration should be carefully evaluated in terms of ethics, society, and pedagogy. Educators can leverage the potential of AI through proactive collaboration and partnership. Hashmi & Bal (2024) emphasise that higher education institutions need to adapt to enable future employees to succeed in a workplace filled with AI. Duah & McGivern (2024) underline that it is insufficient to prepare only students for the AI era; institutions need to focus on how AI can be effectively used with all their employees—many existing AI applications currently present potential for many academic and administrative higher education staff. Zeb et al. (2024), drawing attention to the unseen part of the iceberg, state that although AI offers opportunities in higher education, its threats should not be overlooked. Therefore, institutions need to adopt a proactive and practical approach. Including the latest version of the most widely used ChatGPT, it can still experience hallucinations. It should not be forgotten that synthetic data is produced, and the information provided should not be unconditionally accepted as correct without double-checking. As of 2024, although AI applications like ChatGPT are essential tools for accelerating processes, they need the quality to take responsibility like a human.

When the literature on the use of AI and ISCED codes is examined, more studies are needed. One of these is the study by Öncü & Süral (2024), which determined the ISCED codes of AUOES programmes according to ChatGPT. According to the ISCED codes determined by AI, the employment status of graduates from AUOES was revealed based on OECD's occupational field data. This study investigated whether AI could classify over a thousand courses according to specific standards in an ODL with over one million registered students. The study sought to explore how AI can contribute to the administrative processes within AUOES, specifically by categorising 1135 courses according to ISCED fields. The use of AI in this context not only suggests potential efficiencies in course classification but also offers insight into its broader role in optimising programme management, accreditation, and compliance with international standards. In this regard, the study sought to answer the following research questions:

RQ1: According to the ISCED fields proposed by AI for the courses:

- What is the general distribution across all courses?
- What is the distribution of unique courses (taught only in one programme)?
- What is the distribution of common courses (taught in at least two programmes)?

RQ2: How does the comparison between the distributions of unique and common courses look?

2. Methods

Document analysis, while often complements other research methods in the literature, is also used as a standalone method (Sak et al., 2021). In document analysis, interviews, direct observation, participant observation, tangible artefacts, and archival records can be used to collect data (Yin, 2009). Bowen (2009) analytically lists the stages of document analysis as locating, selecting, evaluating, and synthesising documents. In this research, the document analysis method was used by following the steps outlined by Bowen regarding document analysis (Figure 1).

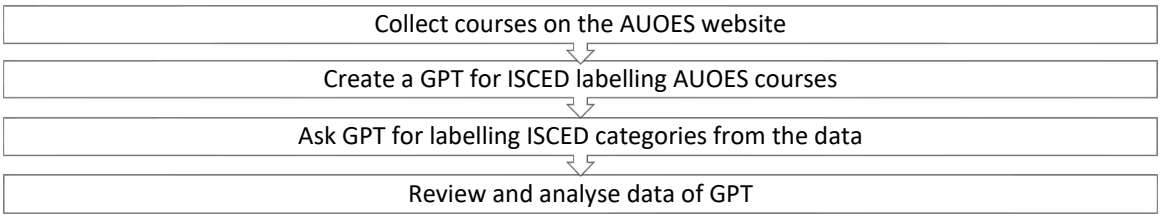

Figure 1: Flowchart of research

In the research, firstly, all courses available on the official website of AUOES, along with their contents, were compiled into a database (Anadolu University, 2023). At this stage, information on 1135 courses and their contents belonging to 63 enrolled programmes was obtained. Analyses were conducted assuming that courses with the same name in different programmes are similar, based on the programme and course information published on universities' websites. In the second stage, a MyGPT was designed on ChatGPT as a Course Labelling application, considering the opinions and experiences of field experts. The GPT was tasked with labelling the AUOES courses according to ISCED fields, considering the contents of the courses. Then, through the application, the GPT was asked to fulfil its task, and the responses provided by the GPT were collected in a database. In the final stage, the findings obtained in the research were evaluated, comparative analyses were conducted, and recommendations were made. Since the research was conducted based on course information accessed on the AUOES website, no interviews with individuals were conducted, private institutional information was used, and no additional permission was obtained.

3. Findings

The results obtained in the research are shown in Table 1.

Table 1: ISCED fields of courses based

ISCED field	All courses		Unique courses		Common courses	
	f	%	f	%	f	%
Business, administration, and law	386	34.01	271	31.40	115	42.28
Social sciences, journalism, and information	212	18.68	156	18.08	56	20.59
Arts and humanities	185	16.30	150	17.38	35	12.87
Health and welfare	114	10.04	93	10.78	21	7.72
Information and Communication Technologies	80	7.05	60	6.95	20	7.35
Services	47	4.14	39	4.52	8	2.94
Engineering, manufacturing, and construction	43	3.79	38	4.40	5	1.84
Agriculture, forestry, fisheries and veterinary	37	3.25	37	4.29	0	0
Education	27	2.38	15	1.74	12	4.41
The Other Occupation	4	0.36	4	0.46	0	0
Total	*1135*	*100*	*863*	*100*	*272*	*100*

The distribution of the courses taught in the programmes enrolled at AUOES according to ISCED codes is as follows: Business, administration, and law (386); Social sciences, journalism, and information (212); Arts and humanities (185); Health and welfare (114); Information and Communication Technologies (80); Services (47); Engineering, manufacturing, and construction (43); Agriculture, forestry, fisheries and veterinary (37); Education (27). Courses that do not fit into these categories are indicated as "The Other Occupation" (4).

The distribution of the courses taught in the programmes enrolled at AUOES, in terms of unique courses (taught only once), according to ISCED codes, is as follows: Business, administration, and law (271); Social sciences, journalism, and information (156); Arts and humanities (150); Health and welfare (93); Information and Communication Technologies (60); Services (39); Engineering, manufacturing, and construction (38); Agriculture, forestry, fisheries and veterinary (37); Education (15); The Other Occupation (4).

The distribution of the courses taught in the programmes enrolled at AUOES, in terms of their common teaching status (a course being taught in at least two programmes), according to ISCED codes, is as follows: Business,

administration, and law (115); Social sciences, journalism, and information (56); Arts and humanities (35); Health and welfare (21); Information and Communication Technologies (20); Education (12). Services (8); Engineering, manufacturing, and construction (5). Courses that do not fit these categories are indicated as The Other Occupation (4). There are no commonly taught courses in the fields classified as Agriculture, forestry, fisheries and, veterinary and The Other Occupation.

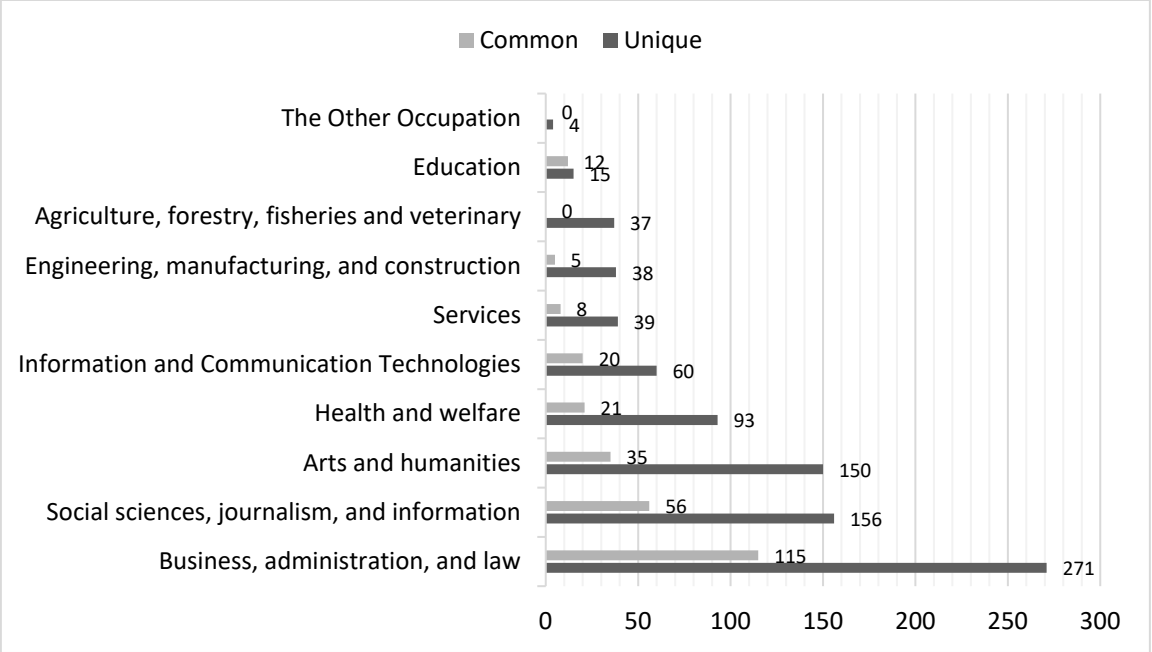

Figure 2: ISCED fields of courses based on their status

Figure 2 shows the status of courses being common and unique according to ISCED codes. Although the rankings according to the number of courses are similar, when examining the distributions within the fields themselves, it is observed that there are close values in the field of Education. Accordingly, 12 common and 15 unique courses are taught in the field of Education. In the fields of Agriculture, forestry, fisheries and veterinary and The Other Occupation, however, no courses are taught commonly; all of these courses (37) are taught uniquely, exclusive to only one programme.

The findings of this study suggest that AI appears to categorise courses according to ISCED fields and demonstrates its potential for administrative use in higher education. The AI-generated classifications reveal an underrepresentation of fields such as 'Education' and 'Agriculture', while 'Business Administration and Law' courses predominate. These results reflect AI's ability to process large datasets rapidly, offering insights that may help align courses with vocational fields and labour market demands. The study also highlights AI's potential to facilitate classification tasks and allow human resources to focus on more complex and strategic educational challenges. The integration of artificial intelligence into administrative processes enables AUOES to manage its large-scale operations more efficiently. Specifically, ChatGPT-4's ability to analyse course content and automatically assign them to ISCED fields ensures that courses are classified in accordance with standards. This automatic classification contributes to obtaining more detailed and accurate statistics in enrolment and graduation processes. Additionally, by reducing the manual classification burden on administrative staff, it allows them to focus on more critical tasks such as strategic planning and student support services. Thus, the use of artificial intelligence not only enhances AUOES's administrative efficiency but also strengthens the alignment of educational programs with international standards.

4. Results and Discussion

The results from the study suggest that the AI system employed in this research may have been able to categorise 1135 courses based on ISCED fields, with the largest proportion falling under 'Business Administration and Law' (34%), indicating a predominance of courses related to white-collar professions within AUOES. The AI also reflects a significant distribution of courses across 'Social Sciences, Journalism, and Information' (18.68%) and 'Arts and Humanities' (16.30%), supporting the notion that these fields are also strongly represented.

Furthermore, the classification of courses by AI suggests that fields such as 'Education' and 'Agriculture, Forestry, Fisheries, and Veterinary' are underrepresented in terms of both unique and common courses, which indicates areas for potential growth or realignment within the AUOES curriculum. While the findings reflect the potential utility of AI in administrative processes, particularly in mapping courses to vocational fields, it is important to exercise caution. AI-generated data, while useful, should be supplemented with human oversight to ensure alignment with vocational fields, employment trends, and ISCED classifications. "The rapid adoption of AI developments and generative AI tools like ChatGPT presents new opportunities and challenges for higher education. Although significant literature discusses AI in higher education, Katsamakas et al. (2024) have conducted a study adopting a complex systems approach, stating that there is a lack of a systemic approach capturing a holistic perspective on AI transformation in higher education institutions. According to this study, higher education institutions face policy traps. Leaders of higher education institutions need to be systems thinkers to manage the complexity of AI transformation and to benefit from AI feedback loops while avoiding associated traps. Additionally, managers must decide where AI will be positioned in long-term scenarios. Mao et al. (2024) emphasise that in determining AI policies in higher education, it is necessary to consider what role will be given to machines, the extent to which processes will be automated, the level at which human empathy can remain, and how decisions can be made between humans and machines on issues of justice and equality. Furthermore, although AI, thanks to applications like ChatGPT, can perform complex operations in a short time due to its natural language processing skills and advanced algorithms, it is still a machine that cannot take responsibility like a human, can produce synthetic data, and sometimes provides incomplete or incorrect information because it experiences hallucinations. In this context, it is essential to double-check rather than trust machines 100%.

ISCED fields, beyond serving merely as a categorization system, provide meaningful data that are utilized in the statistics of major organizations such as the OECD. This standardization not only facilitates international comparisons but also supports the alignment of educational programs with labour market needs. By integrating AI into the process of assigning courses to ISCED fields, institutions can ensure more accurate and timely classifications, enhancing the quality and relevance of the data used in both academic and policy-making contexts.

In their study with 1,217 participants from 76 countries, Yusuf et al. (2024) investigated the global impacts of AI in higher education and revealed a tendency worldwide to use these tools for different purposes in education and teaching. However, they have emphasised that using these tools without responsibility threatens educators and administrators and that AI integration in higher education should be carried out within certain standards. Chukwuere (2024) examined the use of AI in higher education in peer-reviewed English journals between 2020 and 2023 and stated that AI-based chatbots could improve student engagement, facilitate the educational process, support research assistants, and benefit administrative processes.

The results obtained from this study suggest that institutions with a high number of courses, like ODL, can utilise AI for both classification and course content by adhering to standards such as ISCED. Dabis & Csáki (2024) examined empirical studies of 30 universities among the top 500 in the 2023 Shanghai Ranking list. Despite legal and ethical concerns about how higher education institutions should use AI, they reveal the potential for using AI in curriculum development. Our results suggest that the use of AI optimizes AUOES's administrative processes by effectively classifying courses according to ISCED fields and accelerating compliance with international standards.

In summary, although there are limited studies in the literature on the use of AI for administrative purposes in ODL and even in higher education, the studies revealed that AI used for different purposes should be applied according to specific standards. However, using AI under the control and collaborating with experts in the field will prevent possible errors. In this respect, domain experts need to configure AI tools. The distribution of courses taught in programmes registered with AUOES according to ISCED codes shows that the field of "Business, administration, and law" has the highest value in terms of both the total number of courses and commonly taught courses. This indicates how central and widespread this field is among programmes. Similar trends are observed in other fields; however, especially in the "Education" field, the numbers of common and unique courses being close to each other shows that programmes in this field include both general and specific course contents in a balanced manner. In fields with no common courses, it is understood that course contents are more specific and unique to the programmes. This study highlights the potential benefits of using AI in administrative processes within higher education institutions, particularly in standardisation tasks such as the classification of courses according to ISCED fields. Due to its rapid reading and analytical capabilities, AI can streamline tasks that would otherwise require significant manual effort, allowing institutions to expedite these

processes. Consequently, limited human resources can be redirected to more critical and complex areas, enhancing operational efficiency. These findings emphasise the value of integrating AI tools into educational management, supporting decision-makers in optimising both course alignment and resource allocation.

5. Recommendation

This study was conducted using a GPT designed to determine whether AI can accomplish in a short time a complex process that would generally take longer in ODL, and it is limited to the responses provided by the AI. Researchers can undertake more comprehensive studies by performing agent-based simulations and can reveal experts' opinions through empirical studies based on the data obtained from this research. They can investigate employees' attitudes towards AI in large organisations like AUOES and the impact of AI usage on working life. Additionally, managers' and employees' opinions and concerns about using AI in administrative processes can be explored.

Decision-makers can consider the distribution of ISCED fields when opening new programmes or updating course lists in ODLs, especially in centrally administered ODL institutions like AUOES, which has over one million students. As of 2024, there is no elective course application in AUOES; ISCED fields can be considered when creating an elective course list. Moreover, if the micro-credentialing application is implemented, certification can be done according to course pools formed based on professional fields. Since ISCED fields are a widely accepted standardisation in Europe, the statistical status of higher education institutions in various metrics can be presented. Data such as the distribution of programmes for enrolment, the quota distribution of the programme, the number of students, and the number of graduates can be compared with employment situations. Programmes and courses can be structured primarily based on OECD reports and data from official statistical institutions in the country. The controlled use of AI as an effective support tool can accelerate administrative processes and enable decision-makers to utilise the automation process most effectively in deciding what and how much the machine will do between human and machine. Additionally, training can be provided to employees on how AI can be used.

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