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Generation Z of Industrial Design Education

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Abstract

According to generational theories, members of the same generation have similar experiences, attitudes, behaviors, and ways of thinking because they have experienced similar social, cultural, and historical events. Thus, each generation has a different perspective on life and exhibits different approaches to work, education, and family. Generation Z, which constitutes the majority of university students today, also shows a unique approach. This unique approach can create differences in design education. To keep up with this difference, to meet the demands of Generation Z, and to transform them into talented designers, design education should be prepared for this new generation. Generation Z, which comes to design education from its perspective, opens the floodgates to review and renew the industrial design curriculum with generational effects that may require changes in educational strategies. In this context, the study aims to discuss the suitability of the current industrial/product design education curriculum for Generation Z and how the attitudes of Generation Z would be beneficial to change the design education curriculum. For this purpose, generation theories and the characteristics of Generation Z are first discussed in the article. Then, the requirements of the design education curriculum to meet the characteristics, attitudes, and expectations of Generation Z students are discussed. To see the place of these requirements in curriculums. According to the ranking determined for the Art and Design title in the QS World University Rankings 2023, the curriculum of the top 20 universities with industrial design and product design departments were analysed. As a result of the study, the aspects that support and need to support Generation Z in design education are presented.

1. INTRODUCTION

Just as technological, cultural, and social changes cause changes in the design field, everyday social and historical events experienced by a generation also change the individual who realizes the design. Design education is also affected by this difference. Most of today's university students are Generation Z. Considering the characteristics of different generations and how they perceive the world is essential for educators to increase efficiency and effectiveness in education [1]. Therefore, it is necessary to consider Generation Z students' attitudes, thoughts, behaviors, and beliefs and the points where they will affect education. According to Seemiller and Grace, we can mobilize, empower, prepare, and educate this generation to solve our world's problems or miss a great opportunity [2].

On the other hand, design is a process that introduces new values and ways of thinking, transforming itself as living standards and technology change. Design practices are constantly transforming to keep pace with change and bring about change. This transformation, of course, also affects designers. For this reason, one of the points to be emphasized in design education is that students should be handled carefully as future designers to direct and meet the change in design practice. Developing design practices will change who and how design is done and significantly impact design education [3].

As Trowler states, learning involves social participation and communication [4]. Therefore, for design education, communication, and social skills can be used as guidelines for curriculum design, and student profiles and characteristics are significant factors to consider in structuring design education. For this

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reason, as students from different generations with different characteristics are involved in design education, education programs, and curricula should be reviewed for student adaptation, such that maximizing the knowledge and skills of Generation Z as new-generation designers are essential for both the professional future of students and the future of the design discipline.

To better meet the expectations of Generation Z, it is essential to review the industrial design education curriculum and consider how to renew and improve it. Considering generational differences in industrial design education can provide valuable information to understand better students' learning processes and learning resources and to strengthen communication with students [5]. Generational studies can also make significant contributions to developing effective practices, policies, and programs for institutions [2]. For this reason, the study aims to examine the industrial design education curriculum within the framework created in the context of generational theories depending on Generation Z.

2. GENERATION THEORIES

With the generational theory, researchers state that individuals born within a typical period have similar ways of thinking and behaving, value judgments, and attitudes through shared experiences. Gasset says that each generation forms its behaviors and perspectives through the power of significant cultural and historical events shared by people with a typical birth date range [6]. Mannheim, likewise, states that individuals born in the same historical period and socio-cultural context have similar mindsets, experiences, and behaviors due to the influence of the typical events they have experienced during the formation years of a generation [7]. Events that attract attention and profoundly affect and capture the emotions of many people during a generation's formation phase help to determine that generation's characteristics [8]. Therefore, what makes a generation unique is that from birth onwards, all its members encounter similar trends at similar ages [9]. For this reason, many researchers argue that generational similarities are influenced by history rather than the chronological birth year of an individual and are related to similar social events experienced by members of a generation during their growing up years ([10]; [11]; [12]; [13]).

Every generation has a generational identity. This is a set of generally common behaviors and attitudes that a generation expresses throughout its life cycle. [8]. Generational identity defines an era and finds the boundary that separates it from other generations. Because each generation develops different behaviors and attitudes from others with the subjective experiences it has lived in the historical context in which it exists. However, it is not correct to say that every member of a generation will carry all of these behaviors and attitudes. A generation, like an individual, has many different characteristics, and none of these characteristics alone is decisive [8]. Although not all generation members carry all the characteristics of generational identity, most of them develop some common characteristics depending on historical and social experiences. Therefore, all members of a generation are influenced by their generational personalities, although not every individual fits the personality profile of the generation exactly [9].

According to Edmunds and Turner, global generations are emerging with increased communication and interaction thanks to technological advances [14]. Today, changing technology, social and societal changes and the ability of individuals to communicate and follow each other through many different channels create a global generational identity. Accordingly, young people belonging to a generation are becoming more and more similar globally [15].

2.1. Generation Z

When academic studies on generations are examined, studies on Generation Z are relatively new and limited. The related literature is still developing [16]. There is more disagreement on the birth dates of Generation Z. For example, [17] (2005-2025); [18] (1998-...), [19] (1991-2000); [20] (1993-2005); [21]; [22]; [23],- (1990-2000); [24]; [25] (1995>...) and according to Seemiller and Grace [26] it consists of individuals born between (1995-2000). Generation Z is the world's first 21st-century generation [27]. Although their digitally evolving social characteristics make Generation Z unique, they are not the only

thing that defines them. They have been shaped by technological progress, violence, a volatile economy, and social justice movements [2].

Table 1. *Characteristics of Generation Z*

Characteristic Properties	In Seemiller and Grace's study, Generation Z members were loyal, thoughtful, compassionate, open-minded, and responsible [26]. Older generations see them as good-natured, diligent, innocent, risk-averse, and emotionally fragile [17]. Their distinctive characteristics are independence, dependence on technology, speed, practicality, efficiency, impatience, dissatisfaction, and being result-oriented [24]. To these characteristics, they are expected to prefer multitasking, effective technology use, individual work, creativity, global perspective, and non-standard and personalized products [24]. They are highly educated, technologically savvy, and creative [28]. They may need help developing their creativity and awareness of new technologies [26], and an educational approach that can equip industrial design graduates with more robust creativity may need to be adopted.
Educational Life	Generation Z is, first and foremost, an education generation [23]. They have received education earlier than previous generations and have grown up in an advanced and planned education system. Without going to school, the age that was home-schooled first is the most ready for school [29]. They are expected to be the most diverse university students ever [30]. According to Renfro, Generation Z students learn through graphics, prefer customized educational activities, and dislike exams [31]. They expect clear assignment definitions. They expect continuous and immediate feedback and may be frustrated if they do not receive quick feedback. They are interested in the present depending on the knowledge required at a particular moment. Therefore, pre-planned learning activities are thought to be less effective for these individuals [23].
Learning Preferences	They care about learning through real-life experiences [32]; [26]. They want to know the necessary skills for their future careers, and their learning experiences are markedly different from those of previous generations. According to Northeastern University's Innovation Survey, they prefer learning opportunities to apply to real life [2]. Although they value hands-on opportunities that lead to career success, this expectation is not only related to professional practices. For this reason, educators can be supportive not only of career opportunities and interests but also of the more significant meanings in their lives and of capturing their values and passions [2]. They also attach importance to internship opportunities to gain connections, skills, and experiences that will contribute to them in the future. Therefore, it may be beneficial for organizations to offer various internship opportunities that will contribute to the development of students [2].
Relation to Technology	Generation Z refers to people born after the popularisation of the "World Wide Web" [22]; [23]. They were raised in a demanding and impatient culture that harbours high-tech products connected to social networks [33]. According to Tulgan, the ubiquity of the internet and technology integration into life means historical change for this generation [34]. This generation sees technology as a part of natural life [35]. It is thought that social media will leave significant traces on Generation Z and create addiction [24]. This generation is thought to be predisposed to learning and development activities supporting their freedom in technology-enabled, personally optional conditions [23]. The individualistic nature of technology has helped Generation Z to get used to independent learning [2]. They are independent, intrinsic, and self-paced learners who can access and study information wherever and whenever they want, and they prefer to learn from the Internet rather than printed materials [26]. They come to class with mobile phones, laptops, or tablets that enable them to connect to the internet and access information [33]. Generation Z students who prefer hands-on learning are observant and like to watch others complete tasks before doing them themselves. This approach is reflected in the tendency to acquire knowledge through video [2]. Generation Z, who use YouTube like Google and most have their video platform, likes to communicate and inform each other through video [23]. Therefore, in addition to traditional educational materials, materials with visual content may be more helpful for this generation. Thanks to internet technology, they can simultaneously deal with more than one subject [24]. Generation Z, who are technologically literate, is shaped for multitasking using technology and media. They move quickly from one task to another [21]. Therefore, it takes a long time for them to adapt due to difficulty focussing. Attention deficit is quite prominent compared to previous generations [36].
Entrepreneurship	Generation Z students want to know what competencies are expected in the professions they want to have with an education that prepares them for a meaningful career. These characteristics contribute to their willingness to learn [30]. They are interested in innovation and entrepreneurship [2]. According to the Northeastern University Innovation Survey, they believe that universities should teach the knowledge and skills needed to run a business [2]. Renfro stated that most Generation Z students will work in jobs that do not currently exist [31]. Wiedmer added that they will be self-employed entrepreneurial professionals with specific expertise and broad flexibility and bring solutions to problems [29].
Teamwork	They prefer to work independently in teamwork, even in cooperation [37]. They want to develop solution-oriented relationships with their counsellors and peers and need guidance in dealing with difficulties [30]. They see their peers and instructors as valuable resources and often like to work with others independently after thinking through a project on their own [2]. They respect authority, embrace hierarchy, and want their ideas to be considered and valued [26]. To conduct successful teamwork, it is necessary to understand why they prefer individual learning. They like to work individually because they can focus, determine their work pace, and evaluate their knowledge before sharing it with others [2].
Social and Environmental Sensitivity	For Generation Z, who are sensitive to social issues, "we" rather than "me" is significant [26]. Most of them stated that they do not want to disappoint others, will defend their ideas, and want to make a difference in people's lives [26]. Therefore, rather than the "self-centred" definition attributed to Generation Y, Generation Z is considered "off-centred" [30]. Discussions on social justice, immigration, and women's rights have affected Generation Z's sensitivity, who believe they can change the world. Therefore, they care about community engagement opportunities that provide lasting solutions for social problems [2].
Problem-solving, Coping with Failure, and Risk-taking Ability	Generation Z is growing up trying to understand the rapidly changing world [24]. They have had social, economic, and technological experiences such as terrorism, violence, and global pandemics. These experiences can help to understand why Generation Z is risk-averse, cautious, and sceptical [26]. Generation X adopts a protective style in raising this generation [17]. Generation Z children live more planned lives with less freedom; they are more isolated and programmed than ever. Helicopter parenting tendencies increased in intensity during this period ([22]; [34]). Therefore, they prefer structured and organized learning styles [38]. They want a technology that is easy to use, supports solving problems, helps in various activities, and provides communication and information with relevant people [23].

Social Skills and Communication Preferences	Its command of technology provides this generation with unlimited interests and makes it a global generation. They prefer the internet for comfortable and effective communication and thus socialize. Therefore, social skills need to be taught in face-to-face meetings [23]. They live together in a virtual peer ecosystem through verbal and visual communication established through technology [34]. Cross-Bystrum stated that Generation Z shows honest communication through Facebook, Facetime, Skype, and similar communication mechanisms, even though they do not share the same physical space [39]. It is stated that they learn primarily from their peers and teachers [40]. However, establishing personal relationships strengthened by communication through interactive media is very important for them because they still expect and desire personal interactions [26].
Knowledge Behaviour	The gap between the unknown skills of the future and those taught today is increasing. Therefore, to acquire these skills, Generation Z students should be taught how to discover and produce knowledge. Due to their instant access to information in the digital environment, it is thought that students of this generation need to pay more attention to details and trust the first information they reach without checking its accuracy [26]. In addition, they are overwhelmed by the crowd of data and need help with evaluation [30]. Therefore, the focus should be on helping this generation of students assess resources [29]. Due to their easy access to information, they prefer learning through observation, visual experience, and practice rather than passive activities such as listening to classroom presentations. The world is an open book for Generation Z as they grow up one click away from any information [27].

3. METHOD

This study aims to determine the suitability of the design education curriculum for Generation Z, to contribute to its development accordingly, and to address the current situation from a broad framework. In this context, the study sample was determined to be among the top twenty universities with industrial design and product design undergraduate departments according to the ranking decided for the Art and Design title in QS World University Rankings 2023 [41]. In addition, only universities for which information on curricula was available were included in the study. Within the scope of this study, since there is no known and reliable success ranking for industrial and product design, universities were determined using the QS World University Rankings 2023 success ranking. These universities were selected because they are pioneers in education and have entered this ranking with a certain standard of success. The universities included in the study are shown in Table 2.

Table 2. *The Universities within the scope of the study*

	University Name
1	University of the Arts London
2	Rhode Island School of Design
3	The New School
4	Pratt Institute
5	Politecnico di Milano
6	Glasgow school of art
7	Art Center College of Design
8	Savannah College of Art and Design
9	Carnegie Mellon University
10	Tsinghua University
11	RMIT University
12	The Hong Kong Polytechnic University
13	Emily Carr University of Art
14	Konstfact University of Arts, Craft and Design
15	Universität der Künste Berlin
16	Loughborough University
17	Maryland Institute College of Art
18	National University of Singapore (NUS)
19	University of Technology Sydney
20	Zurich University of the Arts

In this study, firstly, information about the curriculum was collected from the official web pages of the selected universities' industrial design/product design departments. This information generally includes data such as curriculum structure, course package, course contents, course syllabus, and learning outcomes. In this context, the study's data were obtained from about 1500 courses and information about the curriculum structure and learning outcomes of 20 departments. The data were analysed by content analysis method. Content analysis is a method used to draw repeated and valid conclusions by analysing the content of a text [42]. In this method, data are coded by predefined categories and interpreted through a systematic classification [43]. The content analysis method consists of coding the data, creating themes of the coded data, organizing the codes and articles, and defining and interpreting the findings [44]. In this context, the data related to the curriculum of the universities examined in the study were coded under the headings associated with Generation Z, as shown in Figure 1. These headings were created in parallel

with the characteristics of Generation Z presented under specific themes based on the literature in Table 1.

Figure 1. *Topics to be considered in education for Generation Z.*

During the analysis, the authors first coded the data separately, and then the study was completed by comparing the structured data. In the analysed courses, coding was done by looking for a relationship with the headings shown in Figure 1. Although the universities are analysed separately in the study, it is aimed to reveal the general situation. For this reason, the courses associated with Generation Z were evaluated within the broad context of industrial design education depending on their intensity in the curriculum.

4. RESULTS

To include digital tools, applications, and learning environments

Rapidly developing technology and the digital world significantly affect the dynamics of product design. In terms of design education, the new generation needs to include the technologies that are widespread today both directly in the curriculum as a subject and to use technology in practice. When the relevant schools' curriculum, course contents, and procedures were examined, it was seen that the effort to include technology in education with digital tools and applications was more common than other topics. A total of 112 courses from fifteen universities meet the expectations of Generation Z with their content and design practices. It has been observed that schools that include digital tools, applications, and learning environments such as 3D modelling programs, rapid prototyping and other prototyping tools, digital fabrication, programming, coding, virtual reality and augmented reality technologies, robotics, game technologies, animation, internet of things, intelligent products, wearable technologies, data analysis, media production, digital communication, social media use and information technologies in their curricula, which are the subject of contemporary applications related to technology, mostly use the opportunities to benefit from the possibilities of technology to benefit new generation designers. In addition, it is noteworthy that there are courses related to photography and video, albeit only a few, and videos to support traditional lessons. For Generation Z, who are prone to learning through video, sharing their knowledge, and being visible, it may be easier to associate these lessons with real life. For this generation, also called gamers [40], it is thought that classes with games included in the curriculum will also attract their interest.

Developing Creativity

According to the examined university curricula, 22 courses from 10 schools were found to be specialized in increasing students' creative thinking skills. Although there is a possibility of adopting an approach that extends to all of the courses since design education is already related to developing creativity, it was found that more than half of the relevant universities have classes that directly help to mobilize the creative potential of students, encourage different perspectives, and examine the creative process. Inspected courses were primarily structured on creative expression, strategies, and creative thinking methods. In

addition, the designer's attitudes, behaviours, ways of thinking, and methods of producing creative responses to design problems are also mentioned.

Encouraging Entrepreneurship

When the related curricula were analysed, it was seen that 18 courses from 10 universities were available to support Generation Z in entrepreneurship. The topics are developing entrepreneurial skills, business opportunities, collaborations, technology-oriented entrepreneurship, leadership, project management, career planning, and starting an individual company. It also showed how design thinking skills can be used for business opportunities, how new technologies can offer new entrepreneurial opportunities, how bringing different disciplines together can benefit entrepreneurship, and how designers can shape the agenda. In addition, topics related to business ideas, economics, business administration, marketing, and customer relations were also included, albeit to a lesser extent.

Fostering Interdisciplinary Collaboration and Teamwork

According to the curricula analysed, 35 courses from 15 universities were found to be customized to support Generation Z students for teamwork and interdisciplinary collaboration. The courses mainly include projects in partnership with different disciplines, project work with student groups, various industries and public institutions, real-life projects, and using digital environments that support collaboration. Collaboration, working practices, team criticism, and communication methods were also emphasized. For the Carnegie Mellon University "Collaboration by Design" course, stating that students will collaborate with their instructors to develop the curriculum can be considered a particularly developmental approach for Generation Z, who want their ideas to be considered and valued.

To Include Environmentally and Socially Sensitive Practices

When the curricula, course contents, and practices of the related schools were analysed, it was seen that 96 courses related to environmental and social sensitivity were available in 20 universities. The topics are mostly centred around sustainability, circular design, eco-design, sustainable change, social sustainability, social innovation, projects and collaborations focusing on social problems, designer's responsibilities, and ethics. Practices are diversified, with opportunities for collaboration with various organizations and local communities. The effort to include environmental and social sensitivity issues and practices in education was observed to be more common than other topics. In more detail, themes such as universal design, design for health, plan for disadvantaged groups, ideal for a changing world, design for the future, cultural studies, design for social justice, public service design, diversity and equality, collective intelligence, social participation, and empathy emerge. To provide an understanding of the impact of design on the individual, society, and the environment. Therefore, the aim of understanding design's social and environmental impact on the individual comes to the fore.

Developing Problem-Solving Skills

According to the curricula analysed, 11 courses from 9 universities were found to be directly tailored to support students' individual decision-making and problem-solving skills in the design process. The courses mainly include self-management skills, problem analysis and framing, multidimensional, creative, and critical thinking about the problem, and designer behaviour. In addition, teamwork and the ability to take responsibility were supported.

Developing the Ability to Cope with Failure and Take-Risk

When an evaluation was made regarding the ability to cope with failure and risk-taking skills, it was seen that six courses in 4 of the universities approached these issues. Even if the courses are not directly related to these issues, they were included in the scope of the research because they addressed these issues. The content of these courses commonly focused on learning through failure, failure, and trial and error as an element of the creative process, the ability to reach successful results based on past experiences, questioning, observing, and reframing problems. It was also observed that risk-taking skill was associated with entrepreneurship.

Opportunity to Learn with Real Life Practices

The analysed curricula showed that 16 courses from 11 universities are directly structured to support students' learning through real-life problems in the design education process. In this context, it has been observed that projects and internships carried out through institutional partnerships play a significant role in helping students establish concrete connections with companies from various sectors to develop experiences for the professional working environment. Design by the companies' production techniques and material properties and professional design process issues have also attracted attention.

Practices that Improve Communication Skills

According to the analysed curricula, 14 courses are available in 7 universities to support the communication skills of the new generation of students. The topics are mostly centred around developing communication and presentation skills, communicating with stakeholders, preparing for professional life, storytelling, and the role of technology in touch. In addition, topics related to collaborations, digital applications for communication, representation methods in design, visual and verbal communication, and team communication were also included, albeit to a lesser extent.

To Bring the Ability to Research and Access Accurate Information

When the curricula, course contents, and practices related to research and gaining the ability to access the correct information were analysed because Generation Z is exposed to intensive knowledge through the internet and needs help with the reliability of the information they access, it was seen that 23 courses in 10 universities approached these issues. The topics are research methods, selection of appropriate research methods, user research, data analysis and visualization, and information literacy. In addition, the place of research in the design process and digital literacy were also mentioned. Analysing information is one of the most essential skills to be gained by Generation Z students, and critical thinking, distinguishing reliable sources, and correct information have been considered less than other subjects.

The topics that the titles in which the data described above are coded correspond to in the curricula, and the topics on which the universities analysed are concentrated are shown in Figure 2. Although it is not aimed to compare universities in the study, the universities that add the subjects that may interest Generation Z to their curricula the most in terms of course density are Art Center College of Design, The New School, and Carnegie Mellon University. In contrast, the universities focusing on these subjects the least are Konstfack University of Arts, Crafts and Design, Politecnico di Milano, and Emily Carr University of Art.

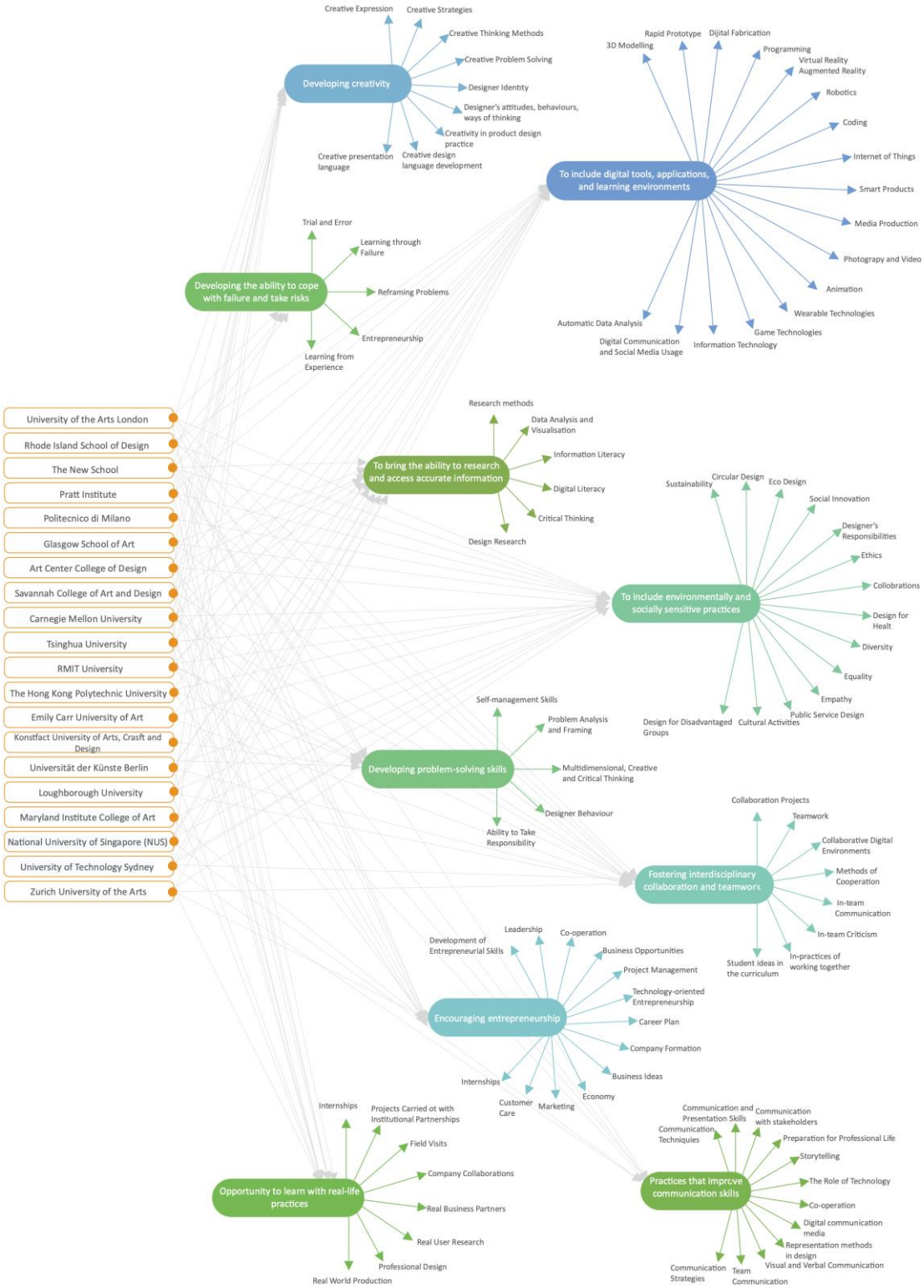

Figure 2*. Subject Headings and Distribution to University Curricula*

5. CONCLUSION AND DISCUSSION

Considering the characteristics of generations to determine a collective understanding with the acceptance that the factors determined with generational theories will not emerge in a precise way in every individual can provide a different perspective for redesigning education. With members of Generation Z starting university, considering the characteristics, learning styles, and educational preferences of this generation

can help to develop inclusive, flexible, and interactive educational methods. In addition, with technological and social changes and the demands of the industry, design education needs to be restructured as it moves towards different fields of knowledge and distinct levels of interaction. In line with this requirement, universities are restructuring their curricula differently.

In this study, the design education curriculum is analysed within the framework created by generational theories depending on the changing students' generations. It has been observed that industrial design/product design departments have curricula at different levels and focus on other subjects within the scope of the preferences, expectations, and aspects that need to be developed by Generation Z and the current requirements of design practice. Topics and methods involving digital tools, applications, learning environments, and environmental and social awareness were found to have a higher potential for inclusion in education than other topics. On the other hand, it was observed that the intensity of courses to promote coping with failure and problem-solving skills was less (See Figure 2). In general, all other topics were highly affected by the close relationship with technology.

Generation Z's close relationship with technology also affects their expectations for education in this direction. Curricula are sufficient to meet this expectation in general. The widespread inclusion of contemporary technological tools, methods, digital content, and learning environments in curricula and course practices is highly valuable to encourage Generation Z and ensure their active participation. The presence of familiar technological tools can improve students' abilities and competencies by increasing their motivation and engagement and supporting their learning approaches. In addition, including videos related to any subject can increase their participation by utilizing Generation Z's interest in learning through observation [2]. Therefore, by integrating technology into learning environments and applications, it is necessary to regard students as active learners and provide experiential knowledge. Students have stated that using the internet and information technology positively impacts design education and that they support using the internet to support design education [45]. In addition, Generation Z has access to a large amount of information via the Internet, and curricula need to focus more on developing skills to analyse, make sense of, evaluate, and distinguish reliable sources, visualize, and present data. In addition, about the development of curricula with digital tools, applications, and learning environments, it was observed that subjects such as the Internet of Things, digital fabrication, artificial intelligence, coding, and robotics, which came with Industry 4.0, were intensively included in the programs.

It has been observed that Generation Z students' awareness of their responsibilities by considering the environmental and social dimensions of their designs is widely supported by the curricula. Even if the intensity of issues such as sustainability, eco-design, and social innovation is because they have been taken into consideration in design practice and design education for a long time, addressing them together with technology for communication and collaboration seems to be a new way to meet the sensitivity of Generation Z on this issue.

It has been observed that the intensity of the courses added to the curriculum to provide skills to support the creativity of Generation Z needs to be higher in number. However, although not directly structured on this subject, it is thought that other project-based courses, by the nature of the design curriculum, support students' creativity. In addition, it may be appropriate to include an essential system that supports Generation Z students who are afraid of taking risks, coping with uncertainty and failure to express their ideas freely, and presenting the concept of creativity in theoretical and practical terms in close relation with other courses. In parallel, it is very significant to support the ability of critical thinking and problem-solving in the design curriculum. Students should be supported because these subjects are integral to the design process. Generation Z has an entrepreneurial aspect. This provides an opportunity for the innovation and business-related aspects of design. Therefore, considering the intensity of entrepreneurship-related courses in the data, it should be supported more in the curriculum. The curriculum can also be supported in terms of issues such as innovation, planning, business modelling, teamwork, project and team management, internship and interdisciplinary collaboration with professionals, real-life experience, and online communication because the roles of designers are changing towards a more inclusive and collaborative approach based on the subjectivity common in human

relationships [46]. Design students are expected to develop the ability to use new technologies and tools to address design problems comprehensively, communication and collaboration skills for becoming interdisciplinary team members, and lifelong learning skills. In this direction, there is an increasing interest in new academic programs that include projects involving students from different departments, such as industrial design, engineering, and marketing, in the education process. [47]. Therefore, design education should prepare students for changing roles, increasing responsibilities, and problems related to different fields to support Generation Z students.

A comprehensive design education curriculum is significant for creating a favourable institutional environment for students to develop practical skills and mindsets. In this context, it can be said that each university has started to restructure its courses according to the expectations and needs of Generation Z to encourage, support, and guide them more skilfully and consciously by enriching its curriculum under several interrelated topics, even if it does not include all of the issues identified for Generation Z characteristics. Universities that successfully update their curricula can set an example for the future planning of design education and can be pioneers in collective progress.

Although the study has a scope that can be extended to other design fields, the first limitation is that it is limited to industrial design and product design departments. In addition, another end of the study is that it is impossible to reach a success ranking for industrial design/product design departments and departments such as industrial design engineering, whose curricula can be parallel to these departments, and some essential universities cannot be included in the study. On the other hand, although the official websites of universities are a crucial channel for sharing information, it isn't easy to know whether the information about the curriculum is up-to-date and complete. Therefore, the existence of information that cannot be accessed directly through official websites is another limitation of the study. However, the study is intended to provide a window into the changes that can be made for Generation Z. Future studies can be restructured by addressing the relevant limitations. Self-evaluation of universities with industrial design/product design departments by using their data and tacit knowledge within the department may offer a different perspective for the future of design education. In addition, conducting a field study directly with Generation Z students in industrial design/product design departments may be interesting to learn first-hand the direction in which design education should evolve. It would also be helpful to get the opinions of lecturers who have the opportunity to observe and communicate with Generation Z students. In addition, it may also be beneficial to examine in detail the practical implementation of each topic identified for Generation Z.

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