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Different 21st Century Skills Among Z Generation in The Higher Education Based on The Level of Students, and Gender Difference

Suciani Latif[1], Nur Fadhilah Umar[2] *, Yasdin[3]
[1] Guidance and Counseling, Universitas Negeri Makassar, Indonesia
Email: suciani.latif@unm.ac.id
[2] Guidance and Counseling, Universitas Negeri Makassar, Indonesia
Email: nurfadhilahumar@unm.ac.id
[3] Automotive Engineering Education, Universitas Negeri Makassar, Indonesia
Email: yasdin@unm.ac.id

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Abstract. Generation Z is a generation that is unique from the previous generation because it has technological capabilities and lives in an era of advanced technology. This uniqueness requires generation Z to have 21st-century skills to adapt to the demands of the industrial era 4.0. However, not all Generation Z have these skills and adaptability. Therefore, this study aims to describe and distinguish the skills of 21st-century students as seen from the level of lectures and gender differences. This type of research is descriptive quantitative research. The sample in this study amounted to 268 students from 9 faculties, namely Education, Language, Engineering, art, psychology, social science, sports, economics and science. This sample consisted of 130 women and 138 men. The measuring instrument in this study uses an adaptation of the 21st-century skill instrument, which consists of 4 aspects: 1) Information and technology literacy skills, 2) Entrepreneurship and innovation skills, 3) Social responsibility and leadership skills, and 4) career consciousness. Techniques of data analysis using descriptive statistical data analysis and ANOVA using JASP assistance. The results showed that there were differences in students' 21st-century skills based on semester level, and there were differences in students' 21st-century skills based on gender.

Keywords: Z Generation, 21st-century skills, level of study, gender difference

INTRODUCTION

The rapid development of information technology in the 21st century has changed how humans work, communicate and interact. These changes, of course, change how each individual adapts to his environment. Changes in how to adapt are changing environments because job demands also change cognitive abilities and skills. Several studies have shown that one of the hallmarks of the 21st-century generation, or what is known as gen Z is technological proficiency, high innovation ability, and high career awareness (Mardhiyah et al., 2021; Santika, 2021).

Gen Z is a generation that is seen as having a career goal by building several parallel careers, namely having several jobs simultaneously in the world of work (Rachmawati, 2019). This generation has a

priority on advancing the career path quickly, which is the personal and professional goal of Gen Z, thus in line with the results of Hasibuan's research (Hasibuan, 2022), which states that to succeed in the world of work, Gen Z needs to be directed to have creative, innovative and inspiring behaviour or skills, with tend to build work patterns and prioritize their technological abilities so that they can prepare themselves with future skills or soft skills (Sobarningsih & Muhtar, 2022).

The skills in question are 21st-century skills, where the digital revolution emphasizes all-technology updates that characterize Gen Z. According to Ismail & Nugroho (2022), this industrial revolution era requires the ability to read, analyze, and use information (big data) in the world. Hence, in the digital world, technological literacy, namely understanding how machines work, technology applications (coding, artificial intelligence, and engineering principles), and human literacy (character, design, and communication. Furthermore (Pramudita et al., 2021; Sumarno, 2019). The 21st century consists of three main types of skills: life and career skills, learning and innovation skills, and information media and technology skills.

The 21st-century skills of students vary with each major. Based on the results of research by Hadiyanto et al., (2021) that the importance of developing skills in higher education enables graduates to function more effectively in the world of work and life in general. However, in each department, students have different 21st-century skills. This argument is in line with the results of research by Abdurazzokovna & Murotdilloevna (2021) that students have a particular set of skills that can be seen from the comparative needs of the study programs in which they are engaged. So that universities in each department master the knowledge, skills and expertise following their field (Satria, 2022).

The difference in skills, especially in the 21st century, that students have is not only in the aspect of the study program but also at the level of study for early students and final year students. The results of Barriyah's and Werdiningsih's research (Bariyyah, 2021; Werdiningsih, 2022) state that this difference is influenced by the fact that final-year students tend to dominate and have had many interactions and environmental experiences in the learning process, which are more optimal than early-level students. In addition, based on the results of research by Gómez & Yáñez (2021) that other factors that influence the difference in 21st-century skills of students in terms of gender, girls have a terrible perception of their digital skills, as well as a lower tendency towards technology than boys, so that male students are more skilled in utilizing information technology and more suited to digital interests (Hämäläinen et al., 2021). The difference is also in line with research by (Blesia et al., 2021; Nadiroh et al., 2021; Vincent et al., 2022) that girls are more dominantly interested in aspects of communication and cooperation. Therefore, this study aims to determine the description or differences in 21st-century skills of students seen from the level of study and differences in gender.

Information and Technology Literacy skills. Technology and information are currently at a significant stage of development due to current globalization, which requires good digital literacy (Sari & Yoni, 2021; Wijayasekara, 2021). Technology and information literacy can be interpreted as a person's knowledge related to computer-related functions. In other words, they have the awareness, attitude and ability of a person to use technology to access information (Reddy et al., 2021). Furthermore, Claro et al. (Kim et al., 2021) state technology and information literacy are the capacity to solve information, communication and knowledge problems in a digital society. Therefore, this literacy is needed for problem-solving. The meaning of literacy is more than just the ability to read and write. However, it also includes thinking processes and the definition of technological and information literacy reform, including critical thinking and creative thinking in using digital software as the basis for the ability to evaluate information. Critically and solve problems (Ali et al., 2022; Sukmawati & Majiri, 2022).

Technology and information literacy skills can be defined as a person's ability to recognize information needs, identify, find, access, understand, evaluate, and use technology and information efficiently, effectively, legally, and ethically in solving problems and making appropriate decisions (List, 2019; Naveed, 2021). In addition to the American Library Association (Avcı & Ergün, 2022), information literacy skills refer to the ability to recognize information needs, find the information needed, and effectively use resources, processes and systems to assess the information obtained. Technology

also develops social and ethical aspects of using technology (Nuraini et al., 2022).

Entrepreneurial skills can be defined as a process by which individuals pursue opportunities without regard to the resources they control. Therefore, an entrepreneur is an innovator responsible for the value creation process (Marzi, 2022; Paladino, 2022). Therefore, it can be explained that skills that follow the demands of the world of work, through entrepreneurship, students gain not only business skills and experience but also a forum where they can pour creative and innovative ideas into productive projects (Tshishonga, 2022).

Furthermore, this entrepreneurship involves the skills and competencies needed to identify, develop and exploit opportunities in new or existing businesses (Saucedo & Sánchez, 2022) (de Los Dolores González-Saucedo & Vélez-Sánchez, 2022). Entrepreneurship and innovation skills according to (Jardim, 2021) that it is essential to make the value of entrepreneurship part of the culture of citizens, promoting it from the start through the development of three groups of competencies, namely: creativity and innovation, a spirit of initiative, self-efficacy and resilience. In addition, (Lima, 2021) explains that several factors for developing entrepreneurship skills are divided into three areas containing different competencies, including (a) identifying and capturing opportunities to create value by exploring the social, cultural, and economic landscape; (b) developing creative ideas. and innovative; (c) visualizing future scenarios to guide actions and efforts, and; (d) recognizing ideas in economic potentiation and economic fields to create value.

Social Responsibility and Leadership skills. Social responsibility can be defined as social norms, attitudes, personality traits and individual characteristics, as well as being a value. The concept of an individual with social responsibility is someone aware of his self-esteem and responsible for his thoughts, feelings and behaviour that can meet his needs. It will bear the consequences when it does not carry out (Gokalp & Inel, 2021; Siddiky, 2020). The characteristics of the attitude of responsibility include being able to carry out tasks on time, having self-control and discipline under any circumstances, having accountability, being ready to be held accountable and ready to be held accountable, having consideration or consequences of the actions experienced, and always showing perseverance, diligence. And keep trying to achieve achievement (Khayun, 2022).

Leadership is a rational attitude, strategy making, taking quick action and conducting a thorough analysis (Manalu & Sitinjak, 2022). Furthermore, (Hussain & Ashcroft (2022) explain that leadership skills are a set of qualities and efficient cognitive, personal, and technical skills possessed by a leader in carrying out their duties easily, accurately, and quic kly to achieve the desired results (Kouhsari et al., 2022). Furthermore, leaders of the 21st century must have the characteristics of a motivator, coach, and director (Ulfah et al., 2022). So that the implementation of leadership skills as a process of a leader will influence others in the application of ideas or concepts (Khayun, 2022).

Career Consciousness. Career Consciousness is a determining factor in career management, but career awareness also implies individual talents and interests by understanding opportunities from various career fields (Fényes et al., 2021; Han et al., 2021). In addition, Owodunni (2022) explain that this curry awareness means an individual understanding of various long-term possibilities and having the knowledge needed to plan and choose a career. *Career awareness* is an important skill that allows a person to become more independent. (Ghafar, 2020).

Career awareness skills include individuals' beliefs, thoughts, feelings and attitudes so that they affect the choice of a particular career (Owodunni, 2022). The concept of career awareness refers to one's awareness of career opportunities, requirements, and features after choosing a career (Dinç, 2020). Furthermore, Dagyar et al., (2020) state that students with career awareness have sufficient knowledge and awareness of personal competencies. That competency allows them to make choices in educational and professional aspects in determining careers for the future, thus helping individuals to be aware of the relationship between themselves, educational opportunities and the world of work, which are also important aspects of career planning (Ogunwole, 2019).

METHOD

This type of research uses descriptive quantitative research to describe the differences

in 21st-century student skills seen from the level of study and gender.

The sample in this study was 268 students from Makassar State University and Tadulako University Palu. The research sample was taken from 9 (nine) faculties consisting of Education, Language, Engineering, arts, psychology, social sciences, sports, economics and science. This sample consisted of 130 women and 138 men.

This study's instrument is adapted from the 21st-century skill instrument from Cevik & Sentruk (Cevik & Senturk, 2019). The confirmatory factor analysis (CFA) test results using the JASP application showed a good fit index value and a high-reliability value. Specifically, it can be seen in table 1 below:

Table 1. Confirmatory Factor Analysis Test Results from the 21st Century Skills Instrument

Instrument	N	Reliability Test		Validity Test				
		McDonald's	Cronbach's	RMSEA	GFI	CMIN/DF	CFI	TLI
21 Century Skills	268	0.921	0.920	0.069	0.789	677.183/430	0.824	0.809
Information and Technology Literacy Skills		0.877	0.877					
Entrepreneurship and Innovation Skills		0.863	0.861					
Social Responsibility and Leadership Skills		0.6190	0.613					
Career Consciousness		0.794	0.792					

McDonald > 0.60 (Reliable)
Cronbach alfa > 0.60 (Reliable)
RMSEA ≤ 0.08 (Accepted Model)
GFI (Goodness of Fit)= 0 (poor fit)- 1.0 (perfect fit)
CMIN/DF ≤ 2.0 (Accepted Model)
CFI ≥ 0.95 (Accepted Model)
TLI ≥ 0.95 (Very Good Fit)

Data analysis in this study uses descriptive data analysis to describe the average of each variable and inferential data analysis in the form of ANOVA to see differences in 21st-century skills of students seen from differences in gender and level. of studies. Analysis of this data using the JASP application for windows.

RESULTS AND DISCUSSION

Result

1. Differences in 21st Century Student Skills Judging from the Type of Student Study

Based on the data in table 2, the significance value of the 21st-century skill variable is p <0.001 with an M square value of 13647,881. Therefore, it can be concluded that there is a significant difference in ability between students in the early and final semesters. These differences consist of 1) Information and technology literacy skills, 2) Entrepreneurship and innovation skills, 3) Social responsibility and leadership skills, and 4) career consciousness.

In table 2, the significance value in information and technology literacy skills is p < 0.001 with an M square value of 193.750. Therefore, there is a significant difference in ability between early and final semester students. In addition, the significance value of the aspect of entrepreneurship and innovation skills is p <0.001 with an M square value of 427,536. Therefore, it can be concluded that there is a significant difference in ability between early semester students and final semester students.

In table 2, the significance value in social responsibility and leadership skill is p <0.001 with an M square value of 3166,075. Therefore, it can be concluded that there is a significant difference in ability between early semester students and final semester students. Meanwhile, in the aspect of career consciousness, it shows a p-value <0.001 with an M square value of 677,529. Therefore, it can be concluded that there

is a significant difference in ability between early semester students and final semester students.

Table 2. Differences in 21st Century Student Skills Judging from the Type of Student Study

	Type Mahasiswa	M	SD	M Square	F
21st century skill	Entry-Level of Students	89.339	6.101	13647.881	210.699***
	Final- level of Students	104.010	10.444		
Information and Technology Literacy Skills	Entry-Level of Students	39.939	3.070	193.750	193.750***
	Final- level of Students	47.126	5.379		
Entrepreneurship and Innovation Skills	Entry-Level of Students	23.539	2.663	427.536	44.579***
	Final- level of Students	26.136	3.689		
Social Responsibility and Leadership Skills	Entry-Level of Students	12.479	1.276	166.075	76.139***
	Final- level of Students	14.097	1.752		
Career Consciousness	Entry-Level of Students	13.382	1.187	677.529	271.271***
	Final- level of Students	16.650	2.061		

N= 268 *(Entry Level of students*= 165; *Final Level of students*= 103)
*** (p <0.001)
** (p <0.01)
*(p <0.05)

2. Differences in 21st Century Student Skills Based on Gender

Based on the data in table 3, the significance value of the 21st-century skill variable in terms of gender between students is p < 0.01 with an M square value of 895,070. Therefore, it can be concluded that there is a significant difference in ability between female and male students. The difference is seen in the aspects of Information and technology literacy, social responsibility, and leadership skills. While in the aspects of Entrepreneurship Innovation Skills and Career Consciousness, female and male students have no significant difference in ability.

In table 3, the significance value in the aspect of information and technology literacy skills is p <0.001 with an M square value of 321.174. Therefore, there is a significant difference in ability between female and male students in terms of gender. In addition, the entrepreneurship and innovation skill aspect is p > 0.05 with an M square value of 15,637. Therefore, it can be concluded that there is no significant difference in ability between female students and male students in terms of gender.

In table 3, the significance value in social responsibility and leadership skill is p < 0.01 with an M square value of 22.639. Therefore, it can be concluded that there is a significant difference in ability between female students and male students in terms of gender. Meanwhile, in the aspect of career consciousness, it is p > 0.05 with an M square value of 10,784. Therefore, it can be concluded that there is no significant difference in ability between female students and male students in terms of gender.

Table 3. Differences in 21st Century Student Skills Based on Gender

	Gender	M	SD	M Square	F
21st century skill	Female	94.235	10.231	895.070	7.941**
	Male	99.235	12.746		
Information and Technology Literacy Skills	Female	42.257	4.962	321.174	11.466***
	Male	45.395	7.000		
Entrepreneurship and Innovation Skills	Female	24.439	3.305	15.637	1.404
	Male	25.132	3.535		
Social Responsibility and Leadership Skills	Female	12.983	1.608	22.639	8.322**
	Male	13.816	1.887		
Career Consciousness	Female	14.557	2.253	10.784	2.155
	Male	15.132	2.133		

N= 268 (Female= 130; Male= 138)
*** (p <0.001)
** (p <0.01)
*(p <0.05)

Discussion

21st-century skills are skills that Generation Z must possess to adapt and respond to the demands of the 4.0 industrialization era. These demands are not only on aspects of digital literacy and technology but also on leadership and entrepreneurship (Cevik & Senturk, 2019). as well as the ability to direct and regulate careers (Aryani & Umar, 2020; Umar, 2021). The 21st-century skills in Generation Z have differences based on factors based on the semester level. The results of this study indicate differences in 21st-century skills in early semester students and final semester students in terms of information and technology literacy, leadership and social responsibility aspects, entrepreneurship and innovation aspects, and career awareness. The results of this study are in line with the results of research by (Sulam et al., 2019) that there are differences in 21st-century skills when students enter the higher education environment. Early-level students will experience an increase in various aspects of skills to adapt to the work environment and the demands of information technology. The adaptation is because, in the learning process in higher education, they will get many learning experiences both from the aspect of learning experiences in lectures, through organizations, and learning experiences from various learning activities such as project assignments and case-based learning (Coll & Coll, 2018; Khlaisang & Songkram, 2019).

The development of technology and literacy skills in students is due to the educational process in higher education, which demands online learning and the implementation of blended learning. Therefore, these skills increase and show differences in students in the early and final semesters (Coll & Coll, 2018; Umar et al., 2022). In addition, in the aspects of leadership and social responsibility, students will experience an increase from the first semester to the final semester, this is due to the adaptation process, and project assignments carried out in groups to form student leadership, especially in learning (Germaine et al., 2016; Khlaisang & Songkram, 2019), leadership and social responsibility skills include skills in self-regulation and group regulation (Sinring et al., 2022). In addition, career awareness in early-level students will increase along with the addition of the semester to the final semester. The improvement is because students will be aware of efforts in preparing to enter the world of work, starting from identifying suitable jobs, choosing jobs to enter the world of work that is by the things they are interested in, and staying in the job (Aryania et al., 2019.; Pandang & Umar, 2021; Umar et al., 2021).

This study also shows differences in 21st-century skills in students based on gender

differences, especially aspects of technology and literacy skills and aspects of leadership and social responsibility skills. The gender differences are because even though female and male students have the same abilities, the construction of a patriarchal culture forms the lower self-efficacy of female students compared to male students (Pandang et al., 2022; Pandang & Umar, 2021). Thus, students will be seen as more prominent than female students in terms of innovation and leadership.

Therefore, it is recommended for higher education to develop students' 21st-century skills not only in the learning aspect but also to develop blended learning that accommodates students in innovating and building communication between groups and leadership. In addition, gender-sensitive methods or learning are needed to shape female students' self-efficacy in developing skills, especially in the aspects of leadership and technology and literacy skills.

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