Student Leadership Management Faculty of Engineering In The Era of Industrial Revolution 4.0

Rosnelli[1], Yuniarto Mudjisusatyo[2], Darwin[3], and Siti Zulfa Yuzni[4]

{rosnelli@unimed.ac.id[1], yuniarto@unimed.ac.id[2], darwinspi@unimed.ac.id[3], sitizulfa@unimed.ac.id[4]}

Lecturer in Electrical Engineering Education, Universitas Negeri Medan[1], Lecturer in Educational Administration, Universitas Negeri Medan[2], Lecturer in Educational Management, Universitas Negeri Medan[3], Lecturer in Architecture. Universitas Negeri Medan[4]

Abstract. The aim of the research is to explore the concept of leadership management design for Engineering Faculty students in the Industrial Revolution 4.0 era. The research was carried out at a state university in Medan, North Sumataera using interview techniques and questionnaires for students. The results of the research show that to support student success in the field requires knowledge and skills about the differences between managers and leaders in organizations, concepts and structures of leadership in organizations and society. Furthermore, students are expected to be able to reflect on data-based facts about organizational and community leadership problems, leadership concepts and values based on local wisdom, leadership styles in organizations, implementation of leadership styles in solving organizational problems, digital simulations for skills e-leadership, solving leadership problems in organizations and delegating organizational authority, as well as the role of leaders in decision making and organizational policies.

Keywords: Higher Education, Student Leadership, delegation of authority and decision, the era of the Industrial Revolution 4.0.

1 Introduction

The era of the Industrial Revolution is often referred to as the era of disruption. This is due to the movement of the industrial world and job competition becoming non-linear [1]. This condition is the impact of automation and connectivity in the industrial world on technological developments, so that the demand for workforce skills needed in the industrial world must also be able to respond to the technological developments that occur. Likewise, the conditions that occur in the world of entrepreneurship, there are many changes due to developing technological advances. However, the world of industry and entrepreneurship that implements digital technology transformation can provide more effective and efficient operational impacts [2]. Another advantage of connectivity that occurs as a result of digital transformation, especially by utilizing the Internet of Things (IoT), makes connectivity in the world of industry and entrepreneurship wider. This condition has an impact on the response of higher education which

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facilitates students to respond to digital transformation, increasing digital literacy. Students can improve their usage skills, and can analyze opportunities, obstacles and challenges to digital transformation [3]. The response of higher education to digital transformation was very fast and increased during the Covid-19 pandemic by implementing online learning [4].

Ross & Maynard (2021) found that the use of computers and Artificial Intelligence (AI) is increasingly integrated into human life. This means that workers' skills need to be improved to enter a world of work that is changing along with technological developments. Moreover, education manages vocational students who are expected to immediately enter the world of work after completing their education. [5] revealed that vocational education must truly prepare vocational students' skills to enter the world of work in the era of the Industrial Revolution 4.0. Furthermore, the choice of learning model for vocational students must be planned by selecting an effective learning model according to the needs of the field and the characteristics of the students as well as the skills that must be developed [6]. That conditions in the era of the Industrial Revolution 4.0 require an in-depth study of the learning curriculum for vocational students in higher education so they can enter the world of work. The use of Artificial Intelligence (AI), computers, the Internet of Things (IoT) and robots in production systems is more optimal in terms of time, especially to monitor and optimize reducing production costs and increasing efficiency.

The increasingly rapid development of technology today is in line with the development of educational progress at the Faculty of Engineering, which seeks to encourage students to pursue careers in technology-related jobs. To enter the world of work in the engineering field, students must not only have knowledge and skills in engineering fields such as computing, engineering design and product development, but also must master non-technical professional skills, which still need to be developed [8]. The results of Morgan's research (2000) reveal that technical higher education alumni in the workforce require a variety of skills other than technical skills in the world of work and entrepreneurship [9]. Non-technical skills required of them such as people management skills, communication. Apart from that, skills to be able to work successfully in a work team are also very much needed [10]. Apart from that, technical education alumni in the workforce need to operationalize interpersonal behavior for future career development, such as decision-making skills, skills to respond to global competencies and so on [11]. This happens because workers from technical education alumni, who initially worked as technicians, may one day switch their jobs to leadership or managers in accordance with their career development in the world of industry and entrepreneurship.

Based on the field data above, it shows that technical education alumni in the workforce, who initially worked as technicians utilizing the technical skills they had acquired in higher education, apparently need professional leadership skills in the future because of their career development in the world of industry and entrepreneurship. Based on field conditions, the reality is that engineering faculty students need leadership competencies to be successful in the world of work and entrepreneurship. Meanwhile, there is a state university in the city of Medan, North Sumatra, which makes leadership courses a mandatory subject that must be taken by all students at the university. Meanwhile, the university also manages an engineering faculty, in which there are 14 study programs.

This research aims to explore the concept of student leadership which makes alumni of Engineering Faculty students at one of the state universities in Medan, North Sumatra, have professional leadership skills to be successful in the world of work and entrepreneurship. Professional leadership skills that are applied in the world of work and entrepreneurship are

identification skills, teamwork skills, critical decision making in challenging situations. Apart from that, effective communication skills, creative thinking skills to analyze business acumen, problem solving for difficulties faced, and understanding of responsibility and ethics are still needed. Specifically, this research explores: 1) what is the leadership design framework for Faculty of Engineering students for mastering professional leadership skills in the world of work and entrepreneurship, 2) how is the leadership management of Faculty of Engineering students in the Industrial Revolution 4.0 era.

2 Literature Review

Technology and industry are experiencing rapid changes in the Industrial Revolution 4.0 era [12]. The world of education has responded to this condition to produce alumni who are able to adapt to advances in technology and industry in accordance with the demands of the times. Likewise, higher education must be able to respond to technological developments that occur by reviewing the curriculum implemented and the facilities used. Likewise with higher education which manages the Faculty of Engineering. This is done to facilitate engineering students to continue to develop and be able to respond to technological developments that occur, so that they can enter the world of work and entrepreneurship in accordance with current market needs.

Engineering students are prepared for engineering-related work. These conditions require the development of the engineering learning curriculum, so that it is in line with the learning that facilitates engineering students. Engineering students continue to consistently have their learning process facilitated to be able to consistently follow technological developments, so that they can meet the needs of current market developments. In addition to the learning process for engineering students, it is directed consistently and relevantly to technological developments in the real world to improve students' technical competence in an effort to prepare them to enter the world of work. However, it is also important for engineering students to be prepared to have leadership skills to successfully manage people in the world of industry and entrepreneurship [13].

Engineering students need to be equipped with leadership competencies to successfully manage people in the world of work and entrepreneurship. This is because it is still possible that one day they can develop their careers to reach leadership positions. The development of increasingly better performance can result in career advancement in the world of industry and entrepreneurship [14]. When they occupy the leadership element, by utilizing the leadership skills they have, it can make it easier to manage the people they lead to achieve the vision, mission and goals of the organization they lead. When they can manage the human resources in the organization they lead, the success of the organization will be easier to achieve together. One of the reasons for this success is that it supported by leadership that is able to manage its subordinates to carry out their tasks effectively and efficiently.

The knowledge and skills that a leader and manager must possess make them have a responsible attitude in carrying out their duties [15]. This is why leadership and management skills need to be socialize to engineering faculty students, so that they are motivated to have them. These skills can lead them to success at work after they occupy leadership or manager positions [16]. By discussing the differences between leaders and managers, they will understand and understand the scope of work that is the responsibility of a leader and manager [17]. Knowledge about the differences between managers and leaders in organizations can direct them to be more

professional in carrying out their duties in accordance with the job description of the job they are responsible for in the digital era [12]. Furthermore, learning about the differences between managers and leaders in organizations can foster students' attitudes to be responsible for work in their field of expertise independently in the world of work and entrepreneurship.

Leadership concepts and structures in organizations must be mastered by leaders and managers [15]. By mastering organizational concepts and structures, it is easier to coordinate when carrying out work successfully and completely in the era of digital transformation [14]. Furthermore, they can understand and comprehend the results of their work, which must be reported to the appropriate parties in accordance with the existing organizational structure in the world of industry and entrepreneurship [18] . Learning about the concepts and structures of leadership in organizations can foster students' attitudes to be responsible for work in their field of expertise independently in the world of work and entrepreneurship. Furthermore, he can position himself to complete his job description in the world of work and in the business world. Apart from that, if the results of their analysis show that the work must be done as a team, then they can recruit and collaborate with other workers by understanding the organizational structure related to the job description.

Alumni of engineering faculty students, apart from being successful in the world of work and entrepreneurship, are also expected to be successful in their relationships in society and in community organizations. For this reason, engineering faculty students are required to have knowledge and understanding of the concepts and structures of leadership in society in the digital era [12]. However, a leader in the world of industry and entrepreneurship who has been successful in the world of work cannot be separated from the world of society which responds to the digital transformation that is a necessity today ([14]. This is because they definitely also socialize in the community where they live. This is what makes them need to have knowledge about the concepts and structures of leadership in society [19] . Learning about the concepts and structures of leadership in society can foster an attitude of responsibility for work in one's field of expertise independently and in groups in society [18]. Apart from that, it can adapt well in the community environment.

The increasingly rapid development of the world of industry and entrepreneurship in the Industrial Revolution 4.0 era means that there are always leadership problems that occur in the field [20]. These conditions require a leader to be able to think critically and analytically to reflect on the facts of organizational and societal leadership problems resulting from changes occurring in response to data-based digital transformation [19]. The results of this analytical critical thinking analysis are needed to analyze the facts that have occurred as a result of digital transformation in the field [21]. When the data and facts in the field are comprehensively obtaine by a leader, the leader can utilize critical thinking and analysis to produce new innovations [22]. New innovative results are the final result of critical thinking and analysis products that have been adapted to field conditions, so that leaders can make appropriate, effective and efficient decisions and policies that allow everyone to accept them happily.

Making the right, effective and efficient decisions in solving problems in the world of industry and entrepreneurship is not an easy thing (Downs, 1985). This is because in managing human resources, each individual led has different conditions. This is the condition for producing ideal decisions and policies for resolving leadership problems that become complicated with the variety of people being led [23]. However, in line with this, learning about reflecting facts about organizational and societal leadership problems based on data can lead to changes in leadership culture. The current state of digital transformation fosters adaptability in organizations and

society [20]. Apart from that, by utilizing information about data-based facts about organizational and community leadership problems, creative and innovative ideas can emerge in solving problems by utilizing e-leadership [24].

Along with technological changes that are currently developing rapidly, especially in the era of the industrial revolution 4.0, it shows that there is a change in leadership concepts and values based on local wisdom [17]. Students in the engineering faculty must also be able to respond well to these conditions. Through understanding changes in leadership concepts and values based on local wisdom, it is hoped that students will have traits. Attitudes and personalities that are easy to adapt to in the community environment and respect the cultures of other people who are different from them, especially those related to the role of leaders in the era of digital transformation [24]. Apart from that, based on his experience in the field, the results of his observations in the world of industry and entrepreneurship as well as in society, it is hoped that he can give rise to creative and innovative ideas in terms of digital skills which are currently very much needed in the world of industry and entrepreneurship [18] . The conditions of the industrial revolution 4.0 era show that digital skills are currently skills that must be possessed by engineering faculty alumni.

Along with technological developments in the Industrial Revolution 4.0 era, the implementation of leadership styles in organizations also needs to be analyzed, for the accuracy of leadership styles implemented in the world of industry and entrepreneurship [17]. Each leadership style has its own strengths and weaknesses [12]. The application of leadership styles in the world of industry and entrepreneurship to achieve the vision, mission, goals effectively and efficiently, also needs to look at the existing work culture conditions, as well as the character and competency conditions of the people they lead. Learning about leadership styles in organizations trains students to be able to make the right decisions in implementing appropriate leadership styles in organizations and society. Apart from that, he can come up with creative and innovative ideas by analyzing the conditions of the subordinates he leads. Furthermore, it is hoped that they can utilize e-leadership and digital skills [14].

The leadership learning process of students in higher education, after they have knowledge about leadership styles, they must be able to analyze data and facts in the field related to leadership issues. Based on the theory they master, they are asked to raise leadership problems based on field data and facts to find effective and efficient solutions in solving these leadership problems [13]. This is intende so that they become familiar and skilled in studying leadership problems and finding solutions that are adapted to supporting theoretical studies. Next, they were asked to design scenarios to simulate solving leadership problems in organizations. This leadership simulation exercise can generate creative ideas to respond to digital transformation, design online learning, demonstrate e-leadership abilities and digital skills.

Implementing leadership styles in solving organizational problems must analyze the situation and conditions in the field. Applying appropriate leadership styles can solve problems with maximum results. This is because each leadership style has its own strengths and weaknesses. The effectiveness of applying leadership styles to different situations may not necessarily produce maximum solutions to leadership problems [13]. Learning about the implementation of leadership styles in solving organizational problems leads students to be able to come up with creative and innovative ideas for students about solving organizational problems related to digital transformation, by utilizing e-leadership and digital skills.

Digital simulation is a necessity in the current era of Industrial Revolution 4.0 [22]. All sectors now need workers who are skilled in using digital technology. Digital simulations can trigger users to be more creative in finding solutions to the problems they face without risking losses in component damage, especially digital simulations related to technological product development [19]. Apart from that, digital simulations can stimulate users to develop constructive thinking patterns in developing products [24]. Simulations can also be used to train students to solve leadership problems in organizations. Learning about simulating leadership problem solving in organizations is training for students to come up with creative ideas and respond to digital transformation, design online learning, demonstrate e-leadership abilities and digital skills.

Leaders in the world of industry and entrepreneurship always face problems in the world of work, which require leaders to take a leadership role in delegating organizational authority [16]. Giving the right authority to the right people can result in faster organizational progress [25]. Learning about the role of leaders in delegating organizational authority can train students to develop an attitude of responsibility for work in their field of expertise independently in the world of work and entrepreneurship [23]. Next, you can assess and make the right decisions in terms of determining people to receive organizational authority so that the tasks given can be carried out optimally.

Leaders in the world of industry and entrepreneurship always face problems in the world of work, which require leaders to take a leadership role in decision making and organizational policies , so that the vision, mission and goals of the organization can be achieved optimally [26]. Learning about the role of leaders in decision making and organizational policies can train oneself to develop a responsible attitude towards work in one's field of expertise independently in the world of work and entrepreneurship [13]. Furthermore, by utilizing comprehensive information you can make the right decisions in an effort to realize the organization's vision and mission.

3 Methodology

This research was carried out at one of the State Universities in Medan City, North Sumatra which manages the Faculty of Engineering, which has the provision that leadership courses are mandatory courses that must be taken by students studying at that university. This research was conducted in the odd semester 2022/2023. The research population was all students at the engineering faculty. Meanwhile, the research sample was taken randomly to represent all study programs at the engineering faculty that take leadership courses. The research results were taken from interviews and giving questionnaires to the research sample. Field data was converted into three categories, namely the high category for data 3.01-4.0; while for the medium category it is 2.01-3.0; for the low category it is 1.00-2.00. Thus it appears that the questionnaire given to participants was a questionnaire which contained statements, which had alternative answers ranging from 1-4. The type of research carried out is descriptive research. Checking research data was also carried out through interviews to ensure the validity of the data produced. The questionnaire used to collect field data is a valid and appropriate questionnaire for collecting field data, the results of which are then analyzed to be explored to become research results. The research sample can be seen in the following table.

Table 1. Research sample.

Research Sample	Category	Frequency	Percentage
Engineering Faculty Student	Man	90	64
	Woman	50	36

4 Result and Discussion

The results of field data analysis revealed that the leadership design framework for students at the Faculty of Engineering in Higher Education started from a discussion of the differences between managers and leaders in organizations. The concept and structure of leadership in organizations. Next, we discuss the concept and structure of leadership in society. Then it continues with a data-based reflection on the facts of organizational and societal leadership problems. Discussion of reflections on data-based facts about leadership problems in organizations and society, carried out after students carried out surveys and observations in the field about things that happened regarding leadership problems in the field based on the results of their observations, observations and experiences. in life. Then n continued with leadership concepts and values based on local wisdom and leadership styles in the organization . Implementation of leadership styles in solving organizational problems. Next, students are asked to design simulations related to leadership problems in the field by utilizing digital transformation. Simulation of solving leadership problems in organizations, directing students to design simulations that must be displayed in front of the learning class, and continuing with various leaders' roles in delegating organizational authority. The final discussion is about the role of leaders in decision making and organizational policies

4.1 Engineering Faculty Student Leadership Design Framework

Based on the results of data analysis in the field, conclusions were drawn regarding the leadership design framework for Engineering Faculty students in higher education as illustrated in the following Figure 1.

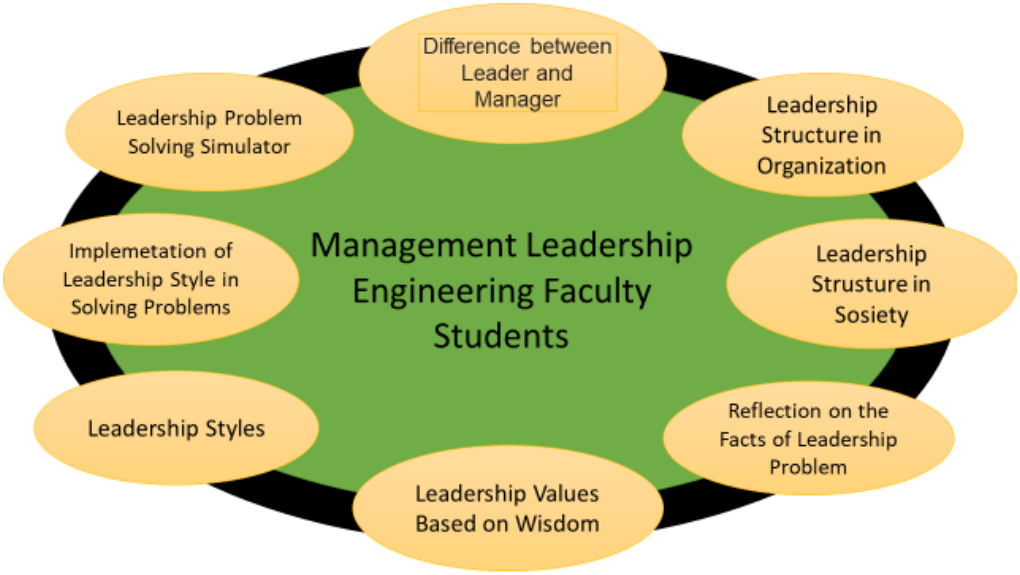

Fig. 1. Leadership Management of Engineering Faculty students.

4.2 Leadership Management of Engineering Faculty Students in the Era of Industrial Revolution 4.0.

Based on analysis of field data originating from interviews and questionnaires, it was found that the leadership management of Engineering Faculty students in higher education in the era of the Industrial Revolution 4.0 (RI 4.0) is summarized in the following Table 2.

Table 2. Leadership Management of Engineering Faculty Students in the RI 4.0 Era.

Rank	Description of Leadership Good Practices	Means	elementary school	Levels
1	The difference between managers and leaders in organizations.	3.62	,740	High
2	The concept and structure of leadership in organizations.	3.50	,878	High
3	The concept and structure of leadership in society	3.12	,878	High
4	Reflection of data-based facts on organizational and societal leadership problems	3.00	,759	High
5	Leadership concepts and values based on local wisdom.	2.67	,846	Medium
6	Leadership styles in organizations.	2.57	,846	Medium
7	Implementation of leadership styles in solving organizational problems	2.47	,740	Medium
8	Simulation of solving leadership problems in organizations	2.35	,975	Medium
9	The role of leaders in delegating organizational authority	2.22	,914	Low
10	The role of leaders in decision making and organizational policies	2.00	,916	Low

The table above shows that the description of good practice in managing the leadership of engineering faculty students in higher education, that students to be successful in the field, must know about the differences between managers and leaders in organizations, concepts and structures of leadership in organizations, concepts and structures of leadership in society . Furthermore, students are expected to be able to reflect on data-based facts about leadership problems in organizations and society, leadership concepts and values based on local wisdom, leadership styles in organizations, implementation of leadership styles in solving organizational problems , simulations of solving leadership problems in organizations , the role of leaders in delegating organizational authority, the role of leaders in decision making and organizational policies.

The results of data analysis show that after students discussed the differences between managers and leaders in organizations [16]. This learning can foster student attitudes and motivate Engineering Faculty students to take responsibility for work in their field of expertise independently in the world of work and entrepreneurship. Apart from that, he also has a responsible attitude towards work in his field of expertise independently and in work groups in the community. Furthermore, they are motivated to have an adaptable attitude in organizations and society. Bringing up creative and innovative ideas in the use of e-leadership which is currently popular in the industrial world.

Learning about the concepts and structures of leadership in organizations can foster students' attitudes to be responsible for work in their field of expertise independently in the world of work and entrepreneurship. Furthermore, he can position himself to complete his job description in the world of work and in the business world. Apart from that, it can foster an attitude of adaptability in the community and respect for other people's cultures. Learning about the concepts and structures of leadership in society can foster an attitude of responsibility for work in one's field of expertise independently and in groups in society. Apart from that, it can adapt well in the community environment.

Learning about data -based reflection on facts about organizational and societal leadership problems fosters students to be able to adapt in organizations and society. Apart from that, by utilizing information about data-based facts about organizational and community leadership problems, creative and innovative ideas can emerge in solving problems using e-leadership. Learning about leadership concepts and values based on local wisdom can foster students' attitudes to adapt to the community and respect other people's cultures [1, 21, 27]. Apart from that, it can generate creative and innovative ideas in terms of digital skills, by exploring leadership concepts and values based on local wisdom through e-learning.

Learning about leadership styles in organizations trains students to be able to make the right decisions in implementing appropriate leadership styles in organizations and society. Learning about leadership styles, adapt directs students to think critically and analyze, look at conditions in the field, so that they can determine appropriate leadership styles that are adapted to the conditions of the subordinates they lead, as well as the culture that has been formed in the organization [8]. These conditions shape the character of students who can come up with creative and innovative ideas by analyzing the conditions of the subordinates they lead. Furthermore, it is hoped that they will be able to utilize e-leadership and the right digital skills to make the organization they lead a success.

Students are able to come up with creative and innovative ideas in terms of digital skills. Students can make decisions to implement appropriate leadership styles in organizations and

society. Bringing up creative and innovative ideas in the use of e-leadership and digital skills. Students can come up with creative and innovative ideas about solving organizational problems related to digital transformation, by utilizing e-leadership and digital skills. Students are enthusiastic when carrying out exercises to come up with creative ideas to respond to digital transformation, design online learning, demonstrate e-leadership abilities and digital skills. Furthermore, students have a responsible attitude towards work in their field of expertise independently in the world of work and entrepreneurship. Students have a responsible attitude towards work in their field of expertise independently in the world of work and entrepreneurship [12, 14. 23].

Students need to analyze leadership styles, so they can implement appropriate leadership styles in the field. To achieve this, students need to develop appropriate leadership simulation scenarios in organizations. Students need training for leadership simulations in organizations. Students need to access videos about effective leadership. so you can see good practical examples of solutions to leadership problems. Next, students need to create videos to solve leadership problems in organizations, so they can be more creative in responding to digital transformation. The results of the research analysis show that students can explain the role of leaders in delegating authority. Students can analyze the right person to receive delegation of authority [17]. Students can explain the role of leaders in decision making. Students can analyze the decision-making process in solving leadership problems. Students can analyze the information needed before making a decision.

Research findings show that increasing student leadership skills makes students more creative and innovative in terms of evaluating programs and designing new programs, which they can implement in the world of work and entrepreneurship. Apart from that, support from the university is the development of the curriculum and design of the conceptual framework for the student leadership course, prepared by the course design team at the university level. Apart from that, the Faculty is given the authority and is financially facilitated to carry out leadership training involving stakeholders from the world of industry and entrepreneurship, so that the training carried out is in accordance with the student expertise program at the Faculty level. All of this is done to accelerate the improvement of student leadership, increase the competency of graduates so that they can be successful after working in the field, especially in the industrial and business world, which has been connected digitally [12, 20, 21].

5 Conclusion

Description of good practices in leadership management for Engineering Faculty students in higher education, that students to be successful in the field, must know about the differences between managers and leaders in organizations, concepts and structures of leadership in organizations, concepts and structures of leadership in society. Furthermore, students are expected to be able to reflect on data-based facts about leadership problems in organizations and society, leadership concepts and values based on local wisdom, leadership styles in organizations, implementation of leadership styles in solving organizational problems, simulations of solving leadership problems in organizations , the role of leaders in delegating organizational authority, the role of leaders in decision making and organizational policies.

6 Suggestion

Based on the results of field data analysis, it shows that in the future there will still be a need for socialization regarding the role of leaders in delegating authority. Apart from that, it is still necessary to increase students' knowledge and skills to master the role of leader in decision and policy making

References

[1] Ross, P., & Maynard, K. (2021). Towards a 4th industrial revolution. Intelligent Buildings International, 13(3), 159-161.

[2] Bejaković and Ž. Mrnjavac, ‘‘The importance of digital literacy on the labour market,’’ Employee Relations, Int. J., vol. 42, no. 4, pp. 921–932, Apr. 2020, doi: 10.1108/ER-07-2019-0274.

[3] Monteiro and C. Leite. (2021). ‘‘Digital literacies in higher education: Skills, uses, opportunities and obstacles to digital transformation,’’ Revista de Educación a Distancia (RED), vol. 21, no. 65, Jan. 2021, doi: 10.6018/red.438721.

[4] Adedoyin, O. B., & Soykan, E. (2023). Covid-19 pandemic and online learning: the challenges and opportunities. Interactive learning environments, 31(2), 863-875.

[5] Sampeallo, Y. G. (2022). Strategi Pendidikan Vokasi Sebelum Memasuki Dunia Kerja Pada Revolusi Industri 4.0. In Seminar Nasional Hasil Penelitian & Pengabdian Kepada Masyarakat (SNP2M) (Vol. 7, No. 1, pp. 128-132).

[6] Irwanto, I. (2020). Model pembelajaran pendidikan vokasional yang efektif di era revolusi industri 4.0. Jurnal Taman Vokasi, 8(1), 46-53.

[7] Verawadina, U., Jalinus, N., & Asnur, L. (2019). Mengkaji Kurikulum Di Era Revolusi Industri 4.0 Bagi Pendidikan Vokasi. Wahana Didaktika: Jurnal Ilmu Kependidikan, 17(2), 228-239.

[8] Park, J. J., Handley, M., Lang, D., & Erdman, M. A. (2022). Engineering Leadership Development: Contribution of Professional Skills to Engineering Undergraduate Students' Leadership Self-Efficacy. International Journal of Educational Methodology, 8(1), 69-80.

[9] Morgan, L. A. (2000). Is engineering hostile to women? An analysis of data from the 1993 national survey of college graduates. American Sociological Review, 65(2), 316-321. https://doi.org/10.2307/2657444

[10] Chowdhury, T., & Murzi, H. (2019). Literature review: Exploring teamwork in engineering education. In B. Kloot (Ed.), Proceedings of Research, 8th Research in Engineering Education Symposium (pp. 244-252). Curran Associates, Inc.

[11] Handley, M. H., & Berdanier, C. G. (2019). Operationalizing interpersonal behaviours of leadership for early-career engineers. International Journal of Engineering Education, 35(3), 719-732.

[12] Mihai, R. L., & CREȚU, A. (2019). Leadership in the Digital Era. Valahian Journal of Economic Studies, 10(1).

[13] Lassoued, K., Awad, A., & Guirat, R. (2020). The impact of managerial empowerment on problem solving and decision making skills: The case of Abu Dhabi University. Management Science Letters, 10(4), 769-780.

[14] Klein, M. (2020). Leadership characteristics in the era of digital transformation.

[15] Wilson, S., & Newstead, T. (2022). The virtues of effective crisis leadership: What managers can learn from how women heads of state led in the first wave of COVID-19. Organizational Dynamics, 51(2), 100910.

[16] Krausz, R. R. (1986). Power and leadership in organizations. Transactional Analysis Journal, 16(2), 85-94.

[17] Algahtani, A. (2014). Are leadership and management different? A review. Journal of management policies and practices, 2(3), 71-82.

[18] Prasad, L. M. (2020). Principles and practice of management. Sultan Chand & Sons.

[19] Weber, E., Büttgen, M., & Bartsch, S. (2022). How to take employees on the digital transformation journey: An experimental study on complementary leadership behaviors in managing organizational change. Journal of Business Research, 143, 225-238.

[20] Trice, H. M., & Beyer, J. M. (1991). Cultural leadership in organizations. Organization science, 2(2), 149-169.

[21] Bai-Ngern, K., & Tubtiang, A. (2020, November). Leadership in the Digital Era. In 2020 5th International STEM Education Conference (iSTEM-Ed) (pp. 127-130). IEEE.

[22] Bunjak, A., Bruch, H., & Černe, M. (2022). Context is key: The joint roles of transformational and shared leadership and management innovation in predicting employee IT innovation adoption. International Journal of Information Management, 66, 102516.

[23] Downs, J. A. (1985). The Boundaries of Article III: Delegation of Final Decisionmaking Authority to Magistrates. U. Chi. L. Rev., 52, 1032.
[24] Sainger, G. (2018). Leadership in digital age: A study on the role of leader in this era of digital transformation. International Journal on Leadership, 6(1), 1.
[25] Mandelker, D. R. (1963). Delegation of Power and Function in Zoning Administration. Wash. ULQ, 60.
[26] Lin-Greenberg, E. (2020). Allies and artificial intelligence: Obstacles to operations and decision-making (Spring 2020). Texas National Security Review.
[27] Dehousse, R. (2008). Delegation of powers in the European Union: The need for a multi-principals model. West European Politics, 31(4), 789-805.