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## CONTEMPORARY EDUCATION ISSUES – LEADERSHIP IN ENGINEERING MANAGEMENT

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*Abstract: Contemporary education in the field of engineering is not based just on obtaining hard skills. Instead of that, input from industry clearly reflects the need for students to master the soft skills before they enter the business market. In this paper, an analysis of leadership styles among first-year students of bachelor academic studies in the field of engineering, at the Faculty of Engineering, University of Kragujevac, is presented. Using the methods of descriptive statistics and correlation analysis, it was determined which leadership style is most prevalent among the sample of 122 students who were included in this research. In addition to this analysis, an overview of basic leadership styles (visionary, coaching, affiliative, democratic, commanding, and pacesetter leadership style), their main characteristics, and the manner and purpose of the application is given.*

*Key words: management, leadership, descriptive statistics*

### 1 INTRODUCTION

It is a known fact that bachelor programs at state universities in Serbia, in the field of engineering, are dominantly oriented to provide the knowledge of hard skills for future engineers. A minority of courses are supporting the development of soft skills which are necessary for continual education when formal education is over. Among those soft skills, very significant is leadership. Over the first two decades of the 21st century, many researchers have been trying to define a common set of measures that refer to efficient leadership. This resulted in many different theories about leadership styles. Most of those theories are defining different competencies that are linked to the context of leader working style [1]. Regardless, in the literature that considers

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leadership, there are no defined unique set of competencies that make the one leader successful.

Many authors emphasize that the efficiency of the one leader can be dependent on both, leadership style and context in which the leader is operating [1]. Contingency theory has root this mean. Unlike this, Transformational school supports the view that efficient leadership is depending on adjustment and behaviour in different external conditions. Also, there is opinion that more facilitative styles are successful if there is an increase in context complexity.

Student leadership potential and its development within universities are worth investigating due to its implications for the future. Analysing student leadership style is important for the course preparation and the establishment of leadership programs. Exploring student leadership style can have a positive impact on the inductive conceptualization of leadership program, but also on an understanding of how consciously or implicitly student leadership style is affected. The research of today's student leadership style enables elucidating and considering factors that would lead to structured development in the future.

In the paper, it is observed student leadership potential based on Daniel Goleman's six leadership styles [1]. Different leadership styles are considered as equally important. The questionnaire is designed to examine interaction as well as individual actions of students. Some authors have the view that different leadership styles have to be balanced to establish a positive environment on the faculty, and to contribute to better learning quality. The paper only analyzes the current state of relations between these six leadership styles among students

## **2 LEADERSHIP AND LEADERSHIP STYLES**

Leadership is not a position; it is behaviour [2]. Leaders inspire, motivate, and contribute to integrity and humanity accumulation to lead a group to goal achievement. The success of reaching group goals depends on leadership quality and compliance of leadership style with permanent requirements. Leadership is about amalgamating vision in group goals. The process of leadership is perceived in many different ways. The traditional perspective is established on hierarchy, transaction, and exclusivity. On the other hand, nowadays some perspectives observed leadership as empowering, relational, and inclusive [3].

Leadership can be based not only on goal achievement but also on involving all group members in making decisions, or engagement them to develop capabilities. Every group requires leadership since it may be assumed that leadership is the way of how work is guiding. Leadership also refers to the ability to influence the behaviour of group members. Leadership is "being yourself with skills" [4]. The personality of a leader is very important in defining leadership style. Based on the personality, some of the skills which are obligate for a leader can be trained. Besides, leadership style has a significant influence on group learning which implies that leadership style affects the performances of the group.

Leadership implies the existence of openness to communication, commitment to group policies, as well as compassion and courage. Leadership style has a very important influence on the degree of innovations since leaders can decide on many important questions in one group. Some of them are decisions about introducing new ideas or not, degree of set goals, giving support to group members innovation initiatives or not [5].

This paper involves conceptualizing and theorizing about student leadership. Different theoretical works are used. Also, the paper includes analysing the student

leadership potential. The analyses allow insights into the main characteristics of students, their behaviour in the group, how they motivate others, and how their styles interact with situations and the faculty environment. Leadership can be defined as the process of communicating thoughts to a group member to help them to behave on the way best for the group. Regardless of the results, it is important to be introduced with the leadership potential of students and to take action for their growth. Either, future work can be based on individual development or on practice that facilitates leadership development. It is crucial to integrate leadership development with education. Students must develop integrative habits of mind. There is the aspiration to develop students' knowledge and skills through different courses to create leaders. Research on student leadership refers to analysing their current potential and observe the results of group work. Student leadership can be enhancing with the leadership program. Students can be educated in the way of developing the necessary skills for leadership.

This analysis is based on Daniel Goleman's six leadership styles [1]. This theory was chosen because of fact that it is considering the contribution of energy, emotions, and enthusiasm on goal achievement. This framework also represents an outcome of analysing student leadership style. This analysis is linking leadership, emotional intelligence, and climate performance. Those six styles are present in Figure 1.



Figure 1. *Daniel Goleman's six leadership styles [1]*

Some of the main characteristics of visionary leadership are effective communication and collaboration with members of the group [6], empower of group members to follow the vision and long-term goals of the group [7], and having the perception of the group state in the future which is desired [8]. Visionary leadership is based on having an idea about group state in the future, communicating with others about that idea, and taking actions to reach set goals. Visionary leadership is making a

connection between desired outcomes and taken action. Those leaders are setting the aim of the entire group in front of self-interests. Visionary leadership is creating an atmosphere in which goals are prioritized, policies are aligned with principles, and focus is on progress. Vision is utilized in their work [9]. Visionary leadership emphasizes the importance of the ability to create clear visions providing meaning and purpose of any action taken. First, they create their vision and then share it with others. Visionary leaders usually behave in a way that is appropriate for members to gain the necessary knowledge and skills for goal achievement. Members of the group are highly motivated, committed and they trust their leaders.

The coaching leadership style is oriented toward group members and their professional development. Coaching leadership are focused on helping group members to reach their potentials. Individual development is emphasized. Those leaders are self-aware and have motivation for a higher degree of personal development [10]. Coaching leadership style contributes to confidence builds, development of individual competences, and a strong commitment to common goals [11]. Those leaders also cope better with stress [11]. Usually, people are not preferring this leadership style because the fulfilment of coaching leadership roles requires a lot of time. Empathy, trust, and openness are some of the personality traits correlated to those leaders. They believe in incremental improvements, group members grow, supporting, and removing obstacles. Learning is one of the key elements on which coaching leadership is based. On the other hand, their followers need to be eager to receive different prerequisite information to gain anticipated competences.

Affiliative leadership style implies the existence of a trust, openness, and multiple perspectives. For affiliative leadership it is important to have ability to recognize various possibilities, to have diverse ideas, and to view outwardly impacts as well as oneself. Trust building is one of the main features of affiliative leaders. Those leaders must learn to create reliance in a different context [12]. Affiliative leadership implies building trust, a collaborative environment, and control sharing. The same researchers indicate that the results of work are better because of sharing control [13]. For affiliative leadership, other people opinion should be considered and is important as one's own. An affiliative leadership style is also typical by emphasized harmony and acceptance of differences. Those leaders are familiar with the rules, but they consider the needs of others. This leadership style influence on bigger satisfaction with the job, harmonized atmosphere, and low level of misunderstandings and conflicts.

Democratic leadership is oriented toward helping others in reaching group goals. Democratic leadership behaviour sustains the democratic process. Those leaders are oriented on empowering a sense of belonging to a group. One of the key features of democratic leadership is responsibility distribution. The democratic leader strives to maximize participation in the group work of each team member [14]. Democratic leaders are leading members of the group to challenge their possibilities, skills, and knowledge. Those leaders are usually setting high goals for members but also advise on how to perform a certain task. The main characteristic of the democratic leadership style is deliberation [15]. It is not rare that democratic leaders have insufficient time to make a democratic decision and ensure productivity. Because of this, it is necessary for them to deliberate their obligations. Democratic leaders are a careful listener, creative problem-solving and collective interests oriented.

Commanding leadership style is characterized by rules which leadership is dictating. Those rules must be followed. Commanding leadership is strong and oriented on command in order to complete objectives. Those leaders are making a job to be done. Usually, an instrument for acquirement target is group member rewarding. Members of a group in which leaders are commanding oriented are not creatively

contributing to goals reaching. It is good to combine this leadership style with some other because of the lack of group member motivation in case of continuously commanding. Group members need the ability to make choices between multiple options rather than continuously determining tasks and ways of performing them. Commanding leaderships do not explain their decisions. Unlike the democratic style of leadership, commanding leaders do not delegate authority.

Pacesetting leadership is high performance-oriented. The highest goals pacesetting leaders are setting for themselves. Those leaders are delegating assignments to other members of the group if they are considering that someone else has more competences than themselves. Pacesetting leadership is highly motivated and they are working the best with members which are competent. Some authors stand out that it is better if this style is combined with some other style, as well as a commanding leadership style. Pacesetting leadership is oriented on well-performing tasks and he or she is working better and faster than other members of the team. If there is some member who performs tasks with low performances, pacesetting leadership will request upward results.

### **3 SAMPLE ANALYSIS**

For the purposes of this research, a survey was conducted on a sample of 122 first-year students of bachelor academic studies in the field of Mechanical Engineering at the Faculty of Engineering, University of Kragujevac. Through the survey, students answered 36 questions, giving grades in the interval [0-5], thus, to a certain extent, confirming or refuting the statement. The layout of the mentioned survey is taken from Goleman, 2000 [1]. The aim of the analysis was to determine which leadership style first-year students mainly gravitate to, as well as to determine whether there is interdependence between certain leadership styles among students.

Out of a total of 122 students surveyed, and based on the procedure defined in Goleman, 2000 [1], it was determined that:

- 48 students (39.34%) prefer a democratic leadership style,
- 16 students (13.11%) prefer a coaching leadership style,
- 16 students (13.11%) prefer a pacesetting leadership style,
- 13 students (10.66%) prefer a visionary leadership style,
- 13 students (10.66%) prefer a commanding leadership style, and
- 5 students (4.10%) prefer an affiliative leadership style.
- 11 students (9.02%) equally prefer certain two styles, as follows:
  - 5 students (4.10%) prefer democratic and coaching leadership style at the same time,
  - 2 students (1.64%) prefer pacesetting and visionary leadership style at the same time,
  - 1 student (0.82%) prefers pacesetting and democratic leadership style,
  - 1 student (0.82%) prefers pacesetting and coaching leadership style at the same time,
  - 1 student (0.82%) prefers democratic and visionary leadership style at the same time, and
  - 1 student (0.82%) prefers coaching and visionary leadership style at the same time.

The procedure for determining the dominant leadership style in an individual is based on scoring based on answering questions. For each of the styles, it is possible to achieve a maximum of 30 points (at the individual level). Using the mean, median, and mode operators, the value for each of the considered styles was determined on a considered sample (Table 1).

Table 1. Application of mean, mode and median operators to a considered data set (sample)

<b>Style</b>	<b>Average grade (mean)</b>	<b>Median</b>	<b>Mode</b>
<i>Democratic leadership style</i>	22.54	23	26
<i>Coaching leadership style</i>	21.66	21	21
<i>Pacesetting leadership style</i>	21.55	22	23
<i>Visionary leadership style</i>	21.23	21	22
<i>Commanding leadership style</i>	19.23	20	21
<i>Affiliative leadership style</i>	19.61	20	19

From the presented analysis, it can be seen that the democratic leadership style is the most represented among students. Another indicator that supports this is that the democratic style is in the first or second place among 30 respondents if the coaching leadership style is in the first or second place. In other words, it happened 30 times that in the considered sample, these two styles take the first and second place, regardless of who is in the first place and who is in second place in the rank. The situation is similar when it comes to democratic and pacesetting leadership styles, which appear in one of the first two places as many as 24 times at the same time. The data that speaks a lot about the representation of the elements of democratic leadership style among students is that this style is in the first or second place in the rank of 96 students (78.69%).

When it comes to other styles, coaching and pacesetting leadership style are approximately equal, taking into account all parameters, and are in second and third place, respectively, according to the representation of students. Certainly, the style that has by far the least representation among students is the affiliative leadership style.

By analysing the correlation between the considered leadership styles, it was found that a certain correlation exists exclusively between commanding and pacesetting leadership style, with a correlation coefficient of 0.63, as well as between democratic and affiliative leadership style, with a correlation coefficient of 0.58. However, this correlation of dependence can be characterized as moderate or small. A complete lack of correlation was observed between pacesetting and democratic leadership style ( $r=-0.05$ ), commanding and affiliative leadership style ( $r=-0.03$ ), and between pacesetting and affiliative leadership style ( $r=0.06$ ), where the correlation coefficient was denoted with  $r$ .

## **4 DISCUSSION**

Based on statistically processed data, it can be concluded that the democratic leadership style is by far the most represented among surveyed students (39.34%). This is certainly the most important conclusion of this research. In addition, this leadership style is in the first or second place in 78.69% of students according to the overall score, which again proves that the elements of this leadership style are present in the vast majority of students. Within the statistical analysis, the interconnectedness of styles was examined, which was further explained.

First of all, it is necessary to analyse the students for whom it was not possible to clearly see which style they predominantly belong to. The most noticeable phenomenon is that 5 respondents equally preferred elements of democratic and coaching leadership style. In addition, as many as 30 of them had a combination of these two styles in the first and second place. This actually confirms the assumption that these two styles have some similar characteristics, which are mostly reflected in interpersonal and relationships between leaders and team members. The styles are similar in that they do not have a pronounced role of a leader, as someone who only issues tasks, but as someone who actively participates in solving problems and tries to help team members.

Second, a similar, but less pronounced phenomenon, is that 24 respondents in the first and second place had a combination of democratic and pacesetting leadership styles. This phenomenon is very interesting because these two styles are considered to be dissonant with each other. It is very difficult to determine what connects these two styles in this case, because the correlation analysis shows that there is absolutely no connection between these two styles. The only plausible explanation is that this group of students, depending on the situation, prefers one of these two leadership styles.

Based on the mentioned correlation analysis, it was determined that there is a certain correlation between commanding and pacesetting leadership style, as well as between democratic and affiliative leadership style. Although this correlation is weak, it can be considered to exist. This is confirmed by the fact that these styles are similar and have a lot in common. Also, the lack of correlation between the mentioned democratic and pacesetting leadership style, but also between commanding and affiliative leadership style, and between pacesetting and affiliative leadership style, confirms that these styles are completely different according to their characteristics.

## **5 CONCLUSION**

The aim of this research was to examine the prevalence of leadership styles in first-year students of bachelor academic studies in the field of Mechanical Engineering at the Faculty of Engineering, University of Kragujevac, in order to assess the situation and possibly prescribe appropriate guidelines for further education. Statistical analysis was performed on a sample of 122 students, based on the methods of descriptive statistics and determining the correlation between leadership styles.

Based on the obtained results, it was determined that most students are committed to the democratic leadership style and that those students who prefer another style, in their way of managing team members have certain elements of this style. Another important conclusion of this research is that a certain number of students simultaneously prefer elements of democratic and pacesetting leadership style, although these two styles are completely opposite. Based on the correlation analysis, it was determined that there is a moderate correlation between commanding

and pacesetting leadership style, as well as between democratic and affiliative leadership style. Also, it was found that there is no correlation between democratic and pacesetting leadership style, between commanding and affiliative leadership style, and between pacesetting and affiliative leadership style. These results were, of course, expected.

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