



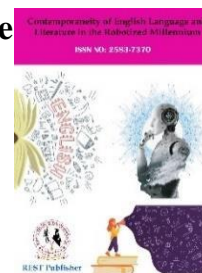
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Decision Support Framework for Medical Education through the VIKOR Approach

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Abstract: A successful lesson introduction requires establishing a connection with the audience, encouraging participation, and conveying key concepts to facilitate learning. Teaching is the application of knowledge, skills, and qualities to provide specialized education to meet both societal and individual needs. The ultimate goal of education is to empower students to become lifelong learners who can prepare for the future, express their thoughts, and learn new skills, knowledge, and moral principles. While learning can be a self-driven process, formal education can make it more accessible. Improving one's writing skills can expedite the learning process. Maintaining student engagement depends on a positive attitude towards teaching and a passion for the subject, which can inspire students. It's important to recognize that individuals have different learning styles. Clinical research empowers healthcare professionals to make optimal patient care choices. It serves as the foundation for developing innovative therapies, protocols, and medical tools. The evaluation of new medications against current ones through clinical trials is crucial for assessing their superiority. Similarly, educational research equips educators and leaders with the evidence needed to enhance teaching and learning methods more strategically and efficiently. The VIKOR method emerged as a multi-attribute decision-making approach designed to address discrete decision problems characterized by non-commensurable criteria and conflicting priorities. It was introduced as a valuable tool for tackling Multi-Criteria Decision Making (MCDM) challenges. This method encompasses the process of ranking and selecting sample sets with conflicting criteria to facilitate decision-making among available alternatives. VIKOR stands out as a multi-criteria decision-making technique that centers on choosing the optimal solution based on its proximity to the ideal outcome. Alternative Taken as Teaching and learning in medicine. Evaluation preference Taken as Effectiveness, Engagement, Clinical Skills, Communication. From the result Teaching and Learning 4 got the first rank whereas is the Teaching and Learning 5 having the Lowest rank.

Keywords: Multiple criteria analysis; Compromise; AHP, MCDM, RESs

1. INTRODUCTION

The statement you provided underscores the intricate nature of the teaching and learning process, as well as the diverse factors and situations that influence education. Let's break down the main ideas within this statement: The Teaching and Learning Process: Education is not a static event but a dynamic process that unfolds over time. Learners progress through a series of interactions, experiences, and stages during this process. Involvement of New Information, Practices, and Skills: Learning extends beyond the acquisition of knowledge; it also encompasses the development of new behaviors and abilities. This process involves integrating new information with one's existing understanding. Diverse Learning Experiences: Education cannot follow a one-size-fits-all approach because students come from diverse backgrounds, possess different needs, and pursue various objectives. Therefore, it is essential to provide a range of experiences and accommodations to address this diversity in the teaching process. Interconnected Factors: Numerous elements, such as the learner's background, motivation, prior knowledge, and the instructional strategies employed, impact the teaching and learning process. The way these factors interact can significantly influence the effectiveness of the educational experience. The statement you provided addresses several key aspects of education: Ongoing Improvement: Proficient educators recognize the significance of staying updated on the latest educational developments and the importance of lifelong learning. Their dedication to professional growth can benefit students by enhancing their teaching abilities. Engaging Introduction: It's essential to immediately capture students' interest with an engaging opening. This not only sets the tone for the lesson but also motivates students to make the most of their educational

experience. Educational Environment: Teaching and learning activities are depicted as occurring within an educational environment, where students produce outcomes and gain knowledge from instructors who provide content, objectives, and goals. Teacher's Role: A teacher serves as the conduit for knowledge transfer to students. Furthermore, abstract nouns such as knowledge, experience, and education are suggested to represent the concept of a "teacher." Overall, this statement underscores the dynamic nature of education, the importance of effective teaching techniques, and the necessity for collaboration between teachers and students in the learning process. It also highlights the complexity of the teaching and learning processes and how various elements interact to create a comprehensive educational experience. Comprehending the ideas and significance of the material leads to abstract learning. Conversely, there are situations where acquiring specific skills is essential for success or earning income. Effectively introducing a lesson involves establishing a connection with the audience, encouraging participation, and conveying key concepts. Teaching facilitates learning, representing the application of information, skills, and qualities to provide a specialized service, meeting societal and individual educational needs. Education's aim is to empower students as lifelong learners, enabling them to prepare for the future, express their thoughts and opinions with confidence, and absorb new values, skills, and knowledge. Learning can be accomplished independently, but education often eases the process. Improving writing skills can expedite learning, and maintaining students' interest hinges on a positive attitude towards instruction and the students. Enthusiasm for a subject inspires students, and understanding their unique learning styles enhances educational effectiveness. Learning is the lifelong process of converting knowledge, skills, and behaviors from experiences and information. Schooling is just one avenue of learning, serving to transmit society's values, knowledge, and skills to successive generations. Active learning, which engages students through debates, role plays, case studies, and problem-solving, fosters better performance and future learning. Learners can undergo changes in knowledge, attitudes, behavior, and perspectives, gaining fresh insights into ideas and the world. Effective instructors, warm and approachable, build strong connections with students, maintain open communication with parents, and collaborate with administrators and fellow educators to bring about meaningful improvements. Teaching and learning are intertwined, fundamental components for meaningful personal growth, with teaching representing the process of knowledge transfer and learning signifying the acquisition of knowledge leading to lasting positive or negative changes. Teaching is influenced by numerous factors, such as maturity, age, motivation, IQ, mental health, physical well-being, dietary habits, aspirations, attention, and interest. This article will explore the positive and negative impacts of various circumstances on the teaching process. We will conduct a detailed analysis of the implementation of a lesson from a reform-based linear-functions unit to illustrate how teaching transforms into a learning experience for educators. As previously mentioned, changes in math education have necessitated adjustments in how subjects like functions are taught [1]. In many cases, an appendix offers a clear explanation of how students have utilized resources for research and pilot testing activities. Meetings with members of the Functions Group, both before and after implementation, have also provided support to teachers [2]. Therefore, we will examine the learning activities that high school teachers participate in and investigate how their perspectives evolve over the course of a year. We will delve deeper into the key themes of the study, including teacher learning, beliefs, and learning activities, before providing more detailed information about the study itself. Whether a language is a second or foreign language, the methods of teaching and learning have evolved over time [19]. The paradigm has shifted from one where the instructor is the central figure and role model to one where the student takes center stage. Considering all of these discoveries, techniques, strategies, and experiences developed in a conducive learning environment [20], it is essential to conduct a comprehensive examination of behavioral style characteristics for teaching and learning before using them to inform instructional design [21]. Over the past decade or so, there has been significant progress in the field of teaching and learning, rooted in language teaching theory and practice and a recognition of the social and political importance of language instruction [24]. Medicines or drugs are substances intended for the treatment, prevention, or diagnosis of diseases, symptom relief, or the enhancement of health. When a chemical molecule with a known structure has a biological impact on a living organism, it is referred to as a drug in pharmacology. A pharmaceutical drug is a chemical substance used for treating, curing, preventing, diagnosing, or improving health. It is often referred to as medication. The realm of medicine encompasses a wide array of topics related to healthcare, including medical research, disease diagnosis, treatment, and prevention. The overarching aim of medicine is to maintain and improve health and well-being. Conventional modern medicine is also known as allopathic medicine.

2. MATERIAL AND METHOD

In the **medical field**, the concept of teaching and learning involves an educational environment where instructors provide students with specific objectives, aims, and content, while students acquire knowledge, perform tasks, and produce results. Various teaching methods include personalized education, traditional lecture-based teaching, technology-based learning, both individual and group instruction, inquiry-driven learning, kinesthetic learning, game-based instruction, and experiential learning.

2.1 Effectiveness, in essence, refers to the ability to achieve a desired outcome or accomplish a specific goal. It signifies the state in which something attains the expected results or leaves a profound and lasting impact. Effectiveness is about the practicality of achieving a goal, distinct from the efficiency, which relates to the method employed. For instance, while a car can transport people efficiently over long distances and to predetermined destinations, it may not be the most efficient means of transportation due to the gasoline it consumes.

2.2 Engagement, in the context of the workforce, pertains to the commitment of employees to their roles. Engaged employees are less likely to resign as they are invested in and enthusiastic about their work. The sexual orientation of the partners in an engagement is inconsequential. It is crucial to keep your top-performing individuals engaged in their work to ensure they continue to contribute their best to your organization.

2.3 Clinical Skills encompass the abilities healthcare professionals employ when assessing, diagnosing, and treating patients. These skills may involve the application of medical knowledge, such as the interpretation of blood test results. While new staff members handle patient care, nurses can focus on enhancing their clinical skills. This is just one aspect of the comprehensive set of clinical skills that nurses require. They need proficiency in both clinical and interpersonal skills as challenging situations often arise.

2.4 Communication is the process of transmitting information from one source, through a message, to a receiver. Every communication involves a sender, a message, and a recipient. Effective communication entails the exchange of information, perspectives, and ideas, ensuring all parties involved fully comprehend the message. It is a two-way process that encompasses the sender, message, channel, recipient, context, and feedback.

VIKOR Method: The VIKOR approach was designed as a multi-attribute decision-making methodology to handle a discrete decision-making problem with non-commensurable (different units) and competing criteria. It was presented as one applicable technique to be used within the MCDM problem. A stability analysis that establishes the weight stability intervals and a trade-offs analysis are added to the VIKOR approach [1]. The focus of this updated VIKOR approach is on finding a compromise solution while covering a wide range of criteria. As a result, it fixes the primary flaw in the original VIKOR approach [2]. The rising complexity of social, economic, technological, and environmental concerns means that decision-making must balance multiple competing interests. These days, traditional single-criteria decision-making is insufficient to address these issues. The VIKOR approach, sometimes referred to as the Compromise Ranking method [4]. With the VIKOR technique, the opponent has the least amount of personal regret while the majority experiences the greatest amount of collective usefulness. The multi-attribute ranking indexes based on the specific measure of proximity to the optimum solution are introduced [17]. When there are competing criteria, the VIKOR technique focuses on ranking and choosing from a group of alternatives. It establishes a middle-ground resolution that the decision-makers could approve [18]. Only until the VIKOR method's ability to improve the caliber of medical decision support is demonstrated will its promise be realized. In this study, we analyze the effect of original data distribution and offer an improved VIKOR approach adopting medical data with NRRs [20]. In recent years, the VIKOR technique has gained popularity in the decision support field. In clinical decision making, moderate qualities with normal reference ranges (NRRs) are generally available; hence, this method cannot support an objective examination on medical data. As a result, we created a VIKOR method with increased accuracy (ea-VIKOR) by changing the standard version and adding a new data normalization technique to make it appropriate for medical data. Only until the VIKOR method's ability to improve the caliber of medical decision support is demonstrated will its promise be realized. In this research, we provide an enhanced VIKOR approach that takes into account the impact of the original data's distribution while adopting medical data with NRRs. The original distance to the regular reference range serves as the foundation for the enhanced approach [20]. By adding the multicriteria ranking index based on the specific measure of "closeness" to the "ideal" solution, the VIKOR approach determines the compromise ranking list and the compromise solution. The Lp-metric, which is employed as an aggregating function in a compromise programming technique, provides the basis for the multicriteria measure for compromise ranking. We simply take into account three maintenance plans to demonstrate the suggested IVF-VIKOR technique. Keep in mind that the suggested IVF-VIKOR method is adaptable enough to take into account as many methods as the business wishes to include in the decision-making process [19]. To put it another way, the VIKOR method was created recently to address multi-criteria decision making (MCDM) issues involving conflicting and non-commensurable (different units) criteria. It works under the assumptions that conflict resolution can be resolved through compromise, that the decision maker seeks the best possible solution, and that all available criteria are taken into consideration when evaluating the alternatives.

3. ANALYSIS AND DISCUSSION

TABLE 1.Impact of Teaching and Learning in Medicine of best and worst value

	Effectiveness	Engagement	Clinical skills	Communication
Teaching and Learning in Medicine 1	10.504	17.083	45.062	25.036
Teaching and Learning in Medicine 2	25.421	13.56	17.025	23.632
Teaching and Learning in Medicine 3	23.451	32.123	45.362	41.035
Teaching and Learning in Medicine 4	15.023	36.025	42.036	15.265
Teaching and Learning in Medicine 5	25.63	15.202	12.63	36.025
Best	10.504	36.025	45.362	15.265
Worst	25.63	13.56	12.63	41.035

Table 1 shows the Impact of Teaching and Learning in Medicine is alternative values **Effectiveness (10.504)**, **Engagement (36.025)**, **Clinical skills (12.63)**, **Communication (15.265)** is the best value in Teaching and Learning in Medicine.

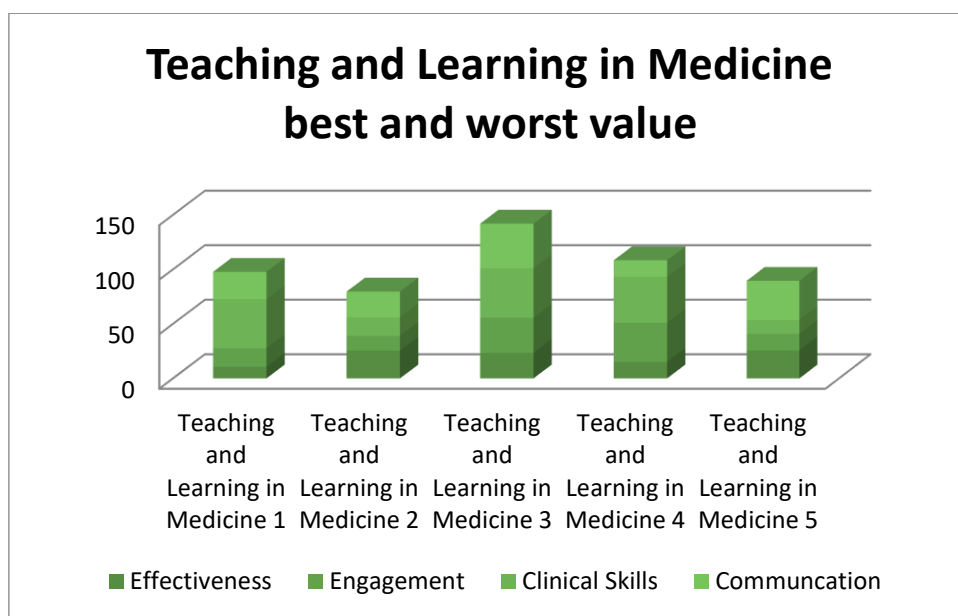


FIGURE 1.Impact of Teaching and Learning in Medicine of best and worst value

Figure 1 is Showing the best Value and Teaching and Learning in Medicine1 **Effectiveness (10.504)** is the highest value, **Engagement (36.025)**, is the lowest value. **Clinical skills (12.63)** is the lowest value, **Communication (15.265)** is the highest value.

TABLE 2.Calculation Sj and Rj

Effectiveness	Engagement	Clinical skills	Communication	Sj	Rj
0	0.210795	0.002291	0.09479	0.307876	0.210795
0.246546	0.25	0.216432	0.08117	0.794148	0.25
0.213986	0.043423	0	0.25	0.507409	0.25
0.074689	0	0.025403	0	0.100093	0.074689
0.25	0.231727	0.25	0.201397	0.933124	0.25

Table 2 shows the calculation Sj and Rj is the sum of Normalization of the tabulation 1 which is calculated from the Determination of best and worst value.

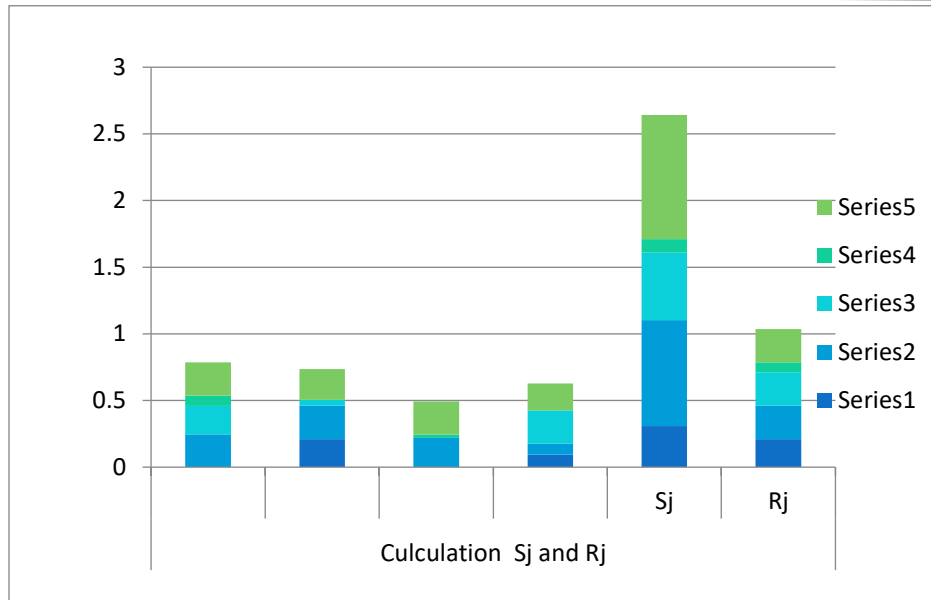


FIGURE 2. Calculation Sj and Rj

Figure 2 shows the Calculation Sj and Rjis the sum of Normalization of the tabulation 1 which is calculated from the Determination of best and worst value.

TABLE 3.Final Result of Calculation Qj

	Sj	Rj	Qj	Rank
General Hospital	0.613461	0.307876	0.306027	4
Surgical Ward	1.125318	0.794148	0.809452	2
Intensive Care	1.007409	0.507409	0.588613	3
Pediatric	0.174782	0.100093	0	5
Elderly Care	1.384521	0.933124	1	1

Table 3 shows the Final Result of Calculation Qj calculated from the sum of the calculation from the Sj and Rj from the Qj value the rank is taken.

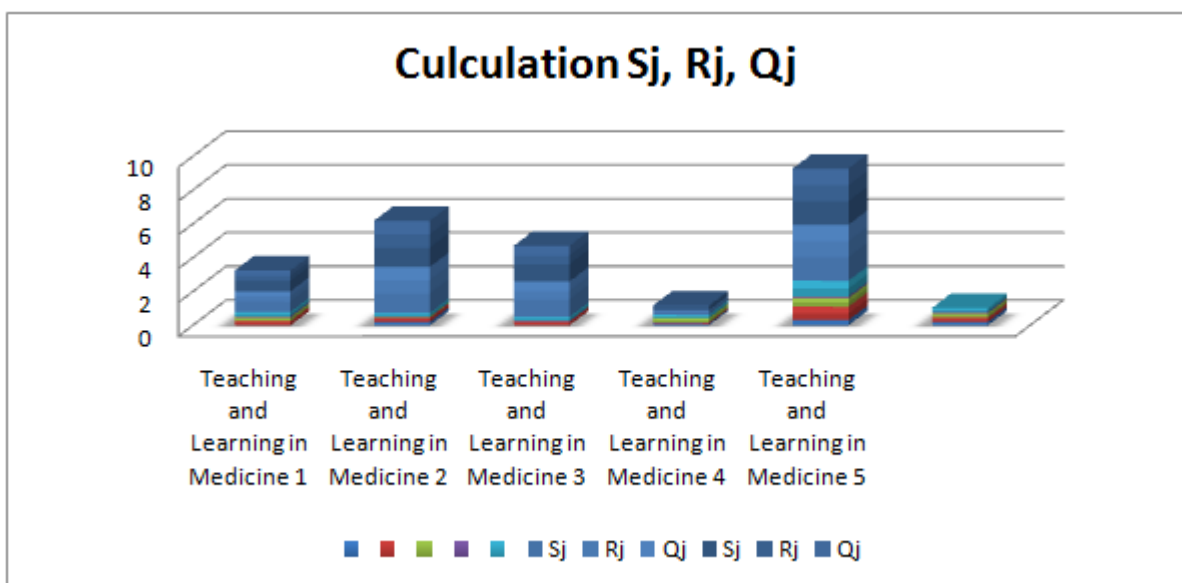


FIGURE 3. Calculation Sj, Rj and Qj

Figure 3 Shows the Calculation S_j , R_j and Q_j Impact of Teaching and Learning using VIKOR method. Q_j for Teaching and Learning₄ is showing the highest value and Teaching and Learning₅ showing the lowest value.

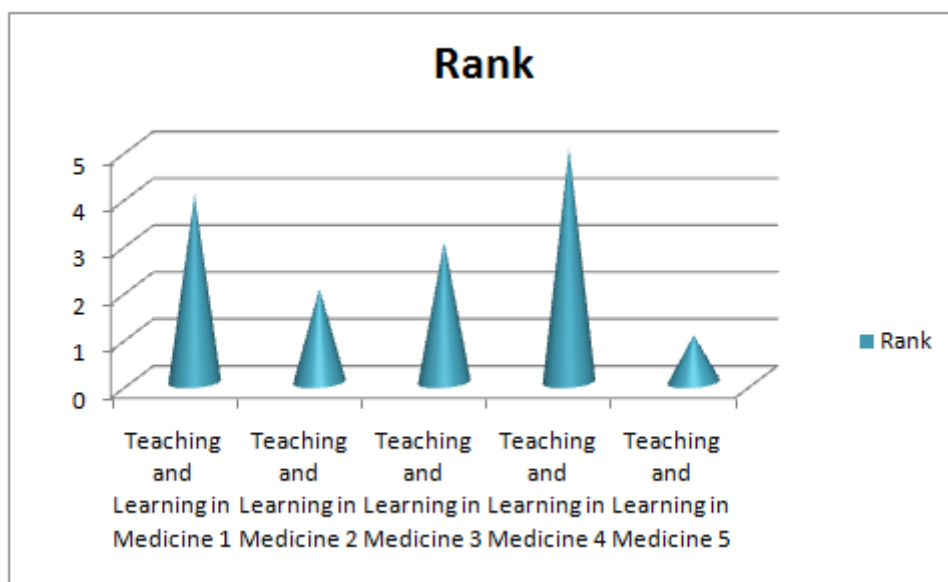


FIGURE 4. Rank

Figure 4 Shows the Rank of Impact of Nurse Staffing Levels on Patient Outcomes for using the analysis of VIKOR Method. Teaching and Learning 4 got the first rank whereas is the Teaching and Learning 5 having the Lowest rank.

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