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Research Article

Determining the Awareness Levels of University Students Living in Isparta Related to Renewable Energy Sources

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Abstract – The objective of this study is to ascertain whether there are statistically significant differences in the awareness levels of students at Süleyman Demirel University regarding renewable energy sources, taking into account demographic characteristics such as gender, age, income level, and so forth. The data for this study were collected from students at Isparta Süleyman Demirel University during the 2023-2024 year. A power analysis for the sample size yielded 362, with 95% power, and a dependency level of 0.05. The initial section comprises demographic questions, while subsequent sections encompass 23 items on renewable energy. In order to ascertain the differences between the relevant variables, an independent sample t-test was employed when there were two variables or groups, and one-way Analysis of Variance (ANOVA) was employed when there were three or more three variables. The results demonstrate that there is no significant difference between male and female in terms of awareness of renewable energy sources. However, analysis of the age variable indicates a significant difference between age groups in terms of the affective sub-dimension. A significant difference was observed regarding the affective sub-dimension in relation to place of residence. No significant differences were identified with respect to the class or income level variables. Finally, a significant difference was noted between faculties with regard to the affective sub-dimension.

Keywords – Renewable Energy Sources, Awareness Level, T-Test, ANOVA.

I. INTRODUCTION

Energy, which is indispensable for our daily lives, has been a need for mankind since the beginning of time. With the increasing demand for energy, the search for new resources has been going on for centuries. However, the increase in industrial activities and technological advances have led to the effort to obtain energy from fossil fuels such as oil, coal and natural gas, which are easily available and require investment [1]. Increasing energy demand and the rapid development of technology have created the need for more affordable and reliable sources to support economic, social and quality of life growth [2]. Energy is a vital requirement for a sustainable economy and life worldwide, leading to increased consumption. Production and technological developments require energy use both directly and indirectly. Fossil fuels are the primary energy source; nuclear and Renewable Energy (RE) sources are used for relatively small amounts of energy consumption. Due to the increase in fossil fuel consumption, both today and in the future, natural life and

human health are being harmed and it is said that the price paid by mankind may be high if not intervened early [3-4].

In addition, renewable energy sources and their utilization have been an important focus. However, efforts to support the use of these resources are limited. Therefore, it has become an inevitable necessity to increase the use of renewable energy sources such as solar, wind, geothermal, hydroelectricity, which are less harmful to the environment and can continuously renew themselves [4-5]. Turkey has a geography with diverse and rich renewable energy resources. It is especially noteworthy in the field of geothermal energy with a limited share of 8% worldwide. Its geographical location increases its solar energy potential by 2640 hours of sunshine per year and it has rare potential in terms of hydraulic energy worldwide. In terms of wind energy, Turkey has a potential of around 160 TWh, and although costs vary depending on geographical altitude and location, in general, the size of this energy source provides a cost advantage [6]. Turkey faces significant challenges to ensure favorable conditions for energy supply and demand security. In order to reduce external dependence, in addition to exploration efforts to access the raw materials of fossil energy resources within the country's borders, it is necessary to create favorable conditions to identify the potential in the field of renewable energy resources and to encourage their use. In this context, the effective use of local resources in terms of energy security and the implementation of incentive policies for renewable energy are important steps to increase the country's energy independence [7-8].

The increase in the perception and knowledge levels of individuals on Renewable Energy are the most important factors in adopting the subject and forming preferences. As the knowledge and perception of individuals about Renewable Energy increases positively, they will be able to acquire positive attitudes and behaviors on this issue and the use of different energies related to RE can be realized efficiently. In this study, the effects of university students' “perceptions of renewable energy” and “awareness of renewable energy” on their “intention to use renewable energy” were tried to be investigated with a proposed model and it was aimed to determine the level of awareness of Isparta Süleyman Demirel University students about renewable energy sources.

II. MATERIALS AND METHOD

The research was conducted among students at Süleyman Demirel University during the 2023-2024 academic year. Data collection involved a structured questionnaire that assessed both demographic characteristics and awareness levels. A power analysis indicated a required sample size of n = 362 to achieve a 95% confidence level with a 5% margin of error. The questionnaire included two sections: the first focused on demographic details while the second contained 23 items assessing knowledge and attitudes toward renewable energy. Analyses were conducted using SPSS, employing independent sample t-tests for two variable comparisons and ANOVA for three or more variables to determine statistical significance in the findings.

III. RESULTS

The findings of this study provide a comprehensive understanding of the awareness levels of university students regarding renewable energy sources, analyzed through various demographic factors.

Table 1. T-test analysis results for Gender variable

Variable	Factor	Group	n	$\bar{x}$	Std.	(p)
Gender	Cognitive Sub-dimension	Male	180	3.61	0.944	0.645
		Female	182	3.56	1.015	
	Affective Sub-dimension	Male	180	3.19	0.948	0.083
		Female	182	3.01	1.017	

*p<0.05

Gender Differences: The analysis revealed no significant differences in awareness levels between male and female students. As shown in Table 1, the mean score for the cognitive sub-dimension was 3.61 for male students and 3.56 for female students ($p = 0.645$), indicating that both genders possess similar knowledge levels regarding renewable energy sources. In the affective sub-dimension, male students had a mean score of 3.19, while female students scored 3.01 ($p = 0.083$). These results suggest that gender does not significantly impact students' awareness of renewable energy.

Table 2. ANOVA results for Age variable

Variable	Factor	Group	n	$\bar{x}$	Std.	(p)
Age	Cognitive Sub-dimension	17-19	53	3.62	0.99	0.510
		20-22	205	3.60	0.96	
		23-26	93	3.59	0.99	
		26+	11	3.15	1.07	
	Affective Sub-dimension	17-19	53	3.09	0.95	0.000*
		20-22	205	2.96	0.97	
		23-26	93	3.30	0.95	
		26+	11	4.1	0.91	

*p<0.05

Age Groups: Significant differences were found in the affective dimensions based on age groups, from Table 2 For the cognitive sub-dimension, the age groups (17-19, 20-22, 23-26, and 26+) showed no significant differences, with mean scores ranging from 3.15 to 3.62 and a p-value of 0.510. However, in the affective sub-dimension, a significant difference was detected ($p < 0.05$), with mean scores of 3.09 for the 17-19 age group, 2.96 for the 20-22 group, 3.30 for the 23-26 group, and 4.1 for those aged 26 and above. This indicates that older students exhibit a higher level of awareness and positive attitudes toward renewable energy sources.

Table 3. ANOVA results for Place variable

Variable	Factor	Group	n	$\bar{x}$	Std.	(p)
Place	Cognitive Sub-dimension	home	115	3.68	0.96	0.647
		apart	121	3.57	0.98	
		dormitory	123	3.52	1.001	
		other	3	3.66	0.000	
	Affective Sub-dimension	home	115	3.32	0.97	0.016*
		apart	121	3.06	0.93	
		dormitory	123	2.93	1.001	
		other	3	3.4	1.5	

*p<0.05

Place of Residence The analysis of students' place of residence (home, apartment, dormitory, other) indicated a significant difference in the affective sub-dimension ($p = 0.016$), as illustrated in Table 3. The mean scores for the affective sub-dimension were as follows: 3.32 for students living at home, 3.06 for those in apartments, 2.93 for those in dormitories, and 3.4 for students in other types of accommodation. However, no significant differences were found in the cognitive sub-dimension ($p = 0.647$), suggesting that while students' living conditions may influence their feelings about renewable energy, their knowledge remains relatively consistent across different living situations.

Table 4. ANOVA results for Place variable

Variable	Factor	Group	n	$\bar{x}$	Std.	(p)
Class Level	Cognitive Sub-dimension	Preparatory	10	3.53	1.21	0.347
		Class 1	47	3.55	1.02	
		Class 2	83	3.73	0.98	
		Class 3	78	3.42	0.95	
		Grade 4	117	3.66	0.91	
		4+	27	3.41	1.07	
	Affective Sub-dimension	Preparatory	10	3.06	1.02	0.126
		Class 1	47	3.04	1.06	
		Class 2	83	2.89	0.95	
		Class 3	78	3.01	0.90	
		Grade 4	117	3.28	0.96	
		4+	27	3.26	1.14	

*p<0.05

Class Level: When examining the differences among class levels (preparatory, 1st year, 2nd year, 3rd year, 4th year, and 4+ years), no significant differences were found in either the cognitive (p = 0.347) or affective (p = 0.126) sub-dimensions in Table 4 This indicates that regardless of their year of study, students have a comparable level of awareness regarding renewable energy sources.

Table 5. ANOVA results for Income Level variable

Variable	Factor	Group	n	$\bar{x}$	Std.	(p)
Income Level	Cognitive Sub-dimension	0-3999	25	3.72	0.85	0.483
		4000-7999	109	3.50	0.97	
		8000+	228	3.61	0.99	
	Affective Sub-dimension	0-3999	25	2.71	0.94	0.082
		4000-7999	109	3.2	0.98	
		8000+	228	3.1	0.98	

*p<0.05

Income Level: Similarly, the findings regarding income levels (0-3999₺, 4000-7999₺, 8000₺+) showed no significant differences in both cognitive (p = 0.483) and affective (p = 0.082) sub-dimensions, as indicated in Table 5. This suggests that students' awareness of renewable energy is not significantly influenced by their income levels.

Table 6. ANOVA results for Faculty variable

Variable	Factor	Group	n	$\bar{x}$	Std.	(p)
Class Level	Cognitive Sub-dimension	Faculty of Law	20	3.26	0,908	0.458
		Faculty of Humanities and Social Sciences	30	3.52	0.981	
		Faculty of Sport Sciences	31	3.58	0.930	
		Faculty of Health Sciences	30	3.45	0.972	
		Faculty of Education	30	3.66	1.117	
		Faculty of Engineering	30	3.67	0.928	
		Faculty of Economics and Administrative Sciences	30	3.67	1.052	
		Faculty of Architecture	30	3.57	1.035	
		Faculty of Technical Education	30	3.43	0.998	
		Faculty of Fine Arts	30	3.47	0.969	
		Faculty of Medicine	36	3.58	0.993	
		Faculty of Communication	35	4.00	0.832	
	Affective Sub-dimension	Faculty of Law	30	3.06	0.922	0.000*
		Faculty of Humanities and Social Sciences	30	3.07	0.932	
		Faculty of Sport Sciences	31	3.14	0.921	
		Faculty of Health Sciences	30	3.23	0.952	
		Faculty of Education	30	2.69	0.936	
		Faculty of Engineering	30	2.72	0.918	
		Faculty of Economics and Administrative Sciences	30	3.27	1.069	
		Faculty of Architecture	30	2.54	1.032	
		Faculty of Technical Education	30	3.08	0.962	
		Faculty of Fine Arts	30	3.66	0.800	
		Faculty of Medicine	36	3.36	0.941	
		Faculty of Communication	35	3.33	0.980	

*p<0.05

Faculty Differences: Significant differences were observed among different faculties concerning the effective sub-dimension ($p < 0.05$), as illustrated in Table 6. For the cognitive sub-dimension, no significant differences were found ($p = 0.458$). Mean scores varied across faculties, with students from the Communication Faculty showing the highest mean score in the affective sub-dimension (4.00), while students from the Education Faculty had the lowest (2.69). This variation highlights the need for tailored educational strategies that target specific knowledge gaps across different academic disciplines.

IV. CONCLUSION AND DISCUSSION

The findings of this study highlight the urgent need for enhanced education and awareness regarding renewable energy sources among university students. As environmental challenges mount and fossil fuels remain finite, educational institutions must foster a culture of sustainability. While the study found no significant differences in awareness levels based on gender, older students demonstrated greater awareness in the affective dimension, indicating that age-related factors may shape attitudes toward renewable energy. This underscores the importance of tailoring educational programs to consider these demographic differences.

The study advocates several strategies to enhance awareness of renewable energy among university students:

Curriculum Integration: Educational institutions should embed renewable energy topics into existing courses across various disciplines, making it a fundamental part of the learning experience rather than an isolated subject.

Collaborative Projects: Encouraging collaborative projects that involve students from different faculties can foster interdisciplinary learning and promote innovative solutions to renewable energy challenges. These projects can enhance hands-on experience and allow students to engage directly with renewable energy technologies.

Awareness Campaigns: Institutions should organize awareness campaigns and workshops that target students and the broader community, focusing on the importance and benefits of renewable energy sources. Engaging with local communities can help bridge the gap between theoretical knowledge and practical applications.

Real-World Applications: Institutions should provide opportunities for students to engage with real-world renewable energy projects, such as internships or partnerships with local renewable energy companies. This exposure can deepen students' understanding and appreciation of renewable energy's role in mitigating climate change and promoting sustainability.

Continuous Evaluation and Feedback: To ensure the effectiveness of educational strategies, institutions should implement continuous evaluation and feedback mechanisms. Gathering data on students' knowledge and attitudes over time will allow for adjustments to curricula and programs based on evolving trends and needs in the field of renewable energy.

In conclusion, the findings of this study highlight the urgent need for universities to play an active role in educating and raising awareness about renewable energy sources. By adopting a holistic approach to education that encompasses diverse strategies, institutions can significantly impact students' perceptions and behaviors towards renewable energy, ultimately contributing to a more sustainable future for society.

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