The Role of Prince Sattam bin Abdulaziz University in Promoting Environmental Sustainability Among Students in Light of Saudi Arabia's Vision 2030

Faisal Bin Shabib Mosleet Alsubaie[1], Ali Lamouchi[2*], Mohamed Sayed Abdellatif[3]

[1]Department of Educational Sciences, College of Education in Al-Kharj, Prince Sattam Bin Abdulaziz University, Saudi Arabia, f.alsabie@psau.edu.sa
[2]College of Science and Humanity Studies, Department of English Language and Literature, Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia, a.lamouchi@psau.edu.sa
[3]Department of Psychology, College of Education, Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia / Department of Educational Psychology, College of Education in Assiut, Al-Azhar University, Egypt. m.heby@psau.edu.sa

Abstracts

Education for sustainable development aims to develop students' awareness of sustainability issues and foster their attitudes towards environmental, economic, and social sustainability. The study aimed to identify the role of Prince Sattam bin Abdulaziz University in promoting environmental sustainability among its students, in line with Saudi Arabia's Vision 2030. A descriptive analytical approach was used, with a sample of 341 university students. The study found that faculty members ranked first in promoting sustainability, followed by curricula, student activities, and university administration. The most important ways to activate the university's role in promoting sustainability from students' perspectives were rated as very important. Statistically significant differences were found between the sample's responses, with females expressing more support in university administration. Academic specialization also influenced responses, with scientific specializations showing more favor in university administration, faculty members, and curricula. The researchers made several recommendations based on the findings.

Keywords: Environmental sustainability, Saudi Arabia's Vision 2030, Prince Sattam bin Abdulaziz University, university students.

Introduction

Environmental crises, including air, water, and food pollution, and climate change pose a global threat (Najmi & Al-Sayed, 2023). Rising temperatures, according to the Intergovernmental Panel on Climate Change (IPCC), lead to issues like sea-level rise, water and agricultural resource damage, disease spread, and increased poverty (Islam, 2022). Countries are focusing on sustainable development to preserve the environment and natural resources, ensuring a healthy and sustainable future for future generations (Holden et al., 2014).

The global interest in environmental sustainability is gaining momentum, with reports, studies, and conferences promoting greening and community practices (Menon & Suresh, 2020). Governments have integrated sustainability into policies since 2005, and universities have been ranked based on sustainability since 2008, according to the UI Green Metric World University Ranking (UI Green Metric World University Ranking, 2022).

Saudi Arabia has placed great emphasis on environmental sustainability within its development plans and Vision 2030 (Bataeineh & Aga, 2023; Elimam, 2022). The Future Plan for University Education (2029) underscores the significance of sustainability in education, research, and community for societal prosperity and progress.

Recent studies highlight the significance of universities in achieving environmental sustainability, as they are essential educational institutions and socially responsible organizations linked to their social and economic environment, playing a crucial role in shaping society and reducing environmental risks (Dagiliūtė & Liobikienė, 2015; Dagiliūtė et al., 2018; Elbably & Nemt-allah, 2024; Filho et al., 2015). Universities are expected to propose creative and innovative solutions to society's problems and lead social and environmental development (Rieg et al., 2021).

In the 21st century, universities have become the primary focus of education on environmental sustainability, integrating economic, social, and environmental dimensions into their practices and policies (Amaral et al., 2015; Meseguer-Sánchez et al., 2020; Žalėnienė & Pereira, 2021). These institutions aim to minimize negative impacts on health through teaching, scientific research, awareness, community partnership, and supervision, promoting sustainable lifestyles.

Universities have become the main focus of education in the new millennium regarding environmental sustainability, not limited to teaching environmental information but integrating economic, social, and environmental dimensions into all their practices and policies. Environmentally sustainability-oriented universities are defined as higher education institutions that aim to minimize negative environmental, economic, and social impacts on health when using their resources while performing their core functions of teaching, scientific research, awareness, community partnership, and supervision, to help society transition to sustainable lifestyles (Giesenbauer & Müller-Christ, 2020; Smaniotto et al., 2020)

The UNESCO report indicated that despite progress in achieving university education for sustainable development globally, Arab countries are the furthest from reorienting their higher education towards sustainability (Buckler & Creech, 2014). Al-Otaibi's study (2015) showed that Najran University's contribution to sustainable development from the perspective of academic

and administrative leaders was moderate. Similarly, Al-Sayed's study (2021) revealed that Saudi universities practice their responsibilities towards environmental sustainability to a moderate degree tending towards weakness.

Previous studies have highlighted the need for universities to educate external community members about environmental risks and the consequences of not preserving them. Studies emphasized the need for updated strategic plans in Saudi universities and the existence of environmental and climatic challenges in the country (Al-Hajji, 2017; Al-Rashidi, 2016). Additionally, Al-Najjar (2019) have highlighted the need for students to learn environmental sustainability concepts through interviews and in the curricula.

Prince Sattam bin Abdulaziz University ranks 938 in the UI Green Metric World University Ranking (2022), indicating a weak interest in sustainability transition compared to global universities. This study aims to explore the role of Prince Sattam bin Abdulaziz University in promoting environmental sustainability among its students in line with Saudi Arabia's Vision 2030. The research aims to understand the impact of gender and academic specialization on the students' responses to this role. The existing research gap requires a comprehensive understanding of the university's role in promoting sustainability.

Literature Review

Environmental Sustainability and the Role of Universities in Achieving It

Environmental sustainability involves preserving natural resources, ensuring long-term environmental quality, and meeting current needs without compromising future generations' ability to meet their needs (Hajian & Kashani, 2021; Uralovich et al., 2023). It involves studying natural systems to balance and protect the environment, aiming to eliminate hunger, poverty, improve education and health, achieve gender equality, and address climate change, pollution, and other environmental factors (Meyfroidt et al., 2023).

Environmental sustainability is an educational process that aims to raise awareness about the environment and global issues, providing knowledge, attitudes, and skills to individuals (Al-Dafrawi, 2019). It involves not just scientific knowledge but also decision-making, responsibility, culture spread, and behavior modification towards environmental protection. The role of universities in environmental sustainability is to maintain continuity, flexibility, and effective programs while preserving the environment and natural resources, while ensuring economic feasibility and readiness for the future (Stoian et al., 2021; Sustiyatik et al., 2023). Universities are crucial for sustainable development, addressing social, economic, cultural, environmental, and political aspects as they represent intellectual and scientific leadership, solving problems and facing challenges (Price et al., 2021).

Environmental sustainability is a crucial global issue affecting human life and the planet (Cavagnaro & Curiel, 2022). Education raises awareness about this issue through integrated learning (Maartensson & Loi, 2022). UNESCO emphasizes that education promotes action on environmental issues, helps learners understand pollution effects, and empowers them with knowledge, skills, values, and attitudes to act as change agents (Glavič, 2020).

Education is crucial for sustainable development and raising awareness (Nemt-allah & Darwesh, 2024). Universities play a vital role in building sustainable communities (Almudara et al., 2023). Environmental sustainability necessitates behavioral changes, making it a key focus for scientific research and educational policies. Studies emphasize the importance of developing sustainable attitudes among learners (Probst et al., 2019).

Universities are key in driving social change in the environmental field by promoting awareness among students and taking significant steps at various levels, including programs, activities, courses, and faculty (Al-Otaibi, 2022; Blaique et al., 2023). Accordingly, universities should develop study programs to enhance students' understanding and knowledge of environmental preservation and how to deal with its problems (Al-Najjar, 2019).

Previous studies have explored the perceptions of university students in universities, and the impact of sustainability courses on student competencies. Asgarova et al. (2023) found low levels of sustainability-promoting activities, with teamwork being the biggest obstacle. Saleem et al. (2023) found that sustainable education curricula are prevalent and associated with increased sustainability awareness. Wang et al. (2022) found a positive correlation between teaching methods and the development of sustainability competencies, enhancing students' belief in the new environmental model and pro-environmental behaviors. Kioupi and Voulvoulis (2022) proposed a six-stage framework for assessing the alignment of learning outcomes with sustainability competencies, but identified obstacles.

Environmental Sustainability and Saudi Vision 2030

Saudi Arabia's Vision 2030 aims to achieve environmental sustainability, focusing on a vibrant society, thriving economy, and ambitious homeland (AlNemer, 2024). The vision aims to protect oil wealth, improve energy consumption efficiency, and protect the environment and resources. Its three main axes include a thriving economy, a vibrant society, and an ambitious homeland. This vision is a roadmap for a prosperous future (Safahi, 2021).

Saudi Vision 2030 emphasizes sustainability in four main aspects: environmental, financial, infrastructure, and social. It outlines a responsibility for future generations to preserve the environment and its natural capabilities (Najmi & Al-Sayed, 2023). The vision prioritizes reducing pollution, protecting terrestrial and marine environments, and rehabilitating natural areas. It also focuses on improving waste management, energy use efficiency, and developing sustainable environmental policies (Media Center for Saudi Vision 2030, 2016).

Al-Sulami et al. (2022) emphasize the importance of raising environmental awareness among Saudi citizens to achieve the Kingdom's environmental sustainability goals in Vision 2030. The Ministry of Environment, Water, and Agriculture launched an awareness campaign under the slogan "Your Environment is Your Priority" on the "X" platform to promote positive environmental behavior and awareness, aiming to enhance knowledge and understanding of environmental problems and resources (Ministry of Environment, Water, and Agriculture, 2024).

Method

Participants

The study sample consisted of 341 students from Prince Sattam bin Abdulaziz University, including 176 male students and 165 female students. Participants were from both scientific (n = 191) and humanities (n = 150) colleges. The mean age of participants was 20.13 years (SD = 2.34).

Measures

A questionnaire was developed based on the study objectives and questions. It consisted of two main sections: The first one Included 20 items measuring four dimensions of the university's role in promoting environmental sustainability: University administration (5 items), Faculty members (5 items), Curricula (5 items), and Student activities (5 items). However, the second Section Included 10 items assessing ways to enhance the university's role in promoting environmental sustainability.

Responses were measured on a 5-point Likert scale ranging from 1 (very low) to 5 (very high). Demographic information including college, gender, and specialization was also collected.

Validity and Reliability Content validity was established by having 7 faculty members review the questionnaire. Agreement rates ranged from 85% to 100%, indicating good content validity.

Internal consistency was assessed by calculating Pearson correlation coefficients between each item and the total score of its respective dimension, as well as between each dimension and the total score of its section. This was done with a pilot sample of 73 students. All correlation coefficients were statistically significant at $p < 0.01$, ranging from 0.489 to 0.854.

Reliability was assessed using Cronbach's alpha and Guttman's split-half coefficient. The Guttman split-half coefficient was 0.815 and Cronbach's alpha was 0.891, indicating high reliability.

Procedure

After obtaining necessary approvals, the questionnaire was distributed to students at Prince Sattam bin Abdulaziz University. Participation was voluntary and anonymous. Data was collected during the academic year 2023-2024.

Data Analysis

Data was analyzed using IBM SPSS v.23. Descriptive statistics (means, standard deviations, percentages) were calculated. Independent samples t-tests were used to examine differences based on gender and academic specialization. The following criteria were used to interpret mean scores:

Table (1) Criteria for Interpreting Mean Scores

Level	Mean Range	Percentage Range
Very High	≥ 4.2	≥ 84%

High	3.4 - < 4.2	68% - < 84%
Medium	2.6 - < 3.4	52% - < 68%
Low	1.8 - < 2.6	36% - < 52%
Very Low	< 1.8	< 36%

Results

The results of this study provide insights into the role of Prince Sattam bin Abdulaziz University in promoting environmental sustainability among its students in light of Saudi Arabia's Vision 2030. The findings are presented in response to the three main research questions.

Research Question 1: What is the current role of Prince Sattam bin Abdulaziz University in promoting environmental sustainability among students in light of Saudi Arabia's Vision 2030? Table 2 presents the overall results for the four dimensions of the university's role in promoting environmental sustainability.

Table (2) Overall Results for University's Role in Promoting Environmental Sustainability

Dimension	M	SD	Percentage	Level	Rank
University administration	4.32	0.76	87%	Very High	4
Faculty members	4.51	0.63	90%	Very High	1
Curricula	4.44	0.68	89%	Very High	2
Student activities	0.68	0.73	87%	Very High	3
Overall	4.41	0.64	88%	Very High	

To address the first research question regarding the current role of Prince Sattam bin Abdulaziz University in promoting environmental sustainability among students in light of Saudi Arabia's Vision 2030, we analyzed students' responses across four key dimensions: university administration, faculty members, curricula, and student activities. Table 3 presents a comprehensive overview of the findings, detailing the mean scores, standard deviations, percentages, levels, and rankings for each item within these dimensions.

Table (3) The Role of Prince Sattam bin Abdulaziz University in Promoting Environmental Sustainability

Items	M	SD	Percentage	Level	Rank
First Dimension: The Role of University Administration in Promoting Environmental Sustainability					
1. The university holds seminars and scientific meetings aimed at developing environmental awareness.	4.44	0.77	89%	Very High	1
2. The university participates with community institutions in studying environmental problems and providing solutions.	4.43	0.76	89%	Very High	2

Items	M	SD	Percentage	Level	Rank
3. The university encourages rationalization of energy consumption on campus.	4.33	0.96	87%	Very High	3
4. The university issues awareness publications about environmental problems and how to address them.	4.17	1.07	84%	High	5
5. The university participates in initiatives supporting environmental and community sustainability.	4.23	0.96	85%	Very High	4
Overall mean for the first dimension	4.32	0.76	87%	Very High	
Second Dimension: The Role of Faculty Members in Promoting Environmental Sustainability					
6. Faculty members integrate environmental sustainability principles into courses to enhance students' environmental awareness.	4.42	0.85	89%	Very High	1
7. Faculty members encourage their students to prepare research focusing on environmental and sustainability issues.	4.35	0.89	87%	Very High	3
8. Faculty members educate students about global environmental challenges and the importance of sustainable solutions.	4.71	0.57	94%	Very High	5
9. Professors motivate students to think critically and innovatively in addressing environmental problems.	4.58	0.67	92%	Very High	4
10. Faculty members encourage students to participate in environmental and community service.	4.47	0.83	89%	Very High	2
Overall mean for the second dimension	4.51	0.63	90%	Very High	
Third Dimension: The Role of Curricula in Promoting Environmental Sustainability					
11. Courses contribute to involving students in field projects and experiences that enhance their practical understanding of sustainability.	4.56	0.63	91%	Very High	2
12. Courses employ realistic case studies to familiarize students with environmental challenges and innovative solutions that can be applied.	4.59	0.60	92%	Very High	1
13. Some university courses include topics that address environmental issues.	4.42	0.93	89%	Very High	4
14. University courses encourage students to care for and preserve the environment.	4.56	0.78	91%	Very High	3
15. University courses encourage students to participate in addressing environmental problems through research projects focusing on finding local and global environmental solutions.	4.09	1.11	82%		5
Overall mean for the third dimension	4.44	0.68	89%	Very High	
Fourth Dimension: The Role of Student Activities in Promoting Environmental Sustainability					
16. Student activities employ campaigns inside and outside the campus to spread environmental awareness and sustainable practices.	4.26	0.98	85%	Very High	5
17. Student activities encourage participation in initiatives such as afforestation campaigns and recycling within the campus.	4.38	0.76	88%	Very High	2
18. Student activities encourage the implementation of projects such as creating community gardens and improving waste management at the university.	4.33	0.86	87%	Very High	4
19. Student activities provide competitions and scientific activities to develop environmental awareness.	4.48	0.69	90%	Very High	1

Items	M	SD	Percentage	Level	Rank
20. Student activities contribute to clarifying the student's role in preserving the environment and its resources.	4.36	0.86	87%	Very High	3
Overall mean for the fourth dimension	4.36	0.73	87%	Very High	
Overall total for the first axis of the questionnaire	4.41	0.64	88%	Very High	

The analysis of students' responses revealed that all four dimensions of the university's role in promoting environmental sustainability were rated as "Very High" by students. The overall mean across all dimensions was 4.41 (SD = 0.64), indicating a very high level of perceived effectiveness in promoting environmental sustainability. Among the four dimensions, faculty members received the highest rating (M = 4.51, SD = 0.63), followed by curricula (M = 4.44, SD = 0.68), student activities (M = 4.36, SD = 0.73), and university administration (M = 4.32, SD = 0.76).

Within the university administration dimension, students most highly rated the university's effort in holding seminars and scientific meetings aimed at developing environmental awareness (M = 4.44, SD = 0.77). The lowest-rated aspect in this dimension was the university's issuance of awareness publications about environmental problems and how to address them (M = 4.17, SD = 1.07), although this still fell within the "High" range.

Regarding faculty members, students particularly appreciated their role in educating about global environmental challenges and the importance of sustainable solutions (M = 4.71, SD = 0.57). While still rated highly, encouraging students to prepare research focusing on environmental and sustainability issues received the lowest score in this dimension (M = 4.35, SD = 0.89).

In terms of curricula, students highly valued the use of realistic case studies to familiarize them with environmental challenges and innovative solutions (M = 4.59, SD = 0.60). The aspect of encouraging students to participate in addressing environmental problems through research projects received the lowest rating in this dimension (M = 4.09, SD = 1.11), though it was still considered "High".

For student activities, the provision of competitions and scientific activities to develop environmental awareness was most highly rated (M = 4.48, SD = 0.69). The employment of campaigns inside and outside the campus to spread environmental awareness and sustainable practices, while still rated highly, received the lowest score in this dimension (M = 4.26, SD = 0.98).

Research Question 2: What are the ways to enhance Prince Sattam bin Abdulaziz University's role in promoting environmental sustainability from the students' perspective? Table 4 presents the results for ways to enhance the university's role in promoting environmental sustainability.

Table (4) Ways to Enhance University's Role in Promoting Environmental Sustainability

Item	M	SD	Percentage	Level	Rank
1. Develop and integrate specialized courses in environmental sustainability across various academic disciplines	4.34	0.93	87%	Very High	10

Item	M	SD	Percentage	Level	Rank
2. Provide financial and moral support to promote scientific research for students and professors in environmental sustainability	4.56	0.68	91%	Very High	2
3. Launch training programs and workshops focusing on topics such as renewable energy, waste management, and biodiversity conservation, to provide students with practical and applied skills	4.46	0.76	89%	Very High	6
4. Stimulate student environmental activities and encourage students to engage in environmental projects such as afforestation campaigns, recycling, and cleaning natural areas	4.54	0.77	91%	Very High	4
5. Build partnerships with local and international environmental organizations to provide opportunities for students to participate in environmental projects and initiatives outside the campus	4.55	0.70	91%	Very High	3
6. Transform the university campus into a model of sustainability by adopting environmentally friendly practices such as using solar energy, efficient water management, and reducing plastic use	4.38	0.87	88%	Very High	9
7. Provide scholarships and rewards for students who contribute distinctively to environmental sustainability projects, to motivate them to continue working in this field	4.45	0.83	89%	Very High	7
8. Use university media such as websites, newsletters, and social media to disseminate information about environmental issues and the importance of sustainability	4.60	0.61	92%	Very High	1
9. Host conferences and seminars that include environmental experts to exchange knowledge and ideas about best environmental practices and latest developments in the field of sustainability	4.48	0.74	90%	Very High	5
10. Guide graduation projects and research theses towards topics related to environmental sustainability, and provide necessary support for students to implement these projects and achieve tangible results	4.42	0.91	88%	Very High	8
Overall	4.48	0.62	90%	Very High	

Students rated all proposed ways to enhance the university's role in promoting environmental sustainability as "Very High", with mean scores ranging from 4.34 to 4.60. The use of university media such as websites, newsletters, and social media to disseminate information about environmental issues and the importance of sustainability was rated highest (M = 4.60, SD = 0.61). This was followed closely by providing financial and moral support to promote scientific research for students and professors in environmental sustainability (M = 4.56, SD = 0.68) and building partnerships with environmental organizations to provide opportunities for students to participate in environmental projects outside the campus (M = 4.55, SD = 0.70).

While still rated very highly, developing and integrating specialized courses in environmental sustainability across various academic disciplines received the lowest rating among the proposed enhancements (M = 4.34, SD = 0.93). The overall mean for this section was 4.48 (SD = 0.62), indicating strong support for all proposed enhancements.

Research Question 3: Are there significant differences in students' perceptions of the university's role in promoting environmental sustainability based on gender and academic specialization? To address this question, we conducted independent samples t-tests to examine differences based on gender and academic specialization. The results for gender differences are presented in Table 5.

Table (5) Gender Differences in Perceptions of University's Role in Promoting Environmental Sustainability

Dimension	Gender	N	M	SD	Df	t
University administration	Male	176	4.27	0.81	339	1.261*
	Female	165	4.37	0.70		
Faculty members	Male	176	4.48	0.64	339	0.961
	Female	165	4.54	0.61		
Curricula	Male	176	4.45	0.71	339	0.292
	Female	165	4.43	0.64		
Student activities	Male	176	4.36	0.75	339	0.076
	Female	165	4.36	0.71		
Overall	Male	176	4.39	0.69	339	0.550*
	Female	165	4.43	0.60		

Note. *p < .05.

Analysis of gender differences revealed significant variations in perceptions of the university administration dimension (t(339) = 1.261, p = 0.05) and the overall score (t(339) = 0.550, p = 0.05). In both cases, female students provided higher ratings than male students. However, no significant gender differences were found for the other dimensions (faculty members, curricula, and student activities).

Regarding academic specialization, we also conducted independent samples t-tests to examine differences between students from scientific and humanities disciplines. The results are presented in Table 6.

Table (6) Academic Specialization Differences in Perceptions of University's Role in Promoting Environmental Sustainability

Dimension	Specialization	N	M	SD	df	t
University administration	Scientific	191	4.51	0.62	339	5.281**
	Humanities	150	4.08	0.86		
Faculty members	Scientific	191	4.64	0.52	339	4.327**
	Humanities	150	4.34	0.72		

Curricula	Scientific	191	4.54	0.61	339	2.870*
	Humanities	150	4.33	0.73		
Student activities	Scientific	191	4.47	0.70	339	3.190
	Humanities	150	4.22	0.75		
Overall	Scientific	191	4.54	0.55	339	4.264
	Humanities	150	4.24	0.71		

Note. $^{*}p < .05$; $^{**}p < .01$.

Significant differences based on academic specialization were found in three dimensions: university administration ($t(339) = 5.281$, $p < 0.01$), faculty members ($t(339) = 4.327$, $p = 0.01$), and curricula ($t(339) = 2.870$, $p = 0.05$). In all these cases, students from scientific disciplines provided higher ratings than those from humanities disciplines. Interestingly, no significant differences based on academic specialization were found for student activities or the overall score.

These findings provide a comprehensive picture of students' perceptions of Prince Sattam bin Abdulaziz University's role in promoting environmental sustainability. They highlight areas of strength and suggest potential avenues for further enhancement of the university's efforts in this crucial area.

Discussion

This study aimed to examine the role of Prince Sattam bin Abdulaziz University in promoting environmental sustainability among its students in light of Saudi Arabia's Vision 2030. The findings reveal that the university is playing a significant and effective role in enhancing environmental sustainability awareness and practices among students across four key dimensions: faculty members, curricula, student activities, and university administration. These results align with the objectives of Saudi Vision 2030 regarding environmental sustainability and highlight the university's commitment to fostering environmentally conscious graduates.

The study found that all four dimensions of the university's role in promoting environmental sustainability were rated very highly by students, with an overall mean of 4.41 out of 5. This indicates a strong perceived effectiveness of the university's efforts in this area. Among the dimensions, faculty members received the highest rating ($M = 4.51$), followed closely by curricula ($M = 4.44$), student activities ($M = 4.36$), and university administration ($M = 4.32$).

The prominent role of faculty members in promoting environmental sustainability aligns with previous research highlighting the importance of educators in shaping students' environmental awareness and attitudes (Wang et al., 2022). The high rating for faculty members suggests that they are effectively integrating sustainability concepts into their teaching, encouraging critical thinking about environmental issues, and motivating students to engage in sustainability-related

research. This finding underscores the crucial role of faculty in translating institutional sustainability goals into tangible learning outcomes for students.

The strong performance of curricula in promoting environmental sustainability is encouraging and consistent with studies emphasizing the importance of embedding sustainability concepts across academic programs (Saleem et al., 2023). The use of real-world case studies and field projects, which received high ratings from students, indicates an effective approach to making sustainability education practical and relevant. This practical orientation can enhance students' ability to apply sustainability principles in their future careers and personal lives.

The positive evaluation of student activities in promoting environmental sustainability highlights the importance of extracurricular engagement in reinforcing classroom learning. This finding aligns with research showing that hands-on experiences and peer-to-peer learning can significantly enhance environmental awareness and behavior (Asgarova et al., 2023). The university's efforts in organizing competitions, scientific activities, and campaigns to spread environmental awareness appear to be well-received by students and contribute to a holistic approach to sustainability education.

While university administration received the lowest rating among the four dimensions, it was still evaluated very highly by students. This suggests that while there is room for improvement, the university's leadership is perceived as supportive of sustainability initiatives. The emphasis on seminars, scientific meetings, and community engagement in addressing environmental issues indicates a strategic approach to sustainability that extends beyond the classroom.

The study revealed interesting differences in perceptions based on gender and academic specialization. Female students provided significantly higher ratings than male students for the university administration dimension and the overall score. This gender difference could be attributed to several factors, including potentially higher environmental awareness among female students, as noted in some previous studies (e.g., Alsiddiq, 2014; Bani Khalaf & Al-Faheedi, 2023). It may also reflect differences in how female students engage with or perceive university initiatives.

Regarding academic specialization, students from scientific disciplines provided significantly higher ratings than those from humanities disciplines for university administration, faculty members, and curricula dimensions. This finding aligns with some previous research (e.g., Al-Maafa, 2020) and may be explained by the greater focus on environmental and sustainability issues in scientific curricula. Scientific disciplines often involve more direct engagement with environmental concepts and research, potentially leading to a heightened awareness of the university's role in promoting sustainability.

However, the lack of significant differences in perceptions of student activities between scientific and humanities students is noteworthy. This suggests that extracurricular sustainability initiatives are reaching students across disciplines equally, which is a positive indication of the university's inclusive approach to environmental education.

Students' suggestions for enhancing the university's role in promoting environmental sustainability provide valuable insights for future improvements. The high ratings given to all

proposed enhancement strategies indicate strong student support for expanding sustainability initiatives. The top-rated suggestion of using university media for disseminating environmental information highlights the importance of effective communication in promoting sustainability awareness. This aligns with research emphasizing the role of media in shaping environmental attitudes and behaviors (Najmi & Al-Sayed, 2023).

The strong support for financial and moral support for sustainability research, partnerships with environmental organizations, and stimulating student environmental activities underscores the desire for more hands-on, practical engagement with sustainability issues. These suggestions align with best practices in sustainability education that emphasize experiential learning and real-world problem-solving (Rieg et al., 2021).

Conclusion

This study illuminates the significant role of Prince Sattam bin Abdulaziz University in promoting environmental sustainability among its students, aligning with Saudi Arabia's Vision 2030. By addressing identified areas for enhancement and building on existing strengths, the university can further amplify its impact on fostering environmentally conscious graduates. This research contributes valuable insights to the broader discourse on sustainability in higher education, offering actionable recommendations for educators, policymakers, and institutions committed to advancing sustainable practices and environmental awareness in the context of national development goals.

While this study provides valuable insights, it has some limitations that should be addressed in future research. The cross-sectional nature of the study limits our ability to assess changes in students' perceptions over time. Longitudinal studies could provide a more comprehensive understanding of how the university's sustainability initiatives impact students throughout their academic careers.

Additionally, while the study captured students' perceptions, it did not directly measure their environmental knowledge, attitudes, or behaviors. Future research could incorporate these measures to assess the actual impact of the university's sustainability initiatives on students' environmental competencies.

Furthermore, the study focused on a single institution. Comparative studies across multiple Saudi universities could provide a broader perspective on the implementation of sustainability education in the context of Vision 2030.

The study suggests that Prince Sattam bin Abdulaziz University should focus on enhancing its role in promoting environmental sustainability. It suggests leveraging faculty expertise, enhancing curriculum integration, expanding student activities, strengthening administrative support, addressing gender differences, and bridging the gap between disciplines. Faculty members' high ratings suggest that the university should continue to develop their capacity in sustainability education. The study also suggests expanding student activities to further engage students with environmental issues. The university should also investigate gender differences in perceptions and ensure sustainability initiatives are equally engaging for all students.

Funding:

The authors extend their appreciation to Prince Sattam bin Abdulaziz University for funding this research work through the project number (PSAU/ 2024/02/29507)"

Acknowledgment:

The authors extend their appreciation to the Deanship of Scientific Research at Prince Sattam bin Abdulaziz University for supporting this project number (PSAU/ 2024/02/29507)"

Conflicts of Interest

The authors declare no conflict of interest.

Authorship and Level of Contribution

All authors contributed to the research of the literature, collection of data, analysis, and interpretation of the collected data.

WORKS CITED

Al-Dafrawi, N. (2019). A proposed course in sustainable environmental development based on environmental awareness activities to develop environmental awareness among science teacher students in faculties of education. Journal of the Faculty of Education, Alexandria University, 29(2), 131-191. https://search.mandumah.com/Record/1119224

Al-Hajji, S. H. (2017). A proposed vision for practicing social responsibility at King Faisal University. Journal of Education, Al-Azhar University, 176(2), 522-611. https://doi.org/10.21608/JSREP.2017.7569

Al-Maafa, M. Y. (2020). The role of the university in developing environmental awareness among Najran University students. Journal of the Association of Arab Universities for Research in Higher Education, 40(4), 113-136. http://search.mandumah.com/Record/1105649

Almudara, S. B., El-Gammal, M., Ali, M., Abdellatif, M. S., Elshazly, A. I., Ibrahim, S., & Al-Rashidi, A. (2023). The impact of training on digital citizenship skills in developing students' attitudes towards sustainable development at the university level. Research Journal in Advanced Humanities, 5(3), 78-99. https://doi.org/10.58256/8jrvr939

Al-Najjar, F. K. (2019). The effect of a training program on sustainable development practices on developing awareness of environmental problems and volunteer work skills for female students at Sattam bin Abdulaziz University. Journal of Educational and Psychological Sciences, 3(2), 52-78. DOI: https://doi.org/10.26389/AJSRP.F130918

AlNemer, A. (2024). Examining the Kingdom of Saudi Arabia's Tourism Sector and Assessing Its Potential Contributions in Achieving the Kingdom's Vision 2030 (Publication No. 31331279) [Doctoral dissertation, Pepperdine University]. Retrieved from https://www.proquest.com/openview/74b335

Al-Otaibi, A. (2022). The role of Saudi universities in developing environmental awareness among students and its relationship to their level of awareness of sustainable development. Shaqra University Journal for Humanities and Administrative Sciences, 9(1), 351-384. https://search.mandumah.com/Record/1285866

Al-Otaibi, M. (2015). Contribution of Najran University to sustainable development from the perspective of academic and administrative leaders at the university. Journal of Educational and Psychological Sciences, 8(3), 953-1002. https://doi.org/10.12816/0031509

Al-Rashidi, A. (2016). The role of strategic management in achieving sustainable administrative development in Saudi universities [Unpublished doctoral dissertation]. Naif Arab University for Security Sciences.

Al-Sayed, M. A. (2021). A proposed strategy to enhance the responsibility of Saudi universities towards environmental sustainability. Journal of Education, 189(3), 199-242. https://doi.org/10.21608/JSREP.2021.165755

Alsiddiq, F. M. (2014). Attitudes towards the environment among Khartoum University students in light of some educational variables. Specialized International Educational Journal, 3(8), 90-112. http://search.mandumah.com/Record/843140

Al-Sulami, A., Al-Otaibi, F., Al-Radhi, L., & Naji, A. (2022). The absence of environmental awareness in the Kingdom of Saudi Arabia and its impact on green marketing in light of the Kingdom's Vision 2030. Arab Journal of Science and Research Publishing, 6(4), 1-23. https://doi.org/10.26389/AJSRP.J240721

Amaral, L. P., Martins, N., & Gouveia, J. B. (2015). Quest for a sustainable university: a review. International Journal of Sustainability in Higher Education, 16(2), 155-172. https://doi.org/10.1108/IJSHE-02-2013-0017

Asgarova, R., Macaskill, A. and Abrahamse, W. (2023). Authentic assessment targeting sustainability outcomes: a case study exploring student perceptions. International Journal of Sustainability in Higher Education, 24(1), 28-45. https://doi.org/10.1108/IJSHE-07 2021-0266.

Bani Khalaf, H. A., & Al-Faheedi, H. O. (2023). Attitudes of students of the Faculty of Science and Arts in Sharurah towards the environment and the role of the college in developing them. Afaq Journal for Sciences, 8(1), 193-211. http://search.mandumah.com/Record/1348846

Bataeineh, M., & Aga, O. (2023). Integrating sustainability into higher education curricula: Saudi Vision 2030. Emerald Open Research, 1(3), 1-13. https://doi.org/10.1108/EOR-03-2023-0014

Blaique, L., Nazmy, P., Aldabbas, H., & Corbin, T. (2023). Understanding Social Responsibility Awareness Among University Students. Journal of Law and Sustainable Development, 11(11), e1644-e1644. https://doi.org/10.55908/sdgs.v11i11.1644

Buckler, C., & Creech, H. (2014). Shaping the future we want: UN Decade of Education for Sustainable Development; final report. UNESCO. Retrieved from https://www.google.com/books

Cavagnaro, E., & Curiel, G. H. (2022). The three levels of sustainability. Routledge. https://doi.org/10.4324/9781003155614

Dagiliūtė, R., & Liobikienė, G. (2015). University contributions to environmental sustainability: challenges and opportunities from the Lithuanian case. Journal of Cleaner Production, 108, 891-899. https://doi.org/10.1016/j.jclepro.2015.07.015

Dagiliūtė, R., Liobikienė, G., & Minelgaitė, A. (2018). Sustainability at universities: Students' perceptions from Green and Non-Green universities. Journal of Cleaner Production, 181, 473–482. https://doi.org/10.1016/j.jclepro.2018.01.213

Elbably, Y., & Nemt-allah, M. (2024). A Mindfulness-Based Intervention on Verbal Insight and Social Problem-Solving in University Students. Journal of Palestine Ahliya University for Research and Studies, 3(1), 164-177. https://doi.org/10.59994/pau.2024.1.164

Elimam, H. (2022). Environmental problems and development sustainability in light of the kingdom's 2030 vision: opportunities and challenges. International Journal of Education and Social Science, 9(1), 2410-5171. Retrieved from https://ijessnet.com/wp-content/uploads/2022/10/4-20.pdf

Filho, W. L., Shiel, C., & Paço, A. D. (2015). Integrative approaches to environmental sustainability at universities: an overview of challenges and priorities. Journal of Integrative Environmental Sciences, 12(1), 1-14. https://doi.org/10.1080/1943815X.2014.988273

Giesenbauer, B., & Müller-Christ, G. (2020). University 4.0: Promoting the transformation of higher education institutions toward sustainable development. Sustainability, 12(8), Article 3371. https://doi.org/10.3390/su12083371

Glavič, P. (2020). Identifying key issues of education for sustainable development. Sustainability, 12(16), Article 6500. https://doi.org/10.3390/su12166500

Hajian, M., & Kashani, S. J. (2021). Evolution of the concept of sustainability. From Brundtland Report to sustainable development goals. In Sustainable resource management (pp. 1-24). Elsevier. https://doi.org/10.1016/B978-0-12-824342-8.00018-3

Holden, E., Linnerud, K., & Banister, D. (2014). Sustainable development: Our Common Future revisited. Global Environmental Change, 26, 130–139. https://doi.org/10.1016/j.gloenvcha.2014.04.006

Islam, M. (2022). Threats to humanity from climate change. In S. Bandh, (Ed.), Climate Change: The Social and Scientific Construct (pp. 21-36). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-86290-9_2

Kioupi, V., & Voulvoulis, N. (2022). The contribution of higher education to sustainability: the development and assessment of sustainability competences in a university case study. Education Sciences, 12(6), Article 406. https://doi.org/10.3390/educsci12060406

Maartensson, H., & Loi, N. M. (2022). Exploring the relationships between risk perception, behavioural willingness, and constructive hope in pro-environmental behaviour. Environmental Education Research, 28(4), 600-613. https://doi.org/10.1080/13504622.2021.2015295

Media Center for Saudi Vision 2030 (2016). National Transformation Program 2020. Available at http://vision2030.gov.sa/ar/media-center

Menon, S., & Suresh, M. (2020). Synergizing education, research, campus operations, and community engagements towards sustainability in higher education: A literature review. International Journal of Sustainability in Higher Education, 21(5), 1015-1051. https://doi.org/10.1108/IJSHE-03-2020-0089

Meseguer-Sánchez, V., Abad-Segura, E., Belmonte-Ureña, L. J., & Molina-Moreno, V. (2020). Examining the research evolution on the socio-economic and environmental dimensions on university social responsibility. International Journal of Environmental Research and Public Health, 17(13), Article 4729. https://doi.org/10.3390/ijerph17134729

Meyfroidt, P., De Bremond, A., Ryan, C. M., Archer, E., Aspinall, R., Chhabra, A., ... & Zu Ermgassen, E. K. (2022). Ten facts about land systems for sustainability. Proceedings of the National Academy of Sciences, 119(7), Article e2109217118. https://doi.org/10.1073/pnas.2109217118

Ministry of Environment, Water, and Agriculture. (2024). "Your Environment is Your Priority" initiative. Available at https://www.spa.gov.sa/N2022990

Najmi, A. H., & Al-Sayed, M. A. (2023). A proposed concept for developing Tabuk University's responsibilities towards environmental sustainability in light of global experiences. Journal of the Faculty of Education, Tanta University, 89(1), 965-1008. http://search.mandumah.com/Record/1383403

Nemt-allah, M., & Darwesh, A. (2024). Fostering Flexible Minds: The Effect of Probing Questions in Enhancing Divergent Thinking in Geography. Journal of Palestine Ahliya University for Research and Studies, 3(2), 45-57. https://doi.org/10.59994/pau.2024.2.45

Price, E. A., White, R. M., Mori, K., Longhurst, J., Baughan, P., Hayles, C. S., ... & Preist, C. (2021). Supporting the role of universities in leading individual and societal transformation through education for sustainable development. Discover Sustainability, 2(1), 49. https://doi.org/10.1007/s43621-021-00058-3

Probst, L., Bardach, L., Kamusingize, D., Templer, N., Ogwali, H., Owamani, A., ... & Adugna, B. T. (2019). A transformative university learning experience contributes to sustainability attitudes, skills and agency. Journal of Cleaner Production, 232, 648-656. https://doi.org/10.1016/j.jclepro.2019.05.395

Rieg, N. A., Gatersleben, B., & Christie, I. (2021). Organizational change management for sustainability in higher education institutions: A systematic quantitative literature review. Sustainability, 13(13), Article 7299. https://doi.org/10.3390/su13137299

Safahi, I. (2021). Environmental protection in the Kingdom of Saudi Arabia according to Vision 2030. Journal of the Faculty of Sharia and Law in Tafhna, (23), 2609-2652. https://doi.org/10.21608/jfslt.2021.217914

Saleem, A., Aslam, S., Sang, G., Dare, P.S. and Zhang, T. (2023). Education for sustainable development and sustainability consciousness: evidence from Malaysian universities. International Journal of Sustainability in Higher Education, 24(1), 193 211. https://doi.org/10.1108/IJSHE-05-2021-0198.

Smaniotto, C., Battistella, C., Brunelli, L., Ruscio, E., Agodi, A., Auxilia, F., Baccolini, V., Gelatti, U., Odone, A., Prato, R., Tardivo, S., Voglino, G., Valent, F., Brusaferro, S., Balzarini, F., Barchitta, M., Carli, A., Castelli, F., Coppola, C., ... Iannelli, G. (2020). Sustainable Development Goals and 2030 Agenda: Awareness, knowledge and attitudes in nine Italian universities, 2019. International Journal of Environmental Research and Public Health, 17(23), 8968. https://doi.org/10.3390/ijerph17238968

Stoian, C. E., Șimon, S., & Gherheș, V. (2021). A comparative analysis of the use of the concept of sustainability in the Romanian top universities' Strategic Plans. Sustainability, 13(19), Article 10642. Retrieved from https://journal.unnes.ac.id/nju/index/index

Sustiyatik, E., Jauhari, T., & Gupta, S. (2023). Dynamics of Economic Management in the Context of Non-Formal Education: An Analysis of Resource Management for the Sustainability of Education Programs. Journal of Nonformal Education, 9(2), 207-216. Retrieved from https://journal.unnes.ac.id/nju/index/index

UI Green Metric World University Ranking (2022). Available at: http://greenmetric.ui.ac.id

Uralovich, K. S., Toshmamatovich, T. U., Kubayevich, K. F., Sapaev, I. B., Saylaubaevna, S. S., Beknazarova, Z. F., & Khurramov, A. (2023). A primary factor in sustainable development and environmental sustainability is environmental education. Caspian Journal of Environmental Sciences, 21(4), 965-975. https://doi.org/10.22124/CJES.2023.7155

Wang, Y., Sommier, M. and Vasques, A. (2022), "Sustainability education at higher education institutions: pedagogies and students' competences", International Journal of Sustainability in Higher Education, 23(8), 174-193. https://doi.org/10.1108/IJSHE-11-2021 0465

Žalėnienė, I., & Pereira, P. (2021). Higher education for sustainability: A global perspective. Geography and Sustainability, 2(2), 99–106. https://doi.org/10.1016/j.geosus.2021.05.001