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Green Technology Innovations: Awareness, Attitude and Practice of University Students

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Abstract: Background: Increasing concern over environmental conditions has led to a constant focus on green technology innovation. It is anticipated to have a dual beneficial effect on the economy and the environment by improving technology and lessening environmental stress. **Purpose**: This study was conducted to assess university students' awareness, attitudes, and practices regarding green technology innovations. **Design**: Descriptive correlational research design was utilized to achieve the purpose of the study. **Setting**: This study was conducted at the Faculty of Nursing and Faculty of Arts in Shebin Elkom city, Menoufia University, Egypt. Methodology: **Sample**: Systematic random sample consisted of 400 university students from its four grades of both selected scientific and literary faculties. **Instruments**: Involved 1. Self-administered structured questionnaires that included students' socio-demographic characteristics and sources of knowledge about green technology innovation; 2. Students' awareness questionnaires about green technology innovations; 3. Students' attitude scale about green technology innovations; and 4. Students' reported practice scale about green technology innovations. **Results**: The main findings revealed that more than half of the participating university students (57%) had a fair awareness about green technology innovations, while 41.5% had a poor awareness, and only 1.5% had a good awareness. Majority of the students (86.5%) had a positive attitude toward green technology innovations. About half of the students had moderate practice (49.7%), as well as about half of them had a high practice (49.3%) toward green technology innovations. **Conclusions**: More than half of the university students in the study had a fair awareness toward green technology innovations, while majority of them had a positive attitude, and about half of them had a moderate practice as well as about half had a high practice toward green technology innovations. **Recommendation**: Awareness campaigns and workshops should be developed to provide university students with the necessary knowledge, attitudes, and practice regarding green technology to increase awareness and encourage them to adopt green technology.

Keywords: *Attitude, Awareness, Green technology, Practice, University students*

Introduction

Green technology innovation is seen as the optimal solution in addressing most of the environmental issues affecting our society today. Green technology innovation is any technology that promotes environmental sustainability through creating eco-friendly products, utilizing energy efficiently, waste reduction, hazardous material reduction, resource conservation, and renewable energy sources (Liu & Liang, 2024).

Green technology (GT) also known as environmental technology or clean technology, is to support innovative technological products and processes that will help the earth regain its health and reduce reliance on traditional non-renewable energy sources like fossil fuels. The main objective is to create innovative technologies that don't damage the environment, which should benefit people, wildlife, and human health (Chukwurah et al., 2024).

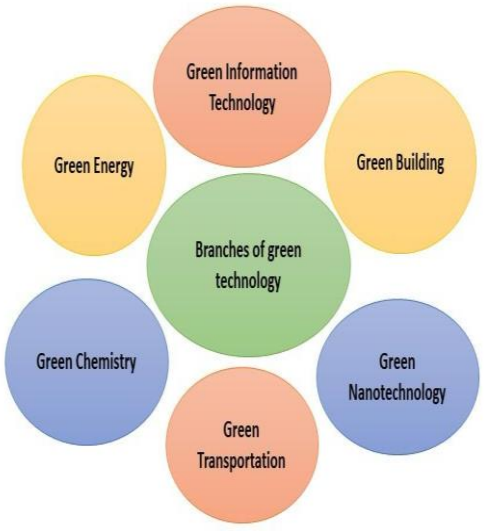
The important goals of GT are to, reduce fuels, waste, energy consumption, etc.; recycle of paper, plastic, cans, batteries, clothing, etc.; refuse the use of plastic bags; renewing energy such as wind power, water power, solar energy, bio-fuel, waste water and take responsibility of maintaining the beauty of the nature by not harming the environment (Bhosale et al., 2020) figure [1].

Figure (1): Goals of green technology

Adopted from Bhosale, M. V. S., Pujari, M. V., & Jagtap, M. R. (2020, February). Green Technology. In NATIONAL SEMINAR.

Branches or sections under the green technology field including green information technology, green building, green nanotechnology, green transportation, green chemistry and green energy (Nazir, 2021).

Figure (2): Branches of green technology



Adopted from Nazir, (2021). Development of green technology from the past to the future development: a systematic literature review. Systematic Literature Review and Meta-**Analysis Journal, 2(1), 25–37.** https://doi.org/10.54480/slrm.v2i1.13

Higher education institutions play a crucial role in teaching students and fostering a sense of responsibility for environmental health. As they assume important roles in teaching sustainable development, students will be expected to make decisions that will attain sustainability because they are the leaders of tomorrow (Maatallah et al., 2024).

Empowering students and increasing their awareness and knowledge of sustainability and GT are pivotal in fostering education for sustainable development and building a sustainable future. Universities and authorities should give sustainable education and awareness-raising projects top priority in order to ensure a more sustainable future. Education is required in order to raise awareness about GT (Polas, 2023: Chou & Wang, 2024).

Researchers showed that a good attitude results in behavioral intention from the standpoint of pro-environmental behavior. Also, acquiring knowledge will change our attitude toward things and other people. In turn, practices will predict our attitudes, and attitude can predict practices (Bechler et al., 2021).

Attitude, therefore, is a key driver in determining whether an individual engages in environmentally responsible behaviors, such as recycling or reducing waste. Moreover, research has demonstrated that people who have a favorable attitude toward pro-environmental issues are more likely to engage in activities and actions that are beneficial to the environment (Valenzuela-Fernández et al., 2023).

Students who are thought to be the future leaders of the nation. It is necessary to educate them on the significance of sustainable development, particularly with regard to the practice of GT (Yusof et al., 2023). Environmental concern and green initiatives at universities are crucial in fostering pro-environmental behavior by motivating students to practice sustainable development through water and energy conservation, sustainable transportation, waste separation, and social development (Roy, 2023; Ribeiro et al., 2021).

Nurses play a crucial role in environmental protection. Nurses' knowledge and awareness of environmental issues are important for protecting and improving health (Kallio et al., 2020).

Significance of the study

Green technology is a significant parameter in attaining regional and international sustainable development goals (Ahmad et al., 2023; Söderholm & Pettersson, 2025). Creating a younger generation with a high level of environmental consciousness is considered crucial, particularly among students, as environmental challenges are perceived to be on the rise among this generation, along with a lack of awareness and a negative attitude (Uddin, 2024).

Purpose of the study:

The purpose of the study was to assess university students' awareness, attitudes, and practices regarding green technology innovations.

Research questions:

1) What's the awareness level of university students regarding green technology innovations?
2) What's the attitude level of university students regarding green technology innovations?
3) What's the practice level of university students regarding green technology innovations?
4) Is there a relationship between demographic characteristics of university students and their awareness, attitude and practice regarding green technology innovations?

Subjects and Method

Design:

Descriptive correlational research design was utilized.

Setting:

This study was conducted at two randomly chosen faculties out of twenty faculties in Shebin Elkom City, Menoufia Governorate, Egypt. It includes the Faculty of Nursing out of twelve scientific faculties and the Faculty of Arts out of eight literary faculties.

Research sample:

Systematic random sample consisted of 400 university students from its four grades of both selected scientific and literary faculties.

Sample size technique:

In order to calculate the sample size required. The university contains 20 faculties: twelve scientific and eight literary. Multistage random sampling was used: firstly, one scientific faculty was selected out of twelve scientific faculties, and one literary faculty out of eight literary faculties in Menoufia University. Faculty of Nursing was selected randomly as a representative of the scientific faculties and it has 3600 university students. Faculty of Arts was selected randomly as a representative of the literary faculties and it has 14000 university students. To choose the university students who agree to participate in the current study (second stage sampling), the Epi website (Open-Source Statistics for Public Health) was used.

As pointed out by Epi website (Open Source Statistics for Public Health): http://www.openepi.com/SampleSize/SSCohort.htm (reviewed on 8th August, 2023).

Sample size equation was:

Sample size n = **[DEFF*Np (1-p)]/**

[(d^2/$Z^2_{1-\alpha/2}$*(N-1) +p*(1-p)]

The 95% confidence intervals, with a sample size of 392 participants was used. It was approximated to 400 students as current study sample size. The distribution of the total sample size will be done through disproportional allocation sets. The sample size in each selected faculty to be 200 university students, who will be selected randomly from its four grades (100 students from each of first and second grades and 100 students from the third and fourth grades).

Instruments for data collection:

Instrument I: - A self-administered questionnaire:

It was developed by the researcher based on reviewing of the related

literatures (Chik et al., 2017; Hussin & Hafit, 2018; Yusof et al., 2023) to assess socio-demographic characteristics of university students and included the following:

- **Part I: - Students' socio-demographic characteristics**: - It included age, gender, type of faculty, academic year, and residence.
- **Part II: - Sources of knowledge about green technology innovation**: - It included various choices as TV and radio; social media and internet; relatives, friends and neighbors; institutions of learning as well as books, newspapers and magazines and the response of each question was in the form of yes or no.

Instrument II: - Students' awareness questionnaire about green technology innovations:

The questionnaire was developed by the researcher based on reviewing of the related literatures (Chik et al., 2017; Hussin & Hafit, 2018; Mohammed, 2021; Yusof et al., 2023) to assess university students' awareness about green technology innovations. It consisted of fifty-four items, four items about concept of green technology, five items about goals, seven items about benefits, four items about challenges facing the use of green technology, four items about impact of green technology, seven items about types of green technology, four items about parties responsible for protecting the environment, two items about green technology initiatives in Egypt, nine items about green technology innovations and eight items about role of every individual toward green technology to improve environmental health.

Scoring system:

The response of these questions was in a form of yes (aware) or no (not aware). The correct response scored one and incorrect response scored zero. The overall score of awareness was 54 points. Awareness was categorized into three levels as good awareness when the student achieved > 75 % of the total score, fair awareness when the student achieved from 50 to 75 % of the total score and poor awareness when the student achieved ≤ 50 % of the total score.

Reliability was applied by the researcher for testing internal consistency of its questions. Test-retest reliability was done using 40 students during pilot study with two weeks apart between them and correlation coefficient (Cronbach's alpha) was calculated between the two scores. The Cronbach's alpha coefficient test for awareness was 0.84 that indicated the tool was reliable.

Instrument III: - Students' attitude scale about green technology innovations:

The scale originally developed by Yusof et al., (2023), was adapted and expanded by researcher to assess students' attitude regarding green technology innovations. It included nine item instead of five item such as respect the environment, support environmental campaigns, willing to pay more to buy environmentally friendly products, inform the nearest

environmental organization/government agency if there is an environmental problem, support the sale of green technology products, make sure all electrical appliances are turned off before leaving the place and after, etc.

Scoring system:

Each item was ranked on a 5-point Likert scale, with numerical values ranging from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The overall score of attitude is 45 points. Higher values were reflected a more positive attitude when the student achieved ≥ 80 % of the total score and lower values were reflected negative attitude when the student achieved < 80 % of the total score.

Reliability of the instrument, Cronbach's alpha coefficient was 0.89 that indicated the tool was reliable.

Instrument IV: - Students' reported practice scale about green technology innovations:

The scale originally developed by Yusof et al., (2023), was adapted and expanded by researcher to assess students' reported practice regarding green technology innovations. It included nineteen item instead of eight item such as reuse the unprinted part of the paper for other uses, use a reusable water bottle, buy items that are recyclable or made from recycled materials, separate the waste into the categories of paper, plastic, bottles, and cans for recycling purposes, practice recycling at home and outdoors, turn off the lights before leaving a room , turn off the water tape after use, use sleep mode on the personal computer if it is not in use , use the stairs to get to another floor, etc.

Scoring system:

Each item was ranked on a 5-point Likert scale, with numerical values ranging from 1 to 5 (1= never, 2= rarely, 3= sometimes, 4= often, 5= always). The overall score of practice is 95 points. Practice was categorized into three levels as high practice when the student achieved > 75 % of the total score, moderate practice when the student achieved from 51 to 75 % of the total score and low practice when the student achieved ≤ 50 % of the total score.

Reliability of the instrument, Cronbach's alpha coefficient was 0.89 that indicated the tool was reliable.

Validity of the instruments: -

Validity of four instruments were tested for its content by a jury of three experts in the field of Family and Community Health Nursing and Community Medicine to ascertain relevance and completeness, suggestions were incorporated into the instruments.

Pilot study: -

A pilot study conducted on 10 % of the total sample (40 students) to test the feasibility, applicability of the instruments. The sample of the pilot study was not included in the total sample to assure the stability of result.

Ethical considerations: -

The study was approved by the Ethical and Research Committee of the Faculty of Nursing, Menoufia

University (No. 975). A written consent was obtained from all students to share in the study. They were assured about confidentiality and anonymity of the collected data. Also, the purpose of the study was clarified for the students by the researcher.

Procedure for data collection: -

- Study period for data collection was extended from February to end of April, 2024.
- An official permission that was obtained from the Deans of both study settings Faculty of nursing and the Faculty of Arts.
- The researcher was introducing herself and explain the purpose and nature of the study to all participate university students.
- Interviewing all university students at their faculties, on two days/week from the 10:00AM to 1:00 PM. About 25students per day until cover the needed sample size.
- Self -administered questionnaire was distributed to the participated students who were present at the time of interview to assess awareness, attitude and practice about green technology innovations. Questionnaire took about 20-30 minutes to be answered.

Statistical Analysis: -

The data collected were tabulated & analysed by SPSS statistical package version 26 on IBM compatible computer and open Source Epidemiologic Statistics for Public Health version 3.01. Two types of statistics were done:

- **Descriptive statistics**: Data were expressed number and percentage (No. & %) for qualitative data and mean& SD for quantitative data.
- **Analytic statistics**: Normal distribution was assessed by performing the normality tests such as Shapiro– Wilk test and Kolmogorov-Smirnov test, One-way analysis of variance (ANOVA) test was done to compare quantitative normally distributed variables, Student t-test (t): was used to study association between two quantitative variables, and Pearson Chi-squared test ($\chi 2$): was used to study association between two qualitative variables.
  - P value <0.05 was set to be statistically significant

Results

Table (1) shows that 68.8% of the participated university students aged between 20-22 years with a mean age of 20.5±1.2 years. Also, 50.7% of them are male, 48.8% of them are from rural area. Each 25% of them are from a different academic year (1st, 2nd, 3rd, and 4th). Moreover, 50% from faculty of Nursing and 50% from Faculty of Arts.

Figure (3) shows that 81.8% of the university students have their knowledge about GT innovation from social media and internet, 62.3% from TV and radio, 35.3% from relatives, friends, and neighbours, 32.5% from institution of learning and 24.5% from books, newspapers, and magazine.

Table (2) shows that the mean score of some aspects of students' awareness about green technology innovations as concept of green technology is (1.74±1.08), types of green technology are 3.00±1.47, green technology

initiatives in Egypt are 0.72±0.73, as well as top green technology innovations examples are 3.68±1.51. Also, the mean total score of students' awareness aspects about green technology innovations students is 28.1±5.79.

Table (3) shows that 57% of the participated university students have fair awareness about GT innovations while 41.5% have poor awareness and while only 1.5% have good awareness.

Table (4) shows that the most of studied university students agree and strongly agree to respect the environment (98.2%), support environmental campaigns (95%), be willing to pay more to buy environmentally friendly products (86.2%), and inform the nearest environmental government agency if there is an environmental problem (93.2%).

Figure (4) shows that 86.5% of the students have a positive attitude toward GT innovations while 13.5% have a negative attitude.

Figure (5) shows that 49.3% of the university students have high practice toward GT innovations while 49.7% have moderate practice and only one percent have low practice.

Table (5) shows that female students have a higher mean score awareness about GT innovation (28.8±5.4) compared to male students (27.3±6.1), and the difference is significant statistically ($p < 0.001$). Moreover, students who are in the 4th academic year have a higher mean score awareness about GT innovation (32.9±4.3) compared to students in 1st academic year and the difference is significant statistically ($p < 0.001$).

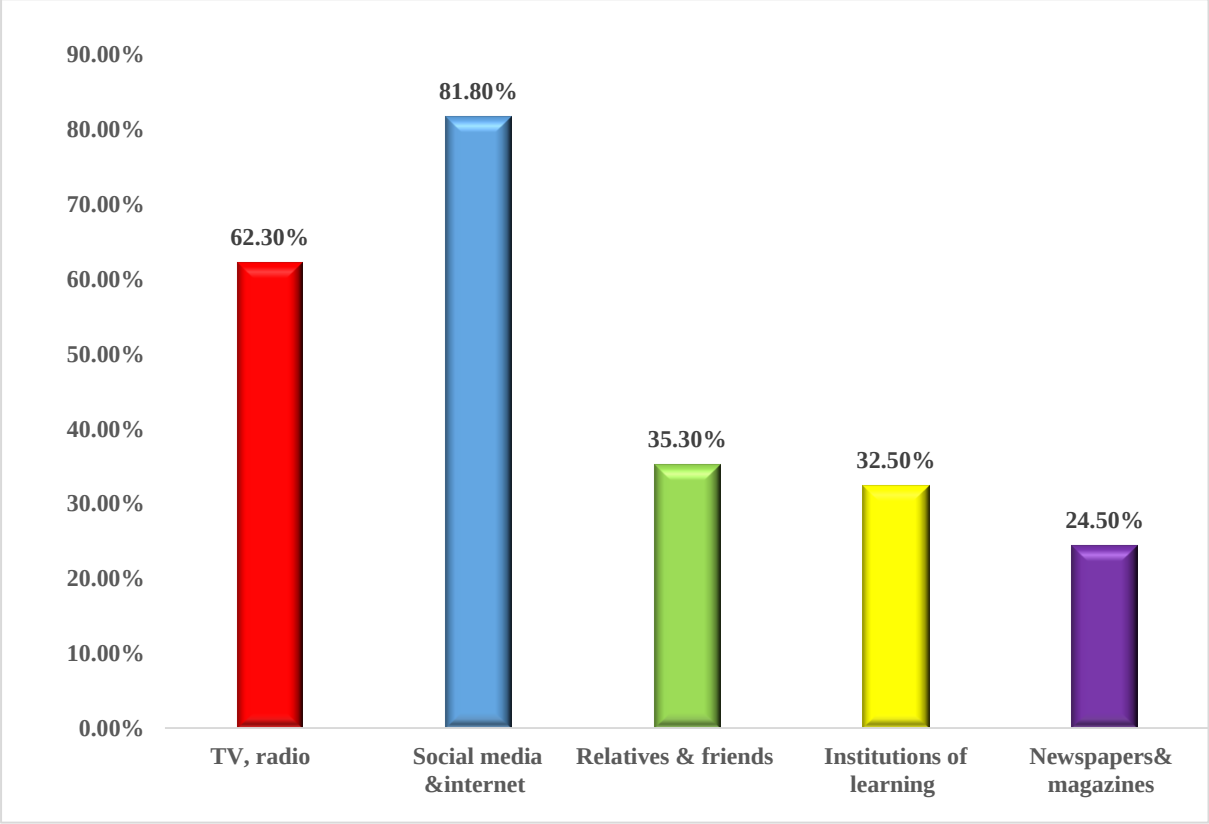
Table (6) shows that there is no statistically significant relation between mean scores of attitude toward GT innovations and demographic data of university students as age, sex, residence, academic year and the faculty name ($p > 0.05$).

Table (7) shows that university students who are in the 2th academic year have a higher mean score practice about GT innovation (72.7±7.6) compared to university students in 3rd academic year (68.4±4.6), and the difference is significant statistically ($p < 0.001$). Also, university students from Faculty of Nursing have a higher mean score practice about GT innovation (70.8±6.4) compared to university students from Faculty of Arts (69.5±6.3), and the difference is significant statistically ($p = 0.043$).

Table (1): Distribution of demographic characteristics of the university students (n=400)

Demographic characteristics of the university students		No.	%
Age (years)	**<20**	110	27.4
	20-22	275	68.8
	>22	15	3.8
Mean± SD		**20.5±1.2 years**	
Sex	**Male**	203	50.7
	Female	197	49.3
Residence	**Rural**	195	48.8
	Urban	205	51.2
Academic year	**1st**	100	25
	2nd	100	25
	3rd	100	25
	4th	100	25
Faculty name	**Nursing**	200	50
	Arts	200	50

Figure (3) Distribution of sources of university student's knowledge about green technology innovation (n=400)



Answer research question No. 1

What's the awareness level of university students regarding green technology innovations?

Table (2): Distribution of mean score of the university students' awareness aspects about green technology innovations (n=400)

Mean score of the university students' awareness aspects about green technology innovations	Mean ±SD
Concept of green technology (4 score)	1.74±1.08
Goals of green technology (5 score)	2.61±1.33
Benefits of green technology (7 score)	3.85±1.76
Challenges facing the use of green technology (4 score)	2.18±1.03
Impact of green technology (4 score)	2.61±1.25
Types of green technology (7 score)	3.00±1.47
Parties responsible for protecting the environment (4 score)	2.12±1.01
Green technology initiatives in Egypt (2 score)	0.72±0.73
Top green technology innovations examples (9 score)	3.68±1.51
Role of every individual toward green technology to improve environmental health (8 score)	5.54±1.53
Total mean score awareness (54 score)	**28.1±5.79**

SD: standard deviation.

Table (3): Distribution of the awareness level of university students about green technology innovation (n=400)

Awareness level of university students about green technology innovation	No.	%
Good awareness: > 75%	6	1.5
Fair awareness :51-75 %	228	57
Poor awareness: ≤50%	166	41.5

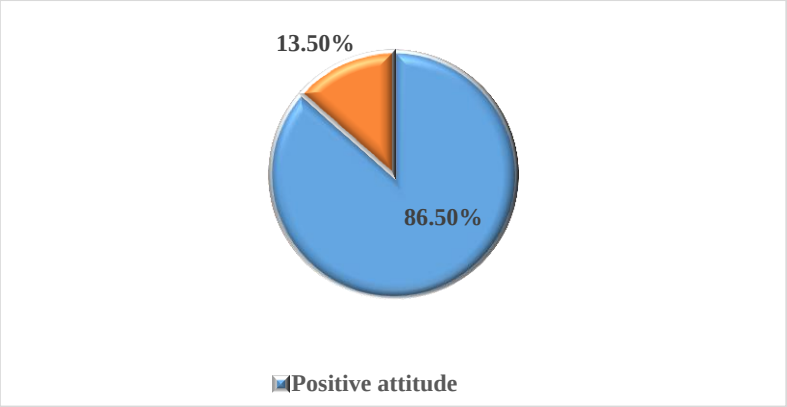
Answer research question No. 2

What's the attitude level of university students regarding green technology innovations?

Table (4): Distribution of university students' attitude about green technology innovations (n=400)

University students' attitude about green technology innovations	Strongly Disagree		Dis Agree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%
1. I respect the environment	0	0	0	0	7	1.8	211	52.8	182	45.4
2. I support environmental campaigns	2	0.5	0	0	18	4.5	276	69	104	26
3. I am willing to pay more to buy environmentally friendly products	3	0.8	0	0	52	13	264	66	81	20.2
4. I will inform the nearest environmental organization /government agency if there is an environmental problem	1	0.3	0	0	26	6.5	309	77.2	64	16
5. I consider the electricity bill that is paid monthly to reduce my electricity consumption	0	0	0	0	25	6.3	298	74.5	77	19.3
6. I make sure every product I used does not harm the environment	0	0	0	0	24	6	302	75.5	74	18.5
7. I support the sale of green technology products	0	0	0	0	40	10	297	74.3	63	15.8
8. I make sure all electrical appliances are turned off before leaving the place and after use	0	0	0	0	8	2	256	64	136	34
9. I make sure the water tap is turned off after use	0	0	0	0	9	2.3	254	63.5	137	34.2

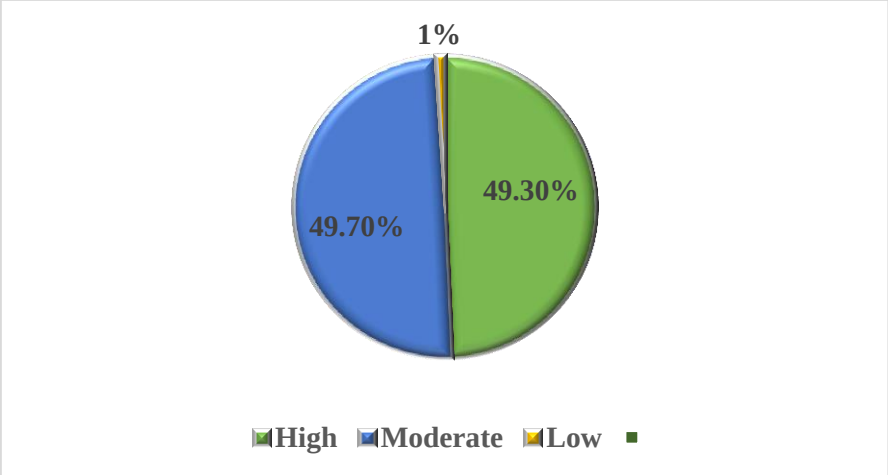
Figure (4) Distribution of the attitude level of university students about green technology innovation (n=400)



Answer research question No. 3

What's the practice level of university students regarding green technology innovations?

Figure (5): Distribution of university students' reported practice level about green technology innovations (n=400)



Answer research question No. 4

Is there a relationship between demographic characteristics of university students and their awareness, attitude and practice regarding green technology innovations?

Table (5): Distribution of the university students' demographic data in relation to mean scores of awareness toward green technology innovations (n=400)

University students' demographic data		Awareness of GT	Test of significance	P-value
		Mean± SD		
Age (years)	**<20**	21.2±3.3	F=232.7	**P<0.001***
	20-22	30.4±3.9		
	>22	34.1±6.7		
Sex	**Male**	27.3±6.1	t=2.68	**P=0.007***
	Female	28.8±5.4		
Residence	**Rural**	29.2±5.5	t=3.82	**P<0.001***
	Urban	27±5.8		
Academic year	**1st**	20.6±2.9	F=220.6	**P<0.001***
	2nd	28.4±3.3		
	3rd	30.2±3.5		
	4th	32.9±4.3		
Faculty name	**Nursing**	29.8±5.8	t=6.27	**P<0.001***
	Arts	26.3±5.2		

F:one-way ANOVA test, t= student t-test *: statistically significant.

Table (6): Distribution of the university students' demographic data in relation to mean scores of attitude toward green technology innovations (n=400)

University students' demographic data		Attitude of GT	Test of significance	P-value
		Mean± SD		
Age	**<20**	37.9±3.6	F=0.76	P=0.470
	20-22	37.7±3.3		
	>22	36.9±2.5		
Sex	**Male**	37.8±3.3	t=0.79	P=0.425
	Female	37.5±3.4		
Residence	**Rural**	37.8±3.3	t=0.437	P=0.663
	Urban	37.6±3.3		
Academic year	**1st**	37.8±3.5	F=2.34	P=0.072
	2nd	38.2±3.1		
	3rd	37.9±3.5		
	4th	37±3.1		
Faculty name	**Nursing**	37.8±3.1	t=0.92	P=0.356
	Arts	37.5±3.5		

F:one-way ANOVA test, t= student t-test.

Table (7): Distribution of the university students' demographic data in relation to mean scores of practice toward green technology innovations (n=400)

University students' demographic data		Practice of GT	Test of significance	P-value
		Mean± SD		
Age	**<20**	69.4±5.9	F=1.02	P=0.362
	20-22	70.4±6.4		
	>22	70.2±8.1		
Sex	**Male**	70.3±6.4	t=0.383	P=0.702
	Female	70±6.4		
Residence	**Rural**	70.5±6.5	t=1.32	P=0.187
	Urban	69.7±6.2		
Academic year	**1st**	68.8±4.3	F=9.85	**P<0.001***
	2nd	72.7±7.6		
	3rd	68.4±4.6		
	4th	70.4±7.4		
Faculty name	**Nursing**	70.8±6.4	t=2.03	**P=0.043***
	Arts	69.5±6.3		

F: one-way ANOVA test, t= student t-test, *: statistically significant.

Discussion

Green technology (GT) innovation is seen as the optimal solution in addressing most of the environmental issues affecting our society today (Kaliappan & Hamid, 2021). The major goal is to develop new technologies without harming the environment, which should have a positive impact on people, wildlife, and human health (Sharma et al., 2023). Education can be used to influence people's environmental behavior. Environmental attitudes of the young generation are critical since they will eventually be impacted by and responsible for environmental problems caused by current behaviors (Firmanshah et al., 2023: Souib & Khalid, 2023). Thus, the purpose of the study was to assess university students' awareness, attitudes, and practices regarding GT innovations.

Pertaining to student's awareness level toward GT innovations, the present study findings showed that more than half of the participated university students had fair awareness about GT innovations, while less than half of them had poor awareness and only one percent point five had good awareness table (3). This finding was in line with (Kaliappan & Hamid, 2022; Sharma et al., 2023; Pambudi, 2024) they revealed that the level of knowledge on GT was average among students.

On the other hand, the current study finding was inconsistent with (Elmeanawy et al., 2021; Ead & Fahmy, 2022) they revealed that there was a poor knowledge levels among students about GT. This difference of findings may be related to no awareness campaigns conducted among students as well as insufficient coverage of environmental topics within the university curriculum.

Also, the current study finding was inconsistent with other studies revealed that majority of students had high level of knowledge regarding GT (Mustapha et al., 2019; Al-Nuaimi & Al-Ghamdi, 2022; Yusof et al., 2023).

This difference of findings may be related to awareness campaigns and workshop conducted among students in the university about GT and environmental sustainability.

Regarding sources of university students' knowledge about GT innovation, the present study findings showed that the majority of the university students had their knowledge about GT innovation from social media and the internet figure (3). This result was in line with Hussin, & Hafit, (2018) they showed that majority of the respondents getting the information relating to GT through the internet.

Concerning to students' attitude about GT innovations, the present study showed that the most of studied university students agree and strongly agree to respect the environment, support environmental campaigns and willing to pay more to buy environmentally friendly products table (4). These results were in agreement with Yusof et al., (2023) they showed that, the majority of university students agree and strongly agree to support environmental campaigns, love the environment and willing to pay more to buy environmentally friendly products.

Pertaining to student's attitude level toward GT innovations, the present study findings showed that majority of the students had a positive attitude toward GT innovations, while thirteen point five had a negative attitude figure (4). This result was in agreement with other studies that revealed the same result that most students' attitude was positive and higher level (Reyes & Madrigal, 2020; Al-Nuaimi & Al-Ghamdi, 2022; Ead & Fahmy, 2022; Lamprea, 2023; Yusof et al., 2023; ZUBIR et al., 2024).

On the other hand, the current study finding was inconsistent with (Choe et al., 2020; Samy, 2024) they revealed that students' attitude was average and not satisfactory when it comes to GT awareness and other environmental education. This difference of findings may be due to the lack of important environmental competencies enhancing environmentally-friendly attitude within the curriculum and poor active and contextual teaching-and-learning processes.

Pertaining to student's reported practice level toward GT innovations, the present study findings showed that about half of the university students had moderate practice toward GT innovations, as well as about half of them had high practice and only one percent had low practice figure (5). This finding was in line with (Mustapha et al., 2019; Yusof et al., 2023; ZUBIR et al., 2024) they showed that overall practice of GT among the university students was at a moderate level.

On the other hand, the current study finding was inconsistent with other studies and revealed that respondents' practices related to GT were high (Reyes & Madrigal, 2020; Kaliappan & Hamid, 2022). This difference in findings may be related to conducted awareness campaigns and initiatives among students in the university toward sustainable practice to improve green behavior.

Also, the current study finding was inconsistent with other studies, which

revealed that respondents' practices related to GT were negative or below satisfactory levels (Ahmad et al., 2020; Samy, 2024). This difference in findings may be related to no environmental concerns or sustainable practices in the university curriculum and campus operations.

Pertaining to the studied university students' demographic data in relation to mean scores of awareness about GT innovations, the present study findings showed that female students had a higher mean score awareness about GT innovation (28.8±5.4) compared to male students (27.3±6.1), and the difference was significant statistically ($p<0.001$). Moreover, students who were in the 4th academic year had a higher mean score awareness about GT innovation (32.9±4.3) compared to students in 1st academic year and the difference was significant statistically ($p < 0.001$) table (5). This result was in agreement with (Al-Naqbi & Alshannag, 2018; Yusof et al., 2023) they showed that female students' knowledge of sustainable development and GT was higher than their male students, and the difference was significant statistically ($p = 0.00$). As well as, fourth-year students had the highest mean knowledge, whereas first-year students had the lowest mean.

Concerning to studied university students' demographic data in relation to mean scores of attitude toward GT innovations, the present study findings showed that there was no statistically significant relation between mean scores of attitude toward GT innovations and demographic data of university students as age, sex, residence, academic year and the faculty name ($p > 0.05$) table (6). This result was in line with (Al-Naqbi & Alshannag, 2018; Reyes & Madrigal, 2020) they showed that there was no significant relationship between mean scores of attitude toward sustainable development and gender and academic level.

Concerning to studied university students' demographic data in relation to mean scores of practice toward GT innovations, the present study findings showed that university students who are in the 2th academic year have a higher mean score practice about GT innovation (72.7±7.6) compared to university students in 3rd academic year (68.4±4.6), and the difference is significant statistically ($p < 0.001$). Also, university students from Faculty of Nursing have a higher mean score practice about GT innovation (70.8±6.4) compared to university students from Faculty of Arts (69.5±6.3), and the difference is significant statistically ($p = 0.043$) table (7). This result was in agreement with the findings of a study performed by Al-Naqbi & Alshannag, (2018) they showed that Science college students scored the highest mean, while Education and Law college students scored the lowest mean.

Conclusions

- More than half of the participating university students had a fair awareness about green technology innovations, while forty-one percent point five had poor awareness and only one percent point five had good awareness

- Majority of the university students had a positive attitude toward green technology innovations.
- About half of the university students had a moderate practice toward green technology innovations, as well as about half of them had a high practice.

Recommendations

- Awareness campaigns and workshops should be developed to provide university students with the necessary knowledge, attitudes, and practice regarding green technology to increase awareness and encourage them to adopt green technology.
- Promote the integration of green technology innovation culture into the curriculum of university students to help them realize the value of green technology innovation and their role in promoting it.
- Universities should apply recycling stations on campuses, and that will allow students to practice recycling while they are on campus.

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