

# Readiness of Green Skill Implementation among Welding Program Students at Public Skill Training Center

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## Abstract

In recent years, green skills have begun to receive significant attention and are increasingly taken seriously by the public, driven by the rapid advancement of green technologies globally, including in Malaysia. In response to this trend, the present study was conducted to assess the awareness and readiness to implement green skills among students enrolled in the Welding Technology Program at a Public Skills Training Center (ILKA) in Batu Pahat. A total of 101 Welding Technology Program students participated in the study. Descriptive analysis, including mean and standard deviation, was employed to analyze the data. The reliability coefficient for the research instrument was high,  $\alpha = 0.94$ . Overall, the findings indicate a highly encouraging level of awareness of green skills among the students, with the majority demonstrating a strong personal awareness of green skill implementation at ILKA. In terms of knowledge, the level of implementation of green skills was also positive, as most respondents agreed with the items assessing their understanding of green concepts. Similarly, students showed favorable attitudes toward green skills, further reinforcing their readiness to adopt environmentally responsible practices. In conclusion, the results of this study demonstrate that welding students at the ILKA exhibit a commendable level of readiness to implement green skills, both in knowledge and attitude, reflecting their potential to contribute effectively to the green industry.

## 1. Introduction

Environmental pollution continues to pose serious threats to human health and the planet's ecological balance. In response to these negative impacts, the concept of "green" has gained increasing global attention. Technological advancements—particularly in green technology—have accelerated this shift, with widespread implementation observed in countries across the world, including Malaysia. This development has also driven the emergence of the green economy, which is closely associated with the growing demand for green skills (Kwauk & Casey, 2022).

Green skills refer to the knowledge, values, attitudes, and technical abilities necessary to support sustainable practices in the workplace. These skills are essential across all sectors and job roles in modern organizations. According to Lai, Zaima, and Lee (2018), green skills are complementary to green jobs and green careers. In the context of this study, green skills specifically relate to those applied in the field of welding, particularly among

students enrolled in welding technology programs. These skills not only involve technical competencies but also emphasize environmental responsibility and sustainable work practices.

da Costa et al. (2025) noted that green skills are critical for supporting the growth of a low-carbon economy, especially through the use of environmentally friendly technologies and sustainable production methods. These practices aim to reduce energy consumption and minimize the exploitation of natural resources, thereby contributing to ecological preservation. In welding, for instance, environmental pollution—such as air contamination and toxic emissions—can occur during metal fabrication processes. This pollution poses health risks to workers and contributes to environmental degradation. Therefore, integrating green skills into the Welding Technology curriculum is vital to preparing future welders to work responsibly and sustainably.

Li, Khattak, Lu, and Khan (2023) highlighted the importance of green skills in the employment sector, emphasizing that industries must increasingly consider the environmental impact of their products, services, and manufacturing activities. In recent years, there has been growing scholarly focus on green skills as an essential component of sustainable development in technical and vocational education and training (TVET). According to the International Labour Organization (ILO, 2023), green skills encompass not only practical competencies but also the values and attitudes required for environmental stewardship.

Lai, Zaime, and Lee (2018) argued that integrating green skills into vocational education enhances the employability of graduates, particularly in emerging green economies. In Malaysia, TVET institutions have begun embedding green elements into their welding and manufacturing programs, in line with Industry 4.0 goals and national sustainability agendas (MIDA, 2023). Supporting this, Hussin and Ahmad (2022) found a positive correlation between students' exposure to green curriculum content and their environmentally responsible behavior in hands-on technical courses such as welding and machining.

Despite these advances, limited research has been conducted on students' readiness to implement green skills, especially in the context of welding. Although the green industry demands environmentally conscious workers, many students remain unaware of the relevance and importance of green skills. This lack of awareness may stem from insufficient exposure to green technologies and limited environmental knowledge (Gan, Ahmad, & Boey, 2013). Consequently, the implementation of green skills in Public Skills Training Institutions (Institut Latihan Kemahiran Awam – ILKA) may be hindered by students' lack of awareness and preparedness.

Therefore, this study aims to investigate the awareness and readiness of welding technology students at ILKA in adopting green skills. Specifically, the study focuses on students' knowledge and attitudes, as these are critical indicators of readiness for integrating sustainable practices in the welding field. The findings are expected to inform strategies for strengthening green skill integration in vocational education and supporting Malaysia's transition toward a sustainable and green economy.

## 2. Methodology

In this study, a survey design was employed using a quantitative approach. Data were collected by distributing questionnaires to a targeted sample of students enrolled in the Welding Technology Program at an ILKA in the Batu Pahat District, located in the southern region of Peninsular Malaysia.

### 2.1 Population and Sample

A total of 101 students who pursued Welding Technology Program at a ILKA in Batu Pahat were randomly selected to participate in this study. Out of 101 participants, 96 (95%) were male students and only 5 (5%) were female students. Table 1 shows the demographic information of the participating students.

**Table 1** Respondents' demographic information

	Item	Frequency	Percentage (%)
Gender	Male	96	95.0
	Female	5	5.0
Age group	15 - 17 year	0	0.0
	18 - 20 year	63	62.4
	21 year and above	38	37.6
Seniority	1 <sup>st</sup> Year Student	51	50.5
	2 <sup>nd</sup> Year Student	26	25.7
	3 <sup>rd</sup> Year Student	17	16.8
	4 <sup>th</sup> Year Student	7	6.9

## 2.2 Research Instrument

The questionnaire used for data collection was composed four parts. Part A (respondent demographic information), part B (awareness of green skills among welding course students at the ILKA), part C (implementation of green skills among welding course students at the ILKA in terms of knowledge) and part D (implementation of green skills among welding course students at the ILKA in terms of attitude). Five-point scale was used for every item in the questionnaire. See Table 2. The questionnaire has been validated by three experts. The items have been refined based on the recommendations provided by the experts. In terms of reliability, the Cronbach's Alpha,  $\alpha = 0.94$ , which means that the questionnaire can be used for actual data collection.

**Table 2** *Five-point scale*

Rating	Scale
Strongly Disagree (SD)	1
Do Not Agree (DA)	2
Not Sure (NS)	3
Agree (A)	4
Strongly Agree (SA)	5

## 2.3 Data Analysis

For the purpose of data analysis, the mean score was classified into three levels. Table 2 shows the level of mean scores based on three categories.

**Table 2** *Interpretation mean score (Landel, 1977)*

Mean Value	Interpretation Level
1.00 - 2.33	Low
2.34 - 3.67	Medium
3.68 - 5.00	High

## 3. Results and Discussion

This section presents and analyzes the data collected in accordance with the research objectives and questions. The data were obtained through the administration of questionnaires to a total of 101 respondents. All participants were students from an ILKA enrolled in a Welding Technology program.

### 3.1 Level of Awareness of Green Skills Among Welding Course Students at the ILKA

The questionnaire included seven items designed to measure the level of awareness of green skills among students enrolled in the Welding Technology Program at ILKA. Table 4 presents the results of the descriptive analysis related to their level of awareness of green skills.

**Table 4** Analysis of awareness of green skills among welding course students at the ILKA

Item	Mean (M)	Standard Deviation (SP)	Level
1. I am aware that the design of welding products needs to be environmentally friendly.	4.24	0.67	High
2. I am aware that good leadership is needed to support green activities such as environmental management in welding workshops.	4.37	0.58	High
3. I am aware that green skills are in high demand by most industries to protect the environment from climate change.	4.40	0.58	High
4. I am aware that green skills are required to use green technology.	4.37	0.63	High
5. I am aware that knowledge of green skills is needed by the workforce to support environmental sustainability.	4.36	0.64	High
6. I am aware that green skills are needed by society to reduce the impact of human activities on the environment.	4.34	0.67	High
7. I am aware that green skills can overcome the problems of environmental destruction, global warming, or climate change happening around the world.	4.38	0.63	High
Average	4.35	0.63	High

Based on the research findings, the level of awareness of green skills among students enrolled in the Welding Technology Program at ILKA is highly encouraging. The majority of respondents demonstrated a high level of awareness regarding green skills. These findings contrast with those of Qayyum (2010), who reported that, to date, public awareness of green skills remains unsatisfactory. Many individuals are still unfamiliar with the term and lack a clear understanding of what green skills entail.

Furthermore, the present study reveals that nearly all students acknowledge and agree that green skills are increasingly in demand across industries as part of efforts to mitigate climate change and protect the environment. These findings align with the study by Buntat and Othman (2012), which highlighted that employers are increasingly seeking workers equipped with green skills to support sustainability in social, economic, and environmental dimensions. This shift is driven by the growing transition toward green industries, resulting in a corresponding need for a workforce that possesses relevant green competencies.

According to Zolkifli, Kamin, Abdul Latif, Buntat, and Awang (2016), the emergence of the green industry has significantly influenced employers' expectations regarding job roles and required employee skills. In other words, the growing demand for green skills has created a skills gap in the labor market. If left unaddressed, this gap may impede economic growth, limit employment opportunities, and undermine global efforts to combat climate change.

### 3.2 Level of Implementation of Green Skills Among Welding Courses at the ILKA in Terms of Knowledge

The analysis involved seven items that required respondents to assess the level of green skills implementation, specifically in terms of knowledge, among welding course students at ILKA. Table 5 presents the results of the descriptive analysis on the level of implementation of green skills in this context.

**Table 5** Analysis study of the implementation of green skills among welding course students at the ILKA in terms of knowledge

Item	Mean (M)	Standard Deviation (SP)	Level
1. I apply the knowledge of green skills in the assignments given by the instructor.	4.20	0.70	High
2. I can distinguish between materials or waste that can be recycled or materials that need to be disposed of.	4.32	0.58	High
3. I know the elements found in green skills.	4.18	0.65	High
4. I was able to apply the knowledge of green skills in designing environmentally friendly welding products.	4.17	0.68	High
5. I share knowledge with classmates in applying green skills in themselves.	4.25	0.70	High
6. I know the negative impact that will happen to the environment if green skills are not practiced.	4.30	0.76	High
7. I can present ideas or suggestions about the application of green skills in the learning process.	4.06	0.79	High
Average	4.21	0.69	High

Based on the research findings, the level of implementation of green skills among Welding Technology students at ILKA, in terms of knowledge, is quite encouraging. The majority of respondents agreed with the statements provided, indicating a solid understanding of green skills. These findings contrast with those of Ahmad, Mustafa, Abd Hamid & Abdul Wahab (2011) who examined public knowledge of recycling programs in Penang and Kuala Lumpur and found that awareness was only at a moderate level in both states.

Furthermore, the current study revealed that most students were able to distinguish between recyclable and non-recyclable materials or waste. This finding differs from that of Seow and Indera Syahrul (2010), who reported that while residents in the Batu Pahat district of Johor had a basic understanding of recyclable materials, they did not actively use the recycling bins provided by the authorities.

Additionally, the results of this study contradict the findings of Agboola and Emanuel (2016), who found that many individuals lacked a clear understanding of the impacts of climate change and environmental pollution. In contrast, the present study indicates that the majority of students not only possess knowledge about green skills but also agree that they are capable of proposing ideas or suggestions for integrating green practices into the learning process.

### 3.3 Level of Implementation of Green Skills Among Welding Courses at the ILKA in Terms of Attitude

The questionnaire included seven items designed to assess the level of implementation of green skills among Welding Technology students at ILKA, specifically in terms of their attitudes. Table 6 presents the results of the descriptive analysis related to students' attitudes toward the implementation of green skills.

**Table 6** Analysis study of the implementation of green skills among welding course students at the ILKA in terms of knowledge

Item	Mean (M)	Standard Deviation (SP)	Level
1. I always apply green skills in the welding workshop.	4.10	0.70	High
2. I guide my classmates in applying green skills in the welding workshop.	4.12	0.64	High
3. I always consider environmental factors in my actions so that they do not impact the environment.	4.23	0.65	High
4. I will inform the instructor or lecturer on duty if there is an environmental problem in the welding workshop.	4.21	0.73	High
5. I use energy sources (water and electricity) carefully in the welding workshop.	4.28	0.68	High
6. I took the initiative to cultivate a positive attitude in developing green skills in myself.	4.29	0.64	High
7. I am always ready to get involved in environmental management.	4.23	0.71	High
Average	4.21	0.68	High

Based on the findings of the study, the level of implementation of green skills among Welding Technology students at ILKA, in terms of attitude, is quite encouraging. The majority of respondents expressed agreement with the questionnaire items, indicating positive attitudes toward green skills. These results differ from those reported by Ahmad et al. (2011), who found that public attitudes toward environmental issues were concerning. His study revealed that many respondents in both Kuala Lumpur and Penang believed environmental protection was solely the government's responsibility. Similarly, Zurina and Norjan (2003) found that while the community generally shows sensitivity to environmental issues, the willingness to engage actively in addressing those issues remains low.

In contrast, the current study found that nearly all students agreed they would inform their instructor or lecturer if an environmental issue were to arise in the welding workshop. This finding is supported by the study conducted by Ahmad et al. (2011) which compared the respondents from Kuala Lumpur and Penang. The findings revealed that respondents in Kuala Lumpur were more likely than those in Penang to report environmental problems to the relevant authorities, despite believing that environmental care is not their direct responsibility. This indicates an awareness and readiness to act, even in the absence of a strong sense of personal obligation.

Moreover, the results of the present study also indicate that most welding students at ILKA agree to use energy resources such as water and electricity responsibly and to consider environmental factors in their daily actions within the workshop. These findings contrast with those of Hassan, Abd Rahman, and Syed Abdullah (2013), who reported low levels of environmentally responsible behavior and waste reduction practices among their respondents.

### 4. Conclusion

The findings of this study indicate that the level of awareness of green skills among Welding Technology students at ILKA is encouraging. In addition, students' readiness to implement green skills—both in terms of knowledge and attitude—was found to be at a high and commendable level. Green skills represent a critical component that

should be emphasized in higher education, particularly among welding students. Enhancing awareness, expanding knowledge, and fostering positive attitudes toward green practices are essential for cultivating environmentally conscious graduates who are well-prepared to meet the demands of the green industry.

The integration of green skills not only contributes to environmental sustainability but also aligns with the increasing expectations of industries seeking employees equipped with such competencies. Therefore, it is crucial that institutions embed green skills into their curriculum to better prepare students for the evolving labor market.

For future research, it is recommended that similar studies be conducted with students from other technical programs, such as electrical and electronics, building construction, multimedia, and general machining. This would allow for a broader understanding of green skill readiness across various disciplines. Additionally, incorporating a qualitative research approach is suggested to explore, in greater depth, the issues related to awareness and implementation of green skills among students.

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## Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of the paper.

## Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Lai, C. S, Abdul Razak, M. H. A. B.; **data collection:** Abdul Razak, M. H. A. B.; **analysis and interpretation of results:** Abdul Razak, M. H. A. B., Lai, C. S.; **draft manuscript preparation:** Chang, V. S. W., Lai, C. S. All authors reviewed the results and approved the final version of the manuscript.

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