Journal of Pedagogical Research
Volume 8, Issue 3, 2024
https://doi.org/10.33902/JPR.202426503

Research Article

Students for practical learning readiness in vocational education: A post-pandemic survey

Nur Kholifah[1], Muhammad Nurtanto[2], Farid Mutohhari[3], Urip Wahyuningsih[4] and Sri Listiani[5]

[1]*Yogyakarta State University, Indonesia (ORCID: 0000-0003-3775-6461)*
[2]*Jakarta State Polytechnic, Indonesia (ORCID: 0000-0002-6357-7152)*
[3]*Yogyakarta State University, Indonesia (ORCID: 0000-0002-1178-4774)*
[4]*Surabaya State University, Indonesia (ORCID: 0009-0003-4381-4012)*
[5]*Jakarta State University, Indonesia (ORCID: 0009-0009-2902-814X)*

The post-pandemic era of COVID-19 still leaves crucial problems for vocational education (VE). Practical learning readiness (PLR), which includes dimensions of readiness to support knowledge, and physical and psychological conditions of students, is a fundamental problem that must be resolved through systematic mapping. Therefore, this encourages us to measure the level of readiness from these three dimensions. Apart from that, we also examine the differences in dimensions and indicators and test the determination in constructing PLR to determine problem-solving systematically. The survey was conducted on 386 vocational students, but the final number was 339, considering that 47 of them did not have good rational data level criteria. The results of the descriptive analysis show that psychological conditions and supporting knowledge are at a low level, while physical conditions are at a high level. The results of the comparison test show that the three are generally not significantly different, although there are notes on several indicators. Even though all dimensions contribute significantly to building PLR, psychological conditions make the highest contribution. This shows that a low psychological condition is the first step in suffering from VE. Furthermore, several notes regarding the reduction in knowledge-supporting practices are also the second effort that VE must make to increase PLR among its students.

Keywords: Practical learning readiness; Post-pandemic era; Vocational education; Psychological conditions; Supporting knowledge

Article History: Submitted 8 February 2024; Revised 26 May 2024; Published online 1 August 2024

1. Introduction

Since the beginning of 2020, Indonesia has been confronted by the COVID-19 pandemic, which has affected problems across all sectors. One significant impact observed was a decline in the quality of education within the country in terms of processes, outputs, and outcomes (Rasmitadila et al., 2020; Thaheem et al., 2022). Furthermore, vocational education VE] has lost its essence as an institution for human resource development, equipping students with workforce competencies. The transition from offline to online learning significantly disrupted practical lessons, resulting in low-quality outcomes (Saripudin et al., 2020; Tang & Siti Zuraidah, 2022). However, VE is now gradually recovering in the post-pandemic era, where learning typically proceeds without

Address of Corresponding Author

Nur Kholifah, PhD, Yogyakarta State Univeristy, Colombo Street, Sleman, Yogyakarta, Indonesia.

✉ Nur.kholifah@uny.ac.id

How to cite: Kholifah, N., Nurtanto, M., Mutohhari, F., Wahyuningsih, U., & Listiani, S. (2024). Students for practical learning readiness in vocational education: A post-pandemic survey. *Journal of Pedagogical Research, 8*(3), 320-332. https://doi.org/10.33902/JPR.202426503

restrictions in the classroom. Despite signs of recovery, post-pandemic issues that impact VE persist. A study by Putra et al. (2022) reported that the academic performance of VE students has not seen significant improvement, even though learning has resumed normally. It has been argued that student attendance remains limited and discipline in attending classes is still low (Hews et al., 2022; Sukiman et al., 2022), which causes the outcomes of practical learning to fall short of expectations (Mutohhari, Sudira, et al., 2021). Given these issues, it is crucial for VE to analyze aspects suspected to be the primary causes.

Practical learning readiness (PLR) is identified as a key factor significantly impacting student performance (Rabiman et al., 2021). Traditionally, PLR is defined as the overall readiness of institutions to carry out practical activities, encompassing aspects of strategy, infrastructure, faculty, and students (Billett, 2011). Among these, the readiness of students in practical learning has been identified as one of the most crucial aspects affecting low student performance (Alawajee & Almutairi, 2022). Readiness for learning is a condition that has been prepared or planned by an individual to undertake learning activities (Dangi & Saat, 2021). Similar studies have shown that readiness significantly impacts the outcomes obtained from crucial activities (Karim & Mustapha, 2022). Additionally, research by Alam and Parvin (2021) confirmed that low student outcomes are caused by the students' own lack of preparedness.

In vocational students, PLR is influenced by three dimensions: knowledge readiness to support the implementation of practices, physical conditions, and psychological conditions (Billett, 2011; Santrock, 2007). These three dimensions are also crucial in addressing the readiness problems of vocational students in learning (Leong et al., 2020; Wagiran et al., 2022; Yawson & Yamoah, 2020). Knowledge readiness relates to learning theories that lead to the cognitive aspects of individuals, guiding them towards systematic procedures needed during practice (Billett, 2011; Clark & Winch, 2007). Practicing without prior understanding incurs time losses and safety risks from equipment or practice environments. Conversely, vocational students who possess initial concepts can engage more thoroughly in practice and minimize risks, indicating that cognitive activities support the success of psychomotor aspects. Additionally, the dimension of physical conditions that has deteriorated or changed post-pandemic negatively impacts readiness for practical learning (Syauqi et al., 2020). The decline in physical condition experienced by vocational students includes reduced endurance, fatigue, stress, and excessive anxiety during practical learning (Azizan et al., 2022). Moreover, the psychological condition dimension, arising from physical conditions, affects the learning readiness of vocational students (Badri & Yunus, 2022). This is evidenced by the lack of optimal motivation, intent, and emotion in learning (Qazi et al., 2021). These three dimensions have become the focus in the readiness for practical learning of vocational students post-pandemic COVID-19.

PLR contributes to achieving employment suitability for prospective vocational students during the COVID-19 pandemic (Ferdian & Suyuthie, 2022). This highlights the importance of practical learning tasks, commitment to completing tasks, and time allocated for practical learning in enhancing readiness for competition and adaptability of graduates. Furthermore, a study by Nurtanto et al. (2022) emphasized the importance of technical competencies affecting the readiness of vocational students for practical tasks. Based on existing studies, PLR plays a crucial role in the quality of graduates, but significant changes post-pandemic COVID-19 need to be further elucidated through detailed evidence from the established dimensions, thus enabling instructors to anticipate and maximize the competencies achieved by vocational students.

This research was implemented in higher vocational education across several disciplines, including engineering and engineering education, such as mechanical engineering, automotive engineering, information technology, and fashion design. The primary reason is that practical learning reflects the conditions in industries that demand a dominant physical condition, such as standing while working. Therefore, vocational students in practical learning must possess optimal physical condition. Accordingly, this study was conducted to measure the readiness of vocational students based on dimensions of knowledge readiness, physical condition, and psychological

condition post-pandemic COVID-19. The research questions for this study are as follows: (1) What are the measurement level categories of PLR in terms of knowledge support, physical condition, and psychological condition? (2) Is there a difference in PLR levels concerning knowledge support, physical condition, and psychological condition? (3) Is there a difference in PLR levels concerning the indicators of these dimensions? and (4) How do the dimensions of knowledge support, physical condition, and psychological condition influence PLR?

2. Research Methods

This study focuses on uncovering and describing the level of practical learning readiness [PLR] in college students by conducting a survey that adopts the design of Rea and Parker (2014). This study was initiated by observing phenomena related to symptoms or indications of issues in practical learning [PL]. These phenomena were then deeply analyzed to assess the interrelationships between aspects that potentially cause learning problems. The observed phenomena were identified as forming the scope of the concept of practical learning readiness. Given the researcher's limitations in exploring further, it was decided to measure the extent of PLR in students to analyze the level of each dimension (supporting knowledge, physical condition, and psychological condition). All three dimensions were interpreted in terms of levels, and comparisons between dimensions were conducted to clarify the weaknesses or strengths among them that contribute to PLR. Additionally, the influence of these dimensions was measured to assess their contribution to PLR, thus clarifying the potential for establishing a priority scale for sequential improvement of dimensions based on the resulting correlation coefficient.

In this study, 386 vocational students participated in the PLR questionnaire. Among these, 181 (46.89%) were male and 173 (44.82%) were female vocational students. The participants hailed from four universities located in the provinces of Central Java and Yogyakarta. The primary consideration for data collection was the situational ease of obtaining data within a specific time frame and the manageable distance between the two provinces. Respondents were enrolled in four different engineering programs including Mechanical Engineering Education, Automotive Engineering Education, Information Technology Engineering, and Fashion Design (applied vocational). The crucial reason for selecting these study programs was the significant issues in practical learning that required performance in workshops, and the loss of technical competencies among students during the COVID-19 pandemic which resulted in decoupling. A random sampling technique was employed for participant selection.

The questionnaire to assess PLR levels was prepared based on the development of instruments from previous relevant studies. Various research instruments were screened to select criteria that matched the characteristics of the current study. The questionnaire used a four-point Likert scale, including the options Very Low VL], Low [L], High [H], and Very High [VH]. The PLR instrument included dimensions of supporting knowledge, physical condition, and psychological conditions. The supporting knowledge dimension was based on aspects of capital necessary for practice in VE and was structured into nine items adopting instruments formulated by Johnston (1992) and Sirisha et al. (2020), divided into five indicators: philosophical knowledge, working principle knowledge, procedural knowledge, work safety knowledge, and problem-solving knowledge. Additionally, a questionnaire measuring physical condition included six items, adopted from Reeves et al. (2022) and Spinazze et al. (2020), covering three key indicators: changes in body immunity, body stamina, and cognitive strength. Finally, the psychological condition of students was assessed using nine items adopted from Ahmad et al. (2022), Ke et al. (2022), and Qazi et al. (2021), addressing five main indicators: emotional resilience, mental health, learning motivation, self-efficacy, and learning intention.

Before being used for data collection, the questionnaire has been confirmed again related to its validity and reliability. We adopted two methods to strengthen the validity index, namely content validity based on expert opinion interpreted with Aiken scores and construct validity based on field trials analyzed using confirmatory factor analysis [CFA]. The results of this test are shown in

Table 1. In addition, we also consider the level of rationality of the data based on the PLR questionnaire filling criteria. At least, it took a minimum of eight minutes to answer a total of 24 items in the questionnaire, so data from participants who completed them in less than eight minutes were not included for analysis. In this case, there were 47 data that did not meet these criteria and were eliminated, so that the final participant data analyzed totaled 339.

Table 1
Measuring the validity of the questionnaire

Indicator	*Expert (Rater)*				S_1	S_2	S_3	S_4	$\sum s$	*n(c-1)*	*V*	*Construct*	
	1	*2*	*3*	*4*								*LF*	*p*
SK 1	4	4	4	4	3	3	3	3	12	12	1.000	0.783	<.001
SK 2	3	4	4	4	2	3	3	3	11	12	0.917	0.722	<.001
SK 3	4	4	4	4	3	3	3	3	12	12	1.000	0.777	<.001
SK 4	3	4	3	4	2	3	2	3	10	12	0.833	0.782	<.001
SK 5	4	4	4	4	3	3	3	3	12	12	1.000	0.827	<.001
PhC 1	4	4	4	4	3	3	3	3	12	12	1.000	0.880	<.001
PhC 2	4	4	4	4	3	3	3	3	12	12	1.000	0.912	<.001
PhC 3	4	4	4	4	3	3	3	3	12	12	1.000	0.822	<.001
PC 1	3	4	3	4	2	3	2	3	10	12	0.833	0.884	<.001
PC 2	4	4	4	4	3	3	3	3	12	12	1.000	0.893	<.001
PC 3	4	3	4	3	3	2	3	2	10	12	0.833	0.922	<.001
PC 4	4	4	4	4	3	3	3	3	12	12	1.000	0.786	<.001
PC 5	3	4	4	4	2	3	3	3	11	12	0.917	0.885	<.001

Based on the results of the validity test, it is generally clear that the validity is strong, so that it meets the credibility requirements of the questionnaire. First, test the validity of the content based on the opinions of four experts, the Aiken [V] score for all indicators is greater than 0.800, so that it is declared to have a high validity index (Baharuddin et al., 2020). The construct test further strengthens the validity stated by the loading factor [LF] value above 0.700 in testing using Smart-PLS (Hair et al., 2021). Then the reliability test is described through the Composite Reliability [CR] coefficient, Alpha value, and Average Variance Extracted [AVE]. As a result, all constructs have high reliability (Fornell & Larcker, 1981). Table 2 details the results of the reliability test in this study.

Table 2
Measuring the reliability of the questionnaire

Construct	*Mean*	*SD*	*Alpha*	*CR*	*AVE*
Practical learning readiness [PLR]*	3.442	0.791	0.852	0.900	0.692
Physical conditions [PhC9	3.524	0.828	0.842	0.905	0.761
Supporting knowledge [SK]	3.723	1.059	0.838	0.885	0.607
Psychological conditions [PC]	3.782	0.906	0.923	0.942	0.766

Note: *main construct.

Before being analyzed, the data was first filtered based on the criteria described in the previous point to ensure its level of rationality. We used three different methods of statistical analysis to measure the depth of the collected data. First, the data were analyzed descriptively related to their central tendencies (mean, median, mode, standard deviation) and followed by categorizing the average scores based on five categories, namely very low, low, average, high and very high, which are detailed in Table 3. Next, we conducted a comparison test to visualize comparisons between dimensions and indicators. Post-Hoc test with Dunnett C Test and Tukey Test method was adopted to measure comparisons accurately. Descriptive tests and Post-Hoc tests were carried out using SPSS software. Finally, we tested the effect of three dimensions separately in constructing PLR on students. In this case, we adopt path analysis to analyze the correlation coefficient of the

independent variables (SK, PC, and PhC) to the dependent variable [PR]. This test was carried out using the Smart-PLS software together with the construct test on the instrument.

Table 3
PLR level categorization

Interval Score	*Based on Mean*	*Category*
$Mi + 1{,}5\ SDi \leq Mi + 3{,}0\ SDi$	3.25 – 4.00	Very High
$Mi + 0\ SDi \leq M \leq Mi + 1{,}5\ SDi$	2.50 – 3.25	High
$Mi - 1{,}5\ SDi \leq M \leq Mi + 0\ SDi$	1.75 – 2.50	Low
$Mi - 3{,}0\ SDi \leq Mi - 1{,}5\ SDi$	1.00 – 1.75	Very Low

3. Results

3.1. PLR Level Measurement Results

Practical learning readiness level describes the extent to which students are ready knowledge, physically and psychologically. These three are the basic constructions of inherent PLR and are able to become readiness capital for students to undergo practice. In this case, all PLR dimensions are determined by level category, which refers to the mean score obtained by each indicator as well as the total score of each dimension. The scoring on the raw data was carried out by adopting the minimum score and maximum score from the Likert questionnaire scale (1-4). Early consideration is carried out to facilitate further analysis, so that comparative tests can be carried out. As shown in Table 4, only the physical condition dimension is the PLR dimension with the acquisition of readiness in the high category. As analyzed, the dimensions of the physical condition of students occupy the highest level (M=2.86). In this dimension, body stamina has not changed much from the pandemic and post-pandemic eras (M=3.26). While changes in thinking power occur quite drastically, by occupying the lowest level in that dimension (M=2.11). Meanwhile, the psychological condition dimension occupies the lowest level (M=2.18). In this dimension all indicators are in the spotlight because they have a low category.

Table 4
PLR level measurement results

Dimension	*Indicator*	*Mean*	*Percentage*	*Category*
Supporting knowledge (SK)	Philosophical knowledge (SK 1)	2.31	57.75 %	Low
	Procedural knowledge (SK 2)	2.68	67.00 %	High
	Knowledge of working principles (SK 3)	2.20	55.00 %	Low
	Occupational safety and health knowledge (SK 4)	3.12	78.00 %	High
	Problem solving knowledge (SK 5)	2.06	51.50 %	Low
Total	Supporting knowledge (SK)	2.47	61.85 %	Low
Physical condition (PhC)	Changes in body immunity (PhC 1)	3.22	80.50 %	High
	Changes in body stamina (PhC 2)	3.26	81.50 %	High
	Changes in thinking power (PhC 3)	2.11	52.75 %	Low
Total	Physical condition (PhC)	2.86	71.58 %	High
Psychological condition (PC)	Emotional resilience (PC 1)	2.38	59.50 %	Low
	Mental health (PC 2)	2.30	57.50 %	Low
	Learning motivation (PC 3)	2.41	60.25 %	Low
	Self-efficacy (PC 4)	1.87	46.75 %	Low
	Learning intention (PC 5)	1.93	48.25 %	Low
Total	Psychological condition (PC)	2.18	54.45 %	Low

3.2. Differences in PLR levels between Dimensions

Changes in PLR in the pandemic and post-pandemic eras can be seen from the descriptions presented earlier. The most crucial problem is the readiness of the psychological condition dimension, which is still low, marked by this being the lowest dimension. Nevertheless,

comparisons need to be made as an effort to consider the tendency of priority scales to be directed to improvement. We ensure that the comparison reference scale ranges from one to four to avoid analysis errors in SPSS. We ran two tests at the same time using the one percent and five percent significance levels. As presented in Table 5, the Post-Hoc test using the Dunnet C Test method shows that significant differences are only seen in the dimensions of physical condition and psychological condition (p =.048 at 5% significance level). This means that the psychological condition dimension has significantly lower readiness than the physical condition of students. With these results, it can be concluded that psychological condition is a dimension that should receive the leading priority scale in improvement.

Table 5
Differences in PLR levels between dimensions

PLR level dimension		*Mean difference*	*Sig.*	*Evaluation*
Supporting knowledge	Physical condition	−0.39	.092	No difference
	Psychological condition	0.29	.126	No difference
Physical condition	Supporting knowledge	0.39	.092	No difference
	Psychological condition	0.68	.048*	Difference
Psychological condition	Supporting knowledge	0.29	.126	No difference
	Physical condition	−0.68	.048*	Difference

Note. *: $p < .05$.

3.3. Differences in Levels between Indicators on the PLR Dimension

Unlike the previous test, in this section, the comparative test focuses on comparing indicators on each dimension. The goal is not much different, namely as an effort to consider the tendency of priority scales to be directed to improvements in the scope of dimensions. This is done bearing in mind that each dimension certainly needs improvement, so that improvements will be directed in line with the priority scale that has been determined based on the differences. As with the previous test, Table 6 which shows the results of the Post-Hoc test with the Tukey test also only reveals a few dimensions that experience significant differences. First, knowledge of working principles (SK 3) on the dimensions of supporting knowledge is a significantly lower indicator than occupational safety and health knowledge (SK 4). Then, still in the same dimension, problem solving knowledge (SK 5) is also a significantly lower indicator than occupational safety and health knowledge (SK 4). This indicates the need for these two indicators to become priority improvements in order to increase supporting knowledge in VE students. Then, shifting in the physical readiness dimension, the test results revealed a significant difference between changes in body immunity (PhC 1) and changes in thinking power (PhC 3), where PhC 3 has the lowest value in that dimension. Thus, it is clear that improving thinking power is something that needs to be prioritized on this dimension.

3.4. PLR Construction that is based on the Influence of SK, PhC, and PC Dimensions

Although various theories give confidence that learning readiness in students is inseparable from the extent of knowledge, physical and psychological conditions possessed by them. However, we do not propose hypotheses that depart from existing theories. We only tested the extent to which these three aspects construct PLR in VE students. Our main consideration in analyzing it is to map priority scales on dimensions to make systematic improvements. We ran two tests at the same time using the one percent and five percent significance levels. In this case, each dimension represents the data from each indicator, while the PLR represents the total data from each dimension. Smart-PLS is used as a tool for data analysis, and it has been confirmed that the number of samples meets the criteria. Table 7 and Figure 1 present the results of a detailed analysis of the relationship between the PLR dimensions and the PLR as well as the relationship between variables. PLR constructs that include all three dimensions are significantly tested. However, the psychological

Table 6
Differences in levels between indicators on the PLR dimension

PLR level dimension	*Between indicators*		*Mean difference*	*Sig.*	*Result*
Supporting knowledge (SK)	SK 1	SK 2	−0.37	.095	No difference
		SK 3	0.11	.196	No difference
		SK 4	-0.81	.092	No difference
		SK 5	0.25	.137	No difference
	SK 2	SK 3	0.48	.078	No difference
		SK 4	−0.44	.084	No difference
		SK 5	0.62	.060	No difference
	SK 3	SK 4	−0.92	.041*	Difference
		SK 5	0.14	.188	No difference
	SK 4	SK 5	1.06	.029*	Difference
Physical condition (PhC)	PhC 1	PhC 2	−0.04	.368	No difference
		PhC 3	1.11	.024*	Difference
	PhC 2	PhC 3	1.15	.022*	Difference
Psychological condition (PC)	PC 1	PC 2	0.08	.318	No difference
		PC 3	−0.03	.373	No difference
		PC 4	0.51	.071	No difference
		PC 5	0.45	.080	No difference
	PC 2	PC 3	−0.11	.196	No difference
		PC 4	0.43	.087	No difference
		PC 5	0.37	.095	No difference
	PC 3	PC 4	0.54	.066	No difference
		PC 5	0.48	.078	No difference
	PC 4	PC 5	−0.06	.347	No difference

Note. *: $p < .05$.

condition dimension is the dimension with the highest construction contribution (r=.578). This gives a strong signal that psychological readiness is a big basic capital in students in influencing practical learning readiness.

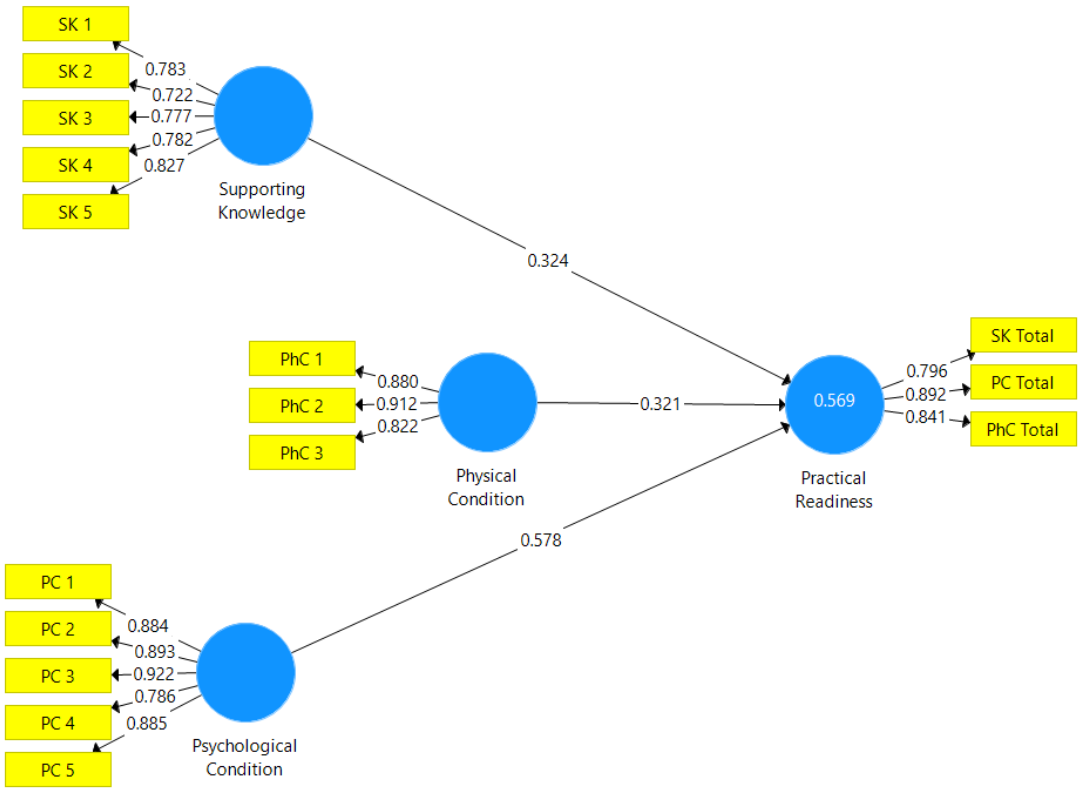
Table 7
Path analysis result

Path	*Estimated correlation*	*t-Value*	*SE*	*p*
PLR construction				
Supporting knowledge → practical readiness	0.324	3.442	0.002	<.001
Physical condition → practical readiness	0.321	2.098	0.002	<.001
Psychological condition → practical readiness	0.578	7.130	0.000	<.001
Correlation between variables				
Supporting knowledge ↔ physical condition	0.268	1.963	0.008	<.001
Supporting knowledge ↔ Psychological condition	0.482	4.116	0.005	<.001
Physical condition ↔ Psychological condition	0.198	1.608	0.001	.004

4. Discussion

The study aims to measure the readiness levels of the dimensions of Physical Conditions (PhC), Supporting Knowledge (SK), and Psychological Conditions (PC). Furthermore, it examines the differences between these dimensions and indicators, and tests their determination towards practice learning readiness (PLR) post-COVID-19 pandemic. Significant issues have been identified in vocational education in the engineering field. Notably, cognitive changes and psychological conditions are reported at their lowest levels. These changes are attributed to heightened anxiety, altered sleep patterns, stress, and limited social interaction (Escobar-Córdoba et al., 2021).

Figure 1
Path analysis



Additionally, online learning has impacted academic activities, communication methods, assessment procedures, and the overall learning burden (Maatuk et al., 2022; Raharjo et al., 2023). Studies by Basheti et al. (2023), Nuryana et al. (2023), and Ruiz-Robledillo et al. (2022) reveal that post-pandemic learning has led to symptoms of academic stress, anxiety, and depression in normal situations. Consequently, vocational students' learning outcomes are reported as suboptimal (Saripudin et al., 2020; Thaheem et al., 2022). These findings corroborate existing evidence that vocational students experience similar phenomena post-COVID-19, impacting their practice learning readiness.

Survey results across the three investigated dimensions confirm that psychological conditions are the lowest variable, followed by the physical conditions of students. This situation has been corroborated by previous studies (Cao et al., 2020; Liu et al., 2023), observed declining mental well-being among vocational students as reflected in their emotional states, resilience, anxiety, stress, and depressive symptoms. Further clarification by Cao et al. (2020) and Tang and Siti Zuraidah (2022) indicates that the pandemic has increased stress and anxiety levels among vocational students. The learning process during the COVID-19 pandemic is identified as a triggering factor for the psychological and emotional conditions experienced. Most vocational students cited the lack of direct interaction as the primary cause (Ahmad et al., 2022; Salta et al., 2021; Xue et al., 2020). Additionally, many students reported very low self-efficacy during practice, attributed to limited interaction with tools, materials, and the lack of hands-on practice during the pandemic (Namubiru Ssentamu et al., 2020; Salta et al., 2021; Tang & Siti Zuraidah, 2022). This condition correlates with practice learning readiness, necessitating mitigation in the mental well-being of vocational students.

Further evidence was sought by examining the differences between indicators at the dimension level of PLR, to inform potential improvements or mitigation efforts. It was found that knowledge of working principles and problem-solving skills showed the lowest scores. Additionally, significant differences were observed in changes in body immunity and cognitive abilities. Practical learning in vocational education should orient around five characteristics: philosophical,

procedural knowledge, working system principles, safety and health, and problem-solving (Billett, 2011; Clark & Winch, 2007). These principles are prerequisites for vocational students to succeed in practical training (Rojewski, 2009). However, low achievements in working principles and problem-solving knowledge were identified, indicating suboptimal practical learning. Nguyen et al. (2022); Salta et al. (2021); Wagiran et al. (2022) reported that long-term online learning during the pandemic, which was less interactive, led to suboptimal cognitive achievements. Notably, problem-solving knowledge was found to be the lowest among the supporting knowledge practice indicators. Problem-solving is recognized as an essential skill in vocational education, deemed a crucial 21st-century skill (Mutohhari, Sutiman, et al., 2021; Nurtanto et al., 2022; Trilling & Fadel, 2012). The correlation between working principles, problem-solving knowledge, and changes in body immunity and cognitive abilities requires immediate curative actions. Physical resilience training (Törpel et al., 2018) and a focus on mental health (Yun et al., 2021) are recommended. The role of lecturers is to ensure that vocational students' aspects identified as problematic are enhanced to achieve practical learning success.

The success of practice learning readiness in vocational students is influenced by psychological readiness. This study identifies crucial issues in the level and indicators of psychological readiness. Therefore, immediate action involves transitioning from online to offline face-to-face learning, introducing challenges, and innovating in teaching methods (Hermawan et al., 2021). Different approaches, such as blended learning in the new normal conditions, are suggested by Dziuban et al. (2018); Resmiaty et al. (2021). With a controlled learning environment and lifestyle, students' psychological and physical conditions are expected to improve in positive learning activities. This is reinforced by previous studies that highlighted changes in students' cognitive abilities directly impacting their learning outcomes (Mohamad et al., 2022; Santrock, 2007).

Overall, all dimensions do not have significant differences in their acceptance in the post-COVID-19 pandemic era. It's just that there are several priority scales that must be prioritized to improve the PLR and the dimensions of the highlighted PLR have significant differences at the lower threshold. In addition, the three dimensions of PLR studied are also significant constructs for PLR, so it is very important to improve them systematically to prepare VE students before practicing. The psychological condition identified as the most crucial factor must be the first focus of attention for VE. Moreover, psychological condition is a dimension of PLR which has a low level of acceptance at this time. Research from Naidoo and Cartwright (2020), Siow et al. (2021), and Skipor & Vorobieva (2021) provide specific recommendations for improving the psychological aspects of students by conducting counselling, practical learning simulations, and strengthening their motivation through interactive learning innovations. Furthermore, institutions must advocate for the growth of knowledge as the foundation of practical learning. Currently, with digital technology, it is very easy to obtain various sources of student learning needs, requiring only guidance and supervision from lecturers to facilitate and enhance students' digital literacy (Astuti et al., 2022; Fawaid et al., 2022; Jaedun et al., 2022). Finally, stimulation is essential to enhance students' cognitive abilities, which remain low in the dimension of physical conditions.

5. Conclusion

Even though the COVID-19 pandemic has passed, the learning process in vocational education still needs to be re-evaluated. The lack of optimal learning outcomes due to students not returning to practical learning readiness is proven through this research. The most important thing that VE still overlooks is that the psychological conditions identified are still low. Moreover, in terms of self-efficacy and low learning intentions, this certainly contributes to strong problems that affect student readiness. Therefore, this dimension is very important to be the first focus of attention, which must be resolved through strengthening such as counselling guidance, learning simulations, and learning motivation through learning innovation. Apart from that, strengthening knowledge to support practice must continue to be pursued through guidance and supervision of lecturers, especially in the knowledge aspect of problem-solving, which is currently a superior skill that

students must master. Finally, in terms of physical conditions, strengthening thinking power through various stimuli must be strengthened to improve students' abilities.

Author contributions: All the authors contributed significantly to the conceptualization, analysis, and writing of this paper.

Declaration of interest: Authors declare no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

Ethical statement: All subjects who participated in the study have given their consent for participation, for both collection and analysis of the data. No additional ethical approvement was needed.

Funding: The authors stated that they did not receive any financial support for their study.

References

Ahmad, W. N. W., Idrus, A. A., Azman, M. N. A., & Kassymova, G. K. (2022). Correlates of mental health on online distance learning during COVID-19 among Malaysia vocational students. *International Journal of Public Health Science*, *11*(1), 254–262. https://doi.org/10.11591/ijphs.v11i1.21105

Alam, G. M., & Parvin, M. (2021). Can online higher education be an active agent for change? —comparison of academic success and job-readiness before and during COVID-19. *Technological Forecasting and Social Change*, *172*(1), 1–13. https://doi.org/10.1016/j.techfore.2021.121008

Alawajee, O. A., & Almutairi, H. A. (2022). Level of readiness for in-class teaching among teachers of students with special educational needs: Post-COVID-19. *Eurasian Journal of Educational Research*, *2022*(98), 1–20. https://doi.org/10.14689/ejer.2022.98.01

Astuti, M., Arifin, Z., Nurtanto, M., Mutohhari, F., & Warju, W. (2022). The maturity levels of the digital technology competence in vocational education. *International Journal of Evaluation and Research in Education*, *11*(2), 596–603. https://doi.org/10.11591/ijere.v11i2.22258

Azizan, S. N., Lee, A. S. H., Crosling, G., Atherton, G., Arulanandam, B. V, Lee, C. E., & Rahim, R. B. A. (2022). Online Learning and COVID-19 in Higher Education: The Value of IT Models in Assessing Students' Satisfaction. *International Journal of Emerging Technologies in Learning*, *17*(3), 245–278. https://doi.org/10.3991/ijet.v17i03.24871

Baharuddin, M. F., Masrek, M. N., & Shuhidan, S. M. (2020). Content validity of assessment instrument for innovative work behaviour of Malaysian school teachers. *International Journal of Scientific and Technology Research*, *9*(4), 1940–1946.

Basheti, I. A., Assaraira, T. Y., Obeidat, N. M., Al-Haq, F. A. A., & Refai, M. (2023). Assessing anxiety and depression among students Post-COVID-19: Exploring associating factors. *Psychology Research and Behavior Management*, *16*, 1797–1810. https://doi.org/10.2147/PRBM.S409632

Billett, S. (2011). *Vocational education: purposes, traditions and prospects*. Springer. https://doi.org/10.1007/978-94-007-1954-5

Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, *287*, 112934. https://doi.org/10.1016/j.psychres.2020.112934

Clark, L., & Winch, C. (2007). *Vocational education : international approaches, developments and systems*. Routledge.

Dangi, M. R. M., & Saat, M. M. (2021). Interaction effects of situational context on the acceptance behaviour and the conscientiousness trait towards intention to adopt. *Educational Technology & Society*, *24*(3), 61–84. https://www.jstor.org/stable/27032856

Dziuban, C., Graham, C. R., Moskal, P. D., Norberg, A., & Sicilia, N. (2018). Blended learning: the new normal and emerging technologies. *International Journal of Educational Technology in Higher Education*, *15*(1), 1–16. https://doi.org/10.1186/s41239-017-0087-5

Escobar-Córdoba, F., Ramírez-Ortiz, J., & Fontecha-Hernández, J. (2021). Effects of social isolation on sleep during the COVID-19 pandemic. *Sleep Science*, *14*(Special 1), 86–93. https://doi.org/10.5935/1984-

0063.20200097
Fawaid, M., Triyono, M. B., Sofyan, H., Mutohhari, F., Jatmoko, D., Wachid, N., Majid, A., & Rabiman, R. (2022). Entrepreneurial intentions of vocational education students in Indonesia : PLS-SEM approach. *Journal of Technical Education and Training*, *14*(2), 91–105. https://doi.org/10.30880/jtet.2022.14.02.009
Ferdian, F., & Suyuthie, H. (2022). The effect of online learning quality on vocational students' learning achievement during the Covid-19 Pandemic. *Jurnal Pendidikan Vokasi*, *12*(2), 100–109. https://doi.org/10.21831/jpv.v12i2.47570
Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50. https://doi.org/10.1177/002224378101800104
Hair Jr, J. F., Ringle, C. M., Hult, G. T. M., Danks, N. P., Sarstedt, M., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R*. Springer Nature.
Hermawan, R., Septian, M., & Hayat, H. (2021). Learning policy model for vocational higher education after the Covid-19 pandemic. *Al-Ishlah Jurnal Pendidikan*, *13*(3), 2083–2090. https://doi.org/10.35445/alishlah.v13i3.1220
Hews, R., McNamara, J., & Nay, Z. (2022). Prioritising lifeload over learning load: Understanding post-pandemic student engagement. *Journal of University Teaching and Learning Practice*, *19*(2), 128–146. https://doi.org/10.53761/1.19.2.9
Jaedun, A., Nurtanto, M., Mutohhari, F., Majid, N. W. A., & Kurdi, M. S. (2022). Mediating role of teachers' self-efficacy and psychological capital in determining success during learning transition periods in vocational education. *Journal of Education and E-Learning Research*, *9*(3), 207–215. https://doi.org/10.20448/jeelr.v9i3.4193
Johnston, S. (1992). Images: A way of understanding the practical knowledge of student teachers. *Teaching and Teacher Education*, *8*(2), 123–136. https://doi.org/10.1016/0742-051X(92)90003-L
Karim, R. A., & Mustapha, R. (2022). TVET student's perception on digital mind map to stimulate learning of technical skills in Malaysia. *Journal of Technical Education and Training*, *14*(1), 1–13. https://doi.org/10.30880/jtet.2022.14.01.001
Ke, G. N., Grajfoner, D., Wong, R. M. M., Carter, S., Khairudin, R., Lau, W. Y., Kamal, K. A., & Lee, S. C. (2022). Building the positive emotion-resilience-coping efficacy model for COVID-19 pandemic. *Frontiers in Psychology*, *13*(1), 1–14. https://doi.org/10.3389/fpsyg.2022.764811
Leong, C. M., Goh, C. F., Ismail, F., Tan, O. K., & Ong, C. H. (2020). E-learning satisfaction: Investigating gender differences. *International Journal of Electronic Commerce Studies*, *12*(1), 1–28. https://doi.org/10.7903/IJECS.1774
Liu, M., Deng, Y., Wu, B., Zhou, L., & Zhang, Y. (2023). The serial mediation effect of prospective imagery vividness and anxiety symptoms on the relationship between perceived stress and depressive symptoms among chinese vocational college students during the COVID-19 pandemic. *Current Psychology*, *43*(4), 3175–3186. https://doi.org/10.1007/s12144-023-04606-0
Maatuk, A. M., Elberkawi, E. K., Aljawarneh, S., Rashaideh, H., & Alharbi, H. (2022). The COVID-19 pandemic and E-learning: challenges and opportunities from the perspective of students and instructors. *Journal of Computing in Higher Education*, *34*(1), 21–38. https://doi.org/10.1007/s12528-021-09274-2
Mohamad, B., Abbas Adamu, A., & Akanmu, M. D. (2022). Structural model for the antecedents and consequences of internal crisis communication (ICC) in Malaysia oil and gas high risk industry. *SAGE Open*, *12*(1), 1–13. https://doi.org/10.1177/21582440221079887
Mutohhari, F., Sudira, P., & Nurtanto, M. (2021). Automotive engineering drawing learning: effective online learning using autocad application. *Journal of Education Technology*, *5*(2), 214–219. https://doi.org/10.23887/jet.v5i2.33197
Mutohhari, F., Sutiman, S., Nurtanto, M., Kholifah, N., & Samsudin, A. (2021). Difficulties in implementing 21st century skills competence in vocational education learning. *International Journal of Evaluation and Research in Education*, *10*(4), 1229–1236. https://doi.org/10.11591/ijere.v10i4.22028
Naidoo, P., & Cartwright, D. (2020). Where to from here? Contemplating the impact of COVID-19 on South African students and student counseling services in higher education. *Journal of College Student Psychotherapy*, *32*(02), 1–15. https://doi.org/10.1080/87568225.2020.1842279
Namubiru Ssentamu, P., Ng'ambi, D., Bagarukayo, E., Baguma, R., Mutambo Nabushawo, H., & Nalubowa, C. (2020). Enhancing student interactions in online learning: A case of using YouTube in a distance learning module in a higher education institution in Uganda. *Higher Education Research*, *5*(4), 103–117. https://doi.org/10.11648/j.her.20200504.11

Nguyen, H. H., Tuong, H. A., Hoang-Thi, M., & Van Nguyen, T. (2022). Factors influencing online learner performance during coronavirus disease pandemic: A case study in Vietnamese universities. *European Journal of Educational Research*, *11*(3), 1509–1522. https://doi.org/10.12973/eu-jer.11.3.1509

Nurtanto, M., Sudira, P., Sofyan, H., Kholifah, N., & Triyanto, T. (2022). Professional identity of vocational teachers in the 21st century in Indonesia. *Journal of Engineering Education Transformations*, *35*(3), 30–36. https://doi.org/10.16920/jeet/2022/v35i3/22085

Nuryana, Z., Xu, W., Kurniawan, L., Sutanti, N., Makruf, S. A., & Nurcahyati, I. (2023). Student stress and mental health during online learning: Potential for post-COVID-19 school curriculum development. *Comprehensive Psychoneuroendocrinology*, *14*(March), 100184. https://doi.org/10.1016/j.cpnec.2023.100184

Putra, A. B. N. R., Heong, Y. M., Meidyanti, D. S., & Rahmawati, A. D. (2022). Hi world: The virtual book learning integrated augmented reality to increase knowledge of covid-19 prevention in the learning process post-pandemic era. *International Journal of Interactive Mobile Technologies*, *16*(6), 176–187. https://doi.org/10.3991/ijim.v16i06.29001

Qazi, Z., Qazi, W., Raza, S. A., & Khan, K. A. (2021). Psychological distress among students of higher education due to e-learning crackup: moderating role of university support. *Journal of Applied Research in Higher Education*, *4*(1), 1–14. https://doi.org/10.1108/JARHE-02-2021-0069

Rabiman, R., Sudira, P., Sofyan, H., & Nurtanto, M. (2021). Practical learning media in subject maintenance of chassis and power (MCP) based online: simple learning using videos on YouTube. *International Journal of Interactive Mobile Technologies*, *15*(3), 130–145. https://doi.org/10.3991/ijim.v15i03.14943

Raharjo, R., Abdullah, I., Indiyanto, A., Mariam, S., & Raharjo, F. H. (2023). Impact of online learning on teachers' authority during the COVID-19 pandemic in Indonesia. *International Journal of Educational Reform*, *32*(2), 230–246. https://doi.org/10.1177/10567879221140091

Rasmitadila, Aliyyah, R. R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., & Tambunan, A. R. S. (2020). The perceptions of primary school teachers of online learning during the covid-19 pandemic period: A case study in Indonesia. *Journal of Ethnic and Cultural Studies*, *7*(2), 90–109. https://doi.org/10.29333/ejecs/388

Rea, L. M., & Parker, R. A. (2014). *Designing and conducting survey research: a comprehensive guide*. Jossey-Bass.

Reeves, J. J., Longhurst, C. A., San Miguel, S. J., Juarez, R., Behymer, J., Ramotar, K. M., Maysent, P., Scioscia, A. L., & Millen, M. (2022). Bringing student health and Well-Being onto a health system EHR: the benefits of integration in the COVID-19 era. *Journal of American College Health*, *70*(7), 1968–1974. https://doi.org/10.1080/07448481.2020.1843468

Resmiaty, T., Chaeruman, U. A., & Kusumawardani, D. (2021). The implementation of blended learning in the new normal era at vocational school of health. *Jurnal Pendidikan Vokasi*, *11*(2), 182–191. https://doi.org/10.21831/jpv.v11i2.42495

Rojewski, J. W. (2009). A conceptual framework for technical and vocational education and training BT. In R. Maclean & D. Wilson (Eds.), *International handbook of education for the changing world of work: bridging academic and vocational learning* (pp. 19–39). Springer. https://doi.org/10.1007/978-1-4020-5281-1_2

Ruiz-Robledillo, N., Vela-Bermejo, J., Clement-Carbonell, V., Ferrer-Cascales, R., Alcocer-Bruno, C., & Albaladejo-Blázquez, N. (2022). Impact of COVID-19 pandemic on academic stress and perceived classroom climate in spanish university students. *International Journal of Environmental Research and Public Health*, *19*(7), 1–15. https://doi.org/10.3390/ijerph19074398

Salta, K., Paschalidou, K., Tsetseri, M., & Koulougliotis, D. (2021). Shift from a traditional to a distance learning environment during the COVID-19 pandemic: University students' engagement and interactions. *Science and Education*, *12*(01), 1–30. https://doi.org/10.1007/s11191-021-00234-x

Santrock, J. W. (2007). *Educational psychology*. McGraw-Hill Ryerson.

Saripudin, S., Sumarto, S., Juanda, E. A., Abdullah, A. G., & Ana, A. (2020). Vocational school teachers' perceptions of e-learning during covid-19. *Journal of Engineering Education Transformations*, *34*(Special Issue), 7–13. https://doi.org/10.16920/JEET/2020/V34I0/157844

Siow, M. L., Lockstone-Binney, L., Fraser, B., Cheung, C., Shin, J., Lam, R., Ramachandran, S., Novais, M. A., Bourkel, T., & Baum, T. (2021). Re-building students' post-COVID-19 confidence in courses, curriculum and careers for tourism, hospitality, and events. *Journal of Hospitality and Tourism Education*, *33*(4), 270–287. https://doi.org/10.1080/10963758.2021.1963973

Sirisha, M., Mohebbanaaz, Rajiv, J., & Nalla, D. (2020). An efficient method to improve practical knowledge-technical lab report writing. *Journal of Engineering Education Transformations*, *33*(Special Issue), 97–101. https://doi.org/10.16920/jeet/2020/v33i0/150074

Skipor, S. I., & Vorobieva, A. E. (2021). Psychological characteristics of psychologists' adaptation to online

counseling during the covid-19 pandemic. *Russian Psychological Journal*, *18*(1), 61–73. https://doi.org/10.21702/rpj.2021.1.5

Spinazze, P. A., Kasteleyn, M. J., Aardoom, J. J., Car, J., & Chavannes, N. H. (2020). Cross-sectional analysis of university students' health using a digitised health survey. *International Journal of Environmental Research and Public Health*, *17*(9), 1–13. https://doi.org/10.3390/ijerph17093009

Sukiman, Haningsih, S., & Rohmi, P. (2022). The pattern of hybrid learning to maintain learning effectiveness at the higher education level post-COVID-19 pandemic. *European Journal of Educational Research*, *11*(1), 243–257. https://doi.org/10.12973/eu-jer.11.1.243

Syauqi, K., Munadi, S., & Triyono, M. B. (2020). Students' perceptions toward vocational education on online learning during the COVID-19 pandemic. *International Journal of Evaluation and Research in Education*, 9(4), 881-886. https://doi.org/10.11591/ijere.v9i4.20766

Tang, S., & Siti Zuraidah, M. O. (2022). COVID-19 pandemic: Do learning motivation and learning self-efficacy exist among higher vocational college students? *Journal of Education and E-Learning Research*, *9*(1), 38–44. https://doi.org/10.20448/jeelr.v9i1.3756

Thaheem, S. K., Zainol Abidin, M. J., Mirza, Q., & Pathan, H. U. (2022). Online teaching benefits and challenges during pandemic COVID-19: a comparative study of Pakistan and Indonesia. *Asian Education and Development Studies*, *11*(2), 311–323. https://doi.org/10.1108/AEDS-08-2020-0189

Törpel, A., Herold, F., Hamacher, D., Müller, N. G., & Schega, L. (2018). Strengthening the brain—is resistance training with blood flow restriction an effective strategy for cognitive improvement? *Journal of Clinical Medicine*, *7*(10), 337. https://doi.org/10.3390/jcm7100337

Trilling, B., & Fadel, C. (2012). *21st century skills: learning for life in our times*. John Wiley and Sons.

Wagiran, W., Suharjana, S., Nurtanto, M., & Mutohhari, F. (2022). Determining the e-learning readiness of higher education students: A study during the COVID-19 pandemic. *Heliyon*, *8*(10), 1–11. https://doi.org/10.1016/j.heliyon.2022.e11160

Xue, J., Chen, J., Hu, R., Chen, C., Zheng, C., Su, Y., & Zhu, T. (2020). Twitter discussions and emotions about the COVID-19 pandemic: Machine learning approach. *Journal of Medical Internet Research*, *22*(11), 1–16. https://doi.org/10.2196/20550

Yawson, D. E., & Yamoah, F. A. (2020). Understanding satisfaction essentials of E-learning in higher education: A multi-generational cohort perspective. *Heliyon*, *6*(11), 1–9. https://doi.org/10.1016/j.heliyon.2020.e05519

Yun, P., Xiaohong, H., Zhongping, Y., & Zhujun, Z. (2021). Family function, loneliness, emotion regulation, and hope in secondary vocational school students: a moderated mediation model. *Frontiers in Public Health*, *9*(722276), 1–11. https://doi.org/10.3389/fpubh.2021.722276

Zainal Badri, S. K., & Wan Mohd Yunus, W. M. A. (2022). The relationship between academic vs. family/personal role conflict and Malaysian students' psychological wellbeing during COVID-19 lockdown. *Journal of Further and Higher Education*, *46*(1), 76–88. https://doi.org/10.1080/0309877X.2021.1884210