Perceptions toward E-Training and E-Assessment of Practical Skills: A Pre-Post Intervention Survey in Selected Vocational Institutions in Uganda

Ronald Mutebi[1], Bonaventure W. Kerre[2] and Joseph Mubichakani [3]
[1]Department of Technology and Vocational Skills, Kabale University, Uganda
[2]Department of Technology Education, University of Eldoret, Kenya
[3]Department of Science Education, University of Eldoret, Kenya

Corresponding Email: mutronnie77@gmail.com

Abstract

Whereas the COVID 19 pandemic provided an opportunity for innovations in online delivery and evaluation of self-regulated learning outcomes; for most developing countries, e-training and e-assessment of practical skills dragged at take-off stage due to stakeholders' perception that the pedagogy cannot provide the required experience and productivity in mastering practical competencies. The purpose of this study, therefore, was to examine participants' pre and post intervention perception towards e-training and e-assessment of vocational practical skills. The study used a pre and post intervention survey (Before–after) design and stratified sampling was used to select sixty-nine trainees (n=69) that would be comfortably accommodated in the respective institution workshops, Twenty instructors (n=20) and eight assessors (n=8). The 24-item questionnaire used for data collection was validated, piloted and checked for reliability (Cronbach's alpha: 0.726). The data characteristics were explained using descriptive statistics and the significance of the identified differences was examined using the within subjects' statistical test (Paired Samples T - Test). The findings showed a statistically significant difference in participants' perception toward e-training and e-assessment of vocational practical skills at the start of the study (pre-test) and their perception after undergoing e-training and e-assessment ($t_{97} = 10.089$, $p > .005$). The study concludes that perceptions about e-training and e-assessment of practical skills significantly change after experiencing e-training and e-assessment sessions. The study then recommends that when migrating to e-training and e-assessment of practical skills, efforts should be made to start with small-scale piloting sessions that can give stakeholders the opportunity to build up own experiences and acceptance of the pedagogy.

Keywords: *Perception, E-training, E-assessment, Practical skills, Vocational Training.*

INTRODUCTION

After separating trainees, instructors and institutions of learning; the Covid 19 pandemic provided a new one-dimensional and challenging teaching environment (online learning) that in turn motivated the emergence of insights on how this pedagogy can be improved and shaped for success (Kelly, 2022). Although the findings of a study that compared outcomes of face-to-face and online pedagogies, provided statistical support and evidence that the delivery of Technical and Vocational Education and Training (TVET) practical skills online is as effective as face-to-face delivery (Mutebi, Kerre, & Mubichakani, 2023a), some evidence has indicated that this transition to online teaching and learning should be considered as a process and cautioned about a possibility of the attainment gap widening (TASO, 2023).

In the post COVID 19 era, educationists are grappling with approaches and interventions that address lessons learned in the process of shifting from face-to-face to online learning that become a normal for continuity of learning during the pandemic. Whereas online learning and assessment of the theory-based subjects largely proved to be a novel and efficiently successful intervention that provided the opportunity for innovations in online delivery and evaluation of self-regulated learning outcomes (Mohanty, 2021); for most developing countries, as revealed by Syauqi et. al., (2020) e-training and e-assessment of practical skills dragged at take-off stage due to stakeholders' perception that the pedagogy cannot provide the required experience and productivity in mastering practical competencies. Since practical skills are key in any Vocational Education and Training (VET) system, and that closure of educational institutions due to pandemics is now a reality for humanity to cope with in the future; then understanding trends in stakeholder's perception towards e-training and e-assessment of vocational practical skills becomes imperative for education planners, managers and policy makers. The purpose of this study therefore, was to examine participants' pre and post intervention perception towards e-training and e-assessment

of Vocational practical tasks. To achieve this purpose, the study tested the hypothesis "There is no significant difference in participants' perception towards e-training and e-assessment of vocational practical skills before and after undergoing e-training and e-assessment sessions".

From a philosophical viewpoint, Hoffman et al. (2015) framed perception as an evolutionary construct, by likening perceptual systems to biological traits such as limbs or organs that evolve through natural selection. Underscoring perception's role as a tool for biological fitness rather than a conduit for absolute truth, their research concluded that human perception of space-time and physical objects does not mirror objective truth but instead functions as an adaptive interface that has evolved to conceal reality while prioritizing behaviors that enhance survival (Hoffman, Singh, & Prakas, 2015). Expanding on this idea, Forrester (2017) explored the notion of perceptual relativity, emphasizing that reality is fundamentally contingent on the observer. He contended that, no objective reality exists independently of an observer's perception, because what is "knowable" is inherently shaped by the observer's framework. Consequently, he adds, acknowledging this observer-dependent nature of reality, fosters greater open-mindedness and societal tolerance (Forrester, 2017).

Psychological theories of perception are largely rooted in Gestalt principles. Using the example of observing a cat on a sofa, Bernstein et al. (1991) illustrated the distinction between *sensation*—the raw sensory input— and *perception*—the interpretation of this input through prior experiences. They concluded that while visual sensations involve detecting shapes and colors, perception integrates these stimuli into a meaningful whole (such as, recognizing a cat) by drawing on contextual knowledge and experiences (Bernstein et al., 1991). Furthering this framework, Wertheimer's thesis, as cited in Hamlyn (2017), suggested a structural congruence between external phenomena (the "phenomenal" or "behavioral environment") and the brain's cortical processes during sensory interpretation. This perspective, he notes, reflects the Gestalt school's rejection of a strict separation between sensation and perception, instead subsuming perceptual interpretation under sensory experience itself (Hamlyn, 2017).

In recent decades, perception has emerged as a pivotal theme in health and medical research. The *Health Belief Model*—a widely recognized framework for analyzing health-related decision-making—suggests that individuals' health actions are primarily driven by their perceived susceptibility to illness, the severity of health risks, and their evaluation of the benefits and barriers associated with interventions (Daddario, 2007). Within nursing practice, discrepancies between nurse and patient perceptions have been found to result in communication breakdowns and compromised care outcomes (McDonald, 2011). Similarly, research on placebo analgesia has highlighted the interplay of psychological and physiological factors in pain perception. Roche's (2007) study demonstrated that patients' expectations, attitudes and preconceived beliefs critically molded their perception of pain, with neural mechanisms of pain relief influenced by both the mind and the body before and after administration of placebo analgesia.

As the teaching and learning process migrated from face-to-face to e-learning as a result of COVID 19 related closures of Educational institutions, various scholars sought to understand stakeholders' perception towards the pedagogy. Whereas previous literature appeared to support the idea that the quality of service was key in the acceptance of e-learning, Thongsri et al (2019) disputed the idea and went on to show that the most important factor in the acceptance of e-learning was stakeholders' expectancy (in terms of performance and effort). Other recent studies have indicated a similarity before and after switching to online learning (Hollister, et al., 2022); and preferences of students being influenced mostly by their educational stage (Al Hashimi et al., 2022).

Stakeholders perception of e-training and e-assessment of practical skills has also been a focal point of recent research. A study examining students' perceptions of online Mechanical Engineering Education during the COVID-19 pandemic found that online pedagogical approaches did not enhance learning experiences or improve efficacy in acquiring technical competencies (Syauqi, Munadi, & Triyon, 2020). Then, findings on students and staff perspectives found that whereas there were some splendidly positive elements of online learning such as availability of session recordings and sessions being engaging, delivering practical-based courses in an online context showed numerous difficulties (McCullogh, et al., 2022) and challenges (Mutebi, Kerre, & Mubichakani, 2023b). Another study to assess the overall perception of medical students towards virtual practical sessions concluded that whereas hands-on practical training cannot fully be replaced by virtual practical sessions, the latter is a good replacement modality in fields such as microbiology, radiology, biochemistry and histology (Al-Shouli, et al., 2024).

METHODOLOGY

This pre and post intervention survey involved trainees, instructors and assessors of the National Certificate in Building Construction (NCBC) and the National Certificate in Woodwork Technology (NCWT); and was conducted at St Joseph's Vocational Training Institute (VTI-1) and Nakawa Vocational Training College (VTI-2) in Uganda. Considering that the intervention involved practical tasks being performed in a workshop, the inclusion criteria for the study was first year trainees, their respective instructors and assessors from the Uganda Vocational and Technical Assessment Board (UVTAB) that were voluntarily willing to attend all the e-training and e-assessment sessions. The exclusion criteria for the study were trainees that meet the inclusion criteria but have, at some point in previous levels of schooling, trained and performed the practical tasks to be delivered and assessed during the study; as well as instructors and assessors that meet the inclusion criteria but had engagements that may make them unavailable for some of the practical sessions. Stratified sampling was used to select sixty-nine trainees (n=69) that could fit in the respective institution workshops, Twenty instructors (n=20) and eight assessors (n=8).

Study participants were surveyed using a validated questionnaire having three sections that collected participants perception across eight (08) parameters on e-training delivery of practical skills in section 1, six (06) parameters on acquisition of practical skills competencies in section 2, and ten (10) parameters on e-assessment of practical skills in section 3. A pilot study of the twenty-four-item questionnaire gave a Cronbach's alpha of 0.726 which showed that it was reliable. Ethical approval of the study protocols and tools was obtained from the Mbarara University of Science and Technology Research Ethics Committee – REC (Approval number MUST-2022-570) and the study was approved by the Uganda National Council for Science and Technology – UNCST (Approval number SIR181ES).

The survey tool was administered at the start of the study to collect initial (onset) perception towards e-training and e-assessment of vocational practical skills (pre-test data). Study participants then underwent training and assessment of pre-selected practical tasks. The face-to-face training session at one institution (Control group) was filmed, digitally enhanced and then streamed online as the only source of training for the participants at the second institution (Experimental group). Assessors of each practical task were always located at the experimental group institution from where they scored the experimental group (face-to-face assessment because they were in the same location) and then also scored the control group (online assessment because they were separated in location). For the subsequent practical task, the previous experimental and control groups swapped roles: the former experimental group became the face-to-face control group, while the former control group transitioned to the experimental group, receiving online training to complete the task. At the end of all sessions, the survey tool was again administered to the study participants so as to collect their perception toward e-training and e-assessment of vocational practical skills (posttest data). Mean scores for participants' pre-test and posttest responses were calculated for each parameter, along with the change in scores (posttest minus pre-test). Results were organized into tables and visual graphs. Descriptive statistics summarized the data's key characteristics, while inferential analyses evaluated the significance of differences between pre- and post-test means by testing the study hypothesis using the paired samples T-test.

RESULTS AND DISCUSSION

Demographic profile of participants

The demographic profile of trainees was 56.5% trainees of NCBC and 43.5% trainees of NCWT; and 50.7% of the trainees from VTI-1 and 49.3% trainees from VTI-2. The study trainees consisted of 26.1% females and 73.9% males; and 24.6% of trainees had joined from the Uganda Advanced Certificate of Education (UACE), 71% had joined from the Uganda Certificate of Education (UCE), and 4.3% had Joined from the Community Polytechnic/Technical School. 79.7% of the trainees were competent in the use of ICTs and 20.3% were not competent; whereas 26.1% had some form of prior experience in online learning and 73.9% had no prior experience.

The demographic profile of instructors was 50% teaching NCBC and 50% teaching NCWT; and 50% from VTI-1 and 50% from VTI-2. The study instructors consisted of 30% females and 70% males; and 10% of instructors were post graduates, 40% were graduates, and 50% diploma holders. All instructors were competent in the use of ICTs; whereas 10% had some form of prior experience in online teaching and 90% had no prior experience. The

demographic profile of assessors was 50% assessing NCBC and 50% assessing NCWT; and all from the Uganda Business and Technical Examinations Board (UBTEB). The study assessors consisted of 12.5% females and 87.5% males; and 12.5% of assessors were post graduates, 25% graduates, and 62.5% diploma holders. All assessors were competent in the use of ICTs and had no prior experience in online assessment.
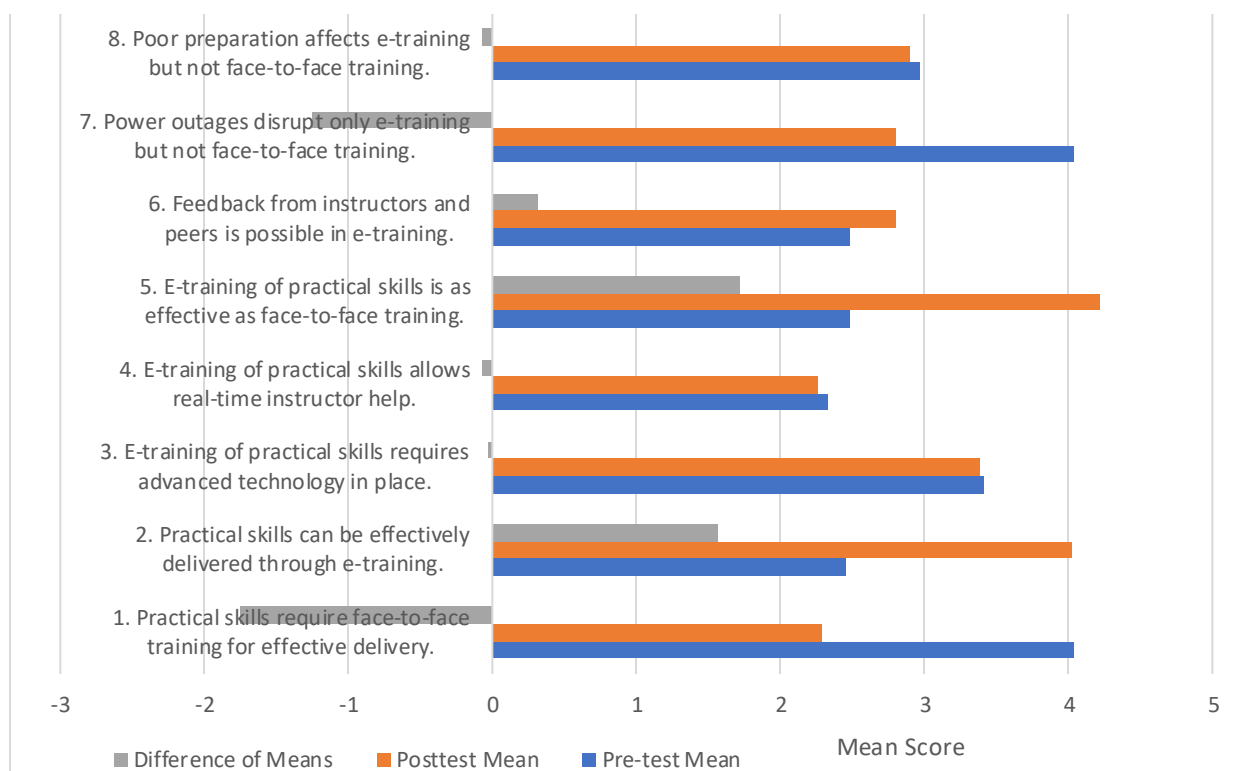
E-training of practical skills descriptive statistics

The survey's e-training section captured participants' perceptions across eight parameters, with outcomes summarized in Table 1 and graphically in Figure 1.

Table 1. Mean scores of participants' pre-test and posttest perceptions toward e-training of practical skills.

Parameter	Perceptions on e-training	Pre-test Mean	Posttest Mean	Means Difference
1.	Practical skills require face-to-face training for effective delivery (Instructor and trainee in same physical space and time).	4.04	2.29	-1.75
2.	Practical skills can be effectively delivered through e-training (Instructor and trainee separated in physical space and time).	2.46	4.03	1.57
3.	E-training of practical skills requires advanced technological infrastructure to work well.	3.41	3.38	-0.03
4.	E-training of practical skills allows real-time instructor help when needed.	2.33	2.26	-0.07
5.	E-training of practical skills is as effective as face-to-face training of the same.	2.49	4.22	1.72
6.	Feedback from instructors and peers is possible in e-training of practical skills.	2.48	2.80	0.32
7.	Power outages disrupt only e-training but not face-to-face training of practical skills.	4.04	2.80	-1.25
8.	Poor preparation affects e-training but not face-to-face training of practical skills.	2.97	2.90	-0.07

Whereas pre-test mean results of the survey questionnaire section on practical skills training delivery, showed that participants agreed with: practical skills being only delivered when a trainer and trainees are in the same physical location at the same time, and electricity outages only affecting e-training delivery; posttest results showed a change in participants perception to disagreement on the two parameters. Then, whereas pre-test mean results showed that participants disagreed with: practical skills being effectively delivered online (Parameter 2 pre-test mean score of 2.46), and online having the same potential as face-to-face in enhancing educational effectiveness (Parameter 5 pre-test mean score of 2.49); posttest results showed a change in participants perception to agreement on the two parameters (posttest mean scores of 4.03, and 4.22 respectively).

Figure 1. Bar chart of pre-test and posttest perceptions toward e-training of practical skills.

The results showed that participants perceptions at the onset of the study (pre-test) and after undergoing the intervention (posttest) remained largely unchanged on: the need for advanced technology for effective online delivery (Parameter 3 pre-test 3.41 and posttest 3.38); online enabling trainees have communication with instructor (Parameter 4 pre-test 2.33 and posttest 2.26); online providing feedback from peers and instructors (Parameter 6 pre-test mean score of 2.48 and posttest 2.80); and inadequate preparation for training being a challenge for only e-training delivery (Parameter 8 pre-test mean score of 2.97 and posttest 2.90).

E-assessment of practical skills descriptive statistics

The survey's e-assessment section captured participants' perceptions across ten parameters, with outcomes summarized in Table 2 and Figure 2.
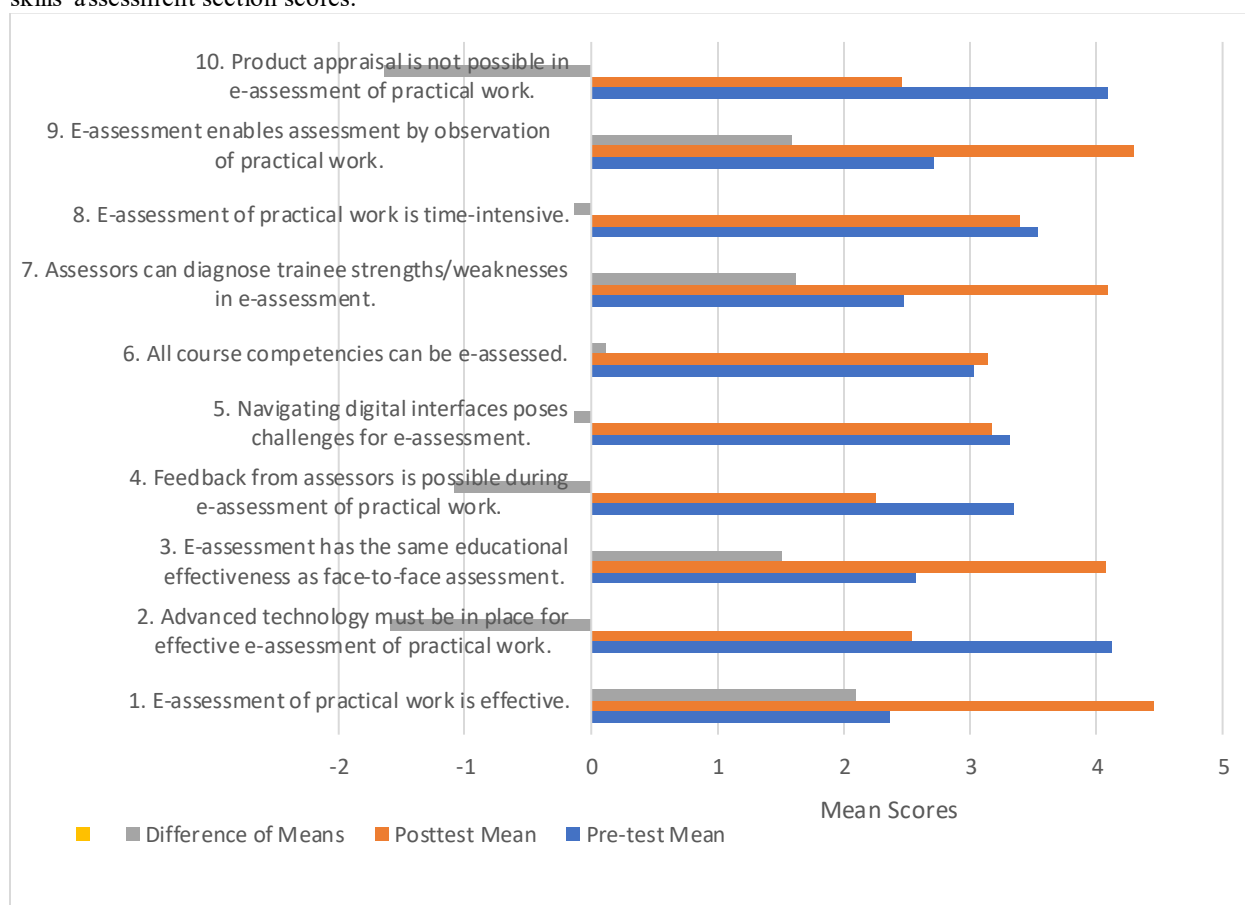
Table 2. Mean scores of pre-test and posttest perceptions toward e-assessment of practical skills.

Parameter	Perceptions on e-assessment	Pre-test Mean	Posttest mean	Means Difference
1.	E-assessment of practical work is effective.	2.36	4.46	2.10
2.	Advanced technology must be in place for effective e-assessment of practical work.	4.13	2.54	-1.59
3.	E-assessment of practical work has the same educational effectiveness as traditional face-to-face assessment.	2.57	4.07	1.51
4.	Feedback from assessors is possible during e-assessment of practical work.	3.35	2.26	-1.09
5.	Navigating digital interfaces poses challenges for e-assessment.	3.32	3.17	-0.14
6.	All course competencies can be e-assessed.	3.03	3.14	0.12

7.	Assessors can diagnose trainee strengths/weaknesses in e-assessment.	2.48	4.10	1.62
8.	E-assessment of practical work is time-intensive.	3.54	3.39	-0.14
9.	E-assessment enables assessment by observation of practical work.	2.71	4.30	1.59
10.	Product appraisal is not possible in e-assessment of practical work.	4.10	2.46	-1.64

The pre-test findings on practical skills assessment showed, that participants agreed with: the need for advanced technology as a prerequisite for effective online assessment of practical skills (Parameter 2 pre-test mean score of 4.13), and product appraisal not being possible in e-assessment of practical work (Parameter 10 pre-test mean score of 4.10). However, after the intervention, participants perception changed to disagreement on the two parameters (posttest mean score of 2.54, and 2.46 respectively). Then, whereas pre-test mean results showed that participants disagreed with: practical tasks being effectively assessed online (Parameter 1 pre-test mean score of 2.36), e-assessment of practical work having the same educational effectiveness as traditional face-to-face assessment (Parameter 3 pre-test mean score of 2.57), Assessors diagnosing trainees strength and weaknesses online (Parameter 7 pre-test mean score of 2.48), and online assessment y observation of performance (Parameter 9 pre-test mean score of 2.71); after undergoing the intervention, participants perceptions on these parameters changed to agreement (posttest mean scores of 4.46, 4.07, 4.10 and 4.30 respectively).

The results showed that pre-test and posttest participants perceptions remained unchanged and largely neutral on: getting online feedback from the assessor (Parameter 4 pre-test 3.35 and posttest 2.26); navigating around ICTs as a major challenge for online assessment (Parameter 5 pre-test 3.32 and posttest 3.17); ability for all course competencies to be e-assessed (Parameter 6 pre-test mean score of 3.03 and posttest 3.14); and procedure for online assessment being time consuming (Parameter 8 pre-test mean score of 3.54 and posttest 3.39). Figure 2 graphically illustrates and compares the pre-test mean, posttest mean and difference in both means of the practical skills assessment section scores.

Figure 2. Bar chart of pre-test and posttest perceptions toward e-assessment of practical skills.

Acquisition of practical skills competencies descriptive statistics

The survey's section on acquisition of practical skills competencies captured participants' perceptions across six parameters, with outcomes summarized in Table 3.

Table 3. Mean scores of pre-test and posttest perceptions toward acquisition of practical skills competencies.

Parameter	Perception on acquisition	Pre-test Mean	Posttest mean	Means Difference
1.	Practical skills competences can be fully acquired through e-training without requiring physical attendance at an institution.	2.12	4.04	1.93
2.	A satisfactory level of desired outcomes of practical skills acquisition can be achieved through e-training and e-assessment.	2.55	4.01	1.46
3.	A practical skill acquired online can be performed by a trainee to the expected standards.	2.23	4.17	1.94
4.	E-training of practical skills makes trainees feel engaged and involved with the task being illustrated or performed.	3.33	3.59	0.26
5.	E-training environments offer the same interaction and active engagement with practical tasks as face-to-face training.	2.48	4.13	1.65
6.	E-training and e-assessment environments are capable of providing feedback.	2.49	2.26	-0.23

Whereas pre-test mean results showed that participants disagreed with: practical skills competences being fully acquired through e-training without requiring physical attendance at an institution (Parameter 1 pre-test mean score of 2.12), a satisfactory level of desired outcomes of practical skills acquisition being achieved through e-training and e-assessment (Parameter 2 pre-test mean score of 2.55), performance of a practical skill acquired online to the expected standards (Parameter 3 pre-test mean score of 2.23), and e-training environments offering the same interaction and active engagement with practical skills techniques, concepts and tasks as the traditional face-to-face training (Parameter 5 pre-test mean score of 2.48); after undergoing the intervention, participants perceptions on these parameters changed to agreement (posttest mean scores of 4.04, 4.01, 4.17 and 4.13 respectively).

The results then showed that participants pre-test and posttest perceptions remained unchanged and largely neutral on the ability e-training of practical skills to make trainees feel engaged and involved with the task being illustrated or performed (Parameter 4 pre-test 3.33 and posttest 3.59). The results also showed that in the pre-test and posttest data, participants consistently disagreed with the ability of e-training and e-assessment environments to provide feedback that can enable trainees to identify and address errors constructively (Parameter 6 pre-test 2.49 and posttest 2.26). Figure 2 graphically illustrates and compares the pre-test mean, posttest mean and difference in both means of the practical skills assessment section scores.
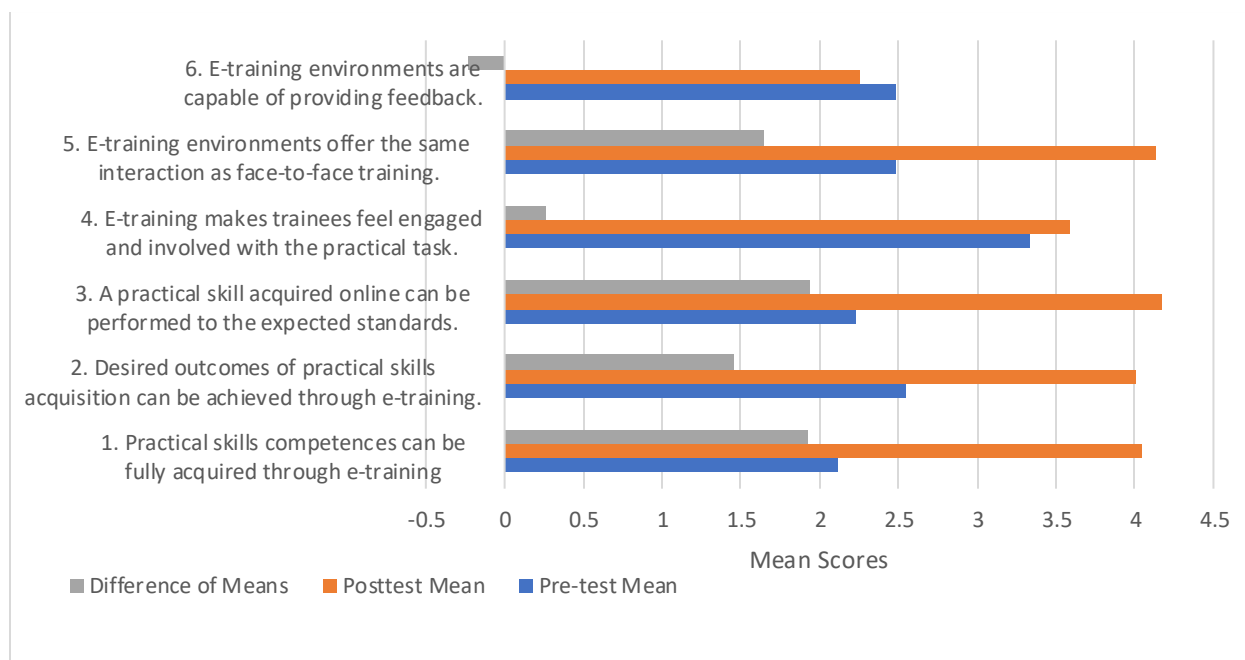
Figure 3. Bar chart of pre-test and posttest perceptions toward acquisition of practical skills competencies.
.

Inferential statistics

The study sought to test the hypothesis "*There is no significant difference in participants' perception towards e-training and e-assessment of vocational practical skills before and after undergoing e-training and e-assessment sessions*". To analyse the significance of the pre-test and posttest difference in perceptions of the 97 data records, a paired samples T-test (a within-subjects statistical design) was used. Data analysis was done using SPSS (version 26), and the results are summarized in Table 4. The analysis revealed a slight increase in posttest mean scores (3.3665) compared to pre-test scores (2.9589), resulting in a mean difference of 0.40761.

Table 4. Paired Samples T-test statistics of the pre-test and posttest results.

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Posttest Mean	3.3665	97	.23846	.02871
	Pre-test Mean	2.9589	97	.30084	.03622

As indicated in Table 5, the positive correlation coefficient of 0.242 suggests a general tendency for higher posttest scores to correspond with higher pre-test scores. The p-value of 0.045 (Table 5) falls below the study's significance threshold ($\alpha = 0.05$), leading to the rejection of the null hypothesis that no correlation exists between the variables.

Table 5. Paired Samples Correlations of participants' pre-test and posttest results.

		N	Correlation	Sig.
Pair 1	Posttest Mean & Pre-test Mean	97	.242	.045

The analysis reveals a p-value of < 0.001 (Table 6), which is below the study's significance threshold ($\alpha = 0.05$) and thus, the null hypothesis is rejected. This indicates that the observed mean difference of 0.40761 between posttest and pre-test scores in participants' perceptions is statistically significant. Therefore, participants' initial perceptions toward e-training and e-assessment of vocational practical skills significantly shifted after they experienced e-training and e-assessment ($t_{97} = 10.089$, p > .005).

Table 6. Paired Samples Test of participants' pre-test and posttest results.

| | Paired Differences | | | | | | | |
| | | | | 95% Confidence Interval of the Difference | | | | Sig. (2-tailed) |
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	
Posttest & Pre-test Mean	.40761	.33561	.0400	.32699	.48823	10.089	96	.000

Discussion

With the majority of participants having no prior experience of online learning or assessment (73.9% of trainees, 90% of instructors and all assessors), which is representative of the prevailing situation in most developing countries, they lacked previous experience that would work as a reference point (Bernstein et al., 1991) upon which they could interpret and thus give meaning to their pre-test perceptions. This lack of exposure to e-training and e-assessment of practical skills meant that participants previous experiences were only the traditional face-to-face training delivery and assessment. These prior experiences (face-to-face) were key elements in their study onset action (pre-test results) to disagree with the idea of practical skills being effectively delivered and assessed online. This aligns with Daddario's (2007) assertion that perceptions of health-related severity and barriers critically influence decision-making, and Roche's (2007) findings that patients' expectations, beliefs, and attitudes directly shape their experience of pain perception—both before and after placebo analgesia use.

The posttest mean score (3.3665) exceeded the pre-test mean (2.9589) by 0.40761, indicating that after experiencing e-training and e-assessment of practical skills sessions, participants' perceptions shifted toward acceptance and confidence in their effectiveness to achieve intended objectives (Forrester, 2017). This evolution in perception aligns with Hoffman et al.'s (2015) assertion that perception functions as an adaptive interface, dynamically shaped by experience. Furthermore, the findings resonate with the Gestalt theory, which posits that perception aligns with sensory input through structural congruence between observed phenomena and neural interpretation (Hamlyn, 2017), reinforcing how experiential adaptation reshapes understanding.

These findings shed light on the underlying reason why e-training and e-assessment of practical skills has dragged at take-off stage. Policy makers and Educationists have not provided opportunities for stakeholders to build own experiences that can shape perceptions on the effectiveness of e-training and e-assessment of practical skills. This vacuum of experience in e-training and e-assessment of practical skills has led to a silent perception conflict (McDonald, 2011) between implementors of online learning and stakeholders (Trainees, instructors and assessors) resulting in suboptimal outcomes as compared to the delivery on theory-based subjects.

The results of this study contrast with prior research by Syauqi et al. (2020), which reported students' dissatisfaction with online learning's efficacy in fostering competency mastery, and Thongsri et al. (2019), which found minimal impact of service quality on acceptance of online learning. These discrepancies may stem from differences in the two studies' methodologies, scope, and focus. While this research directly compared perceptions before and after e-training and e-assessment exposure, Syauqi et al. (2020) focused narrowly on student views of online Mechanical Engineering Education during COVID-19.

Also, some participants' perceptions remained unchanged in the pre-test and posttest. These included skepticism about online platforms' capacity to facilitate instructor communication for problem-solving, the feasibility of receiving peer and assessor feedback for error correction, the perception that online practical skill assessment is inherently time-consuming, and the notion that inadequate preparation only affects e-training and e-assessment compared but not the traditional method.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study's results demonstrate that stakeholders' perceptions toward e-training and e-assessment of practical skills evolve significantly after they experience and engage with these methods. This suggests that earlier misconceptions and information vacuums regarding the viability of e-training and e-assessment of vocational practical skills stemmed from stakeholders limited prior exposure to such experiences. Consequently, the study offers critical insights for educational institutions, training providers, curriculum developers, and policymakers to anticipate stakeholder perceptions and attitudes during the transition to e-training and e-assessment of vocational practical skills. Initial resistance or negative perceptions toward e-training and e-assessment should be acknowledged as part of the adaptation process, with stakeholders requiring time to accumulate firsthand experiences that inform then evolve their perceptions.

Recommendations

1. Gradual Integration of e-training and e-assessment into vocational practical skills programs to allow stakeholders' perceptions to shift positively through repeated exposure and familiarity.
2. Implementation should start with small-scale pilot initiatives e-training and e-assessment of vocational skills, to enable trainees, instructors, and assessors build experiential confidence and acceptance of the intervention.

Limitations of the Study

The study involved participants experiencing practical tasks and thus had to be conducted in a workshop setting. This necessitated a sample size limited to the capacity of the workshops which resulted in a smaller participant pool, potentially affecting the generalizability of the findings to broader national or regional populations. Additionally, the underrepresentation of female trainees in the selected vocational programs meant the study sample lacked adequate gender diversity, further limiting its demographic applicability.

Suggestions for Further Research

Future research should replicate this study across a wider range of public and private vocational institutions (both formal and non-formal) to assess whether the findings remain consistent in diverse educational and operational contexts.

REFERENCES

Al Hashimi, S., Alamarat, Y., & Zaki, Y. (2022). Students' perceptions of online assessment, feedback practices, and challenges. *International Journal of Evaluation and Research in Education (IJERE) Vol. 11,*, 1939~1949. doi:10.11591/ijere.v11i4.22753

Al-Shouli, S. T., Younis, A., Alamri, A., Alhumimidi, A., Barashid, A., Altamimi, I., . . . Aljerian, K. (2024). Perception of Medical Students toward Virtual Practical Sessions during COVID-19 Pandemic: A Cross-sectional Study. *Journal of Nature and Science of Medicine*, 299-304.

Bernstain, D. A., Roy, E. J., Srull, T. K., & Wickens, C. D. (1991). *Psychology.* Dallas: Houghton Mifflin Company.

Daddario, D. K. (2007). A review of the use of the health belief model for weight management. *Medsurg Nursing 16(6)*, 363 - 366.

Forrester, R. (2017). *The Philosophy of Perception: An explanation of Realism, Idealism and the Nature of Reality.* Newlands: Best Publications Limited.

Hamlyn, D. W. (2017). *The Psychology of Perception: A Philosophical Examination of Gestalt Theory and Derivative Theories of Perception.* New York: Routledge & Kegan Paul Ltd.

Hoffman, D. D., Singh, M., & Prakas, C. (2015). The Interface Theory of Perception. *Psychon Bull Rev (2015) 22:*, 1480–1506. doi:10.3758/s13423-015-0890-8

Hollister, B., Nair, P., Hill-Lindsay, S., & Chukoskie, L. (2022). Engagement in Online Learning: Student Attitudes and Behavior During COVID-19. *Frontiers in Education, 7.* doi:https://doi.org/10.3389/feduc.2022.851019

Hussain, E. T., Daoud, S., Alrabaiah, H., & Owais, A. K. (2021). Students' Perception of Online Assessment During the COVID-19 Pandemic: The Case of Undergraduate Students in the UAE. *2020 21st International Arab Conference on Information Technology (ACIT),*, (pp. 1-6). Giza, Egypt. doi:10.1109/ACIT50332.2020.9300099.

Kelly, K. (2022). Building on Students' Perspectives on Moving to Online Learning during the COVID-19 Pandemic. *The Canadian Journal for the Scholarship of Teaching and Learning, 13*(1), 1-18. doi:https://doi.org/10.5206/cjsotlrcacea.2022.1.10775

McCullogh, N., Allen, G., Boocock, E., Peart, D. J., & Hayman, R. (2022). Online learning in higher education in the UK: Exploring the experiences of sports students and staff. *Journal of Hospitality, Leisure, Sport & Tourism Education*(31), 1-10.

McDonald, S. M. (2011). *Perception: A concpt analysis.* Texas: The University of Texas at Tyler.

Mohanty, S. B. (2021). Educatioal Transformation in the era of COVID 19: Challenges and Issues. *Journal of All India Association for Educational Research, 33*(1), 1-17.

Mutebi, R., Kerre, B. W., & Mubichakani, J. (2023). Challenges of an Online Pedagogy as a Method for TVET Practical Skills Training Delivery and Assessment. *East African Journal of Education Studies, 6*(2), 396-405. doi:Article DOI: https://doi.org/10.37284/eajes.6.2.1383

Mutebi, R., Kerre, B. W., & Mubichakani, J. (2023). Effectiveness of an Online Pedagogy in Trainees' Acquisition of Practical Skills: A Case of Selected TVET Institutions in Uganda. *The Uganda Higher Education Review*, 43-53. doi:https://doi.org/10.58653/nche.v11i1.04

Roche, P. A. (2007). Pain and placebo analgesia: two sides of the same coin. *Phyical Therapy Reviews, 12(3)*, 189-198. doi:10.1179/108331907X222985

Syauqi, K., Munadi, S., & Triyon, M. B. (2020). Students' perceptions toward vocational education on online learning during the COVID-19 pandemic. *International Journal of Evaluation and Research in Education (IJERE) Vol. 9, No. 4*, 881~886. doi: DOI: 10.11591/ijere.v9i4.20766

TASO. (2023, March). *Online teaching and learning in the time of COVID-19.* Retrieved from TASO - Transforming Access and Students Outcomes in Higher Education: https://cdn.taso.org.uk/wp-content/uploads/2023-03-22_Summary_Online-teaching-and-learning-in-COVID-19_TASO.pdf

Thongsri, N., Shen, L., & Bao, Y. (2019). Investigating factors affecting learner's perception toward online learning: evidence from ClassStart application in Thailand. *Behaviour & Information Technology Volume 38, - Issue 12*, 1-16.