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Flexible Learning, Protocol Implementation, and Institutional Resilience in Technical and Vocational Education and Training: Evidence from Nueva Vizcaya, Philippines

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Abstract

This study examined the implementation of Technical and Vocational Education and Training (TVET) arrangements during the COVID-19 "new normal" in Nueva Vizcaya, Philippines, and identified the institutional constraints that shaped flexible training delivery. Using a descriptive-comparative design, the study involved 50 respondents 12 administrators and 38 trainers from 12 public and private technical-vocational institutions. Data were gathered through a survey instrument based on TESDA Circular No. 66, series of 2020, and analyzed using frequency, percentage, weighted mean, t-test, F-test, and thematic ranking of reported challenges. Results showed that blended learning was the dominant delivery mode (66%), while 34% of respondents reported using a combination of distance and face-to-face learning. Overall, enrollment protocols were only partially implemented (M = 2.15), whereas training delivery (M = 2.63), assessment (M = 2.96), and administrative protocols (M = 2.92) were fully implemented. Administrators and trainers generally shared similar assessments of implementation. However, significant differences emerged in enrollment implementation by mode of delivery during MECQ and by institutional years of existence, and in assessment implementation by mode. The most frequently reported challenge was the lack of online learning resources (f = 44), followed by poor internet connectivity (f = 20), limited trainers' IT skills (f = 10), insufficient administrative support (f = 4), and unavailable tools or facilities (f = 3). The findings suggest that regulatory compliance was strongest in areas supported by explicit monitoring and mandatory protocols, while digital learning capacity remained the principal weakness. The study argues that post-pandemic TVET resilience requires sustained investment in digital learning resources, trainer capability, connectivity, flexible enrollment systems, and hybrid models that preserve hands-on competency development.

Keywords: TVET; flexible learning; blended learning; distance education; institutional resilience; technical-vocational education

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1. Introduction

Technical and Vocational Education and Training (TVET) occupies a strategic position in national development because it links education directly with employability, productivity, entrepreneurship, and middle-level skills formation. The underlying thesis treated TVET as a platform for socio-economic development and emphasized its role in equipping individuals with practical competencies for industry and self-employment. This orientation is especially important in provincial labor markets where formal employment, small enterprise, agriculture, construction, caregiving, tourism, and service occupations depend on occupation-specific competencies and certification.

The COVID-19 pandemic exposed a structural tension in TVET that was less pronounced in many academic programs: continuity of learning had to be maintained even though a substantial proportion of technical training depends on physical demonstration, tools, workshops, laboratories, competency practice, and direct observation. In Nueva Vizcaya, the disruption affected administrators, trainers, laboratory and workshop personnel, and trainees. Some qualifications were suspended or closed temporarily because their competency requirements demanded close physical interaction. Training institutions therefore had to balance public-health requirements with the fundamental pedagogical principle of learning by doing.

TESDA responded by institutionalizing flexible arrangements through policy issuances that enabled online, blended, distance, and combined distance/face-to-face delivery. These arrangements were designed to maintain training continuity while reducing health risks and ensuring that practical components could still be delivered under controlled conditions. The uploaded thesis documented this transition in Nueva Vizcaya and showed that the provincial TVET sector moved rapidly from predominantly traditional face-to-face training toward blended and hybrid forms of delivery. The study therefore provides a useful empirical snapshot of institutional adaptation during a period of acute disruption.

The relevance of the findings extends beyond the emergency period. UNESCO-UNEVOC now frames digital transformation as a continuing TVET priority involving changes in teaching and learning, organizational management, flexible delivery, digital skills, and the role of providers within local ecosystems. Its 2024–2026 strategy similarly emphasizes flexible pathways and the capacity of TVET institutions to respond to digital, green, and inclusive transitions. The pandemic-era experience in Nueva Vizcaya can thus be read not only as crisis management but also as an early stage of the longer-term digital transformation of skills education.

The central issue is that policy adoption does not automatically create institutional capability. A training institution can comply with health, assessment, and administrative rules while still lacking high-quality online resources, reliable connectivity, trainer competence in e-learning, or digitally accessible enrollment systems. This distinction is especially consequential in TVET because the instructional challenge is not simply to move lectures online; rather, institutions must redesign learning experiences so that knowledge, practical performance, coaching, assessment, and industry relevance remain coherent across physical and digital environments.

Accordingly, this article reworks the thesis into a journal-oriented analysis of flexible learning, protocol implementation, and institutional resilience. It retains the original dataset and statistical findings while reframing the discussion around a broader question: what did the pattern of implementation reveal about the capacity of local TVET institutions to absorb disruption and sustain quality training under constrained conditions?

2. Literature Review and Analytical Context

Flexible learning in TVET is inherently more complex than in programs dominated by theoretical content. The uploaded study cited UNESCO, the International Labour Organization, the World Bank, and related scholarship to show that remote and online learning created difficulties in programs where practical skills, equipment handling, demonstration, apprenticeship, and performance assessment were central. Hoftijzer et al. (2020) argued that TVET programs most dependent on learning-by-doing faced the greatest barriers to rapid distance-learning substitution. Ndahi (2020) likewise documented limited instructor preparedness, weak digital infrastructure, interrupted internet service, and difficulties in simulating practical activities in remote environments.

Blended learning emerged as a practical compromise because it allowed knowledge-oriented content to be delivered through online or offline digital resources while reserving laboratory, workshop, and competency-based tasks for scheduled face-to-face sessions. Alvarez (2020) highlighted the institutional and faculty-development challenges associated with blended learning in the Philippine context, while Rasheed et al. (2020) synthesized problems in online components of blended learning and underscored technology, learner, and instructional barriers. These concerns are directly relevant to TVET because a hybrid model is effective only when the digital and face-to-face components are intentionally integrated rather than merely placed side by side.

Digital competence is another foundational condition. The thesis reported that trainers had been required to undertake training such as Facilitate eLearning Sessions, yet some still needed further support in learning-platform development and

online resource preparation. This is consistent with Lie et al. (2020), who found that teachers' technological and pedagogical knowledge, prior exposure to online learning, and support systems influenced online engagement. UNESCO-UNEVOC has continued to stress that TVET teachers and trainers need not only digital training but also time, technical assistance, and opportunities to integrate new tools into practice.

Infrastructure and connectivity shape access as strongly as pedagogy. The thesis described unstable and slow internet connections, weather- and location-related access problems, limited availability of smartphones among some trainees, and insufficient load allowances. These findings reflect a digital divide that affects both participation and the reliability of institutional systems such as online registration, synchronous learning, and electronic attendance. Digital transformation in TVET is therefore inseparable from questions of access, affordability, device availability, and local connectivity.

At the organizational level, the pandemic also demonstrated the importance of institutional resilience. Resilience in this context refers to the capacity of training providers to continue essential functions, reorganize delivery, comply with regulatory requirements, protect learners and staff, and preserve training quality during disruption. The thesis suggested that older institutions may have had advantages in resources, established procedures, and organizational stability, although the statistical pattern was not uniform across all domains.

Recent UNESCO-UNEVOC guidance extends this resilience perspective beyond emergency response. Its digital transformation agenda emphasizes new digital competencies, flexible and individualized learning pathways, digitally supported organizational management, and closer connections between providers and labor-market ecosystems. The 2024–2026 UNESCO-UNEVOC strategy similarly positions TVET modernization around flexibility, digitalization, sustainability, and inclusion. These developments reinforce the continued relevance of the Nueva Vizcaya findings: the deficits observed during the pandemic online resources, connectivity, and digital capability are precisely the capacities that now shape the competitiveness and accessibility of contemporary TVET.

3. Objectives of the Study

1. To describe the institutional and respondent profile of the participating TVET institutions in Nueva Vizcaya;
2. To determine the level of implementation of enrollment, training delivery, assessment, and administrative protocols under the new-normal TVET arrangements;
3. To test whether implementation differed according to respondent type, mode of learning, and years of institutional existence;
4. To identify and rank the principal challenges experienced in implementing TVET programs under flexible-learning conditions; and
5. To derive policy and institutional implications for strengthening resilient and digitally enabled TVET delivery.

4. Methodology

The study used a descriptive-comparative research design. The original investigation sought to describe the extent to which TVET arrangements were implemented and to compare perceptions across respondent groups and institutional profiles. This design was appropriate because the primary variables were levels of implementation of policy-based protocols and the reported challenges experienced by institutions.

The study was conducted in Nueva Vizcaya, a province in Region II with a mixture of public and private TVET providers. The research covered 12 institutions: 10 private technical-vocational institutions, one TESDA Technology Institution, and one provincial training center. The institutions represented providers operating under the Unified TVET Program Registration and Accreditation System and were supervised by the TESDA Provincial Office.

The respondents consisted of 50 individuals: 12 TVET administrators and 38 trainers. Complete enumeration was used because the number of active trainers had been reduced during pandemic-related closures and training suspensions. The sample therefore represented the available administrators and trainers from the institutions covered by the study.

The survey questionnaire was based on TESDA Memorandum Circular No. 66, series of 2020, on TVET arrangements in the new normal. It contained sections on respondent profile, institutional profile, extent of protocol implementation, and implementation challenges. Implementation items used a three-point scale interpreted as 1.00–1.49 = not implemented, 1.50–2.49 = partially implemented, and 2.50–3.00 = fully implemented.

Permission to conduct the study was obtained from the TESDA Provincial Office and the administrators of the participating institutions. Questionnaires were distributed directly while observing the applicable health protocols. Data were treated confidentially. Frequencies and percentages were used for profiles; weighted means summarized implementation levels; t-tests and F-tests examined group differences; and challenge frequencies were tabulated and ranked.

For the present article, no new data were added and no original statistical results were altered. The contribution of

this journal-oriented version lies in reorganizing the thesis evidence around the themes of flexible delivery, compliance, digital capacity, and institutional resilience.

5. Results

5.1 Respondent and Institutional Profile

The respondent profile showed a predominantly male group (54%), with women comprising 46%. The largest age group was 21–30 years old (30%), followed by 31–40 (28%), 51 and above (26%), and 41–50 (16%). Nearly half of the respondents had been in their respective institutions for 1–5 years (46%), while 26% had 11 years or more of service, 20% had 6–10 years, and 8% had less than one year. In terms of qualifications, 56% were college graduates with National Certificate (NC) and National TVET Trainers Certificate (NTTC) credentials, 18% were at college level with NC and NTTC, 12% had master's units with NC and NTTC, and 14% were master's degree graduates with NC and NTTC.

Profile	Category	n	%
Sex	Male	27	54.0
	Female	23	46.0
Age	21–30	15	30.0
	31–40	14	28.0
	41–50	8	16.0
	51 and above	13	26.0
Years in institution	Less than 1 year	4	8.0
	1–5 years	23	46.0
	6–10 years	10	20.0
	11 years and above	13	26.0
Educational attainment	College level + NC/NTTC	9	18.0
	College graduate + NC/NTTC	28	56.0
	Master's units + NC/NTTC	6	12.0
	Master's degree + NC/NTTC	7	14.0

Institutionally, blended learning was the most common delivery mode, reported by 33 respondents (66%), while 17 (34%) reported a combination of distance learning and face-to-face learning. Nearly half of the responses represented institutions that had existed for 10 years or more, suggesting that the sample contained a substantial group of relatively established providers.

Institutional characteristic	Category	n	%
Mode of learning	Blended learning	33	66.0
	Distance + face-to-face	17	34.0
Years of existence	1–3 years	13	26.0
	4–6 years	10	20.0
	7–9 years	3	6.0
	10 years and above	24	48.0

5.2 Overall Level of Protocol Implementation

The overall implementation pattern was uneven. Assessment protocols received the highest mean (M = 2.96), followed by administrative protocols (M = 2.92) and training-delivery protocols (M = 2.63); all three were interpreted as fully implemented. Enrollment protocols received the lowest overall mean (M = 2.15) and were only partially implemented. This pattern indicates that institutions were most successful in areas tied to explicit operational and compliance requirements, while enrollment digitalization lagged behind.

Protocol area	Mean	Interpretation
Enrollment protocols	2.15	Partially implemented
Training delivery protocols	2.63	Fully implemented
Assessment protocols	2.96	Fully implemented
Administrative protocols	2.92	Fully implemented

5.3 Enrollment Protocols: The Weakest Implementation Domain

Enrollment was the least developed component of the new-normal arrangements. Online enrollment during MECQ recorded a mean of 1.82, while online application through TESDA websites or mobile applications received 1.92. Submission of application requirements through email was somewhat stronger at 2.30, and combining face-to-face with online enrollment reached 2.46, but these indicators remained within the partially implemented range.

The pattern reflects a distinction between emergency regulation and digital administrative capability. Institutions could impose health requirements relatively quickly because these were concrete and mandatory; creating end-to-end digital enrollment required systems, connectivity, device access, staff competence, and client digital literacy. The thesis noted that no mature online enrollment system was available at the onset of lockdown, making continued on-site processes difficult to replace.

5.4 Training Delivery: Hybrid Continuity with Uneven Digital Integration

Training delivery achieved an overall mean of 2.63 and was therefore fully implemented. Asynchronous e-learning during ECQ/MECQ reached 2.60, face-to-face training during GCQ/MGCQ reached 2.60, distance learning reached 2.78, modular competency-based workshop arrangements reached 2.82, limits on workshop learners reached 2.88, and physical distancing for community-based training reached 2.92. Coordination with local government units and sanitation of facilities were likewise implemented.

However, the specifically digital and blended indicators remained weaker. Online/e-learning during GCQ/MGCQ obtained a mean of 2.14 and blended learning 2.06, both interpreted as partially implemented. This apparent paradox is analytically important: training delivery as a whole was sustained, but the success came from combining multiple modalities and carefully controlled face-to-face activity rather than from a complete transition to online training.

This is consistent with the practical nature of TVET. Competency-based programs cannot always replace physical demonstration, equipment manipulation, and performance assessment with digital equivalents. The institutions therefore appeared to use digital tools mainly to preserve continuity of knowledge components while maintaining scheduled physical access for skills components whenever regulations permitted.

5.5 Assessment and Administrative Protocols: Strong Compliance

Assessment protocols were the most strongly implemented area, with an overall mean of 2.96. Preparation of seat plans for contact tracing and collection of applicant travel or exposure information both received 2.96. The thesis explained that assessment centers were monitored by TESDA provincial and regional offices and that CCTV documentation was mandatory, which likely strengthened compliance.

Administrative protocols were also fully implemented, with an overall mean of 2.92. The use of protective equipment received the maximum mean of 3.00; regular disinfection and placement of sanitizers each received 2.96; digital thermometers or thermal scanners received 2.88; and restricting persons with fever or flu-like symptoms received 2.90. These scores show that institutions were highly responsive when procedures were clearly specified, externally monitored, and tied to permission to continue operations.

5.6 Differences by Respondent Type, Mode, and Institutional Age

Administrators and trainers generally shared similar assessments of implementation. For enrollment during MECQ, administrators reported a mean of 2.17 and trainers 2.31 ($t = 0.745$, $p = .460$). During GCQ, the means were 2.17 and 2.25 ($t = 0.533$, $p = .596$). For training delivery during MECQ, administrators reported 2.42 and trainers 2.66 ($t = 1.283$, $p = .206$); during GCQ, the means were 2.58 and 2.64 ($t = 0.559$, $p = .579$). None of these differences was statistically significant.

Area	Administrator M	Trainer M	Test	p	Decision
Enrollment (MECQ)	2.17	2.31	t=0.745	.460	Not significant
Enrollment (GCQ)	2.17	2.25	t=0.533	.596	Not significant
Training (MECQ)	2.42	2.66	t=1.283	.206	Not significant
Training (GCQ)	2.58	2.64	t=0.559	.579	Not significant
Assessment	2.92	2.97	t=0.868	.390	Not significant
Administrative	2.94	2.91	t=0.733	.467	Not significant

Mode of delivery produced a significant difference in enrollment during MECQ. Institutions using blended learning reported a mean of 2.13, compared with 2.58 among institutions combining distance and face-to-face learning ($t = 2.924$, $p = .005$). Differences were not significant for enrollment during GCQ or training delivery during MECQ. For training during GCQ, the descriptive means differed (2.12 for blended learning and 2.58 for distance plus face-to-face), but the reported test remained non-significant ($p = .343$).

Area	Blended M	Distance + F2F M	Test	p	Decision
Enrollment (MECQ)	2.13	2.58	t=2.924	.005	Significant
Enrollment (GCQ)	2.27	2.17	t=0.751	.456	Not significant
Training (MECQ)	2.63	2.56	t=0.352	.726	Not significant
Training (GCQ)	2.12	2.58	t=0.957	.343	Not significant
Assessment	3.00	2.87	t=2.093	.042	Significant
Administrative	2.91	2.93	t=0.607	.547	Not significant

Years of institutional existence were associated with significant differences during MECQ for both enrollment and training. Enrollment means were 1.97 for 1–3-year institutions, 1.87 for 4–6-year institutions, and 2.57 for institutions operating seven years or more ($F = 11.490$, $p < .001$). Training-delivery means during MECQ were 2.85, 2.10, and 2.67 respectively ($F = 6.359$, $p = .004$). Differences were not significant during GCQ. Assessment and administrative protocols were also consistently high across institutional age groups, with no significant differences.

Area	1–3 years	4–6 years	7+ years	Test	p	Decision
Enrollment (MECQ)	1.97	1.87	2.57	F=11.490	<.001	Significant
Enrollment (GCQ)	2.10	2.33	2.25	F=0.819	.447	Not significant
Training (MECQ)	2.85	2.10	2.67	F=6.359	.004	Significant
Training (GCQ)	2.75	2.65	2.56	F=1.452	.244	Not significant

5.7 Challenges in Implementing Flexible TVET

The challenge ranking provides the clearest picture of where institutional capacity was weakest. Lack of online learning resources was cited 44 times and ranked first. Poor internet connectivity followed with 20 responses, while trainers' IT skills were cited 10 times. Insufficient administrative support received only four responses, and unavailable tools or facilities only three. The pattern therefore suggests that the critical bottleneck was not institutional willingness or traditional workshop infrastructure; it was the capacity to create, access, and use digital learning resources effectively.

Challenge	Frequency	Rank
Online learning resources	44	1
Internet connection	20	2
IT skills in online teaching	10	3
Not enough administrative support	4	4
Unavailability of tools/facilities	3	5

The thesis reported that many institutions did not possess ready-made online materials because their programs had historically been delivered through traditional face-to-face and workshop formats. This was especially problematic in qualifications such as driving and other performance-intensive programs where digital resources cannot easily substitute for direct practice. Trainers therefore needed additional time and training to redesign resources for online or blended use.

Connectivity compounded the resource problem. Respondents described internet access as available in some locations but frequently slow, unstable, and weather-dependent. Trainees in more remote areas sometimes lacked suitable smartphones or sufficient load allowances, and some required assistance even for online registration and attendance. These barriers constrained participation independently of trainer effort.

IT skills ranked third. Most trainers reportedly possessed at least some digital competence, but the transition exposed gaps in learning-platform development, online pedagogy, and resource creation. Short online training courses were useful but did not always provide enough time for mastery. This suggests that professional development should be continuous, practice-based, and connected to the actual qualifications trainers deliver.

Administrative support was comparatively less problematic. Most respondents viewed administrators as supportive of continued training, although a small number reported inadequate internet allowances or related assistance. Tools and facilities were the least frequently cited challenge, which reflects the pre-existing regulatory requirement that registered TVET qualifications maintain prescribed equipment and workshop resources.

6. Discussion

The results reveal a two-speed pattern of institutional adaptation. Compliance-intensive domains—assessment, administration, and much of training delivery were implemented strongly, while digitally intensive domains online enrollment, e-learning, blended learning, and online resource development lagged. This distinction matters because it shows that resilience cannot be inferred from overall compliance alone. Institutions succeeded where procedures were clear, externally monitored, and connected to authorization to operate; they struggled more where implementation depended on local digital capability.

The partial implementation of enrollment protocols illustrates the administrative dimension of the digital divide. Online enrollment is often treated as simpler than online instruction, yet it requires interoperable systems, stable internet, device access, staff competence, and users capable of completing digital forms and submissions. The absence of a mature online enrollment system at the start of the pandemic therefore created a bottleneck that could not be solved simply by issuing a policy directive.

The training-delivery findings show why hybrid approaches are especially appropriate for TVET. The overall training-delivery score was high, but online/e-learning and blended-learning indicators were only partial. Institutions preserved continuity by combining asynchronous materials, modular arrangements, controlled face-to-face sessions, and distance learning. This confirms the importance of matching modality to competency requirements rather than forcing a universal online model.

From a post-pandemic perspective, the first-ranked challenge online learning resources is particularly significant. UNESCO-UNEVOC's current digital transformation agenda emphasizes that TVET digitalization must affect teaching, learning, organizational management, flexible pathways, and providers' relationships with labor-market ecosystems. Digital resources are therefore no longer emergency substitutes; they are part of the permanent infrastructure of modern TVET. The Nueva Vizcaya data suggest that institutions had begun the transition but lacked sufficient digital content ecosystems to sustain it independently.

Trainer development is equally central. Digital competence cannot be reduced to operating applications. Effective blended TVET requires trainers to redesign activities, determine which competencies can be taught remotely, create or curate digital resources, structure learner interaction, provide feedback, and connect online preparation with hands-on practice. UNESCO-UNEVOC's work on TVET teacher digital capabilities similarly emphasizes pedagogy, time for integration, and technical support in addition to basic skills training.

The significant MECQ differences by institutional age suggest that organizational maturity influenced early-crisis response, although the pattern was not linear across every group. Older institutions may have benefited from established administrative routines, resources, networks, and compliance systems. By GCQ, however, group differences diminished,

implying that policy learning and adaptation spread across institutions as the crisis progressed.

The absence of significant differences between administrators and trainers is also noteworthy. Shared perceptions can indicate organizational alignment: both groups were directly involved in implementing protocols and were exposed to the same constraints. At the same time, the similarity underscores that the weaknesses observed were structural rather than merely attitudinal. When both administrators and trainers identify digital resources and connectivity as primary constraints, solutions must extend beyond individual motivation.

The strong implementation of assessment and administrative protocols offers a useful policy lesson. Compliance was highest where expectations were concrete, measurable, and actively monitored by TESDA. This suggests that future digital-transformation policy may benefit from similarly explicit standards for digital learning resources, online enrollment, data systems, trainer capability, accessibility, and quality assurance. Institutions respond more consistently when expectations are operationalized and accompanied by support and monitoring.

Overall, the study supports a resilience model in which TVET institutions require both physical and digital capacity. Workshop tools and facilities remained important and were generally available, but the pandemic demonstrated that physical capacity alone cannot ensure continuity. Resilient TVET providers need robust digital resources, flexible delivery designs, reliable connectivity, trained personnel, adaptable administrative systems, and quality assurance mechanisms capable of operating across modalities.

7. Implications for Policy and Practice

First, digital learning-resource development should be treated as a core institutional function rather than an optional project. Each qualification should have a curated set of digital and printable materials aligned with competency standards, including demonstrations, safety guidance, formative checks, and preparatory activities for hands-on sessions.

Second, digital infrastructure policy should address both institutional and learner connectivity. School Wi-Fi alone is insufficient when trainees live in areas with weak signals, rely on prepaid data, or lack compatible devices. Offline-capable resources, downloadable modules, low-bandwidth platforms, and scheduled access points remain important for equitable participation.

Third, trainer professional development should move from one-off platform orientation to continuing capability development. Programs should combine digital pedagogy, instructional design, multimedia resource development, online assessment, learner engagement, data privacy, and strategies for connecting remote preparation with workplace or workshop competency practice.

Fourth, TESDA and providers should strengthen digital administrative systems, particularly enrollment, document submission, attendance, progress monitoring, and communication. The partial implementation of enrollment protocols shows that continuity can be undermined even before training begins if administrative access is not flexible.

Fifth, quality assurance for blended TVET should explicitly evaluate integration between digital and face-to-face components. The central question should not be whether an institution uses technology, but whether the combination of modalities supports valid acquisition and demonstration of competency.

Finally, resilience planning should become routine. The thesis was produced in response to a public-health crisis, but future disruptions may arise from extreme weather, disasters, infrastructure failure, or other emergencies. Flexible-learning capacity should therefore be embedded in continuity plans rather than activated only after disruption occurs.

8. Proposed Resilient TVET Delivery Framework

Drawing from the thesis findings and the current direction of TVET digital transformation, this article proposes a five-component framework for resilient provincial TVET delivery: Access, Resources, Capability, Hybrid Design, and Quality Assurance.

Access refers to reliable and equitable mechanisms for enrollment, communication, connectivity, device use, and participation. Resources refer to qualification-aligned online and offline learning materials, digital platforms, tools, and facilities. Capability concerns trainer digital competence, instructional design, and administrative readiness. Hybrid Design concerns deliberate decisions about which learning outcomes can be achieved remotely and which require supervised physical practice. Quality Assurance covers assessment integrity, compliance, learner support, data use, monitoring, and continuous improvement.

The framework assumes that resilience emerges from the interaction of these components. A provider with strong physical facilities but weak connectivity may fail to reach trainees during disruption. A provider with a sophisticated platform but poorly designed practical activities may compromise competency development. A provider with capable trainers but no digital resources may create excessive workload and inconsistent learning experiences. Resilience therefore depends on balance and integration rather than on any single technology.

Component	Core question	Priority actions
Access	Can trainees and staff reliably enter and participate in the system?	Online/offline enrollment; low-bandwidth access; device and data support; accessible communication
Resources	Are quality materials available for each qualification?	Digital modules; demonstrations; OER; printable backups; structured repositories
Capability	Can staff design and facilitate flexible learning?	Continuous trainer development; coaching; instructional design; technical support
Hybrid Design	Is each competency taught in the modality best suited to it?	Map theory vs. practical outcomes; schedule workshops; simulations where appropriate; workplace integration
Quality Assurance	Is learning valid, safe, documented, and continuously improved?	Assessment standards; monitoring; learner feedback; analytics; contingency plans

9. Conclusion

The Nueva Vizcaya TVET sector demonstrated substantial adaptive capacity during the COVID-19 new normal. Training delivery, assessment, and administrative protocols were fully implemented, showing that institutions could reorganize operations and comply with mandatory public-health and regulatory requirements. Enrollment protocols, however, remained only partially implemented, revealing weaker digital administrative capacity.

The most important finding was the concentration of challenges in digital rather than traditional training infrastructure. Online learning resources were by far the most frequently reported problem, followed by connectivity and trainer IT skills. Administrative support and physical tools or facilities were much less prominent. The findings therefore identify digital-content capacity as the principal weakness in the shift toward flexible TVET.

The post-pandemic significance of the study lies in this distinction. Flexible learning should no longer be viewed solely as an emergency response. Contemporary TVET increasingly depends on digital resources, hybrid delivery, flexible pathways, and data-supported institutional management. The experience of Nueva Vizcaya suggests that the next stage of TVET modernization should focus on converting emergency flexibility into durable institutional capability.

Resilient TVET is not fully online TVET. It is a system capable of using digital tools where they add access and flexibility while preserving the practical, competency-based, and work-oriented character of technical education. Achieving this balance requires investment in people, resources, connectivity, administration, and quality assurance.

10. Recommendations

1. Sustain blended and combined distance/face-to-face delivery where these modalities align with competency requirements and learner access.
2. Develop robust online enrollment and electronic document-submission systems with low-bandwidth and assisted-access options.
3. Build qualification-specific digital learning-resource repositories rather than relying on ad hoc trainer-created materials.
4. Improve institutional connectivity and provide practical support for trainees who face device or data limitations.
5. Provide sustained professional development in digital pedagogy, e-learning facilitation, multimedia resource development, and hybrid competency assessment.
6. Maintain strong monitoring of assessment and administrative standards while extending quality-assurance mechanisms to digital resources and blended-course design.
7. Embed flexible-learning and business-continuity arrangements in institutional plans for future public-health, disaster, and infrastructure disruptions.
8. Conduct follow-up studies on learner outcomes, competency-assessment performance, completion, employability, and cost-effectiveness under blended and hybrid TVET models.

11. Limitations

The study was based on 50 respondents from 12 TVET institutions in one Philippine province and therefore should not

be treated as statistically representative of all TVET providers nationally. Its data reflected a specific stage of the COVID-19 response and the regulatory conditions operating at that time.

The implementation scale measured respondents' assessments of policy compliance rather than direct learning outcomes. Consequently, a high protocol score does not necessarily demonstrate equivalent training quality, skill mastery, learner satisfaction, or employment outcomes. The challenge frequencies likewise indicate salience among respondents but do not measure severity through a standardized scale.

Nevertheless, the dataset remains valuable because it captures institutional adaptation across multiple public and private providers and allows comparison of regulatory implementation with digital-capacity constraints.

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