



# Educators' Experiences of Skills Development in a Funded Technology-Enhanced Learning Initiative: A Case Study of Three TVET Colleges

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## Abstract

*The rapid digitalisation of education systems has intensified the need for educators to acquire competencies in digital pedagogy and technology-enhanced learning (TEL). While global frameworks emphasise digital competence acquisition, less attention has been paid to how educators experience TEL training and the processes that enable or constrain meaningful skills development. This paper explores educators' perceptions of TEL training initiatives in three South African TVET colleges participating in the Pro-Telde Project, situating their experiences within broader debates on institutional readiness, pedagogical transformation, and sustainability of digital reforms. Drawing on an interpretive qualitative approach within a mixed-methods design, the study highlights anticipated gains in technical skills, pedagogical confidence, and contextual resource design, alongside constraints such as infrastructure limitations and uneven baseline digital literacy. Findings indicate that the training contributed to a shift from functional technology use towards learner-centred digital pedagogies, enhanced educators' confidence in creating and applying digital learning resources and promoted the transfer of skills through experiential and collaborative learning approaches. The study further found that the translation of newly acquired competencies into practice was strongly influenced by institutional conditions, including infrastructure availability, leadership support, and policy alignment. In addition, trained educators played an important role in extending digital capabilities to colleagues and students, thereby contributing to broader institutional capacity-building. The paper argues that effective capacity-building requires experiential learning, institutional alignment, and sustained post-training support, offering practical insights for higher education and TVET contexts.*

**Keywords:** Technology-Enhanced Learning (TEL), Digital Pedagogy, TVET Colleges, Skills Development, Institutional Readiness, Pro-Telde Project

## 1. Introduction

The accelerating pace of global digital transformation has reshaped education systems, compelling institutions to integrate technology-enhanced learning (TEL) as a central pillar of teaching and learning. TEL is increasingly recognised as a mechanism to democratise access, foster learner engagement, and align curricula with the demands of knowledge economies [1]. Within technical and vocational education and training (TVET), the imperative is particularly acute: vocational institutions are expected to prepare graduates not only with technical expertise but also with digital fluency and transferable competencies that enable adaptability in volatile labour markets [2,3]. The growing importance of TEL lies in its capacity to transform learning environments into interactive, flexible, and student-centred spaces. Frameworks such as DigCompEdu [4] and pedagogical models like e-tivities [5] emphasise the role of digital tools in fostering active participation, collaboration, and contextualised knowledge construction. TEL can enhance student engagement, problem-solving, and workplace readiness when embedded within coherent pedagogical strategies [6,7]. Yet, despite these global advances, the translation of TEL into practice remains uneven, particularly in resource-constrained environments where infrastructural limitations and institutional fragmentation hinder sustainable adoption [8,9].

While TEL initiatives often emphasise technical skill acquisition, research highlights that meaningful integration requires pedagogical confidence, curriculum innovation, and the ability to design contextually relevant learning experiences [10,11]. However, educators frequently struggle to achieve this due to time pressures, uneven digital literacy, and limited institutional [12]. These challenges are particularly acute in South Africa's TVET colleges, which occupy a strategic role in addressing youth unemployment and advancing social inclusion. Although policy frameworks envision TVET as a driver of local economic development governance and funding weaknesses have undermined institutional coherence and



capacity [13] Consequently, studies reveal persistent curriculum-industry misalignment, limited digital learning infrastructure, and inadequate lecturer training, all of which prevent the sector from fulfilling its mandate [12,14].

The Pro-Telde Project was a funded initiative designed to strengthen educator capacity in digital pedagogy and TEL within South African TVET colleges. The project provided structured training programmes aimed at equipping lecturers with both technical skills and pedagogical confidence to integrate digital tools into their teaching practice. By foregrounding experiential learning, peer collaboration, and contextual resource design, Pro-Telde sought to address systemic challenges of institutional readiness and uneven digital literacy, positioning TEL as a sustainable pathway for curriculum innovation and improved teaching effectiveness in vocational education.

The purpose of this study is to examine how educators experience skills development within this initiative. Specifically, it asks: How do educators experience skills development in a funded technology-enhanced learning initiative within three South African TVET colleges? The following section reviews the literature relevant to this inquiry.

## **2. Review of Related Literature**

### **2.1. Theoretical Framework**

This study draws on Constructivism, Technological Pedagogical Content Knowledge (TRACK) and Technology-Enhanced Learning Perspectives to examine educator skills development across multiple dimensions; cognitive, pedagogical, and contextual, by drawing on Constructivism, Technological Pedagogical Content Knowledge (TPACK), and Technology-Enhanced Learning (TEL) perspectives. Originating from Shulman's concept of pedagogical content knowledge, TPACK extends the framework to include technology integration [10]. It emphasises the dynamic interplay between technology, pedagogy, and content knowledge, highlighting the need for educators to balance these domains in practice. Constructivist theory emphasises active, experiential learning, where learners construct knowledge through interaction with their environment [5]. In TEL contexts, constructivism highlights the importance of hands-on application, peer collaboration, and reflective practice. TEL perspectives emphasise the role of digital tools in enabling interactive, learner-centred environments [4,1]. They highlight the potential of TEL to democratise access, foster engagement, and align curricula with labour market demands. Together, TPACK, constructivism, and TEL perspectives provide a multidimensional lens for understanding educator skills development in the Pro-Telde Project. Collectively, these frameworks support the study's focus on educator experiences, institutional readiness, and the sustainability of TEL reforms in South African TVET colleges.

### **2.2. Technology-Enhanced Learning in TVET**

TEL has been widely promoted as a transformative force in vocational education, enabling interactive, flexible, and learner-centred approaches. Studies highlight its potential to enhance engagement and achievement through gamification, smart classrooms, and digital tools [6,7]. However, adoption in TVET contexts remains uneven, with infrastructural constraints and limited institutional investment undermining sustainability [8].

### **2.3. Digital Pedagogy and Educator Competencies**

Frameworks such as DigCompEdu [4] and TPACK [7] emphasise the integration of technological, pedagogical, and content knowledge. Yet research shows educators often struggle to move beyond technical proficiency to pedagogical innovation [11]. TEL training must therefore prioritise experiential learning and contextual resource design to build confidence and adaptability.

### **2.4. Skills Development and Professional Learning in TEL**

Professional development initiatives have demonstrated that peer learning, reflective practice, and hands-on application are critical enablers of TEL competence [5]. In South Africa, however, lecturer training remains inadequate, with limited institutional support for sustained skills development [9]. The Pro-Telde Project's inclusion of lecturers alongside students reflects a multiplier logic which is the



lecturers who acquire TEL competencies can extend programme benefits to colleagues and students who did not participate directly [15].

### **2.5. Institutional Readiness and Support Mechanisms**

Institutional readiness is a decisive factor in TEL implementation. Leadership support, infrastructure provision, and policy alignment are essential enablers [3]. Yet South African TVET colleges face systemic fragmentation, with governance and funding models weakening institutional coherence [13]. The Pro-Telde Project highlighted these challenges across Majuba, Vhembe, and Central Johannesburg Colleges, where infrastructural limitations and uneven digital literacy shaped the effectiveness of training.

### **2.6. Challenges Affecting TEL Implementation**

Constraints include infrastructure limitations, uneven baseline digital literacy, and time pressures [12]. These barriers hinder translation of training into practice, particularly in contexts where educators face heavy workloads and limited access to digital resources.

### **2.7. Knowledge Gap**

Existing studies privilege quantitative measures of competence acquisition, neglecting qualitative insights into educators lived experiences. This study addresses that gap by foregrounding educators' perceptions of TEL training processes in the Pro-Telde Project, examining how institutional conditions enable or constrain skills development

## **3. Research Methodology**

### **3.1. Research Paradigm and Approach**

This study is situated within an interpretive qualitative paradigm, which prioritises understanding participants lived experiences and the meanings they attribute to their engagement with technology-enhanced learning (TEL). The interpretive stance is particularly appropriate for examining educators' perceptions of skills development, as it foregrounds subjective accounts of competence acquisition, institutional support, and pedagogical transformation rather than seeking generalisable causal claims [16]. To achieve this, the study adopts a qualitative approach embedded within a broader mixed-methods evaluation design. While quantitative measures of digital competence acquisition are common in TEL research [6,7], this study emphasises qualitative insights to capture the nuanced processes through which educators experience TEL training. Semi-structured interviews serve as the primary data source, enabling participants to articulate their perceptions of knowledge, skills, and competencies gained, as well as the enabling and constraining factors that shaped their development.

### **3.2. Research Design, Setting, and Procedures**

A case study design was employed, focusing on three South African TVET colleges which are Majuba TVET College, Vhembe TVET College, and Central Johannesburg TVET College that participated in the Pro-Telde Project. These institutions represent diverse socio-economic and geographic contexts, ranging from rural to urban environments, thereby providing a rich basis for examining how institutional conditions shape educators' experiences of TEL training [12,13]. Participants were purposively selected to include educators directly engaged with the Pro-Telde initiative, ensuring relevance to the study objectives. Semi-structured interviews, lasting 30 minutes, were conducted online via teams, guided by open-ended questions on knowledge acquisition, pedagogical confidence, peer collaboration, and institutional support. Data were analysed thematically following [16] six-phase approach, combining inductive coding with deductive lenses informed by TPACK, constructivism, and TEL perspectives. Trustworthiness was ensured through triangulation of perspectives, rich contextual description, and peer debriefing, while ethical clearance was obtained from the University of Johannesburg (Johannesburg Business School). Informed consent, confidentiality, and voluntary participation were strictly observed,



with findings reported in a manner that avoided attributing specific constraints to individual participants or colleges.

#### 4. Results

Five explanatory themes emerged from analysis of educator experiences across the Pro-Telde training cohort. Each theme follows the analytical sequence established by the programme documentation: intended objective, training content deployed to achieve it, participant baseline conditions, evidence of change, practical application, and implication. Table 1 provides a synoptic overview.

**Table 1.** Summary of Themes: Programme Objectives, Evidence of Change, and Implications

Theme	Theme Title	Programme Objective	Key Evidence of Change	Implication
4.1	From Functional to Pedagogical: The Reorientation of Digital Tool Use	Expand platform use from content delivery to interactive, learner-centred pedagogy (both courses)	Padlet deployed for live collaborative introductions; Google Forms converted to formal assessment; YouTube repositories created for on-demand student access; Flippity and Miro used to redesign content encounters	The programme succeeded by changing the pedagogical logic of tool use, not merely the tool inventory. Competence assessments measuring tool knowledge miss this shift entirely
4.2	From Individual Skill Acquisition to Institutional Capability Formation	Build multimedia content creation capacity through animation, motion design, and production tools (Nov course)	Animaker adopted for instructional animation; institution funded studio equipment across two budget cycles; studio became blueprint for colleagues; freemium access severed training capability from post-training practice	The studio ceased to represent an individual achievement and became institutional infrastructure through which capability could be continuously reproduced. Freemium access disrupts this cycle institutionally, not individually
4.3	Experiential Design and the Transfer Problem: What Made Learning Stick	Teach through TEL methods while teaching about them; embed active, task-based learning (both courses)	Physical-to-digital game bridging cited independently by multiple participants; deadline and peer presentation structures produced embodied confidence; prior Mahara exposure retrospectively organised through Miro instruction	The mechanism of transfer is pedagogical architecture: active before passive, embodied before digital, doing before describing. These are replicable design principles
4.4	Institutional Conditions and Three Modes of Capability Translation	Enable sustained TEL implementation beyond training completion (both courses)	Enabling environment: multi-year equipment budgets, sector-wide plan, trained educator as blueprint. Constraining environment: load-shedding, connectivity gaps, data costs redirected but did not extinguish practice. Policy-neutral environment: no governing framework, digital teaching individually driven and formally unrecognised	A third institutional condition beyond support and obstruction: policy neutrality. Capable educators in neutral environments cannot convert individual practice into institutional transformation
4.5	Capability Circulation Beyond Direct Programme Participants	Extend programme benefits through trained educators to colleagues and students (both courses)	Post-training peer gatherings extended skills to non-participants; cross-institutional networks persisted; online placement assessments replaced traditional student auditions; resistance to same-level peer training identified and addressed through leadership competence the programme had developed	Training effects did not remain with trained individuals. The relevant unit of evaluation is the institutional capability network, not the direct participant. Multiplier capacity includes change-management competence, not only content knowledge

Source: Authors own compilation

##### 4.1. *From Functional to Pedagogical: The Reorientation of Digital Tool Use*

The first programme objective, addressed across both training blocks, was to expand educators' capacity to use digital platforms not for content delivery alone but for interactive, learner-centred pedagogy. The October 2024 course introduced visual data representation, PowerPoint, Canva, and



Prezi for presentation design, alongside synchronous collaboration tools including Google Meet, Microsoft Teams, and Zoom. The November 2024 course deepened this by introducing multimedia resources, animation, and blended and online teaching methodologies. The two courses were designed to shift the function educators assigned to technology: from administrative infrastructure to a site of active student engagement. At the point of entry, participants across institutions described a pattern of digital use that was functional but pedagogically thin. The most common pre-training technology was the Learning Management System, used as a document repository rather than an interactive environment. Participants who had engaged with Google Classroom during COVID-19 described having done so reactively, without understanding the platform's full capacity. Others rated their prior digital engagement at two out of ten, describing pre-training use as limited to how to distribute lessons and materials. One participant, despite prior exposure to Google Forms, had not understood it as a formal assessment instrument until the programme made that application explicit. The pattern across the cohort was not absence of tools but absence of pedagogical purpose such as educators possessed platforms, they did not yet know how to use.

Following training exposure to Canva, Miro, Mentimeter, Flippity, Animaker, Padlet, Kahoot, and Wayground, educators described a fundamental reorientation in what they understood technology to be for. The most consequential shift was from transmission-oriented tool use to interaction-centred design. One participant redesigned first-day introductions by creating a Padlet profile, distributing the link through Google Classroom, having students complete their own introductions on the platform, and using the resulting visible collaboration as a live demonstration of digital interaction:

*'I'm using digital tools for introduction. And everybody could see that.'*

The activity did not add a tool; it reconstructed what a first class is for. Another participant moved Google Forms from casual use to formal assessment deployment. A third converted lesson content into Flippity sequences and Miro mind maps, replacing information presentation with designed interactive encounters. Participants who had used Teams or Zoom only during COVID-19 began recording lessons, uploading content to YouTube, and providing students with direct links:

*'Whatever I recorded it, I uploaded in YouTube and I give the students a link. They're able to use that link, whatever they are, their own time, and they're able to repeat it.'*

This is not a change of platform; it is a redesign of the temporal logic of teaching. The recording extends the lesson beyond the classroom and places control of repetition with the learner. The programme succeeded in this objective not by transferring new tools but by changing the pedagogical logic within which existing and new tools were deployed.

#### **4.2. From Individual Skill Acquisition to Institutional Capability Formation**

The November 2024 course aimed to build educators' capacity for multimedia content creation, with animation and motion design as its centrepiece. Animaker was the primary platform, introduced as an open production tool for creating animated instructional content. The course also addressed the quality of teaching materials, positioning production not merely as technical output but as pedagogically considered design. The intended outcome was an educator who could generate original instructional resources rather than deploy existing ones. Participants entered this dimension of the programme with uneven preparation. Those with prior digital exposure had conceptual frameworks that accelerated engagement with content creation. One participant described already knowing about timelines and content production but having lacked the structured conditions for application:

*'I always wanted to know how to do animations because I sometimes I go to YouTube and Google how to. And search how to do it, but I never really got to do it because of discipline.'*

The training did not introduce animation as a concept to this participant; it provided the facilitated conditions under which self-directed interest became applied capability. Participants entering with limited prior digital experience encountered animation as genuinely novel, describing it as among the first things of its kind they had encountered. The same training content produced different entry mechanisms



depending on what participants brought to it. Hands-on production emerged as the decisive mechanism of capability formation. Participants consistently identified application rather than instruction as what sharpened skill:

*'When you listen, you sit there and listen, you are not participating. When you do, basically doing is being interactive with the content. So, when you interact with the content by doing something, an activity, that's when your skills are sharpened.'*

The training cycled between explanation and application within the same session, and active production was the norm rather than the exception. Participants described remaining at computers through lunch to continue working, a pattern confirmed by the facilitators themselves, who observed that the South African cohort had not left their machines when the session was formally paused. The most consequential expression of this theme was not the content creation skills themselves, but what happened to them institutionally. Following training completion, one institution approved multi-year equipment budgets for studio infrastructure: microphones, interfaces, studio monitors, and a camera procured across two annual budget cycles. The participant who had established the studio described colleagues using it as a model:

*'Everyone is looking at me now like, okay, let's see the blueprint. We're going to build from there.'*

The studio ceased to represent an individual achievement and became institutional infrastructure through which capability could be continuously reproduced. This distinction carries theoretical weight: a studio is not a set of skills but an enabling environment for continuous production, not a threshold reached but a space maintained. Individual competence had generated institutional investment, and that investment had created the conditions under which further competence could be developed without additional external training. A constraint emerged that worked in the opposite direction. Several platforms introduced in the November course operated on freemium models, restricting functionality without institutional licensing. One participant observed:

*'You are training, but you're not really training, because you need full access to get all the features of the tool.'*

Where institutions did not extend budgets to licensing, the gap between what training had shown to be possible and what post-training resources permitted converted fluent capability into partial access. This is not an individual problem; it is an institutional policy gap that individual motivation cannot bridge.

### **4.3. Experiential Design and the Transfer Problem: What Made Learning Stick**

The programme's pedagogical approach was not only to introduce tools but to teach through them. Both course blocks incorporated active, task-based learning, and the November block specifically foregrounded blended and online teaching methodology as content, meaning that participants were simultaneously learning to teach online and being taught through online methods. The intended effect was for educators to experience the learning approaches they were expected to implement, making the pedagogy of the training itself a demonstration of what it was advocating. Participants consistently identified the facilitators' design strategy as what distinguished Pro-Telde from prior professional development experiences. Earlier training, described as narrowly focused on single tools, had been largely reception-based: a programme delivered to an audience.

Pro-Telde was experienced as structurally different because learning was generated through activity. The facilitators' technique of beginning with traditional physical games before moving to their digital equivalents was cited independently by multiple participants as the most effective single approach. The bridge made the logic of digital interaction visible in embodied terms before asking participants to operate it through a screen:

*'They interacted with us first, and then they said, okay, this is how you do this in a computer.'*



This was not a motivational technique; it provided a conceptual structure for understanding what interaction means, which participants could subsequently apply when designing their own classes. One participant described how the training allowed her to link prior knowledge she had accumulated without fully understanding. She had encountered a collaborative digital tool in a postgraduate diploma programme but had been told only that it was a mind map. The Pro-Telde training introduced Miro by name, with a full account of its pedagogical applications, and in doing so gave meaning to an experience she had already had. The training gave meaning to experiences participants had previously encountered but not fully understood. The physical and temporal structure of training also functioned as a confidence-building mechanism. Being given deadlines, preparing presentations for peer audiences, and writing reports on behalf of one's college created an accountability structure that replicated professional responsibility:

*'a sense of accountability was also enforcing us that you need to be accountable to report.'*

Confidence, in participant accounts, was not a feeling produced by reassurance, but a state produced by having delivered. One participant moved from describing himself as 'a low average' before training to doing whatever he did 'with confidence and with motivation', locating that shift in the accumulated experience of completing, presenting, and submitting rather than in instruction. The mechanism of transfer was pedagogical architecture that is active before passive, embodied before digital, doing before describing.

#### **4.4. Institutional Conditions and Three Modes of Capability Translation**

The programme's objectives were addressed at the level of individual educator competence. The institutional conditions into which trained educators returned were not part of the programme design. Yet those conditions proved to be the primary determinant of whether competence became practice. Participants across institutions described moving between two structurally different environments which are the training environment that is characterised by reliable infrastructure, collaborative peers, facilitated support, and access to full platform functionality, and the institutional environment, which varied significantly in its capacity to sustain what training had produced. Three structurally distinct modes of institutional response emerged from the data. In institutionally enabling environments, capabilities became embedded within broader organisational systems. One institution responded to training completion by approving multi-year equipment budgets, developing a sector-wide TEL implementation plan, and positioning the trained educator as a model for colleagues. The institution was described as 'already ready for implementing' and as approving 'everything that we say we need'. Individual capability was drawn into institutional development which is what one person had learned became the blueprint for what the institution was building. Existing infrastructure further amplified this effect that computer laboratories meant digital tools were available for every lesson without additional provision, removing the access problem before it arose.

In institutionally constraining environments, capabilities remained dependent on adaptation and individual effort. Participants in rural settings described infrastructure conditions that redirected but did not extinguish TEL practice. Unreliable internet connectivity, load-shedding that suspended digital activity for days, inadequate laboratory provision relative to student numbers, and the cost of mobile data for students who lacked institutional connectivity all shaped what was possible:

*'Because I'm from the rural areas, network coverage or internet connectivity, that is the biggest problem.'*

Educators adapted by shifting to offline content, uploading recorded lessons to Google Classroom for asynchronous access, and redesigning assignments to account for uneven connectivity. Practice continued, but it was carried entirely by individual resourcefulness rather than institutional provision. In policy-neutral environments, capabilities remained individually held and structurally unsupported. One participant described an institution in which there was:

*'No policy that speaks to online teaching.'*



Digital practice was individually driven and formally unrecognised:

*'Some of us were doing it because we know how to do it.'*

There was no accountability for digital teaching, no resource allocation attached to it, and no shared institutional direction. Capability existed and was genuinely exercised which one participant taught through a month-long hospitalisation and produced more than twenty student distinctions during that period. But those results were the outcome of personal commitment rather than institutional design, and they could not be extended to colleagues, accounted for in institutional reporting, or built upon over time. Policy neutrality is structurally distinct from obstruction; it does not resist TEL practice, but it ensures that practice remains permanently individual.

#### **4.5. Capability Circulation Beyond Direct Programme Participants**

Training effects did not remain with the educators who had been directly trained. Across all four participants, capabilities circulated into institutional networks through multiple channels which are peer support gatherings, cross-institutional collaboration, redesigned institutional procedures, and the informal transmission of skills to colleagues who had not attended the programme. This pattern was not incidental; it was described as a normative expectation, partly enforced and partly driven by the confidence formation that training had produced. Post-training gatherings at the college level were used to review whether skills were being applied, help colleagues who had encountered difficulties with specific tools, and share knowledge with lecturers who had not attended. This knowledge-sharing was understood as self-reinforcing: 'The more you spread the information, you learn more.' The act of transmission required a different and deeper engagement with content than receiving it, and that deeper engagement consolidated the transmitter's own understanding. Capability circulation was therefore not merely charitable knowledge transfer; it was a productive mechanism for the educators doing the circulating.

Cross-institutional peer networks formed during training persisted after it. One participant described sustained collaboration with a colleague from Central Johannesburg College, extending to joint podcast production and ongoing creative exchange across institutional boundaries. Another described deliberately sitting with participants from other institutions during training sessions and finding that cross-institutional groups were sites of practical support in which colleagues with stronger digital skills demonstrated techniques to those still developing them. The training's rotation of venues across all three colleges and its inclusion of international training in Italy and Greece both contributed to this that they enforced institutional mixing and produced a shared professional identity that outlasted the formal programme.

The social dynamics of circulation were more demanding than simple sharing. One participant described the specific difficulty of training colleagues at the same institutional level:

*'When you want to train your colleagues who are at the same level with you, it comes with resistance.'*

Peer authority is negotiable in ways that hierarchical authority is not, and willingness to learn from a colleague can be conditioned by assumptions about relative standing. The programme had prepared participants for this, developing not just digital capability but the leadership and patience required to work with resistant colleagues:

*'This project taught us to take the initiative, to be the leaders or to be the pioneers to make sure that those who don't want change, they don't resist to change easily.'*

Capability circulation at the peer level depends on this social and institutional competence, not only on content knowledge. Circulation also took institutional procedural forms. One participant used online assessment tools, acquired through the programme, to replace the traditional audition process for incoming students, moving prospective students to online placement assessments that the system marked automatically. This was not an application of a tool to an existing process; it was a redesign of an institutional procedure using capability that training had produced. The programme had not specified



this application; it emerged from the participant's engagement with their institutional context and the agency the training had produced. The impact boundary of the programme was therefore not defined by who attended it.

## 5. Discussion

Findings indicate that TEL interventions function less as direct skills transfer mechanisms and more as capability catalysts, whose effects depend on how institutional environments absorb, reproduce, and circulate what participants acquire. Training exposure is necessary but insufficient; sustainable pedagogical change arises from the interaction between learning design quality, institutional conditions, and capability circulation networks. The most consequential achievement of Pro-Telde was not expanded tool knowledge but a shift in pedagogical logic: participants reoriented what they understood technology to be for. This gap between possessing a platform and knowing what to do with it corresponds precisely to the TPACK distinction between technological knowledge and technological-pedagogical knowledge [10,17]. Thus, evaluating training by which tools participants can name asks the wrong question; the right question is whether they can articulate how a tool changes the student-content relationship. While the literature frames TPACK integration as an individual cognitive achievement [10,11], the Majuba studio complicates this. Individual competence generated institutional investment, which produced infrastructure enabling continuous capability reproduction without further external intervention. The studio became institutional infrastructure, not just individual achievement. Conversely, the freemium access problem disrupts this cycle at the policy level, imposing a constraint that only institutional action can resolve.

The pedagogical mechanisms that made learning durable rather than fragile are replicable. Facilitators' bridging strategy—moving from physical game to digital equivalent, operationalises [18] experiential learning cycle within sessions rather than privileging reception. A less documented mechanism also emerged: training worked not by introducing novelty but by providing an interpretive framework that made existing experience intelligible, retrospectively organising prior knowledge participants had accumulated without fully understanding.

Existing institutional readiness frameworks distinguish supportive from unsupportive environments, treating readiness as binary [3,8]. The findings require a third category: policy-neutral environments, which neither obstruct nor actively enable. The result is permanently individual capability, competence that cannot be extended to colleagues, embedded in processes, or built upon over time. This differs structurally from obstruction (no visible resistance) and from support (no mechanism for converting individual practice into shared capacity). Policy neutrality is underspecified in TEL literature; its identification here enables more granular analysis than binary readiness frameworks permit.

Conventional evaluation defines programme impact at the direct participant level [8,9], but this unit of analysis systematically understates effects. Training produced nodes in institutional capability networks, with effects circulating far beyond the original cohort; redesigned student intake procedures, studio infrastructure, cross-institutional collaborations, and peer gatherings extending skills to non-participants. Capability circulation is the mechanism through which time-bounded training acquires potential for enduring impact. However, circulation depends on social and political competence to manage peer resistance, not only on technical content. Programmes neglecting this dimension produce educators who can do things but cannot extend what they can do to others. This study supports a relational model in which capability formation, institutional conditions, and circulation are simultaneous and mutually determining, not sequential. An educator with strong capability in a policy-neutral institution remains a practitioner; the same educator in an institutionally committed environment becomes infrastructure. The outcome of a training investment is determined as much by what institutions do after training ends as by what the training itself achieves.

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