

Activity-Centered and Emotional Design as Catalysts for Sustainable Innovation in Open and Distance Learning for Adult Learners

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Abstract. Sustainable practice in the creative industries calls for design methods that support innovation without losing sight of human experience and longer-term cultural change. In Open and Distance Learning (ODL), adult learners' engagement, persistence, and well-being depend on how learning goals, digital tools, institutional rules, communities, roles, and emotional experience work together. This conceptual paper brings Activity-Centered Design (ACD) and Emotional Design into a single theory-synthesis framework, informed by an integrative review of activity theory, temporally extended user experience, adult ODL, and sustainable creative education. The proposed logic moves from diagnosis to design: ACD locates contradictions in the activity system, Emotional Design examines how those contradictions are experienced over time, and the combined lens guides structural and experiential responses. An illustrative online studio case shows how this approach changes decisions about critique, scheduling, tool integration, feedback, community, and recovery for working adult creative practitioners. Design heuristics, candidate evaluation indicators, ethical safeguards, and boundary conditions are also proposed. The framework remains a conceptual proposition for empirical testing; it is not presented as evidence of established effectiveness.

Keywords: Activity-Centered Design; Emotional Design; Sustainable Innovation; Open and Distance Learning; Adult Learners; Creative Industries

1 Introduction

In the creative industries, design shapes more than products and services. It also influences cultural norms, learning practices, and social behaviour [2]. Interaction design is therefore judged not only by usability and efficiency, but also by what it contributes over time to cultural, emotional, and pedagogical experience. In education, this broader view of sustainability includes learner engagement, inclusion, emotional well-being, and the ability of a system to support continued learning [5,19,21].

Open and Distance Learning (ODL) has emerged as a key mechanism for widening access to education, especially for adult learners balancing professional, familial, and societal responsibilities. Despite its strategic importance, many ODL platforms remain grounded in linear, content-centric, and efficiency-driven design approaches. Such approaches prioritise content delivery and task completion while giving insufficient attention to learners' lived experiences, emotional states, and socio-cultural contexts. From an interaction design perspective, this is not merely a technical limitation but a structural sustainability problem embedded in how learning systems are conceived and governed.

Design methodology shapes what educators and developers notice when they examine learners' use of technology. User-Centered Design (UCD) is not confined to task efficiency; contextual inquiry, participatory design, and co-design can involve users as active partners and address social and emotional experience [32]. The concern here is narrower. Some implementations reduce user-centredness to isolated task analysis, interface preferences, or short usability tests, leaving the wider activity system and the emotional effects of repeated participation largely unexamined. ACD–Emotional Design complements participatory and contextual UCD by making systemic contradictions and their longer-term emotional consequences more visible.

The special issue asks how sustainability and innovation can be advanced through design practice. In response, this paper examines design methodology rather than proposing another technology or instructional technique. It brings Activity-Centered Design (ACD) together with Emotional Design and treats ODL as a socio-technical activity system. The aim is to support learning practices that remain emotionally sustainable across different cultural and technological settings.

1.1 Positioning of the Proposed Framework and Original Contribution

The framework draws on, but differs from, three main strands of earlier research. Activity-theory models in online and distance learning have mostly been used to explain instructional effectiveness, interaction quality, or learning outcomes, with less attention to design methodology and long-term sustainability [3,7]. Research on emotion in online learning often treats emotion as an internal learner state associated with satisfaction, self-regulation, or achievement [5,8,9]. Emotional Design studies in digital learning have tended to concentrate on interface strategies and emotional affordances without fully examining the surrounding institutional and socio-technical conditions [2,4].

The contribution of this paper is the connection it makes between these strands through Activity-Centered Design and Emotional Design. Activity theory is used for

more than explaining context, and emotion is not treated simply as a learner variable. Instead, emotional experience is understood as something that develops within an activity system over time, shaped by its tools, rules, community, and division of labour. The two lenses are not merely placed side by side, with ACD explaining context and Emotional Design decorating the interface. They form a proposed generative design relationship: activity-system configurations give rise to emotional trajectories, and those trajectories affect whether learners continue to participate. This relationship directs attention to structural and emotional conditions at the same time. A rigid assessment rule, for instance, may be both a scheduling conflict and a recurring source of anxiety, identity threat, and withdrawal. Addressing it may require changes to the rule itself, alongside recovery options, supportive feedback, and community support. In this account, sustainability concerns emotional endurance, professional identity, and continuity of participation, especially for adult learners in ODL. The framework is offered as a basis for empirical investigation, with claims kept within the limits of a conceptual contribution.

1.2 Conceptual Approach

The study uses theory synthesis supported by an integrative review of four related bodies of literature: Activity Theory and Activity-Centered Design; Emotional Design and temporally extended user experience; adult ODL engagement and self-regulation; and sustainable creative and studio-based education. Sources were selected purposively when they defined a core construct, clarified a theoretical boundary, or offered relevant evidence on adult online learning and virtual studio practice. Seminal works provide the conceptual foundations, while recent studies address current conditions in ODL, creative practice, and affective computing.

The four bodies of literature were compared in terms of their unit of analysis, treatment of time, location of emotion, implied design action, and view of sustainability. From this comparison, propositions were developed linking activity-system alignment with emotional trajectories, professional identity, and continuity of participation. The studio example is used to examine whether these propositions lead to design decisions that differ from those produced by either lens alone. It is an analytical illustration, not an empirical case study, and it cannot establish effectiveness. This approach follows guidance for conceptual articles and integrative reviews, in which the contribution comes from a reasoned reconfiguration of theoretical domains that have usually been treated separately [22,23,31].

2 Sustainability, Design, and Innovation in Creative Industries

Creative industries have long been recognised as drivers of innovation through design-led thinking, interdisciplinary collaboration, and cultural production. Sustainability within these industries increasingly emphasizes methodological rigor, ethical responsibility, and long-term societal impact. Design thinking has been promoted as a catalyst for sustainable innovation by encouraging empathy, experimentation, and systemic problem framing. However, without robust theoretical grounding, design

thinking risks becoming superficial or trend-driven. This concern is especially relevant in online design education, studio-based distance learning, and professional development for creative practitioners, where learners must produce artefacts, negotiate ambiguous briefs, participate in critique, use specialised digital tools, and develop a credible professional identity. In these settings, sustainability concerns not only continued access to course content but also the endurance of creative confidence, participation in studio communities, and the capacity to continue learning as tools and practices evolve [19,21,28].

In educational contexts, sustainable innovation requires design approaches that support enduring learning practices rather than short-term technological novelty, emphasizing learning environments as evolving design systems rather than static instructional solutions [17,18]. ODL systems for graphic design, multimedia, animation, game development, architecture, digital media, and other creative disciplines must therefore evolve with learners' changing needs, capabilities, emotional states, and professional practices. Creative learning is rarely linear: it depends on iteration, experimentation, critique, revision, collaboration, and the use of resource-intensive software and production workflows. These characteristics make content-centric and efficiency-oriented delivery particularly inadequate. A sustainable approach must acknowledge creative learning as a complex, socially situated, emotionally exposed, and professionally consequential activity [24–27].

Several studies provide the starting point for this synthesis. Kwong and Churchill [7] use activity theory to analyse interaction and learning in an ePortfolio system, showing the value of systemic diagnosis. Wu et al. [8] and Han et al. [9] examine how academic and epistemic emotions relate to interaction and learning outcomes. Norman [4] and Desmet and Fokkinga [2] explain how designed qualities and human needs shape experience, while research on virtual studios draws attention to critique, community, tools, and professional practice [24–27]. Each strand illuminates part of the problem, but they use different centres of analysis. The framework connects them by examining emotional trajectories as consequences of recurring activity-system configurations and as evidence for redesigning tools, rules, communities, and roles.

3 Activity-Centered Design in Open and Distance Learning

Activity-Centered Design (ACD) originates from activity theory, which conceptualizes human action as purposeful, socially situated, and mediated by tools, rules, and community structures [3]. In contrast to task-oriented design approaches, ACD treats meaningful activity as the primary unit of analysis, emphasizing why people act, not merely how they interact with interfaces. This distinction is particularly relevant in educational and workplace-learning contexts, where technology use is inseparable from participants' identities, motivations, organisational rules, and socio-cultural conditions [14,30].

For adult learners, ODL is usually woven into work, caregiving, professional identity, prior experience, and plans for continued learning [11,33]. Adult-learning theory emphasises autonomy, the value of experience, relevance, and problem-centred application, supporting the use of authentic and negotiable learning activities [33]. Yet

adult learners are not a uniform group. Employment security, disability, digital access, cultural expectations, educational history, and confidence all affect how flexibility and autonomy are experienced. The framework therefore begins with a particular learner and context, using activity-system mapping to examine how goals and circumstances meet the available tools, rules, communities, and responsibilities.

From an ACD perspective, common challenges in ODL such as disengagement, attrition, and surface learning are often symptoms of misaligned activity systems rather than individual learner deficiencies. For example, rigid assessment schedules may conflict with adult learners' work responsibilities, while platform navigation structures may reflect institutional logic rather than learners' real-world activity flows. Studies on technology design using ACD have shown that such design inefficiencies often emerge from fragmented activity systems rather than isolated usability flaws [1].

By foregrounding the relationships between subjects, tools, rules, and community, ACD supports sustainable educational innovation by reducing systemic friction, supporting learner autonomy, and enabling adaptive design responses over time. This systemic orientation is essential for ODL systems intended to serve adult learners across extended learning trajectories rather than short-term course completion alone [30].

4 Emotional Design and Adult Learning Experience

Emotional Design emphasizes the role of affect in shaping user experience, decision-making, and behavior [4]. Within learning environments, emotions are not peripheral but central to how learners interpret challenges, regulate effort, and persist over time. Positive emotions such as curiosity, confidence, and satisfaction can strengthen intrinsic motivation, whereas anxiety, frustration, and isolation tend to erode commitment and gradually push adult learners toward disengagement and dropout [20,29].

Some adult ODL learners experience isolation, delayed feedback, competing responsibilities, or reduced self-efficacy, but these are not universal features of adult learning. Emotional and cognitive overload, disconnection, motivation, and readiness vary with teaching arrangements, communication, prior experience, and life circumstances [6,10,11,13,15]. Emotional difficulty is therefore treated as relational and situated. It may arise when the activity system does not accommodate a learner's resources, obligations, identity, or access needs.

Integrating emotional design principles into ODL systems requires deliberate attention to visual aesthetics, interaction feedback, narrative coherence, and tone of communication. For instance, clear progress indicators and supportive feedback can foster confidence, while socially meaningful interaction features can mitigate feelings of isolation. Research on online learning consistently demonstrates that emotionally engaging environments support persistence, self-regulation, and deeper learning strategies; neglecting these emotional conditions is therefore not a neutral design choice but a contributor to attrition [5,8–10,12].

From a sustainability perspective, emotional design contributes to cultural change by reframing lifelong learning as an emotionally rewarding and personally meaningful activity. Within creative industries, this aligns with broader efforts to design

experiences that promote well-being, inclusion, and long-term value creation rather than short-term consumption [19–21,29].

5 Integrating Activity-Centered and Emotional Design for Sustainable ODL

While Activity-Centered Design provides a systemic framework for understanding learning activities, Emotional Design foregrounds the affective dimensions that shape engagement, persistence, identity, and meaning-making. Their integration positions emotions not as isolated interface reactions but as emergent properties of activity-system configurations operating over time [3,4]. The framework therefore asks two connected questions: how are learning activities organised through tools, rules, communities, and roles, and what emotional trajectory does that organisation repeatedly produce for the learner? Sustainable design requires both questions to be answered together.

5.1 Distinctive Value of the Integrated ACD–Emotional Design Lens

Applying ACD and Emotional Design separately can improve an ODL environment, but each approach leaves a consequential blind spot. ACD can identify structural contradictions, such as a mismatch between assessment schedules and adult learners' work responsibilities, yet it may not explain how repeated exposure to that contradiction develops into anxiety, shame, reduced creative confidence, or withdrawal. Emotional Design can improve feedback tone, aesthetics, progress visibility, and immediate affective responses, yet it may leave unchanged the institutional rules, role expectations, or fragmented tool ecology that continually reproduce those negative emotions. The integrated lens connects the source of emotional experience to the organisation of the activity itself.

Used together, the two lenses lead to a different kind of design decision. The aim is no longer to make a difficult activity feel temporarily more pleasant, but to change the conditions that repeatedly produce the difficulty. Consider an adult learner who misses a fixed studio critique because of work obligations. ACD alone may point to flexible scheduling, while Emotional Design alone may suggest more reassuring reminders. The combined analysis asks how critique timing, assessment rules, peer visibility, instructor language, recovery options, and professional identity interact. The response may include asynchronous critique windows, staged milestones, private progress indicators, formative feedback, peer-support roles, and a non-punitive route back into the activity. In this way, the intervention addresses task completion, anxiety, professional identity, and continued participation together [20,30].

Table 1. Comparative value of applying Activity-Centered Design and Emotional Design separately and in integration.

Lens	Primary diagnosis	Typical design response	Limitation when used alone
ACD	Misalignment among goals, tools, rules, community, and roles.	Redesign workflows, schedules, tools, responsibilities, and contextual activities.	May not explicitly trace how structural conditions accumulate into emotional trajectories.
Emotional Design	Immediate or recurring affective responses such as anxiety, frustration, curiosity, or confidence.	Improve feedback, tone, aesthetics, progress visibility, reassurance, and social presence.	May improve the experience around an activity while leaving the structural source of distress unchanged.
Integrated ACD–Emotional Design	Activity-system configurations that repeatedly generate emotional consequences over time.	Redesign structural conditions and emotional supports as one intervention aimed at sustained participation.	Provides a basis for testing whether systemic alignment produces emotional endurance and learning sustainability.

5.2 Illustrative Application: Online Studio-Based Learning for Adult Creative Practitioners

Consider an online postgraduate studio course in digital media for adult creative practitioners. Learners are employed designers, multimedia developers, educators, and freelancers who must complete a portfolio-quality project while balancing work and family responsibilities. The existing course uses a conventional LMS, weekly synchronous critiques, separate file-sharing and video-conferencing tools, fixed deadlines, and instructor-led evaluation. Although the interface is usable, participation declines after the first project milestone. Learners report uncertainty about expectations, anxiety about public critique, frustration with fragmented tools, and a weakening sense of belonging to a creative community. This scenario illustrates an interaction design problem that cannot be reduced either to usability or to individual motivation [24–28].

Using the integrated framework, the design team maps the complete activity system and annotates each component with its recurring emotional consequences. Every intervention is then justified by both an activity-system diagnosis and an intended emotional trajectory. The resulting design decisions are shown below.

Table 2. Illustrative application of the integrated framework to online studio-based learning.

Framework component	Activity-system diagnosis	Distinct design decision and intended emotional outcome
Subject: adult creative practitioner	Learners bring professional experience but have uneven confidence, time, and technical access.	Allow project themes to emerge from authentic workplace or community problems. This strengthens relevance, ownership, and professional confidence.
Object: portfolio-quality creative outcome	Small disconnected exercises obscure the purpose of learning.	Organise the course around one staged portfolio project with visible milestones. This supports purpose, progress awareness, and persistence.

Framework component	Activity-system diagnosis	Distinct design decision and intended emotional outcome
Tools: LMS, creative software, conferencing, and file sharing	Fragmented tools create duplicated work, version confusion, and cognitive friction.	Provide an integrated studio workspace, standard file conventions, lightweight alternatives, and a single submission route. This reduces frustration and preserves creative focus.
Rules: deadlines, critique, and assessment	Fixed synchronous critiques and punitive late policies conflict with employment and family obligations.	Use asynchronous critique windows, flexible milestone ranges, transparent rubrics, and non-punitive recovery pathways. This reduces anxiety without removing academic expectations.
Community: peers, instructors, and industry mentors	Large public critiques intensify exposure and learners feel socially isolated.	Create stable small studio groups, structured critique protocols, and periodic mentor input. This builds trust, belonging, and psychologically safer participation.
Division of labour: roles in feedback and production	The instructor is the sole authority and learners remain passive recipients of judgement.	Distribute roles among learner-as-designer, peer critic, instructor coach, and industry mentor. This increases agency, reciprocity, and professional identity.
Longitudinal emotional trajectory	Repeated uncertainty, isolation, and fear of evaluation accumulate across milestones.	Combine private progress dashboards, formative feedback, reflection prompts, celebration of iteration, and early support triggers. This promotes curiosity, resilience, and sustained participation.

The worked case shows why the integration matters in practice. Emotional outcomes do not arise from interface aesthetics alone, and structural changes are never emotionally neutral. Asynchronous critique, for example, is more than a scheduling convenience. When it is supported by clear protocols, stable small groups, and a route for recovery, critique can shift from a public threat towards a developmental exchange. An integrated studio workspace likewise offers more than better usability; it removes repeated disruptions that can weaken creative momentum and professional self-efficacy. The design concern is therefore sustained participation, not simply short-term satisfaction [24–27].

5.3 Revised Conceptual Framework

Figure 1 presents the revised conceptual model of sustainable ODL design. At its centre is the adult learner as an active subject pursuing meaningful learning and professional goals. The learner's activity is mediated by tools and technology, rules and norms, community, and division of labour. The model adds an explicit longitudinal pathway: activity-system configuration shapes recurring emotional experience; emotional trajectories influence participation and identity; and sustained participation contributes to sustainable learning outcomes. Alignment can generate confidence, curiosity, belonging, and resilience, whereas persistent contradictions can generate anxiety, frustration, isolation, and withdrawal.

In an integrated ACD–Emotional Design model, activity components such as tools, rules, and community are deliberately shaped to foster emotional sustainability. For example, assessment practices framed as developmental feedback rather than punitive evaluation can reduce anxiety and enhance motivation. Similarly, platform interfaces

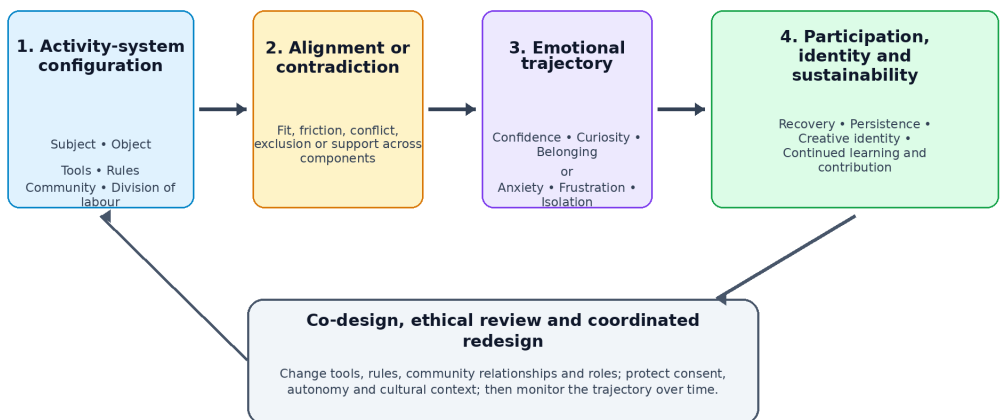
that reflect learners' cultural contexts, professional identities, and prior experiences can foster emotional resonance and a sense of belonging.

This integrated approach contributes to sustainable innovation by helping ODL systems remain adaptable, humane, and culturally responsive over time. It also aligns with democratic technology design principles by recognising adult learners as active participants within broader socio-technical ecosystems rather than passive content consumers.

Figure 1 presents the framework as a longitudinal pathway rather than a static overlay. An activity-system configuration may create alignment or contradiction. When learners encounter the same configuration repeatedly, an emotional trajectory develops, with consequences for participation, professional identity, and sustainable learning. Evidence from that trajectory informs further co-design, ethical review, and coordinated redesign. The feedback loop matters because a single intervention cannot be assumed to be sustainable; its effects must be reconsidered as the activity system and the learner's circumstances change.

Longitudinal ACD-Emotional Design Pathway

From activity-system configuration to sustainable participation, with continuous co-design feedback



Conceptual proposition: sustainable ODL emerges when systemic alignment supports constructive emotional trajectories and participatory continuity.

Fig. 1. Longitudinal integration of Activity-Centered Design and Emotional Design for sustainable Open and Distance Learning.

5.4 Design Heuristics and Candidate Evaluation Indicators

The framework is operationalised through linked diagnostic, generative, and evaluative questions. The indicators below are candidate evidence for future empirical work, not validated measures. They are intended to prevent designers from equating emotional sustainability with immediate satisfaction or platform completion alone.

Table 3. Design heuristics and candidate evaluation indicators for the integrated framework.

Activity focus	Diagnostic question	Emotional risk	Coordinated design response	Candidate evidence
Subject and object	Is the activity meaningful, relevant, and recoverable within the learner's life?	Loss of agency or professional identity	Offer authentic project choices, visible purpose, planning control, and recovery routes.	Perceived relevance; recovery after disruption; continued goal commitment
Tools	Do tools support the complete creative workflow without avoidable switching or exclusion?	Overload, frustration, loss of momentum	Integrate project states, versioning, annotation, accessibility alternatives, and quiet notification periods.	Repeated friction points; recovery time; abandoned or duplicated actions
Rules	Which policies conflict with work, care, access, or iterative creative practice?	Anxiety, shame, perceived unfairness	Use transparent milestone windows, developmental assessment, and non-punitive recovery pathways.	Deadline conflict; exception requests; perceived fairness; persistence
Community	How are critique, belonging, safety, and mutual support organised?	Isolation, defensiveness, fear of exposure	Create stable peer circles, staged disclosure, critique protocols, and timely instructor escalation.	Help-seeking; critique participation; belonging; quality of iteration
Division of labour	Are learner, peer, instructor, mentor, and automated-system responsibilities clear and accountable?	Helplessness, mistrust, feedback dependency	Define roles, response expectations, human oversight, and escalation responsibilities.	Role ambiguity; response delay; support distribution; trust
Trajectory over time	Do recurring interactions improve or erode confidence, identity, and participation?	Accumulated frustration or withdrawal	Review longitudinal patterns and redesign the activity system through participatory feedback.	Emotional trend; recurrence of breakdowns; persistence; portfolio progression

These dimensions support a mixed evidence strategy. Activity-system mapping and policy analysis can identify contradictions; interviews, diaries, and repeated self-report can examine emotional trajectories; platform logs and revision histories can show participation and recovery; and portfolio analysis can examine the continuity and quality of creative work. No single metric should be treated as proof of emotional sustainability.

6 Implications for Creative Industries, Design Education, and Educational Technology

In creative fields, learning cannot be separated from production practice, critique culture, professional identity, or rapidly changing digital tools. Learners in online graphic design, multimedia, animation, game development, architecture, digital content

creation, and creative technology programmes must interpret ambiguous briefs, make artefacts, expose unfinished work to critique, collaborate at a distance, and build professional portfolios. These activities carry emotional weight. Critique can encourage curiosity and growth, but poorly designed rules, roles, and community practices can also produce anxiety, defensiveness, or withdrawal. The integrated framework treats such responses as part of the studio activity system rather than as shortcomings of individual learners [24–28].

For online design education, this means avoiding a simple transfer of face-to-face studio routines into compulsory synchronous sessions. Educators can instead build flexible critique arrangements, staged milestones, transparent assessment, clear peer and mentor roles, accessible toolchains, and recovery pathways for working adults. These choices retain the qualities that make studio education valuable, including iteration, dialogue, reflection, experimentation, and professional judgement, while reducing barriers to participation. Teaching ACD alongside Emotional Design can also help emerging designers ask a broader question: not only whether an interface is usable, but how the whole activity system shapes emotion, identity, and participation over time [24–27].

For educational technology developers, the practical implication is equally specific. Platforms for creative learning may need version control, portfolio development, annotation, asynchronous critique, stable peer groups, tool interoperability, and feedback that reflects different roles. Quizzes and content modules alone cannot support an authentic creative workflow. A platform remains useful when it helps people continue to create, learn, collaborate, and adapt, while also attending to well-being, inclusion, cultural responsiveness, and professional continuity [25–28].

Implementation should involve the people affected by these decisions. Learners, educators, accessibility specialists, and relevant creative-industry partners can help identify contradictions, interpret emotional risks, and decide which trade-offs are acceptable. This follows co-design traditions that treat people as partners in shaping future practice [32]. Their involvement should extend to rules and governance, rather than ending with comments on interface appearance.

7 Discussion, Ethical Boundaries, and Future Research

7.1 Empirical Operationalisation and Evaluation

While this paper has focused on conceptual integration, the illustrative studio case provides a basis for empirical operationalization. Future studies should compare design interventions derived from ACD alone, Emotional Design alone, and the integrated framework. Such studies could examine whether integrated interventions produce different outcomes in activity-system alignment, anxiety, creative confidence, belonging, persistence, portfolio completion, and professional identity. Longitudinal and mixed-method approaches would be particularly valuable because the framework's central claim concerns emotional trajectories and activity-system evolution rather than isolated post-use reactions. Activity-system mapping, learner diaries, critique

observations, platform analytics, repeated affect measures, and interviews could be combined to test how specific structural changes alter emotional and participatory patterns across a course [22,23,31].

Evaluation should distinguish immediate reaction from emotional sustainability. Candidate outcomes include recurrence of friction, recovery after disruption, perceived fairness, confidence following critique, help-seeking, belonging, persistence, portfolio progression, and continuity of professional identity. Evidence should be triangulated because completion or satisfaction alone may conceal unresolved contradictions. Comparative studies should also test whether integrated interventions yield outcomes that differ from ACD-only or Emotional-Design-only responses.

7.2 Ethics, Power, and Institutional Responsibility

Learning analytics, affective computing, and generative AI may support reflection or reveal patterns, but they also create risks of surveillance, manipulation, inaccurate emotion inference, and redistribution of responsibility from institutions to learners. Emotion AI is especially problematic when systems claim access to hidden internal states or act on culturally contingent signals without adequate justification [15,16,34]. Education-specific critiques further warn that emotion-recognition systems may produce intentional harms when contested categories are treated as objective facts [35].

Ethical use begins with a limited and explicit purpose. It also requires data minimisation, informed and revocable consent, accessible alternatives that do not depend on instrumentation, human review, and clear responsibility when harm occurs. Emotional data should never be used for punitive assessment, covert monitoring, or automated judgements about motivation. Learners must be able to inspect, challenge, and opt out of inferences. Most importantly, anxiety or disengagement may signal a structural contradiction. The framework should not be used to manage learners' emotions while inequitable rules, workloads, or access barriers remain unchanged.

7.3 Boundary Conditions

The framework is most applicable where learning extends across time, involves multiple tools and stakeholders, and depends on identity, collaboration, or recurring feedback. It requires adaptation in short procedural training, tightly regulated competency assessment, low-connectivity settings, and contexts where institutional rules cannot readily be changed. Cross-cultural use must not assume that confidence, critique, belonging, or emotional expression have uniform meanings. The framework can be applied without collecting biometric or inferred affective data; interviews, reflective accounts, observed breakdowns, policy analysis, and participatory mapping may be more proportionate. It should not be used to individualise structural problems, prescribe a universally positive emotional state, or claim causal effectiveness before empirical validation.

8 Conclusion

Sustainable ODL for adult learners depends on more than a usable platform or a positive moment of interaction. It requires attention to how goals, tools, rules, communities, and roles are arranged, how learners experience those arrangements over time, and whether participation remains possible when circumstances change. ACD provides the systemic diagnosis, while Emotional Design helps trace the emotional trajectory. In the studio example, bringing the two together changed decisions about projects, tools, critique, peer relationships, roles, feedback, and recovery. The resulting account of sustainability is deliberately conceptual: ODL is more likely to remain valuable when the activity system supports recovery, belonging, professional identity, and continued participation as learners' circumstances and creative practices evolve [2,19–21].

No empirical validation is claimed. The propositions, heuristics, indicators, and worked case are intended to support further inquiry, not to prescribe a universal solution. Application will require cultural and contextual adaptation, interpretation with participants, and explicit ethical governance. Future studies should compare integrated interventions with those based on a single lens, follow emotional and activity-system change over time, and establish where the framework is useful and where its limits become apparent.

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