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Engagement without Visibility in Embodied Practices for Online Teacher Education

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Abstract: In synchronous online teaching, engagement is often inferred from camera use and observable behaviour. This conceptual paper examines the limitations of these proxies when brief movement practices are integrated into online teacher qualification programmes. Drawing on the literature on multidimensional engagement, it analyses the relationship between visible behaviour, conditions of participation and intended learning processes. A hypothetical case illustrates the inferential problem, while a Design-Based Research perspective guides the methodological proposal. The argument identifies four risks: conflating access resources with engagement, interpreting adaptations as withdrawal, changing the activity by requiring visibility, and favouring activities that produce easily observable behaviour. Four commitments are proposed: separating participation from visibility, offering accessible alternatives from the outset, combining structured self-reports and reflective accounts, and specifying the conditions that would call for design revision. These proposals neither demonstrate the effectiveness of embodied practices nor validate alternative measures. They offer a framework for examining engagement without making bodily exposure a prerequisite for recognising it, while acknowledging the limitations of self-report measures and the need for empirical testing.

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1. Introduction

Synchronous online teaching makes some forms of participation immediately visible while leaving others difficult to interpret. In online teacher qualification programmes, teacher educators can observe camera use, movement, chat contributions and connection time. These traces provide useful information about the activity, but their availability does not establish their validity as measures of engagement. Participation also depends on domestic space, connectivity and the ability to appear on screen. Treating a visible trace as a direct expression of motivation may therefore conflate participants' experiences with the conditions under which they can make those experiences observable.

This distinction is particularly relevant when the learning activity involves the body. During a movement practice delivered by videoconference, standing within the camera frame or reproducing a demonstrated movement may be taken as evidence of

engagement. Yet these actions also require space, privacy and willingness to be observed. Conversely, remaining seated, reducing movement or turning off the camera may enable participation. The issue concerns the validity of inferring engagement from bodily visibility, rather than the usefulness of observation across all educational contexts.

Situated within a doctoral project on brief embodied practices in online teacher education, this paper asks: what can count as evidence of engagement when visible participation depends on unequal conditions of access? It develops a conceptual and methodological argument without presenting intervention outcomes. The aim is to question the validity of bodily visibility as an indicator of engagement in online embodied practices and to outline a conceptual and methodological framework for documenting participation from a multidimensional and inclusive perspective, distinguishing conditions of access, observable behaviour and hypothesised learning processes.

2. Theoretical Framework

2.1. Engagement as a Multidimensional Construct

Fredricks et al. (2004) distinguish behavioural, emotional and cognitive engagement. The behavioural dimension concerns participation and effort; the emotional dimension concerns affective responses to people, activities and institutions; and the cognitive dimension concerns investment in learning and the use of strategies, including self-regulation. The framework also highlights the difficulties of distinguishing these dimensions and separating engagement from its antecedents and consequences. In higher education, Kahu (2013) similarly distinguishes engagement, understood as a psychosocial state, from the structural and psychosocial conditions that influence it and the outcomes associated with it.

Research on engagement in technology-mediated learning documents considerable variation in definitions and measures (Bond et al., 2020; Henrie et al., 2015). Behavioural traces are useful, but cannot represent the entire construct on their own. A chat message may document a contribution without revealing its emotional meaning; a connected device may indicate access without demonstrating sustained attention. The validity of a proxy depends on the process it is intended to represent and the circumstances in which it is interpreted.

2.2. Visibility in Synchronous Teaching

Gourlay (2015) questions the privileged status accorded to public, observable participation in higher education, drawing attention to quieter practices that may also support learning. Videoconferencing gives this problem a particular form: teacher educators have access to a selection of visual and textual cues, while much of the learner's activity remains outside the interface. Bailenson (2021) proposes a theoretical account of videoconferencing fatigue that includes prolonged gaze, viewing one's own image, additional nonverbal demands and reduced mobility. These mechanisms are relevant to the design of online movement activities, although they do not demonstrate the effects of the intervention considered here.

A movement activity may conflict with the expectation that participants remain continuously within the camera frame. Moving away from the screen may make an

action less visible without making it less intentional. This tension is not inevitable for every task or interface, but it limits interpretations based on continuous visibility.

3. Project Context and Analytical Approach

3.1. The Proposed Embodied Practice

The project concerns brief sequences of low-intensity movement followed by guided reflection, designed to be integrated into synchronous sessions within online teacher qualification programmes. Embodied approaches provide a theoretical basis for considering the relationships between bodily activity and learning. Faella et al. (2025) review a range of embodied practices in school settings; this literature supports the relevance of the design question, but cannot establish their effectiveness in online teacher education for adults. Shapiro and Stolz (2019) likewise call for careful consideration of the educational implications that can be drawn from embodied cognition.

The proposed activity takes a few minutes of regular teaching time. Seated and standing alternatives are presented from the outset as equally legitimate modes of participation, without assuming that they produce identical outcomes. Participants may reduce their range of movement, keep their cameras off or opt out without providing explanations. Guided questions invite them to notice bodily sensations and consider a possible connection with classroom practice. The context is adult professional preparation, in which work, caring responsibilities and the organisation of domestic space may constrain participation.

3.2. Scope and Analytical Procedure

This paper presents a conceptual analysis informed by selected studies, rather than a systematic review or an empirical evaluation. It involves three analytical steps. First, visible indicators are examined in relation to the behavioural, emotional and cognitive dimensions of engagement, identifying both the process each indicator might represent and possible alternative explanations. Second, a hypothetical case contrasts different conditions of participation to examine whether visibility can justify ranking engagement. The case does not control for actual engagement or provide empirical evidence. Finally, the inferential limitations identified are translated into proposed commitments for design and documentation.

The analysis is organised around three theoretical strands: the multidimensionality of engagement, the sociotechnical conditions of visible participation, and accessibility principles in the design of embodied activities. The four proposed risks and four commitments constitute an interpretive synthesis of these perspectives, rather than categories derived from systematic coding of the literature; they may guide the formulation of testable conjectures in subsequent empirical investigations.

Design-Based Research provides the overall orientation for future iterative development (Barab & Squire, 2004). The present paper contributes to an initial formulation of conjectures and indicators; it does not describe completed design cycles. Following Sandoval (2014), the proposal distinguishes design features, hypothesised mediating processes and expected outcomes. No participant data or observed intervention outcomes are analysed. Issues of consent, institutional ethics review and data management form part of the planning for a possible subsequent empirical phase and are not presented as already resolved.

4. Visibility and Conditions of Participation

4.1. Inequalities in Access to Visible Participation

In their study of online university classes, Castelli and Sarvary (2021) identify concerns about appearance, people in the background, the home environment and internet connectivity among the reasons for keeping cameras off. They also examine differences between student groups and propose an equitable approach to encouraging camera use. Their findings challenge the immediate interpretation of a camera being off as disengagement. However, they concern a specific university context and should not be treated as direct evidence about the adult teacher education population considered here.

Movement activities may intensify some of these constraints. Participants need sufficient space for their chosen action and may have to negotiate the use of shared rooms. Health and disability, bodily comfort, cultural expectations and concerns about peer judgement may influence what can be performed on screen. These are plausible considerations for design and future investigation, rather than findings from the present project. Their relevance lies in the alternative explanations they introduce: the absence of visible movement may result from access constraints, intentional adaptation, technical problems or disengagement, and the trace alone cannot distinguish between them.

4.2. Four Risks in Interpreting Visibility as Engagement

First, a visibility-based measure may conflate engagement with the resources required to access the activity. If appearing on video requires privacy or space, a score that rewards visibility may partly reflect those resources. The bias could be systematic when conditions of access are unequally distributed. Its direction and magnitude would nevertheless require empirical investigation; this paper does not demonstrate that visibility measures resources more than engagement in every context.

Second, interpretation may misclassify adaptation as withdrawal. Choosing a seated alternative or reducing movement may be consistent with the self-regulation encompassed by cognitive engagement (Fredricks et al., 2004). Such a choice does not demonstrate self-regulation, but neither does it provide sufficient evidence of low engagement. Its meaning depends on the participant's purpose, the task and complementary evidence.

Third, requiring visibility may change the experience under study. An activity intended to support attention to bodily sensations may introduce the additional demand of managing how one appears to others. For some participants, being observed may be reassuring or provide social support; for others, it may make the activity intrusive. Camera requirements should therefore be considered part of the intervention design, rather than a neutral means of observing an activity that would otherwise remain unchanged.

Fourth, rewarding an observable proxy may influence subsequent design choices. Teacher educators or adaptive systems might favour movements that remain within the camera frame and tasks that produce easily recorded responses. Campbell's (1979) discussion of the distortion of social indicators provides a conceptual basis for examining this risk. The concern is that what can be readily detected may gradually replace what the activity is intended to support.

4.3. A Hypothetical Case

Consider two female trainees attending the same session from home. The first has a private room, keeps her camera on, stands up and follows the demonstrated sequence. The second connects from a shared kitchen, keeps her camera off and uses the seated alternative. Afterwards, the second trainee writes a brief reflection on changes she noticed in her breathing and shoulder tension, and considers how to adapt the break to a classroom setting. The case is constructed for analytical purposes and does not describe observed participants.

The case highlights the need to distinguish observed behaviour from the interpretation attributed to it. More detailed documentation should consider the chosen modes of participation, the conditions that enable them and any reflective processes associated with the experience, without assuming a direct correspondence between such evidence and overall engagement.

A rule equating camera use and visible movement with engagement would favour the first trainee. However, the available evidence supports different and incomplete interpretations: visible performance documents one form of behavioural participation, while the second trainee's account provides evidence relevant to reflection and possible professional application. It does not follow that the second trainee is more engaged overall. The defensible conclusion is that visibility alone cannot justify such a ranking.

The proposed forms of evidence are not direct or unambiguous indicators of individual dimensions of engagement, but potentially relevant interpretive traces. Their relationship to the construct depends on the task, the conditions of participation and the alternative explanations considered. In particular, the expression of bodily sensations and the production of professional reflections should not automatically be equated with emotional and cognitive engagement, respectively.

5. Documenting Engagement without Requiring Visibility

The analysis suggests four commitments for a future documentation protocol. Table 1 relates them to the dimensions of engagement and identifies their remaining limitations. The indicators are potential sources of evidence, rather than a validated scale. Self-regulation and access are treated as aspects that cut across the dimensions, rather than being introduced as a fourth dimension of engagement.

The first commitment is to separate participation in the activity from camera status. A brief self-report at the end of the activity could record whether the participant attempted the practice, used an alternative, stopped or chose not to participate, while also allowing them not to respond. These categories would document reported participation in the micro-session without certifying attendance in the broader qualification programme. Camera status, where relevant and appropriately recorded, would describe the context without contributing to an engagement score. Missing responses would remain missing data and would not automatically be coded as disengagement.

The second commitment is to make alternatives explicit before participation begins. Seated and standing options, reduced-range movements, participation with the camera off and opting out should be available without requiring personal explanations. Universal Design for Learning provides a basis for anticipating learner variability in design (CAST, 2024). Use of an option may inform discussion of accessibility, but remains ambiguous on its own: non-use may reflect preferences, lack of need, unclear

instructions or reluctance to stand out. Optional feedback should explore these possibilities without requiring disclosure of health conditions or domestic circumstances.

The third commitment is to combine evidence concerning different aspects of the experience. Proposed questions include: "What did you notice during the activity?", "Did anything feel uncomfortable or intrusive?" and "How might you adapt this activity for a class?". Analysis could consider the specificity of the account, its affective content and the reasoning connecting it to professional practice. Comparing these accounts with reported participation, including across successive sessions, would allow convergences and discrepancies to be examined. Multiple self-reports do not, however, constitute independent validation, since they may share the same biases. Allowing brief oral or written responses could reduce dependence on writing proficiency; no single response should be treated as an overall engagement score.

The fourth commitment is to specify in advance the observations that would call for design revision. Repeated reports of discomfort, burdensome instructions or pressure to become visible would call into question the accessibility the practice aims to achieve. Persistently generic reflections or reflections lacking connections to professional situations would require examination of the prompts, timing and pedagogical rationale of the activity. An increase in opting out would warrant further investigation, but would not in itself demonstrate failure. These criteria should be refined for the empirical phase and interpreted alongside participants' explanations and the demands of the session.

Table 1. Visibility-based proxies, proposed evidence and interpretive limitations in online embodied practices.

Dimension or aspect	**Visibility proxy**	**Proposed evidence**	**Remaining limitation**
Behavioural	Camera on; body in frame; visible performance	Reported attempt, adaptation, completion or opting out	Recall and social desirability
Emotional	Facial expression; visible enthusiasm	Brief account of comfort, discomfort or other sensations	Selective disclosure; relationship with the teacher educator
Cognitive	Accurate reproduction of movement	Specific reflection and a reasoned connection to teaching	Writing proficiency; prepared or generic accounts
Self-regulation and access	Seated alternative or camera off interpreted as withdrawal	Use of alternatives interpreted alongside optional explanations	Use and non-use remain ambiguous

Note. These are potential indicators that have not yet been validated. Self-regulation and access cut across the dimensions of engagement. Neither missing responses nor participation with the camera off demonstrates disengagement.

A conjecture map would make the proposed chain explicit: offering alternatives and making visibility optional is hypothesised to reduce barriers to participation; this might enable attention to bodily sensations; guided reflection might then support reasoned connections to teaching practice. These links should be examined separately (Sandoval, 2014). Using an alternative does not demonstrate bodily awareness, and describing a classroom application does not demonstrate subsequent transfer. Similarly, a generic account may reflect an inadequate prompt or difficulty expressing oneself, rather than the absence of a learning process. Future cycles should examine competing interpretations, including cases that contradict design expectations, before modifying the activity or its indicators.

6. Discussion

6.1. Implications for Human and Automated Interpretation

The central implication is that judgements of engagement require an explicit account of what a trace can and cannot support. This requirement applies both when a teacher educator interprets behaviour and when a digital system uses movement or interaction data. Slade and Prinsloo (2013) discuss the contextual and ethical limitations of learning analytics and the importance of viewing learners as active participants in interpreting their own data. Applied to the present case, this perspective supports opportunities to explain or contest an interpretation. It does not imply that all analytics systems use bodily visibility or that automated judgements are necessarily less open to challenge than human ones.

For movement-based adaptive systems, including exergames where relevant, one practical implication is to distinguish an unavailable signal from evidence of low engagement. Missing movement data might result from camera positioning, technical constraints, use of an accessible alternative or a decision not to be recorded. One proposed safeguard is to avoid penalising adaptations based solely on the absence of signals and to offer alternative ways of contributing.

In initial teacher education, the ways in which participation is recognised and documented may also serve a pedagogical modelling function. Prospective teachers experience not only an embodied activity, but also a way of interpreting individual differences, recognising adaptations and attributing meaning to learners' behaviour. Making bodily visibility optional may therefore offer an opportunity to question assessment practices based on conformity to observable behaviour. Whether and how this experience contributes to participants' subsequent instructional design remains to be examined empirically.

6.2. Limitations and Directions for Empirical Work

The argument starts from a single project context: adults attending synchronous online teacher qualification programmes in which the researcher also acts as the teacher educator. Transferability depends on similarities in conditions of participation rather than on statistical representativeness. Attention to contextual description is consistent with Lincoln and Guba's (1985) conception of transferability. The cited literature covers

school engagement, university teaching and embodied approaches; these fields inform the argument, but cannot be assumed to describe the same population or intervention.

A second limitation is the absence of empirical validation. Neither the proposed indicators nor the hypothesised effects of the activity have been tested in the present work. Subsequent research should assess whether the questions are understandable, whether responses can be provided within teaching time, and whether interpretations distinguish engagement from expressive fluency, compliance with requests or favourable judgements of the teacher educator. Transparent coding criteria, examination of contrasting cases and comparison between analysts could support this work. Such procedures would make interpretations more open to scrutiny without turning qualitative accounts into direct measures of an otherwise unobservable internal state.

Third, self-report measures remain susceptible to recall limitations, selective disclosure and social desirability. Paulhus (1984) distinguishes favourable self-deception from impression management; the dual role of teacher educator and researcher makes the latter particularly relevant. Possible safeguards include voluntary responses, separation from assessment and, where feasible, analysis by someone outside the teaching relationship. Anonymous feedback may reduce perceived pressure, but prevents reliable linking of responses across sessions; pseudonymised longitudinal data allow such linking, but should not be described as anonymous. These are design choices for future work, rather than measures already implemented. The proposal makes biases explicit without claiming that self-report measures are inherently superior to observation.

7. Conclusions

In online embodied practices, visible behaviour provides partial evidence of participation and may also reflect the conditions that make it possible. Keeping the camera off, remaining seated or adapting a movement cannot, on its own, support a judgement of disengagement. This paper offers a conceptual framework for aligning evidence with intended learning processes while preserving alternatives to bodily exposure.

Separating participation from visibility, providing accessible alternatives, comparing reflective accounts with reports of participation, and specifying reasons for revising the design provide a basis for subsequent empirical work. The value of these choices will depend on their capacity to support credible and practicable interpretations. For teacher education, the proposal also raises a pedagogical question: how can a training programme model the recognition of engagement in ways that allow learners to adapt their participation? Addressing this question requires attention both to inclusion and to the limitations of the evidence used to assess it.

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