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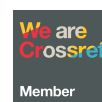
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The hidden curriculum of digital peer interaction: a multisite ethnography in online higher education

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ABSTRACT

Peer interaction in Digital Learning Environments (DLEs) is commonly treated as supplementary to online instruction, yet it can function as a key site where hidden curriculum is enacted through informal socialization. This study examines how peer-to-peer interaction transmits, negotiates, and reinterprets unwritten norms that shape students' academic identities and participation practices in online higher education. Using a multisite ethnographic case study grounded in sociocultural theory and critical pedagogy, data were collected over three months from three Indonesian higher education institutions using synchronous and asynchronous digital platforms. Participants included 36 students and 6 lecturers. Data comprised virtual classroom observations, online discussion forum archives, and semi-structured interviews, and were analyzed using thematic analysis supported by NVivo 12. Findings indicate that peer interaction generated four clusters of hidden curriculum: (1) digital ethics enacted through peer regulation of communication tone, response timing, and visibility practices that shaped credibility and participation; (2) academic integrity negotiated through peer-shared strategies that blurred boundaries between mutual support and misconduct; (3) emotional work expressed in affective labor to sustain group harmony and minimize conflict-related sanctions; and (4) hidden hierarchies produced by unequal platform literacy and social capital, positioning certain students as informal gatekeepers of information and belonging. These peer-mediated norms operated as forms of governance outside formal course design, shaping participation strategies, sense of belonging, and academic identity construction. The study offers context-specific evidence from Indonesian online higher education and highlights the importance of critical digital pedagogy that renders implicit norms discussable and supports more inclusive online learning practice.

Keywords:

Hidden curriculum,
Peer interaction,
Digital learning environments,
higher education,
Multisite ethnography,
Critical pedagogy

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Introduction

The rapid expansion of Digital Learning Environments (DLEs) in higher education, particularly following the COVID-19 pandemic, has reshaped how teaching, learning, and participation are organized (Luk & Yeoh, 2024). Beyond accelerating technological adoption, this shift has transformed how educational practices are structured and experienced. While substantial research has examined digital pedagogy in terms of instructional design, engagement metrics, and learning outcomes, less

attention has been given to the implicit norms and values that circulate within digitally mediated interaction. One such dimension is the hidden curriculum, understood as the transmission of social expectations, values, and power relations that operate beyond formal syllabi (Dastgir & Fakhar-Ul-Zaman, 2023; Myles et al., 2024; Andarvazh et al., 2017). Although hidden curriculum has been extensively analyzed in face-to-face settings, its operation within digital learning environments remains insufficiently theorized and empirically examined (Azimpour & Khalilzade, 2015).

Existing studies suggest that digital environments are not pedagogically neutral. Platforms such as Learning Management Systems, discussion forums, and synchronous collaboration tools embed assumptions about valid participation, acceptable communication styles, and appropriate forms of visibility (Koutsouris et al., 2021; Simoni, 2023; Behmanesh et al., 2025). Research on online interaction further indicates that such infrastructures may shape communicative hierarchies and normative expectations (Hidalgo et al., 2019; Turnbull et al., 2023; Venter, 2020). For instance, silence in discussion forums may be interpreted as disengagement, even though it may reflect digital exclusion, affective burden, or culturally shaped communication norms. Likewise, expectations of constant digital presence in synchronous sessions may generate unspoken pressures and reinforce hidden forms of regulation (da Rocha-Alvarez, 2024). However, much of this scholarship focuses on institutional design or instructor-student dynamics. Less attention has been directed toward peer interaction as a central site where hidden norms are enacted, negotiated, and potentially resisted.

Peer-to-peer interaction constitutes a crucial arena of informal academic socialization in digital spaces. Students learn how to perform competence, manage responsiveness, and navigate participation not only from instructors but also through observing and interacting with peers. Norms regarding response speed, tone of expression, strategic visibility, and even the use of digital gestures form part of an implicit social literacy rarely articulated in formal curricula. These practices generate subtle landscapes of power that influence belonging, credibility, and symbolic inclusion. Yet the sociocultural and political dimensions of these interactions are often overshadowed by technocratic approaches to digital education that prioritize measurable indicators such as participation rates and platform efficiency (Schmader & Sedikides, 2018).

Such approaches risk obscuring how digital learning environments may reproduce or reconfigure structural inequalities. To address this gap, this study integrates sociocultural theory and critical pedagogy as complementary analytical lenses. From a sociocultural perspective (Vygotsky; Lave & Wenger), learning is mediated through interaction within communities of practice; digital platforms function as mediational tools through which norms are internalized and identities are formed. From the standpoint of critical pedagogy (Freire; Giroux), educational processes are embedded in power relations, and hidden curriculum operates as a mechanism through which dominant expectations are reproduced or contested. Bringing these perspectives together enables an examination of how peer interaction in DLEs becomes a site of normative regulation, identity construction, and potential resistance.

This study is situated in Indonesian higher education, a context marked by rapid digital expansion, uneven digital literacy distribution, and sociocultural orientations shaped by collectivist values and relatively high power distance. These characteristics influence communication styles, peer dynamics, and participation strategies in online classrooms. Despite the scale of digital transformation in Indonesia, empirical research examining hidden curriculum within digitally mediated peer interaction remains limited. Accordingly, this study addresses the following research questions: (1) How is hidden curriculum transmitted through peer interaction in digital learning environments? (2) How do students negotiate, reinterpret, or resist these implicit norms? (3) What are the implications of these dynamics for critical digital pedagogy in higher education?

Drawing on a digital ethnographic approach conducted across three higher education institutions implementing intensive online learning, this study provides contextually grounded empirical insights into how hidden curriculum operates within peer interaction and shapes participation, belonging, and academic identity formation. By foregrounding the sociocultural and political dimensions of

digitally mediated learning, the study contributes to ongoing debates in digital education and advances a more critically informed understanding of online pedagogical practice.

Methods

Theoretical and Methodological Orientation

This study is grounded in sociocultural theory and critical pedagogy as complementary analytical frameworks. From a sociocultural perspective, learning is understood as a socially mediated process shaped by interaction, cultural tools, and participation in communities of practice (Vygotsky, 1978; Lave & Wenger, 2001). Vygotsky's concept of mediation informed the observation protocol by directing attention to how digital platforms (e.g., LMS features, discussion threads, chat functions) functioned as mediational tools shaping communicative norms and identity performance. Lave and Wenger's notion of communities of practice guided the analysis of peer interaction as a site where newcomers learn legitimate participation and internalize implicit norms.

Critical pedagogy informed the study's focus on power, inequality, and resistance within digital interaction (Freire, 1970; Giroux, 1983). Freire's critique of "banking education" shaped the interview protocol by probing how students perceived authority, participation expectations, and possibilities for dissent in online classrooms. Giroux's framework of cultural politics guided the analysis of how hidden curriculum operated through subtle regulation of voice, visibility, and belonging. Integrating these frameworks enabled the study not only to describe hidden curriculum but also to interrogate its ideological implications within digital higher education. Methodologically, the research employed a multisite digital ethnographic design to examine peer interaction across three higher education institutions in Indonesia.

Research Sites and Learning Contexts

The study was conducted at three Indonesian higher education institutions selected purposively to represent variation in institutional type (public and private), disciplinary focus, and digital policy implementation. All three institutions had adopted intensive online learning modalities following the pandemic and continued to implement either fully online or hybrid courses at the time of data collection.

Observed courses were fully online undergraduate courses in social sciences and education disciplines. Each course utilized a Learning Management System (Moodle or Google Classroom) for asynchronous discussion forums and assignment submission, combined with synchronous sessions conducted via Microsoft Teams or Zoom. Discussion forums were mandatory and contributed to course grades (10–20% of assessment weight), and synchronous sessions were recorded and made available to students. In addition to institutionally sanctioned platforms, students maintained informal peer communication spaces through WhatsApp, Discord, or Telegram groups, which became important sites for observing informal academic socialization.

Participants and Sampling Strategy

Participants included 36 undergraduate students and 6 lecturers across the three institutions. A purposive sampling strategy was used to select institutions and courses that met the following criteria: (1) sustained use of online platforms for at least two semesters; (2) active peer discussion components; and (3) institutional willingness to grant research access.

Within each course, students were recruited through voluntary participation announcements. Inclusion criteria included: (1) active engagement in online discussions; (2) participation in peer collaborative activities; and (3) willingness to participate in interviews and allow observation of interactional spaces. Snowball sampling was used to identify students who were recognized by peers as active or influential participants in digital discussions. The final sample ensured diversity in gender, year of study, and socioeconomic background. The sample size was determined based on data saturation, achieved when no new thematic categories emerged during iterative analysis. Lecturers were included to provide institutional perspectives on platform configuration, participation policies, and observed student interaction patterns.

Data Collection Procedures

Data were collected over a three-month period through a combination of virtual observation, digital artifact analysis, and semi-structured interviews. Virtual participatory observation was conducted across 24 synchronous sessions (eight per institution), each lasting between 90 and 120 minutes. During formal online classes, the researcher adopted a non-participant observer role to minimize disruption to instructional dynamics. In informal digital spaces, such as WhatsApp and Discord groups, the researcher assumed a limited participant-observer role, engaging minimally while maintaining transparency about the research presence. Observational data were documented through detailed digital field notes, analytic memos, and screenshots to capture interactional patterns, communicative norms, and symbolic practices. Observation in informal spaces was conducted only after explicit consent had been obtained from all group members.

In addition to observation, digital artifact analysis was undertaken to examine interactional traces embedded in online platforms. The artifacts analyzed included 42 discussion forum threads comprising approximately 1,260 student posts and replies, 18 collaborative documents (e.g., Google Docs group assignments), and archived chat transcripts from 12 synchronous sessions. Artifacts were selected purposively to represent both high-activity and low-activity discussions in order to capture variation in participation patterns. The analysis focused on linguistic features, response timing, emoji usage, forms of address, correction practices, and patterns of inclusion and exclusion that signaled implicit norms and hidden regulatory practices.

Semi-structured interviews were conducted to deepen understanding of participants' interpretations of digital interaction. A total of 30 individual interviews were carried out, involving 24 students and 6 lecturers, with each interview lasting between 45 and 75 minutes. Interviews were conducted online, recorded with informed consent, and transcribed verbatim (Zahnoun, 2021). The interview protocol explored participants' perceptions of participation norms, experiences of inclusion and exclusion, strategies of adaptation or resistance, and interpretations of peer expectations in digital learning environments. To enhance credibility, member checking was conducted by sharing summary interpretations with selected participants for clarification and validation.

Data Analysis

Data were analyzed using thematic analysis supported by NVivo 12. The analytical process combined deductive and inductive strategies. First, open coding was conducted inductively to identify emergent patterns related to hidden norms, participation strategies, and identity negotiation. Second, axial coding connected categories to mediational tools, power dynamics, and community participation structures, informed by sociocultural and critical pedagogical frameworks (Vygotsky, 1978; Lave & Wenger, 2001; Freire, 1970; Giroux, 1983). Third, selective coding refined overarching themes into four integrative clusters of hidden curriculum.

To enhance trustworthiness, coding was independently reviewed by a second qualitative researcher. Discrepancies were discussed until consensus was reached. An audit trail consisting of memos, codebooks, and iterative theme development logs was maintained. Credibility was further strengthened through source triangulation (observations, artifacts, interviews), member checking, and peer debriefing.

Ethical Considerations

The study adhered to established principles of qualitative research ethics. Written informed consent was obtained from all participants prior to data collection. For informal digital spaces (e.g., WhatsApp and Discord groups), consent was obtained collectively from all group members before observation commenced. Power dynamics between researcher and student participants were mitigated by clarifying that participation was voluntary, unrelated to course assessment, and withdrawable at any stage without consequence. Participants were reminded periodically of their right to withdraw, including the option to request deletion of previously collected data. All identifying information was anonymized. Screenshots were edited to remove usernames, profile pictures, institutional logos,

timestamps, and other traceable metadata. Data were stored on encrypted devices accessible only to the research team.

Results and Discussion

The findings indicate that hidden curriculum in digital learning environments operates through peer-mediated interaction rather than solely through institutional directives. Across the three institutions, participants consistently described how norms of participation, credibility, and visibility were learned not from explicit instructions but from observing and adapting to peer behavior. The triangulation of virtual observations, digital artifacts, and interviews revealed four interrelated themes that illuminate how hidden curriculum is socially reproduced, stratified, emotionally negotiated, and strategically navigated within digitally mediated higher education.

Internalization of Implicit Norms

Across all three institutions, 28 of the 36 student participants explicitly described a process of observing before participating. This pattern was particularly pronounced among first-year students and those with limited prior experience in online learning. Rather than receiving formal guidance on participation expectations, students reported learning “how to behave” by reading peers’ posts and adjusting their communication style accordingly.

As one participant explained:

“At first I was just observing. Then I started adjusting. Apparently, if we are too short, the answer is considered inactive.” (P-07, Online interview, May 14, 2025).”

This pattern reflects what Lave and Wenger (1991) conceptualize as legitimate peripheral participation. However, in the digital context, peripheral participation does not merely facilitate entry into a community of practice; it becomes the primary mechanism for transmitting hidden curriculum. Through silent observation, students internalize expectations regarding comment length, reference usage, tone, and argumentative structure (Elliot et al., 2020; Darwin, 2019).

Importantly, this internalization is mediated by platform architecture. The hierarchical threading of discussion forums, reply chains, and visible timestamps creates a structure in which participation is publicly measurable and comparable.

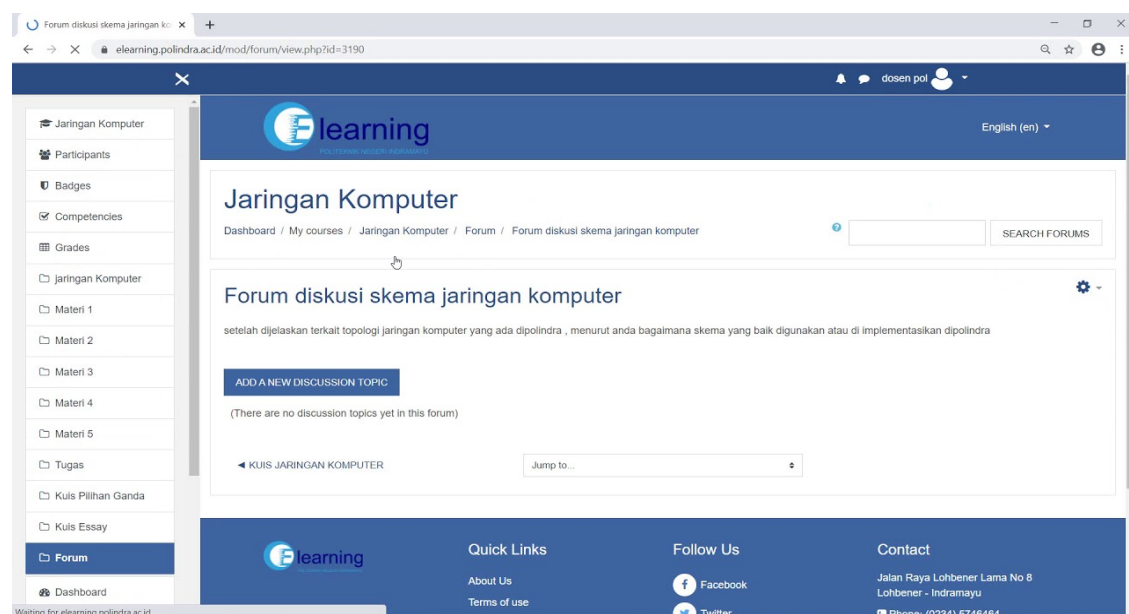


Figure 1. Discussion forum view on the local LMS. Students interact in a digital structure that helps shape social expectations and participation norms in an unwritten manner (Source: bantuan.simpkb.id).

Figure 1 illustrates how interface design positions posts within nested hierarchies, visually privileging longer, well-structured responses that generate multiple replies. The spatial arrangement of comments and the visibility of reply counts subtly construct a participation economy in which depth, frequency, and academic formatting signal competence. In this way, mediation central to sociocultural theory (Vygotsky, 1978) is not abstract but materially embedded in interface design.



Figure 2. Illustration of the appearance of a discussion forum in an online learning platform. The comment area and the "Reply" button mark the structure of digital social interaction that can facilitate the formation of unwritten participatory norms between students.

Figure 2 further demonstrates how features such as the "Reply" button, nested comment structures, and the visible comment box position interaction as iterative, traceable, and publicly accountable. The interface does not simply host communication; it structures the temporal and hierarchical logic of participation. Every contribution is archived, timestamped, and spatially ordered in relation to others. This arrangement subtly encourages responsiveness, lengthier contributions, and discursive continuity. Students become aware that their posts remain permanently visible to peers and lecturers, generating a form of ambient evaluation. The visibility of posts, the permanence of written traces, and the quantifiable nature of contribution reinforce what Vu and Tran (2022) describe as digitally searchable symbols of "activeness," in which participation is transformed into measurable evidence of engagement.

From a sociocultural perspective, these interface features function as mediational tools that shape how students interpret expectations and regulate their behavior (Vygotsky, 1978). The technological affordances of the platform threaded replies, notification alerts, and visible reply counts mediate not only communication but also norm formation. Students learn that credibility is associated with structured argumentation, citation use, and prompt replies because these forms are more likely to receive visible acknowledgment through responses or lecturer feedback. In this way, the interface contributes to the formation of what can be conceptualized as a digital habitus a system of dispositions shaped through repeated participation in digitally structured interaction (Mueller, 2023; Lupton, 2021). Over time, students internalize these expectations as self-regulating standards rather than externally imposed rules.

Importantly, this digital habitus is not formally articulated in course syllabi but emerges through peer surveillance, comparison, and adaptation. Students reported monitoring the length, tone, and

formatting of others' posts before composing their own responses. Those who deviated from dominant norms such as writing brief comments, responding late, or omitting references frequently described feelings of marginalization, embarrassment, or diminished academic legitimacy. Such reactions indicate that hidden curriculum in digital spaces operates as social coercion without formal enforcement. Normative pressure is exerted horizontally through peer interaction rather than vertically through institutional sanction. In this sense, platform architecture and peer evaluation converge to produce a subtle but powerful regime of participatory discipline, shaping not only what students write but how they understand themselves as competent or inadequate members of the online academic community (Vu & Tran, 2022).

Relational Hierarchies and Digital Stratification in Group Work

The second theme, reported by 22 of 36 students, concerns emergent hierarchies within online group work. Across institutions, students described how technological fluency, internet stability, and confidence in digital communication influenced informal leadership roles.

One participant stated:

"I just went with it... The important thing is that my name is on the document."

This remark reflects passive participation shaped not by lack of interest, but by perceived technological disadvantage. Students from rural areas or lower socioeconomic backgrounds reported unstable connections and limited device access, which restricted synchronous participation and reduced visibility in collaborative documents.

Here, hidden curriculum intersects with structural inequality. Digital stratification is not merely a difference in skill but a reproduction of broader socioeconomic disparities within academic interaction. Those with stronger digital capital assume editorial control, moderate discussions, and determine task distribution. Others are relegated to peripheral roles. From a critical pedagogical perspective (Freire, 1970; Giroux, 1983), this dynamic illustrates how power circulates through seemingly neutral collaboration tools. Leadership is legitimized through technological competence, reinforcing implicit hierarchies of credibility and authority. Thus, group work becomes a micro-field in which digital literacy translates into symbolic capital.

Emotional Coping, Peer Solidarity, and Informal Support Networks

The emotional dimension emerged as one of the most pervasive findings, mentioned by 30 of 36 students. Participants described anxiety linked to performative expectations of constant presence, rapid responsiveness, and visible productivity. Students reported feeling judged based on posting frequency, login times, and synchronous attendance. This aligns with Bayne et al.'s (2020) argument that digital education environments foster performative evaluation cultures. In response, students developed informal peer support networks through WhatsApp, Discord, Telegram, and similar platforms. These parallel spaces functioned as affective counter-publics where emotional vulnerability was normalized. As one participant stated:

"If it weren't for my WhatsApp group of friends, I might have dropped out this semester." (P-12, Interview, May 3, 2025).

These spaces facilitated solidarity, deadline reminders, and shared coping strategies. However, emotional labor within these groups was unevenly distributed. Female participants, in particular, described taking on supportive roles—encouraging peers, mediating conflict, and maintaining group harmony—suggesting that gendered expectations may shape affective work in digital learning contexts. In collectivist cultural contexts such as Indonesia, where maintaining group cohesion is socially valued, emotional restraint and supportive communication may be amplified in digital interaction. Thus, hidden curriculum operates not only through cognitive norms but also through affective regulation. Emotional resilience becomes a tacit requirement of digital academic success.

Navigating and Negotiating the Digital Learning System

The final theme highlights student agency but complicates simplistic notions of resistance. Twenty participants described adaptive strategies such as creating comment templates, scheduling "active"

participation during Zoom sessions, or redistributing tasks strategically (Apple, 2023). While these practices demonstrate agency, they simultaneously reinforce the performative logic of the system. For instance, comment templates enable students to meet participation quotas but also normalize the expectation of lengthy, citation-heavy responses. Similarly, scheduling strategic visibility does not dismantle performative norms; it optimizes compliance.

In some cases, students migrated to alternative tools such as Google Docs or Trello to bypass restrictive LMS features. Small study groups created safer discussion environments. These practices reveal that hidden curriculum can be negotiated; however, negotiation often occurs within, rather than outside, dominant digital norms. Thus, resistance is ambivalent. It may mitigate immediate pressure while inadvertently reproducing the metric-driven logic of digital participation. This finding extends critical pedagogy by illustrating how agency operates within constrained digital architectures rather than in opposition to them.

Taken together, these findings demonstrate that hidden curriculum in digital learning environments operates across normative, structural, emotional, and strategic dimensions. Peer interaction functions as the primary mediating space through which academic identity, belonging, and participation are shaped. Rather than being confined to institutional policy, hidden curriculum is embedded in platform architecture, peer surveillance, affective labor, and adaptive negotiation. Understanding this complexity is essential for developing more inclusive digital pedagogies that move beyond participation metrics and address the sociocultural and emotional dynamics shaping online higher education.

Discussion

The findings of this study reveal that the hidden curriculum in digital learning does not only live in the structure of the system or platform design, but is also firmly rooted in students' social interactions that take place informally and repeatedly. The process of internalizing unwritten norms, such as the demand to make long comments, include references, and show argumentative intelligence, shows that students form their learning orientation not only from the explicit instructions of the lecturer, but also from the social norms they capture from their peers. This reinforces the concept that education is never completely "structured" or "formal", but always carries an implicit dimension that shapes the behavior and identity of learners (Sciences et al., 2018; Assen, 2018). In digital contexts, however, these implicit processes are intensified by the visibility, permanence, and measurability of interaction.

Conceptually, these findings extend Costa's (2025) discussion of *habitus* and *field* by demonstrating how students cultivate dispositions that correspond specifically to digitally mediated academic environments (Costa & Li, 2025). The notion of an academic digital *habitus* helps explain how students internalize norms of responsiveness, structured reasoning, and metric visibility as taken-for-granted standards of legitimacy. Unlike traditional academic *habitus* formed primarily through classroom rituals and institutional hierarchies, digital *habitus* emerges at the intersection of peer surveillance, platform affordances, and performative evaluation systems. Students learn not only what to say, but how to appear academically competent within a digitally structured field of visibility.

The pressure to conform to these unwritten norms reflects a subtle but powerful mechanism of social control. Although no formal sanction is imposed on students who write brief comments or fail to display citation competence, many reported experiencing feelings of inadequacy or symbolic exclusion. This suggests that hidden curriculum operates through internalized self-regulation rather than overt institutional discipline. In this sense, digital platforms function as social fields that classify, rank, and differentiate participants based on their capacity to meet implicit standards of visibility and productivity (Rowe, 2022; Selwyn, 2020). Students with limited digital literacy, unstable internet access, or differing communicative styles may therefore be structurally disadvantaged, even when formal access appears equal.

At the same time, peer interaction performs a dual function. On one level, it facilitates social integration and collaborative learning; on another, it reproduces hierarchies of credibility and

symbolic capital. The differentiated norm of formality toward lecturers and flexibility toward peers illustrates how students navigate multiple layers of power within digital space. The practice of “observing first” before participating reflects not only peripheral participation but also strategic social reading an ability to decode implicit expectations embedded within interaction. Thus, digital academic success depends not solely on cognitive mastery but on the capacity to interpret and inhabit complex social codes.

These findings also complicate the common assumption that online learning environments are inherently democratic or socially neutral. Rather than flattening hierarchies, digitally mediated learning introduces a metric-based hidden curriculum in which participation is quantified through comment frequency, response speed, login duration, and citation display. This supports Bayne et al.’s argument that digital education fosters cultures of performative evaluation that normalize constant productivity and visibility (Bayne et al., 2020). Such metricization may obscure structural inequalities while presenting participation as a purely individual responsibility.

Importantly, student strategies of adaptation such as using comment templates or strategically timing visibility should not be romanticized as purely emancipatory. While these practices demonstrate agency, they may simultaneously reinforce the performative logic they seek to manage. Negotiation, therefore, occurs within the constraints of digital architectures rather than outside them. This ambivalence highlights the need to view resistance as situated and relational rather than inherently transformative.

From a pedagogical standpoint, these findings underscore the necessity for higher education institutions to make hidden norms visible and discussable. Interventions such as explicit conversation about participation expectations, flexible discussion formats, critical digital literacy training, and peer mentoring structures may reduce the exclusionary effects of dominant unwritten standards. Recognizing diversity in communicative style, pacing, and expressive modes is essential for counteracting the subtle stratification embedded in digital participation metrics. Without such interventions, digital learning risks reproducing symbolic hierarchies under the guise of technological neutrality.

Conclusion

This study shows that hidden curriculum in digital higher education is not confined to formal institutional structures but is actively reproduced through peer-mediated interaction within digitally structured environments. By analyzing how students internalize, negotiate, and strategically respond to unwritten norms of participation, the findings demonstrate that visibility, metric-based evaluation, and platform architecture shape academic identity and legitimacy in online learning spaces. Theoretically, this research refines sociocultural theory by illustrating how mediation in digital contexts is materially embedded in interface design and participation metrics, extending Vygotsky’s concept of mediated action and Lave and Wenger’s communities of practice into digitally traceable environments. It also advances critical pedagogy by highlighting how normative pressures are reproduced horizontally among peers, not only vertically through instructors. Practically, the findings suggest that educators should make participation norms explicit, adopt more flexible assessment criteria, and integrate critical digital literacy into curricula. Platform designers and institutions should reconsider interface features that intensify performative visibility and unintentionally reinforce exclusion. This study is limited by its focus on three Indonesian institutions and a relatively short observation period, which may constrain transferability. Future research should examine hidden digital curriculum across diverse cultural contexts, adopt longitudinal designs, and explore intersectional dimensions such as gender and socioeconomic background. Ultimately, recognizing hidden curriculum as a central feature of digital learning is essential for developing more equitable and critically informed online higher education practices.

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