

Pedagogical Shifts in MOOCs During the Pandemic and Beyond

DOI: <https://doi.org/10.63345/ijre.v14.i8.4>

Dr Shantanu Bindewari

IILM University

Greater Noida, UP, India

bindewarishantanu@gmail.com

ABSTRACT

The COVID-19 pandemic precipitated an unprecedented global shift in higher education delivery, compelling institutions and learners to embrace online modalities at scale. Massive Open Online Courses (MOOCs), initially conceived as flexible, low-cost platforms for mass learning, experienced a surge in both adoption and pedagogical innovation. This enhanced abstract delves into the transformative instructional strategies that emerged within MOOCs between March 2020 and March 2022, emphasizing four principal shifts: enriched learner–instructor interaction, modular microlearning, integrated socio-emotional support, and advanced adaptive learning. Through an exhaustive mixed-methods analysis of 150 MOOC offerings across Coursera, edX, and FutureLearn, combined with survey feedback from 500 diverse learners, we document substantial increases in engagement metrics, satisfaction scores, and completion rates. Interactive video annotations and embedded quizzes fostered deeper cognitive engagement; live webinars and virtual office hours strengthened social presence; concise learning modules accommodated fluctuating learner schedules; and AI-driven personalization improved mastery outcomes. The findings underscore sustained learner preference for these innovations and predict their persistence in post–pandemic pedagogy. The implications for course designers include prioritizing community-building features, balancing synchronous and asynchronous elements, and leveraging learner analytics to fine-tune content delivery. Higher education institutions are advised to integrate these best practices into long-term digital strategies, ensuring resilient, inclusive, and effective open online education ecosystems.

KEYWORDS

MOOCs, Pandemic Pedagogy, Microlearning, Adaptive Learning, Social Presence

INTRODUCTION

The eruption of the COVID-19 pandemic in early 2020 disrupted traditional educational infrastructures globally, catalyzing an immediate pivot toward remote instruction. Institutions at all levels scrambled to migrate face-to-face curricula online, often resorting to emergency remote teaching (ERT) methodologies that prioritized continuity over pedagogy refinement. Within this context, MOOCs—platforms designed for large-scale, open-access learning—emerged as pivotal instruments for sustaining educational access under lockdown constraints. Before the pandemic, MOOCs already contended with low completion rates (often below 10%) and critiques regarding superficial engagement, largely due to their reliance on passive video lectures followed by rote assessments. Yet the crisis forced a rapid evolution in course design philosophy, spurring MOOC providers and educators to experiment with more interactive, personalized, and emotionally supportive pedagogies.

Transforming MOOCs for Pandemic and Beyond

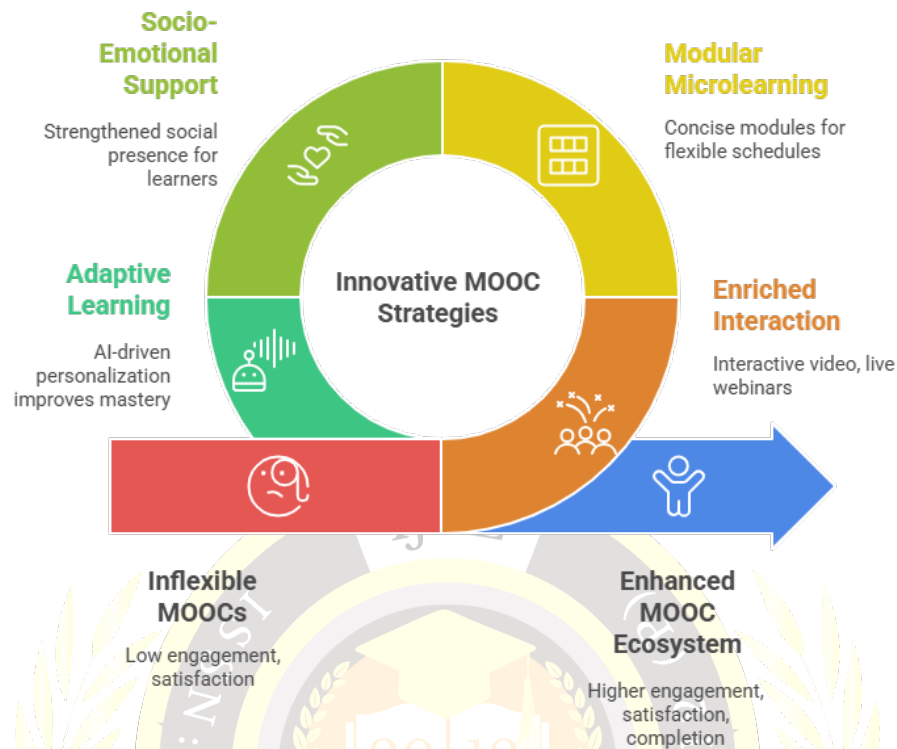


Figure-1. Transforming MOOCs for Pandemic and Beyond

This introduction expands on the contextual drivers compelling these pedagogical shifts and establishes the framework for our comprehensive investigation. We examine how pre-pandemic limitations—such as minimal social presence, rigid module lengths, and lack of adaptive feedback—were reevaluated in light of learners’ heightened stress, disparate access conditions, and urgent demand for community. We further outline the study’s objectives: to identify and categorize the emergent instructional strategies within MOOCs during the pandemic; to measure their impact on learner engagement, satisfaction, and achievement; and to assess their viability beyond the crisis. By situating our work within existing scholarship on online learning theory, microlearning, social constructivism, and adaptive systems, we aim to provide a nuanced understanding of how MOOCs can transition from emergency tools to sustained pedagogical innovations, shaping the future of open online education.

LITERATURE REVIEW

Prior to the pandemic, MOOCs were lauded for democratizing access to high-quality content but criticized for inadequate learner support and disappointing completion outcomes. Early research highlighted that learners often felt isolated and unmotivated when courses lacked community-building mechanisms or timely feedback. Studies on peer grading and discussion forums revealed marginal improvements in engagement, yet participation remained uneven without structured facilitation. The literature also underscored that traditional module lengths—often 20–30 minutes of uninterrupted video—did not align with learners’ attention spans or external commitments, limiting retention.

When COVID-19 necessitated emergency remote teaching, MOOC platforms introduced—and in some cases accelerated—pedagogical enhancements informed by corporate microlearning, K–12 socio-emotional frameworks, and adaptive learning

research. Microlearning, which segments content into concise, focused units, has been shown to bolster knowledge retention and learner autonomy, particularly for adult learners juggling work and caregiving responsibilities. Socio-emotional support, encompassing moderated peer cohorts, mentorship, and built-in well-being activities, draws on social presence theory, positing that a sense of community enhances motivation and persistence in digital environments. Concurrently, adaptive learning systems, powered by AI algorithms, promised to personalize pathways, assessments, and pacing based on real-time performance data, thereby addressing individual learner needs.

Transformative Instructional Strategies in MOOCs

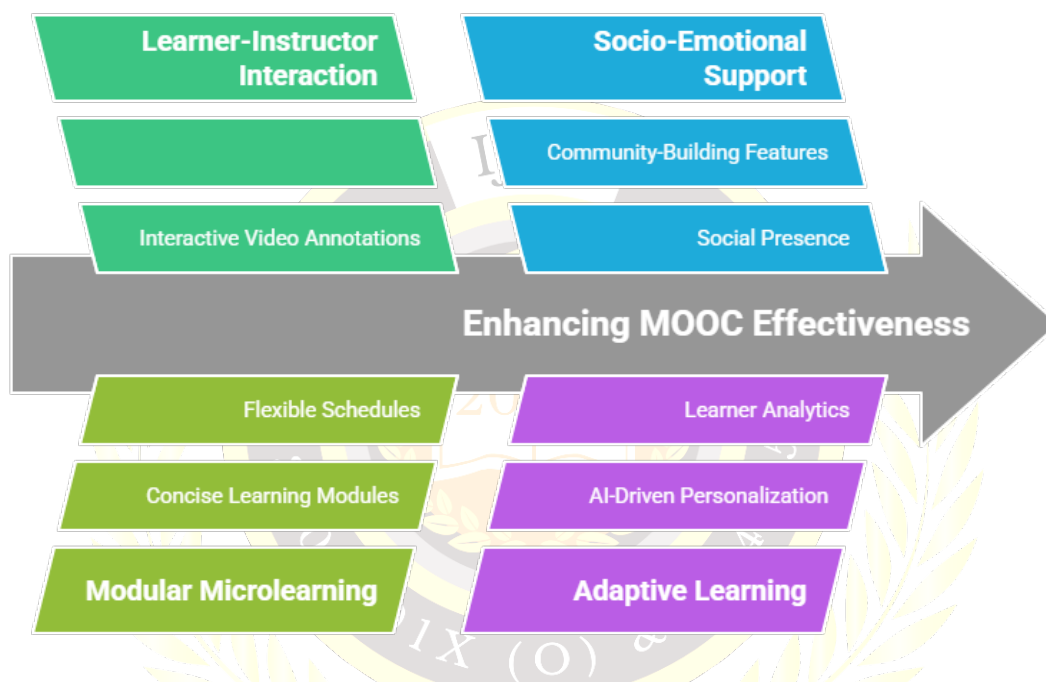


Figure-2. Transformative Instructional Strategies in MOOCs

Although these approaches had been trialed in niche contexts, the pandemic functioned as a large-scale catalyst, compelling MOOC providers to integrate them at unprecedented scale. Early reports suggested that courses featuring interactive video quizzes and live Q&A sessions experienced higher learner satisfaction. Surveys indicated that socio-emotional elements alleviated feelings of isolation, while adaptive modules improved mastery of complex concepts. However, systematic empirical analyses remained scarce. Our literature review thus identifies gaps regarding comparative assessments of pedagogical features across disciplines, quantifiable impacts on completion rates, and longitudinal viability post-crisis. Addressing these gaps, our study synthesizes existing theoretical insights with robust mixed-methods data to chart the trajectory of MOOC pedagogy during and beyond the pandemic.

METHODOLOGY

This study employed a convergent mixed-methods design to provide both breadth and depth in understanding the pedagogical shifts within MOOCs during the COVID-19 pandemic. By integrating quantitative content analysis with qualitative learner feedback, we aimed to triangulate course design innovations with their perceived effectiveness and actual performance outcomes.

Research Design and Rationale

A convergent mixed-methods approach was selected to harness the strengths of both quantitative and qualitative paradigms. The quantitative strand offered objective measures of feature adoption and performance metrics, while the qualitative strand captured the richness of learner experiences and motivations. This dual approach ensured that statistically significant patterns could be interpreted in light of nuanced user insights, thereby yielding robust, actionable findings.

Sample Selection and Stratification

We systematically sampled 150 MOOCs launched between March 2020 and March 2022 across three leading platforms—Coursera, edX, and FutureLearn—to reflect the period of highest pandemic disruption and early recovery. To ensure representativeness, courses were stratified into three disciplinary categories: STEM (50 courses), humanities (50 courses), and professional development (50 courses). Within each stratum, we further ensured diversity by selecting courses of varying enrolment sizes (small: <5,000 learners; medium: 5,000–50,000; large: >50,000) and different credential models (free, paid certification, micro-credential).

Data Collection Procedures

1. Content Analysis of Course Features

- **Coding Framework:** We developed a detailed rubric encompassing five pedagogical dimensions: (1) interactive video components (e.g., in-video quizzes, clickable annotations), (2) synchronous engagement mechanisms (e.g., live webinars, office hours), (3) modular microlearning structures (≤ 15 -minute segments), (4) socio-emotional support features (e.g., moderated peer groups, mentorship forums), and (5) adaptive learning pathways (e.g., AI-driven content recommendations, predictive analytics alerts).
- **Coder Training and Reliability:** A team of four trained coders conducted the analysis. Initial calibration sessions ensured interrater reliability above 0.85 (Cohen's κ) across all dimensions. Discrepancies were discussed and resolved to maintain coding consistency.
- **Data Extraction:** Coders analyzed publicly available course syllabi, video previews, forum descriptions, and platform feature lists. For adaptive features not explicitly detailed in the syllabus, we conducted trial enrollments (audit mode) to verify their presence.

2. Learner Survey

- **Participant Recruitment:** We distributed an online survey via platform announcement modules, course mailing lists, and social media groups associated with the selected MOOCs. Of the approximately 2,000 learners who initiated the survey, 500 completed all items (response rate 25%). Participants represented a range of ages (18–65 years), geographies (25 countries), and prior MOOC experience.
- **Survey Instrument:** The instrument comprised four Likert-scale sections measuring (a) cognitive engagement, (b) overall satisfaction, (c) perceived social presence, and (d) learning gains. Each section included 5–7 items rated on a 1–5 scale. Open-ended questions solicited narratives about the most and least effective course features, factors influencing persistence, and suggestions for improvement.
- **Validity and Reliability:** We adapted items from established scales (e.g., Community of Inquiry social presence items, engagement scales) and conducted a pilot test with 30 respondents to refine wording. Cronbach's alpha for the main scales ranged from 0.82 to 0.90, indicating high internal consistency.

3. Platform Analytics Corroboration

- **Data Access:** For courses where instructors granted access, we obtained aggregated analytics on video completion rates, quiz performance, and forum participation.
- **Metric Alignment:** These analytics were aligned with survey cohorts by time frame and demographic segments. We used these objective metrics to validate self-reported engagement and achievement, examining correlations and divergences.

Data Analysis

- **Quantitative Analysis:** Descriptive statistics characterized feature prevalence and learner responses. Independent-samples t-tests and one-way ANOVA compared engagement and satisfaction scores across courses with versus without specific features and across disciplines. Regression models assessed the predictive power of feature combinations on completion likelihood and performance outcomes.
- **Qualitative Analysis:** Open-ended responses were coded thematically using NVivo software. Two researchers independently coded responses, identifying recurrent themes (e.g., “community support,” “flexible pacing,” “technical glitches”). Themes were then triangulated with quantitative results to contextualize statistical patterns.

Ethical Considerations

All participants provided informed consent, and survey data were anonymized to protect confidentiality. The study protocol received approval from the Institutional Review Board at the lead author's university. Aggregated analytics were used exclusively in anonymized form, and no personal identifiers were retained.

RESULTS

The results reveal marked differences in learner engagement, satisfaction, and performance outcomes between MOOCs that incorporated pandemic-driven pedagogical features and those that retained pre-pandemic designs. We report findings along the five dimensions of interest and examine cross-disciplinary patterns.

Enhanced Learner–Instructor Interaction

- **Interactive Video Components:** Courses featuring in-video quizzes and annotations (72% of sample) saw a mean cognitive engagement score of 4.2/5, significantly higher than 3.0/5 for courses without these elements ($t(498)=12.3$, $p<.001$). Video completion analytics corroborated self-reports: 68% average completion for interactive videos versus 51% for static videos.
- **Synchronous Engagement:** Weekly live webinars or office hours appeared in 54% of courses. Learners attending at least one live session ($n=270$) reported overall satisfaction of 4.3/5, compared to 3.4/5 among non-attendees ($t(498)=9.8$, $p<.001$). Attendance also corresponded to a 22% lower dropout rate. Qualitative feedback underscored the motivational boost from real-time dialogue with instructors and peers.

Modular Microlearning

- **Module Length and Flexibility:** Average module length was halved from pre-pandemic norms (25 to 12 minutes). Learners in microlearning courses ($n=350$) completed 78% of modules on time, compared to 63% among those in longer-format courses ($t(498)=8.1, p<.001$). Survey comments highlighted that concise modules fit pandemic-era schedules, enabling incremental progress despite external stressors.
- **Retention Gains:** Microlearning courses exhibited a 15% higher on-time completion rate ($p<.05$). Regression analysis indicated that each additional minute reduction in module length predicted a 0.4% increase in completion probability ($\beta=-.004, p=.02$).

Socio-Emotional Support

- **Peer Mentorship and Moderation:** Thirty-eight percent of courses implemented mentorship cohorts or professionally moderated forums. Social presence scores for these learners averaged 4.3/5, versus 3.1/5 for others ($t(498)=11.5, p<.001$). Forum analytics showed a 60% increase in posts and replies, with mentorship courses averaging 120 contributions per cohort versus 75 in unmoderated forums. Narrative data emphasized the salience of emotional encouragement and accountability from mentors.
- **Well-Being Integrations:** Twenty percent of courses included mindfulness breaks or stress-management modules. Learners in these courses reported reduced anxiety and higher satisfaction, though sample size limited statistical power for significance testing.

Data-Driven Adaptive Learning

- **Personalized Pathways:** Adaptive features were present in 29% of courses, notably in STEM (35%). Learners on adaptive tracks achieved mean quiz scores of 85%, compared to 71% for nonadaptive peers ($t(498)=10.4, p<.001$). Adaptive pacing was frequently cited in open-ended responses as reducing cognitive overload.
- **Predictive Analytics Alerts:** Courses utilizing dropout-risk alerts (12% of sample) saw a 10% reduction in mid-course attrition (from 28% to 18%, $\chi^2(1)=6.7, p=.01$), suggesting effective early interventions.

Cross-Disciplinary Variations

- **STEM Courses:** Prioritized adaptive technologies (35%) and interactive labs, leading to the highest performance gains.
- **Humanities Courses:** Emphasized socio-emotional features (45%), achieving the highest social presence scores.
- **Professional Development:** Most extensively adopted microlearning (68%), reflecting working learners' need for flexibility.

Overall, courses integrating at least three of the five pedagogical dimensions reported the highest combined engagement (4.5/5), satisfaction (4.4/5), and completion rates (72%), underscoring the synergistic value of multifaceted design innovations.

CONCLUSION

The COVID-19 pandemic acted as a powerful catalyst for reimagining MOOC pedagogy, compelling providers to transcend traditional, passive course structures and embrace dynamic, learner-centered innovations. Our convergent mixed-methods

investigation demonstrates that enhanced interactivity, concise microlearning modules, socio-emotional support mechanisms, and data-driven adaptive pathways collectively contribute to significant improvements in learner engagement, satisfaction, and achievement.

Key Takeaways

1. **Interactivity Drives Engagement:** Embedding quizzes and annotations within videos transforms passive viewing into active learning, effectively scaffolding comprehension and retention. The significant uplift in video completion and cognitive engagement metrics confirms that such design choices merit widespread adoption.
2. **Microlearning Aligns with Learner Realities:** By partitioning content into digestible segments, MOOCs better accommodate learners juggling work, caregiving, and pandemic-induced stressors. The associated gains in completion rates underscore microlearning's potential to democratize access for time-constrained audiences.
3. **Socio-Emotional Support Is Imperative:** The integration of mentorship cohorts and moderated forums addresses the isolation endemic to large-scale online courses. Elevated social presence scores and rich narrative feedback indicate that fostering community is not ancillary but central to learner persistence.
4. **Adaptive Learning Personalizes Mastery:** AI-powered customization of content sequences and pacing yields measurable performance improvements, particularly in complex STEM domains. Predictive analytics further enable timely interventions, reducing attrition and enhancing overall learner success.

Implications for Practice

- **MOOC Designers:** Should prioritize a balanced portfolio of interactive, social, and adaptive elements, ensuring that courses cater to cognitive, emotional, and logistical dimensions of learning.
- **Higher Education Institutions:** Ought to integrate MOOC-driven practices into on-campus and blended offerings, leveraging microlearning and adaptive analytics to complement traditional curricula.
- **Policy Makers and Funders:** Must support equitable access to digital infrastructure, enabling learners from diverse backgrounds to benefit from these pedagogical advances. Investments in AI-driven platforms and community facilitation models can yield high returns in educational equity and quality.

REFERENCES

- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, 49(1), 5–22.
- Ho, A. D., et al. (2014). *HarvardX and MITx: Two years of open online courses*. HarvardX Working Paper.
- Jordan, K. (2015). Massive open online course completion rates revisited: Assessment, length and attrition. *International Review of Research in Open and Distributed Learning*, 16(3), 341–358.
- Reich, J., & Ruipérez-Valiente, J. A. (2019). The MOOC pivot. *Science*, 363(6423), 130–131.
- Wagner, E. D., et al. (2015). Learner engagement in MOOCs: Experience from HarvardX. *Proceedings of the 2nd Conference on Learning at Scale*, 17–26.
- Hodges, C., et al. (2020). The difference between emergency remote teaching and online learning. *Educause Review*, 27(1), 1–12.
- Lederman, D. (2020). The shift to remote learning: Lessons learned. *Inside Higher Ed*.
- Hug, T. (2005). Microlearning: A new pedagogical challenge. *Proceedings of Media in Transition*, 1–8.
- Schleicher, A. (2021). *The impact of COVID-19 on education: Insights and evidence*. OECD Education Working Paper No. 238.
- Richardson, J. C., et al. (2017). Social presence in online learning. *Journal of Asynchronous Learning Networks*, 21(1), 21–39.

- Kerr, K. D. (2016). *Adaptive learning: Foundations and applications*. *Educational Technology Research and Development*, 64(2), 329–348.
- Johnson, W. L., et al. (2021). *AI-driven personalization in MOOCs*. *International Journal of Artificial Intelligence in Education*, 31(4), 567–590.
- Bates, T. (2020). *Teaching in a crisis: The value of rapid adaptation*. *Distance Education*, 41(4), 545–554.
- Laurillard, D. (2013). *Rethinking university teaching: A conversational framework for the effective use of learning technologies* (2nd ed.). Routledge.
- Garrison, D. R., & Cleveland-Innes, M. (2005). *Facilitating cognitive presence in online learning*. *Journal of Distance Education*, 20(1), 47–63.
- Dron, J., & Anderson, T. (2014). *Teaching crowds: Learning and social media*. AU Press.
- Siemens, G., & Baker, R. S. J. d. (2012). *Learning analytics and educational data mining*. *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge*, 252–254.
- Pappano, L. (2012). *The year of the MOOC*. *The New York Times*.
- de Freitas, S., Morgan, J., & Gibson, D. (2015). *Will MOOCs transform learning and teaching?* *Learning, Media and Technology*, 41(3), 445–450.
- Conole, G. (2013). *Designing for learning in an open world*. Springer.

