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TEACHING APTITUDE AND DIGITAL FLUENCY AS CORRELATES OF ENGAGEMENT IN A MASSIVE OPEN ONLINE COURSE (MOOC) OF PROSPECTIVE TEACHERS

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Abstract

Massive Open Online Courses (MOOCs) are becoming a regular part of teacher education in India, yet it is not clear which personal characteristics of prospective teachers shape their engagement in such courses. The present study examined the engagement of prospective teachers in a MOOC in relation to two characteristics: their teaching aptitude, a professional disposition, and their digital fluency, a technological capability. A descriptive survey design was applied with 603 prospective teachers enrolled in a MOOC. Data were collected using the MOOC Engagement Scale (Deng et al., 2020), the Teaching Aptitude Test (Gakhar & Rajnish, 2010) and the Digital Fluency Perception Scale (Uppal, 2019). The Kruskal–Wallis H test, the Mann–Whitney U test with Bonferroni correction, Spearman's rank correlation and multiple regression were used for analysis. The overall mean engagement score was 55.15 (SD = 11.68), indicating a moderate level of engagement. Engagement did not differ significantly across levels of teaching aptitude ($H = 0.98$, $p = .614$), but it differed significantly across levels of digital fluency ($H = 8.85$, $p = .012$), with prospective teachers of high digital fluency more engaged than those of low digital fluency ($U = 15580.5$, $p = .003$). Digital fluency was positively correlated with engagement ($\rho = .16$, $p < .001$), whereas teaching aptitude was not ($\rho = .04$, $p = .271$). When both were considered together, digital fluency was a significant predictor of engagement ($\beta = .14$, $p = .001$), whereas teaching aptitude was not ($\beta = .04$, $p = .334$). The findings suggest that engagement in online professional learning depends more on prospective teachers' digital readiness than on their aptitude for teaching, although the effect of digital fluency was small. Teacher education programmes should strengthen the digital fluency of prospective teachers alongside the use of MOOCs.

Keywords: *learner engagement, teaching aptitude, digital fluency, prospective teachers, MOOC, teacher education*

1. Introduction

Teacher education in India is undergoing a significant digital shift. The National Education Policy 2020 calls for the use of technology and online platforms in teacher

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preparation and continuous professional development (Ministry of Human Resource Development [MHRD], 2020), and Massive Open Online Courses (MOOCs) are now a regular part of the learning experience of prospective teachers. For such courses to benefit future teachers, prospective teachers must not only enrol but engage actively. MOOCs, however, are known for uneven participation and low completion (Hew & Cheung, 2014; Jordan, 2014), and engaging learners in large open courses is more challenging than in conventional online courses (Hew, 2016).

Learner engagement is generally recognised as a multidimensional model which comprises of behavioural, emotional and cognitive involvement in learning (Fredricks et al., 2004), shaped by both personal and contextual factors (Kahu, 2013). For prospective teachers taking a MOOC, two personal characteristics are especially relevant. The first is teaching aptitude, their capacity to acquire the knowledge and skills of teaching (Bingham, 1937), which might make a teacher-education course feel more relevant and motivating. The second is digital fluency, the ability to use digital technologies confidently and to express oneself appropriately in a digital environment (Wang et al., 2013), which might make the online course itself easier to navigate. One is a professional disposition and the other a technological capability; examining them together makes it possible to ask which matters more for engagement in online professional learning.

Indian research has linked teaching aptitude with prospective teachers' classroom behaviour (Lata, 2015) and with their ICT knowledge (Gwal & Gwal, 2023), while international studies have linked digital skills with engagement in technology-enhanced learning (Bergdahl et al., 2020; Getenet et al., 2024; Prior et al., 2016). No study, however, has compared the two in relation to prospective teachers' engagement in a MOOC. The present study addresses this gap.

Rationale and Significance of the Study

If engagement in MOOCs depends on teaching aptitude, institutions would need to support prospective teachers with low aptitude; if it depends on digital fluency, digital skills training should precede or accompany online learning. Knowing which characteristic matters, and how much, can help teacher education institutions target support efficiently, help MOOC designers reduce barriers, and inform policy on online teacher education under NEP 2020. Prospective teachers' digital fluency also matters beyond the course, since they will be expected to use technology in their own classrooms (Mishra & Koehler, 2006; Redecker, 2017).

Objectives of the Study

1. To study the level of engagement of prospective teachers in a Massive Open Online Course (MOOC).
2. To compare the engagement in a MOOC of prospective teachers with regard to their teaching aptitude.
3. To compare the engagement in a MOOC of prospective teachers with regard to their digital fluency.
4. To study the relationship of teaching aptitude and digital fluency with engagement in a MOOC.
5. To study whether teaching aptitude and digital fluency predict the engagement of prospective teachers in a MOOC.

Hypotheses of the Study

- **H_{01}:** There is no significant difference in the engagement in a MOOC of prospective teachers with regard to their teaching aptitude.
- **H_{02}:** There is no significant difference in the engagement in a MOOC of prospective teachers with regard to their digital fluency.
- **H3:** There is no significant relationship of teaching aptitude and digital fluency with the engagement in a MOOC.
- **H4:** Teaching aptitude and digital fluency do not significantly predict the engagement of prospective teachers in a MOOC.

2. Review of Related Literature

Learner engagement in MOOCs

Fredricks et al. (2004) described engagement as comprising behavioural, emotional and cognitive components, and Kahu (2013) argued that it is shaped by learners' psychosocial characteristics as well as by the institution and course. Moore (1989) identified learner–content, learner–instructor and learner–learner interaction as the main forms of engagement in distance education. In MOOCs, Deng et al. (2020) developed and validated a MOOC Engagement Scale which comprised of behavioural, cognitive, emotional and social engagement. Engagement in MOOCs varies widely among learners (Kizilcec et al., 2013), and sustaining it is difficult (Hew & Cheung, 2014). Hew (2016) proposed a model of MOOC engagement organised around self-determination theory, while Littlejohn et al. (2016) found that learners' motivation and self-regulated learning shaped how they engaged with MOOCs.

MOOCs in Indian teacher education

In India, MOOCs are offered mainly through the national SWAYAM platform. Garg and Rani (2025) identified the factors that drive learner engagement in Indian MOOCs, and Uppal (2019) examined the effectiveness of MOOCs for training teachers in higher education. Kazmi and Nadeem (2023) surveyed 159 pre-service teachers in Delhi/NCR and found that most were ready to use MOOCs in terms of technology access and competence, but their motivation was relatively low and they still preferred face-to-face learning. In a qualitative study, Ansari and Biswal (2023) found that M.Ed. students who completed a self-paced research methodology MOOC valued its flexibility and short videos, although many stressed that instructor presence remained important. These studies suggest that the readiness and engagement of Indian prospective teachers in MOOCs cannot be taken for granted.

Teaching aptitude and engagement

Bingham (1937) defined aptitude as an indicator of a person's capacity to acquire knowledge or skill with training. Lata (2015) studied 200 prospective teachers from B.Ed. colleges in Mohali district and examined their classroom behaviour in relation to their teaching aptitude, and Gwal and Gwal (2023) found that pupil-teachers with high ICT knowledge had significantly higher teaching aptitude than those with low ICT knowledge. Internationally, Klassen and Kim (2019) found in a meta-analysis that measures of prospective teachers' personal characteristics predicted later teaching effectiveness, though only weakly. Self-determination theory suggests that learners engage more when they value an activity (Ryan & Deci, 2000), and Watt and Richardson

(2007) found that intrinsic interest in teaching and perceived teaching ability were among the main motivations for choosing teaching. Together these suggest, though they do not establish, that prospective teachers with greater teaching aptitude may engage more in a teacher-education course.

Digital fluency and engagement

Wang et al. (2013) explained digital fluency as a progression rather than a divide between "digital natives" and "digital immigrants", and proposed a model in which demographic, psychological, social and behavioural factors contribute to it. Frameworks of educators' digital competence (Redecker, 2017) and technological pedagogical content knowledge (Mishra & Koehler, 2006) treat such capability as part of what teachers need. Bergdahl et al. (2020) found significant correlations between students' digital skills and their engagement in technology-enhanced learning, although digital skills were not related to disengagement. Prior et al. (2016) found that digital literacy contributed to self-belief, which consequently had positive effects on peer collaboration, learning management system interaction as well as interaction with the course convener, and Getenet et al. (2024) reported similar effects of digital literacy, through self-efficacy, on several dimensions of online engagement. The technology acceptance model likewise holds that perceived ease of use shapes the use of a technology (Davis, 1989). Research on the second-level digital divide shows that differences in digital skills, not only in access, affect who benefits from online opportunities (Hargittai, 2002; van Dijk, 2006).

Research gap

Studies have examined teaching aptitude in relation to classroom and academic variables, and digital skills in relation to online engagement, but not the two together. It therefore remains unknown whether prospective teachers' engagement in online professional learning depends more on their aptitude for the profession or on their capability with technology. This present study aims to address this lacuna in the Indian context.

3. Methodology

Research Design

The study employed descriptive survey design (Creswell & Creswell, 2018).

Sample

The sample consisted of 603 prospective teachers enrolled in B.Ed. colleges affiliated with Himachal Pradesh University who participated in the *ICT in Teaching Learning Process* MOOC, which was developed and delivered through the EduNEXT platform, based on Open edX. A purposive sampling technique was used, and prospective teachers who were enrolled in the MOOC and willing to participate in the course were included in the study. The distribution of the sample by level of teaching aptitude and digital fluency is given in Table 1.

Table 1: Distribution of the Sample by Level of Teaching Aptitude and Digital Fluency

Level	Teaching aptitude: Score range	Teaching aptitude: N (%)	Digital fluency: Score range	Digital fluency: N (%)
High	29–33	157 (26.04)	91–100	242 (40.13)
Average	25–28	286 (47.43)	74–90	205 (34.00)
Low	7–24	160 (26.53)	25–73	156 (25.87)
Total	7–33	603 (100.00)	25–100	603 (100.00)

N = number of prospective teachers. Levels formed using Mean ± ½ SD.

Tools Used

1. **MOOC Engagement Scale:** Engagement of prospective teachers in the MOOC was measured using the MOOC Engagement Scale developed by Deng, Benckendorff and Gannaway (2020), which covers behavioural, cognitive, emotional and social engagement. This scale demonstrated Cronbach's alpha reliability coefficients of .68, .69, .66 and .85 for behavioural, cognitive, emotional and social engagement, respectively. Scores in the present sample ranged from 12 to 72 (M = 55.15, SD = 11.68).
2. **Teaching Aptitude Test**: For measuring teaching aptitude among prospective teachers, Teaching aptitude test by Gakhar and Rajnish (2010) was used. This test consists of 35 items. The test encompassed six categories: (i) Teaching Profession, (ii) Interest Towards Students, (iii) Social Contacts, (iv) Innovations Regarding Activities of the school, (v) Professional Ethics, and (vi) Teaching Potentiality and current knowledge. The reliability coefficient of the test was 0.76. Scores in the present sample ranged from 7 to 33 (M = 26.09, SD = 3.89).

Digital Fluency Perception Scale: Digital fluency was measured using the Digital Fluency Perception Scale by Uppal (2019), comprising 25 items rated on a 4-point forced-choice scale. The reliability coefficient of the test was 0.874. Scores in the present sample ranged from 25 to 100 (M = 81.77, SD = 17.51).

Prospective teachers were classified into high, average and low levels of teaching aptitude and digital fluency according to Mean±1/2 SD.

Statistical Techniques Used

Descriptive statistics were used to determine the level of engagement. The Shapiro–Wilk test showed that engagement scores were not normally distributed ($W = 0.94$, $p < .001$; skewness = −0.89), so the non-parametric Kruskal–Wallis H test (Kruskal & Wallis, 1952) was used to compare engagement across levels of teaching aptitude and of digital fluency. Where H was significant, pairwise comparisons were made with the Mann–Whitney U test (Mann & Whitney, 1947) with Bonferroni correction (adjusted $\alpha = 0.05/3 = 0.0167$). Spearman's rank correlation (ρ) was used to examine the relationships among teaching aptitude, digital fluency and engagement, and partial rank correlations were computed to examine each predictor while controlling for the other. Finally, multiple linear regression was used to examine the joint contribution of teaching aptitude and digital fluency scores to engagement; with a sample of 603, the regression is robust to the moderate skewness of the engagement scores (Field, 2018). Effect sizes

were reported as ε^2, $r = z/\sqrt{N}$ and standardised β (Tomczak & Tomczak, 2014), interpreted using Cohen's (1988) guidelines.

4. Data Analysis and Interpretation

(i) Level of Engagement of Prospective Teachers in the MOOC

Table 2: Levels of Engagement of Prospective Teachers in the MOOC

Level of engagement	N	Score range	Mean	SD	Percentage
High	178	62–72	67.33	3.71	29.52
Average	270	50–61	56.16	3.53	44.78
Low	155	12–49	39.41	8.56	25.70
Total	603	12–72	55.15	11.68	100.00

N = number of prospective teachers; M = mean; SD = standard deviation; % = percentage of the sample.

Table 2 shows that 178 prospective teachers (29.52%) had a high level of engagement in the MOOC, 270 (44.78%) an average level and 155 (25.70%) a low level. The overall mean engagement score was 55.15 (SD = 11.68), indicating a moderate level of engagement, with about one-fourth of prospective teachers showing low engagement.

(ii) Comparison of Engagement in Terms of Teaching Aptitude and Digital Fluency

Table 3: Mean, SD and Mean Rank of Learner Engagement by Level of Teaching Aptitude and Digital Fluency

Variable	Level	N	Mean	SD	Median	Mean rank
Teaching aptitude	High	157	55.92	11.06	59.00	313.73
	Average	286	55.17	10.86	57.00	297.16
	Low	160	54.36	13.56	57.00	299.14
Digital fluency	High	242	56.58	11.10	59.00	324.29
	Average	205	55.03	11.82	57.00	298.98
	Low	156	53.08	12.11	55.00	271.39

N = number of prospective teachers; M = mean; SD = standard deviation; Mdn = median; Mean rank = average rank of engagement scores used in the Kruskal–Wallis test.

Table 4: Kruskal–Wallis H Test Comparing Learner Engagement by Level of Teaching Aptitude and Digital Fluency

Variable	H	df	p	ε^2	Remarks
Teaching aptitude	0.98	2	.614	.002	Not Significant
Digital fluency	8.85	2	.012	.015	Significant at the 0.05 level

H = Kruskal–Wallis test statistic; df = degrees of freedom; p = probability value; ε^2 = epsilon squared (effect size). Table value of χ^2 (df = 2) = 5.99 at the 0.05 level and 9.21 at the 0.01 level.

Tables 3 and 4 show a clear contrast between the two characteristics. Across levels of teaching aptitude, mean engagement was almost identical (55.92, 55.17 and 54.36), and the difference was not significant ($H = 0.98$, $p = .614$, $\varepsilon^2 = .002$). Hence, hypothesis $H_0 1$ is retained. Across levels of digital fluency, engagement grew incrementally from the

low (M = 53.08) to the average (M = 55.03) and high (M = 56.58) groups, and the difference was significant (H = 8.85, p = .012, ε^2 = .015). Hence, hypothesis H_o2 is rejected**.** Pairwise comparisons for digital fluency are given in Table 5.

Table 5: Pairwise Comparison of Learner Engagement by Level of Digital Fluency (Mann–Whitney U Test)

Comparison	**U**	**z**	**p**	**r**	**Remarks**
Low vs. Average	14511.0	1.51	.132	.08	Not Significant
Low vs. High	15580.5	2.94	.003	.15	Significant
Average vs. High	22707.0	1.54	.123	.07	Not Significant

U = Mann–Whitney U statistic; z = standardised test statistic; p = probability value; r = effect size (z/√N). Bonferroni-adjusted level of significance = 0.05/3 = 0.0167.

Table 5 reveals that prospective teachers with high digital fluency were significantly more engaged than those with low digital fluency (U = 15580.5, p = .003, r = .15). The low–average and average–high differences were not significant at the Bonferroni-adjusted level, showing that each step in digital fluency brought a small gain that became significant only between the two extremes.

(iii) Relationships among Teaching Aptitude, Digital Fluency and Engagement

Table 6: Spearman's Rank Correlations (ρ) among Teaching Aptitude, Digital Fluency and Learner Engagement (N = 603)

Variable	**Teaching aptitude**	**Digital fluency**	**Learner engagement**
Teaching aptitude	—		
Digital fluency	.19**	—	
Learner engagement	.04	.16**	—

*Values are Spearman's rank correlation coefficients (ρ). **p < .01. Partial correlations: digital fluency with engagement, controlling for teaching aptitude, ρ = .15 (p < .001); teaching aptitude with engagement, controlling for digital fluency, ρ = .02 (p = .709).*

Table 6 shows that teaching aptitude and digital fluency were positively related (ρ = .19, p < .001): prospective teachers with higher teaching aptitude tended to be more digitally fluent. Digital fluency was significantly correlated with engagement (ρ = .16, p < .001), but teaching aptitude was not (ρ = .04, p = .271). Hence, hypothesis H_o3 is rejected for digital fluency and retained for teaching aptitude. The partial correlations show that the correlation between digital fluency and engagement remained almost unchanged when teaching aptitude was controlled (partial ρ = .15, p < .001), while the already non-significant relationship between teaching aptitude and engagement fell further when digital fluency was controlled (partial ρ = .02, p = .709).

Table 7: Multiple Regression (R) of Learner Engagement on Teaching Aptitude and Digital Fluency (N = 603)

Predictor	B	SE	β	t	p	Remarks
(Constant)	44.35	3.51		12.65	< .001	
Teaching aptitude	0.12	0.13	.04	0.97	.334	Not Significant
Digital fluency	0.09	0.03	.14	3.36	.001	Significant at the 0.01 level
(Constant)	44.35	3.51		12.65	< .001	
Teaching aptitude	0.12	0.13	.04	0.97	.334	Not Significant
Digital fluency	0.09	0.03	.14	3.36	.001	Significant at the 0.01 level

B = unstandardised regression coefficient; SE = standard error of B; β = standardised regression coefficient; t = t-statistic; p = probability value. R = .155, R^2 = .024, adjusted R^2 = .021; F (2, 600) = 7.40, p = .001.

Table 7 shows that, taken together, teaching aptitude and digital fluency significantly predicted engagement (F = 7.40, p = .001), although they explained only 2.4% of its variance. Digital fluency was a significant predictor (β = .14, p = .001): each additional point on the digital fluency scale was associated with an increase of about 0.09 points in engagement, holding teaching aptitude constant. Teaching aptitude did not contribute significantly once digital fluency was taken into account (β = .04, p = .334). Hence, hypothesis H04 is rejected for digital fluency and retained for teaching aptitude.

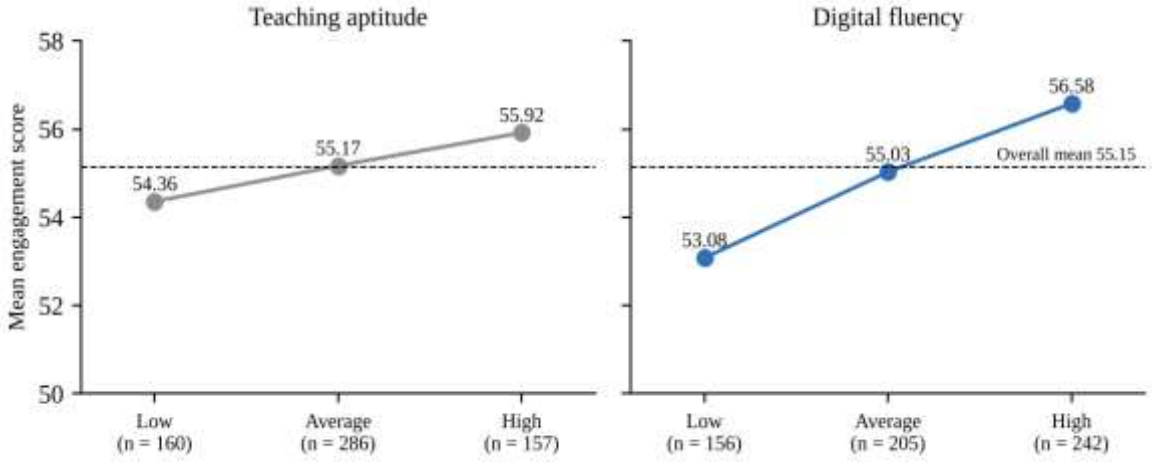

Figure 1: Mean learner engagement of prospective teachers by level of teaching aptitude and digital fluency

Figure 1 places the two characteristics side by side: engagement climbs across the digital fluency levels, while the teaching aptitude levels sit close together around the overall mean.

5. Discussion of the Findings

The study found that prospective teachers showed a moderate level of engagement in the MOOC, with about one-fourth at the low level. This variation is

consistent with research showing that engagement in MOOCs differs widely among learners (Hew & Cheung, 2014; Kizilcec et al., 2013).

The central finding is the contrast between the two characteristics. Digital fluency was related to engagement, whereas teaching aptitude was not, and this held when both were considered together. The result for digital fluency supports earlier evidence that digital skills are associated with engagement in technology-enhanced learning (Bergdahl et al., 2020) and that digital literacy supports online learning behaviour, largely through learners' self-efficacy (Getenet et al., 2024; Prior et al., 2016). A digitally fluent learner can navigate the platform, find resources and take part in discussions with little effort, so more attention is left for learning itself; in terms of the technology acceptance model, the course is easier to use and therefore used more (Davis, 1989). Conversely, prospective teachers with low digital fluency may find the course more demanding, reflecting a second-level digital divide in who benefits from online learning (Hargittai, 2002; van Dijk, 2006).

The absence of a relationship with teaching aptitude runs against the expectation, drawn from self-determination theory (Ryan & Deci, 2000) and research on motivation for teaching (Watt & Richardson, 2007), that prospective teachers more suited to teaching would engage more with a teacher-education course. The regression and partial correlations suggest why. Teaching aptitude and digital fluency were themselves related ($\rho = .19$), so any simple association between aptitude and engagement may partly reflect digital fluency; once digital fluency was controlled, the link with teaching aptitude disappeared. In an online course, the immediate demand is to work effectively with the platform, and this appears to matter more than aptitude for the profession the course is about. This is consistent with Kahu's (2013) view that engagement arises from the interaction of personal and course factors, and with Klassen and Kim's (2019) finding that prospective teachers' personal characteristics predict outcomes only weakly.

Both effects, however, were small: together the two characteristics explained only 2.4% of the variance in engagement. Most prospective teachers already had high digital fluency (mean 81.77 out of 100), which leaves limited room for differences, and engagement also depends on motivation, self-regulation and course design (Hew, 2016; Littlejohn et al., 2016). Digital fluency is therefore best seen as an enabling condition for engagement rather than its main driver, while teaching aptitude does not appear to act as a barrier.

6. Conclusion

The study concludes that prospective teachers showed a moderate level of engagement in the MOOC. Their engagement did not differ according to teaching aptitude, but it did differ according to digital fluency, with highly fluent prospective teachers significantly more engaged than those with low fluency. When both characteristics were considered together, digital fluency remained a significant predictor of engagement while teaching aptitude did not. Engagement in online professional learning thus appears to depend more on prospective teachers' digital readiness than on their aptitude for teaching, although both effects were small.

7. Educational Implications

- **For teacher education institutions:** digital fluency, rather than teaching aptitude, should guide which prospective teachers receive support for online learning. Those with low digital fluency can be offered a short orientation to digital tools and the MOOC platform before the course begins.
- **For teacher educators:** prospective teachers with lower teaching aptitude need not be considered at a disadvantage in MOOCs. Peer support, such as pairing less and more digitally fluent learners, may help those who struggle with the platform.
- **For MOOC designers:** simple navigation, clear instructions and in-course technical help can reduce the effort less digitally fluent learners spend on the platform itself.
- **For policymakers:** as online teacher education expands under NEP 2020, developing prospective teachers' digital fluency, in line with frameworks of educators' digital competence (Redecker, 2017), should accompany the expansion of MOOCs.

8. Limitations and Suggestions for Further Research

- The study was conducted with prospective teachers enrolled in a single MOOC, which limits the generalisation of the findings.
- Engagement was measured through a self-report scale. Future studies could combine it with learning analytics data recorded by the platform.
- Digital fluency scores were generally high, which may have reduced the observed differences.
- The two characteristics explained only a small share of engagement. Future studies could include motivation, self-efficacy and self-regulated learning, and could test whether self-efficacy mediates the effect of digital fluency (Getenet et al., 2024; Prior et al., 2016).
- The study was correlational and cannot establish causation. Intervention studies could test whether digital skills training increases engagement in MOOCs.

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