



Beyond the Classroom: Online Learning, Legal Awareness, and Strategic Communication for Early Marriage Prevention in Remote Indonesian Communities

Ade Nur Istiani*

Universitas Islam Negeri Raden Intan Lampung,
INDONESIA

Erina Pane

Universitas Islam Negeri Raden Intan Lampung,
INDONESIA

Article Info	Abstract
Article history: Received: November 25, 2025 Revised: February 11, 2026 Accepted: March 8, 2026 Keywords: Cultural norms; Digital education; Early marriage prevention; Legal awareness; Online learning.	Early marriage remains a persistent challenge in remote Indonesian communities, where cultural traditions, economic vulnerability, and limited legal awareness continue to influence adolescents' marriage decisions. This sequential explanatory mixed-methods study investigated how online learning, legal awareness initiatives, formal education, and strategic communication collectively contribute to legal awareness, attitudes, and early marriage intention across geographically diverse Indonesian communities. Quantitative survey data from adolescents were complemented by interviews and focus group discussions to provide a contextual understanding of the observed patterns. The findings revealed substantial disparities in legal awareness across community settings and showed that parental attitudes, educational attainment, and engagement with online learning were consistently associated with adolescents' intentions regarding early marriage. Qualitative evidence further highlighted that peer advocacy, community leadership, and digitally supported learning created socially acceptable spaces for discussing sensitive legal and social issues, although their long-term effectiveness requires further evaluation. Overall, the study suggests that integrating online learning with legal education and community-based strategic communication offers a promising approach to strengthening legal awareness and supporting early marriage prevention in underserved communities. Given the cross-sectional design, the findings should be interpreted as evidence of improved awareness, attitudes, and engagement rather than confirmed behavioral change. These results provide practical guidance for designing culturally responsive and context-sensitive digital education programs in remote settings.
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INTRODUCTION

Child marriages are among the most entrenched and multifaceted human rights abuses facing the developing world, with adolescent girls in poor, rural, and socially isolated areas suffering the most from the perpetuation of this phenomenon in light of social, economic, and educational inequality traps that reinforce each other (Kirana & Nisak, 2022; Pourtaheri, 2023). Worldwide, there are roughly 650 million living adult women who got married before they turned eighteen years old, and sub-Saharan Africa and South and Southeast Asia are home to the largest number of child brides (Malhotra & Elnakib, 2021). However, in this context, Indonesia occupies a rather unique spot as a middle-income democratic state that is committed to equality between genders and the protection of children through its Constitution but also the place where about 10% of women between 20 and

* Corresponding Author

Ade Nur Istiani, Universitas Islam Negeri Raden Intan Lampung, INDONESIA ✉ adenur@radenintan.ac.id

24 years of age became wives before they reached the age of 18, with significant discrepancies in the prevalence of early marriages observed between regions (Puspitasari, 2021; Wibowo et al., 2021). The persistence of this practice is not reducible to a single causal factor but emerges from the complex intersection of socio-cultural traditions, household economic precarity, geographic isolation, and inadequate legal enforcement, particularly in Indonesia's remote and underserved communities.

Effects of child marriages extend well beyond the marital moment itself, giving rise to a series of long-term deprivations in education, economic, and health fields. Early marriage leads to girls not completing secondary school education, resulting in limited employment prospects and economic independence (Gundi, 2023; Marphatia et al., 2022). Early marriage is highly correlated with adolescent pregnancy, leading to higher risks of maternal and infant mortality due to lack of professional obstetric help in low-resource countries (Mehari et al., 2023). These interrelated deprivations maintain intergenerational poverty traps that are impossible to break without multi-level interventions addressing underlying structural factors as well as direct behavioral causes (Bergstrom & Özler, 2022; Malhotra & Elnakib, 2021). While the legislative efforts of the Indonesian government namely, Law No. 16 of 2019 on the increase of the minimum marriageable age of both men and women to 19 are an important step in tackling this problem, the enforcement of such legislation in rural areas, where cultural practices continue to take precedence over the law, is still largely insufficient (Holik, 2023; Kirana & Nisak, 2022).

Education and strategic communication have been widely recognized as pivotal instruments for disrupting the normative foundations that sustain early marriage. Educational interventions targeting both adolescents and their families have demonstrated measurable effectiveness in delaying marriage by fostering critical awareness, challenging entrenched gender norms, and expanding adolescents' perceptions of their own life trajectories (Makino et al., 2021; Marphatia et al., 2022). However, such educational approaches frequently fall short when implemented in isolation, particularly without the complementary support of strategic communication strategies that actively disseminate accessible information about early marriage's legal prohibitions, health consequences, and socioeconomic costs (Kabelka, 2024; Surbakti et al., 2022). Multi-dimensional approaches integrating legal education, community advocacy, peer empowerment, and targeted information campaigns have shown considerably greater promise, particularly in contexts where educational access is unequal and culturally mediated (Bergstrom & Özler, 2022; Gundi, 2023).

The accelerating penetration of digital technologies and online learning platforms into even remote Indonesian communities presents a promising and comparatively underexplored opportunity to help transcend the geographic barriers that have long constrained conventional educational interventions (Chalim et al., 2024; Gunawan, 2014). National statistics indicate widespread and growing smartphone and mobile-messaging use across Indonesia, including in outer and rural provinces, suggesting that mobile-based educational platforms are increasingly accessible channels for legal awareness content and peer learning even in areas with limited formal schooling infrastructure (Rachmah et al., 2023; Susilawati et al., 2025; Yusriadi et al., 2022); precise current penetration figures should be verified against the most recent national statistics agency (BPS) and communications ministry releases. Online learning, broadly understood as the purposeful use of internet-connected devices to access educational resources and engage in structured learning activities (Mulhayatiah et al., 2019), has shown encouraging effectiveness in improving knowledge outcomes across some low-resource contexts when thoughtfully designed and contextually adapted to local needs, although the evidence base remains more developed for general digital education than for legal-awareness or early-marriage-prevention content specifically (Dharin et al., 2025; Juhji et al., 2022; Major et al., 2021; Means et al., 2010; Nirmala et al., 2025).

Notwithstanding their considerable promise, digital interventions in remote Indonesian contexts must contend with substantial infrastructure and equity challenges. Approximately 45% of Indonesia's population lacks reliable internet access, with connectivity disparities between urban centers and rural or highland communities remaining particularly acute (Rahayu et al., 2022). Rural and highland communities frequently experience limited broadband coverage, higher relative data costs, and lower baseline digital literacy, creating compounding barriers that restrict online learning uptake among precisely those populations most in need of intervention (Sulisworo et al., 2021; Barbier, 2022). These structural constraints underscore the critical importance of hybrid approaches

that thoughtfully integrate digital components with offline community-based strategies, ensuring equitable access across the full spectrum of connectivity environments that characterize Indonesia's geographic diversity (Coyle et al., 2019; Philbrick et al., 2022).

Previous scholarship on child marriage prevention in Indonesia has made meaningful contributions to understanding the role of formal education, legal frameworks, and community mobilization in reducing early marriage prevalence. However, specific gaps remain: few studies have examined how a combined online-learning and legal-awareness intervention is designed and delivered in remote Indonesian communities, how adolescent legal literacy changes in response, how rural digital-delivery constraints shape uptake, how parental attitudes are affected, and whether such interventions are associated with reduced early marriage intention (Puspitasari, 2021). Most existing studies have examined either formal educational interventions or digital health communication in isolation, without systematically investigating the synergistic effects of combining these modalities within community-embedded, multi-channel intervention frameworks (Bose et al., 2023; Philbrick et al., 2022). This study responds to this gap by empirically examining how online learning platforms, legal awareness campaigns, formal educational engagement, and strategic community communication operate together across 10 contextually diverse Indonesian communities, while acknowledging that it cannot, on its own, resolve every dimension of this broader gap, particularly the question of whether such interventions translate into measurable delays in marriage over time.

The study's theoretical foundation integrates four complementary frameworks: Social Change Communication Theory, Legal Empowerment Theory, Transformative Learning Theory, and Technology-Mediated Learning Theory (specifically the Community of Inquiry framework). These theories provide complementary perspectives for interpreting the findings (Garrison et al., 2000; Kabelka, 2024; Siemens, 2005). Beyond its immediate empirical contributions, this research engages substantively with broader conversations on sustainable development, gender equity, digital inclusion, and Indonesia's obligations under international human rights frameworks, including Sustainable Development Goal 5.3, which specifically targets the elimination of child marriage by 2030 (Malhotra & Elnakib, 2021; Pourtaheri, 2023). The study's findings carry direct implications for policymakers, educators, community organizations, and technology developers engaged in the design of scalable, equitable, and culturally responsive early marriage prevention architectures across Indonesia's diverse regional contexts.

The study is informed by four complementary theoretical perspectives: Social Change Communication Theory, Legal Empowerment Theory, Transformative Learning Theory, and the Community of Inquiry framework. Collectively, these perspectives provide a conceptual basis for understanding how online learning, legal awareness, reflective learning, and community engagement contribute to early marriage prevention in remote Indonesian communities (Garrison et al., 2000; Mahmuddin, 2023; Mezirow, 1991; Riadi et al., 2024; Sadguna & Sundari, 2024; Sakti, 2023; Siemens, 2005). Rather than serving as a causal model, these theories are used to guide the interpretation of the empirical findings.

METHOD

Research Design

The study uses a sequential explanatory mixed-methods research design that incorporates an embedded concurrently delivered digital intervention element and combines quantitative survey-based and qualitative elements to investigate the cumulative effect of online learning tools, awareness campaigns on law, educational programs, and strategic community communication on legal awareness, attitude, and early marriage intentions in 10 Indonesian communities. The use of such a design facilitated the merging of quantitative and qualitative results to gain an overall insight into the research problem (Creswell & Creswell, 2023). Specifically, in chronological order: the digital intervention was first carried out for six weeks (dialogue forum sessions and online learning modules via WhatsApp and YouTube), digital engagement metrics (module visits, quiz completion rates, interaction rates) were collected consistently during this time; the cross-sectional structured survey was administered next at the end of the digital intervention (there is no use of pre-test/post-test design in this study) measuring legal awareness and attitudes, as well as the digital intervention

experience; and finally, the semi-structured interviews and focus group discussions, both in-person and virtual, took place.

The digital intervention strand entailed the systematic development and deployment of digital learning resources: short legal awareness videos (5-10 minutes), animated videos on rights, peer testimonies, and reflective quizzes on WhatsApp educational groups and YouTube channels. The intervention was conducted in six weeks, with one thematic module deployed each week on topics of legal awareness, health impacts, gender norms, peer testimonies, economic readiness, and community activism. Each module ended with a reflective quiz and discussion. Each community-based WhatsApp group had a digital facilitator assigned to it; 10 facilitators underwent two-day standardized training on content deployment, discussion moderation, referrals of participants in case of distress, and fidelity documentation, as well as a facilitation guide and weekly checklist for adherence. Participation and dosing were recorded by WhatsApp group attendance logs (module view counts, quiz completion, and message participation) and validated each week against the intended schedule by the research team; fidelity monitoring entailed reviewing a 20% random sample of facilitator discussion threads each week against the facilitation guide. In case of bandwidth issues in certain communities, offline-ready resources (video file downloads and PDF documents) were made available through the WhatsApp file-sharing service.

Sampling and Participants

The current study used a two-level sampling method. For the first level, purposive sampling was used for selecting the 10 communities based on three levels of stratification, including geographical location (urban, peri-urban, rural, and highland), socioeconomic level (as measured by household income and provision of basic amenities), and closeness to education and legal advocates' facilities. In this case, the communities were selected using stratified purposive sampling, whereas adolescents from the sampled communities were selected using stratified random sampling. Four main participant categories were involved in this study, which included 200 adolescents (aged 14-19, 51% female), 20 parents (two per community), 30 educators (three per community), and 10 community leaders (one per community). Those participants who were 19 years old were retained since their ages did not affect the purpose of the study despite having reached the legal minimum marriage age. The educators acted as key informants by participating in interviews and focus group discussions but were not involved in the quantitative survey. Digital engagement participants comprised 156 surveyed adolescents (78%), who undertook an online learning module, whereas others formed the comparison group. Adequacy of the sample size for the quantitative logistic regression was evaluated through a priori power analysis (using G*Power 3.1) based on a three-predictor logistic regression, using $\alpha = 0.05$, power = 0.80, expected medium effect size (odds ratio ~ 2.0), and expected incidence rate of ~30% for early marriage intention among participants using previous Indonesian samples as reference; the minimum sample size needed was found to be ~150 respondents having complete predictor information, lower than $n = 200$ attained, representing ~15-20 events per predictor variable. Table 1 summarizes the four sets of participants, their sample sizes, sampling technique, and main contribution to the study.

Table 1. Summary of Participant Distribution and Key Contributions

Participant Group	N	Sampling Method	Key Contributions
Adolescents (ADO)	200	Stratified random within purposively selected communities	Legal knowledge, social pressures, cultural expectations, online learning engagement
Parents (PAR)	20	Two per community	Cultural norms, economic drivers, receptiveness to digital tools
Educators (EDU)	30	Three per community	Program implementation, digital facilitation, observed behavioral change
Community Leaders (COM)	10	One per community	Cultural dynamics, community reception of digital and traditional interventions

Participant Group	N	Sampling Method	Key Contributions
Digital Engagement Cohort (DEC)	156	Voluntary participation (overlap with ADO)	Module completion rates, online knowledge acquisition, engagement metrics

Research Instruments and Data Collection

The major quantitative measure used was a structured survey questionnaire with 32 items, which included demographic characteristics of the participants (8 items), legal knowledge (8 items; Cronbach's $\alpha = 0.85$), attitude towards early marriage (10 items; $\alpha = 0.81$), and intention to marry early (6 items; $\alpha = 0.79$). In addition, there were items assessing exposure of the participants to formal and digital education. This instrument was based on validated scales used in previous research on child marriage and translated via a process of forward-backward translation. Content validity was ensured through expert evaluation by three content specialists, after which a pilot study was conducted among 25 adolescents not participating in the project. The results of the pilot study indicated acceptable internal consistency for all measures and good test-retest reliability for the whole instrument ($r = 0.82$).

Data collection was done through interview guides and focus group discussions (FGDs) in a semi-structured format intended to investigate cultural practices, experience with the intervention, and perception regarding digital learning. The interview guides were tested and translated into Bahasa Indonesia in order to make sure that the language was correct in relation to the culture. In order to make sure that there is consistency in data collection between on-ground and virtual data collection, two researchers independently evaluated a portion of interviews and FGDs based on a facilitation checklist involving questioning, time management, and participation of participants.

Digital engagement was assessed by means of learning analytics derived from participation logs on WhatsApp, YouTube Studio analytics, and Google Form records for quiz completion. The measures involved interaction, engagement with videos, and module completion. Since individual-level viewing data could not be completely extracted from WhatsApp and YouTube, engagement of participants with the video modules was assessed using quiz completion records. Data on digital engagement were collected after obtaining informed consent of the participants, de-identified before the analysis, and reported in aggregate form only. A list of all instruments used, data collection procedures, and validity and reliability evidence is provided in Table 2.

Table 2. Summary of Instruments, Data Collection Techniques, and Validity Measures

Instrument	Purpose	Technique	Validity & Reliability
Survey Questionnaire (face-to-face & Google Forms)	Measure legal awareness, attitudes, intervention exposure	Trained assistants (paper); Google Forms (digital)	Content validity (expert panel); subscale $\alpha = 0.79$ – 0.85 ; test-retest $r = 0.82$
Semi-Structured Interview Guide	Explore personal and cultural perspectives	In-person and virtual (Zoom/WhatsApp)	Construct validity (pilot); inter-rater $\kappa > 0.80$
FGD Protocol	Capture collective peer-driven insights	Facilitated 60–90 min sessions; in-person and virtual	Face validity (pretesting); standardized protocol
Observation Checklist	Document non-verbal and contextual cues	Researcher observation during interviews and FGDs	Expert-designed; standardized procedures
Digital Engagement Metrics	Track online learning participation	WhatsApp analytics; YouTube Studio; Google Forms logs	System-generated; cross-referenced with survey data

Data Analysis

Quantitative data were analyzed using SPSS v.27, encompassing descriptive statistics (means, standard deviations, frequency distributions) to characterize demographic profiles, legal awareness levels, and intervention exposure. For chi-square analysis, the continuous legal-awareness index was categorized into low, moderate, and high levels based on pilot-sample tertiles, while the continuous scores were retained for mean comparison and logistic regression analyses. Early marriage intention was dichotomized using a predefined median-split threshold (mean score $>3 = 1$; $\leq 3 = 0$) before logistic regression analysis. Logistic regression models identified the strongest predictors of early marriage intention among three predictors retained after preliminary screening: parental attitudes, educational attainment, and online learning engagement tier. Digital engagement data were cross-tabulated with survey-based knowledge outcomes across three engagement tiers: high ($\geq 75\%$ module completion), moderate (40–74%), and low/no engagement ($<40\%$). Qualitative data underwent six-phase reflexive thematic analysis (Braun et al., 2022; Byrne, 2022): familiarization, initial coding, theme generation, theme review, theme definition, and interpretive write-up. Qualitative data were analyzed using Braun and Clarke's (2022) six-phase reflexive thematic analysis. To enhance analytical rigor, a second researcher independently reviewed 20% of transcripts (Cohen's $\kappa > 0.80$), and member checking was conducted with selected participants. Integration of quantitative, qualitative, and digital engagement findings was accomplished through a convergent synthesis matrix enabling systematic cross-strand comparison (Creswell & Creswell, 2023).

Ethical Considerations

The study was carried out strictly in line with ethical standards of research involving human subjects. The institutional ethics clearance for the study was sought from the Research Ethics Committee of the authors' host university before data collection began. Since the study involved minors and a sensitive topic, the following were some of the measures taken: obtaining written consent of the parent/guardians as well as assent of the adolescents (assent of participants explained orally in Bahasa Indonesia for those who could not read). Facilitators were trained on how to handle participants' distress. A referral system was put in place to appropriate health services and counseling where necessary. Virtual group discussions were held in private spaces chosen by participants. Informed consent was obtained from all participants. Participation in the study was purely voluntary, and participants were made aware of their right to withdraw at any point in time without any consequences. Data collected were anonymized and stored securely on password-protected university servers accessible only to the research team and only used for research purposes.

RESULTS AND DISCUSSION

Quantitative Findings: Demographic Profile and Socioeconomic Context

The quantitative analysis looked at legal awareness levels, attitudes towards early marriage, digital usage, and socioeconomic accessibility in the 10 study communities. Table 3 shows the demographic features of the survey participants according to geographic classification ($n=50$ for each of the urban, peri-urban, and rural strata and $n=50$ for the highland stratum, totaling $n=200$; the "Urban" stratum is the district or sub-district center of each of the sampled remote districts, not an urban national metropolis, in accordance with the Sampling and Participants section). This table clearly shows significant heterogeneity in terms of education, household incomes, and internet usage in different community types. The figure of 16% tertiary education attained by the adolescent respondents refers to the household/family education attained by the respondent (a family member having attained tertiary education), and not the respondents' own education completed, as the respondents' age (14–19) does not allow them to have attained tertiary education, which has been clarified in the footnote of the table. Rural and highland communities show significantly greater percentages of low-income households (75% and 65%) and significantly lower rates of internet usage (24% and 42%) than peri-urban and urban communities, respectively – conditions structurally constraining formal education and digital learning. These disparities establish the structural

backdrop against which intervention engagement and knowledge outcomes are interpreted in Table 3.

Table 3. Demographic Characteristics of Survey Respondents by Geographic Stratum

Variable	Urban (%)	Peri-Urban (%)	Rural (%)	Highland (%)	Total (%)
Gender (Female)	55	51	49	48	51
Education: Primary	10	18	35	40	26
Education: Secondary	70	65	50	45	58
Education: Tertiary	20	17	15	15	16
Household Income (Low)	30	40	65	75	52
Internet Access (Yes)	88	71	42	24	56

Note. "Tertiary" education for adolescent respondents refers to a household member's attainment, not the respondent's own completed education.

Figure 1 shows these three critical variables in terms of socioeconomic status and digital access, illustrating the negative correlation between geographic distance from central cities and structural access to education and digital infrastructure. The increasing proportion of poor individuals and decreasing rates of internet access in urban and highland settings illustrate the complex disadvantage that is facing the exact population that is most vulnerable to early marriage.

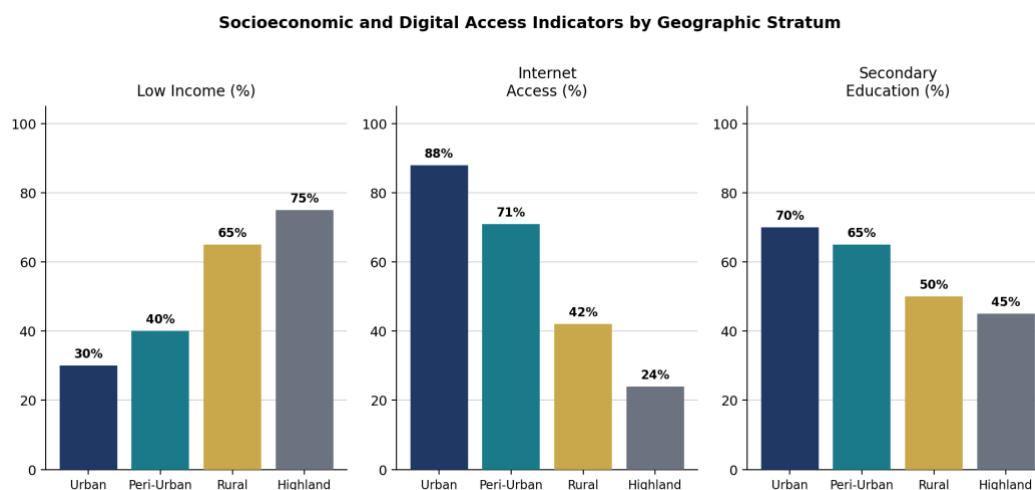


Figure 1. Socioeconomic and Digital Access Indicators: Low Household Income, Internet Access, and Secondary Educational Attainment by Geographic Stratum. Figures derived from Stratified Survey Data (n = 200).

Legal Awareness, Attitudes, and Predictors of Early Marriage Intention

In general, 70% of the sample participants have shown awareness regarding the legal minimum marriage age in Indonesia; however, this generalization did not account for the geographical differences. The urban areas have shown to be the area of residence with the highest scores on legal awareness ($M = 4.3$, $SD = 0.5$), followed by peri-urban areas ($M = 3.9$, $SD = 0.6$), rural areas ($M = 3.3$, $SD = 0.8$), and highlands ($M = 2.9$, $SD = 0.7$). Chi-square test results revealed the existence of a significant correlation between educational attainment and legal awareness ($\chi^2 = 20.15$, $df = 6$, $p < 0.01$, Cramér's $V = 0.32$), suggesting that there is a moderate correlation between the two factors. According to logistic regression analysis, parental attitudes have emerged as the best predictor of early marriage intentions among teenagers ($\beta = 2.03$, $SE = 0.41$, $p < 0.001$, $OR = 7.61$) followed by education level (reverse-coded; $\beta = 1.74$, $SE = 0.37$, $p < 0.001$, $OR = 5.70$) and online learning engagement (reverse-coded; $\beta = 1.31$, $SE = 0.29$, $p < 0.01$, $OR = 3.71$). For ease of interpretation, educational attainment and online learning engagement were reverse-coded so that higher values represented lower attainment and lower engagement.

The fit of the model was found to be adequate (Nagelkerke $R^2 = 0.47$; Hosmer-Lemeshow $\chi^2 = 7.23$, $p = 0.51$), and there was no indication of multicollinearity (all VIFs < 2.0). The level of classification accuracy was 74% (AUC = 0.81). Multilevel sensitivity analysis adjusted for clustering at the community level gave substantively similar results (ICC = 0.06), indicating that clustering did not have any notable impact on the reported findings. Moreover, 62% of the respondents believed that delaying marriage would improve the prospects of education and economic success of adolescents. Agreement on this matter was much greater (82%) among the respondents who were highly engaged in online learning compared to the non-engagers (51%). Figure 2 shows the standardized coefficients of the predictors.

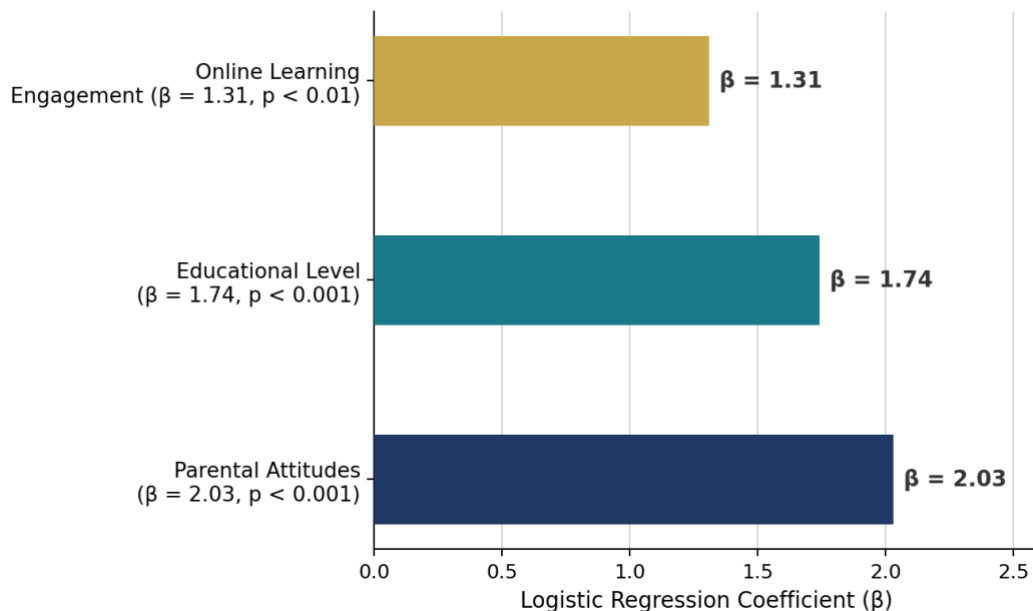


Figure 2. Logistic Regression Coefficients (β) for Predictors of Early Marriage Intention. All Predictors are Statistically Significant ($p < 0.01$). OR = Odds Ratio. Model Nagelkerke $R^2 = 0.47$.

Online Learning Engagement and Legal Awareness Outcomes

Table 4 presents digital engagement data from the WhatsApp-based and YouTube-based online learning modules, stratified by geographic community type. There is an observable gradient in all the metrics considered concerning urban communities, where a significantly greater number of people view modules (91%), complete quizzes (85%), and express positive attitudes (89%) than people in highland communities who show lower levels of module views (37%), quiz completions (28%), and positive attitudes (64%). This gradient of engagement can be explained by the barriers to engagement shown in Table 3, yet other factors might be involved.

Table 4. Online Learning Engagement Metrics and Legal Awareness Scores by Geographic Stratum

Metric	Urban	Peri-Urban	Rural	Highland	Overall
Module View Rate (%)	91	82	58	37	67
Quiz Completion Rate (%)	85	76	49	28	60
Mean Legal Awareness (High Engagers)	4.7	4.3	3.9	3.5	4.1
Mean Legal Awareness (Non-Engagers)	4.0	3.6	2.9	2.5	3.3
Score Gap (High vs Non-Engagers)	+0.7	+0.7	+1.0	+1.0	+0.8
Positive Attitude Toward Delayed Marriage High Engagers (%)	89	81	72	64	77

Notably, the data show that even in highland communities where module view rates were lowest (37%) due to connectivity constraints, participants who did engage with online modules

demonstrated meaningfully higher legal awareness scores ($M = 3.5$) compared to non-engagers within the same communities ($M = 2.5$), representing a within-stratum difference of 1.0 scale point. This within-strata comparison reduces (though does not eliminate) confounding from geographic-level factors, since both engagers and non-engagers were drawn from the same community context; it does not, however, control for individual-level self-selection into engagement, socioeconomic status, baseline awareness, gender, family background, or motivation, any of which could plausibly explain part of the observed gap. The pattern is therefore consistent with, but does not on its own establish, an additive effect of online learning engagement beyond pre-existing differences in community-level resources. Figure 3 illustrates this pattern, comparing mean legal awareness scores between high engagers and non-engagers across all four geographic strata.

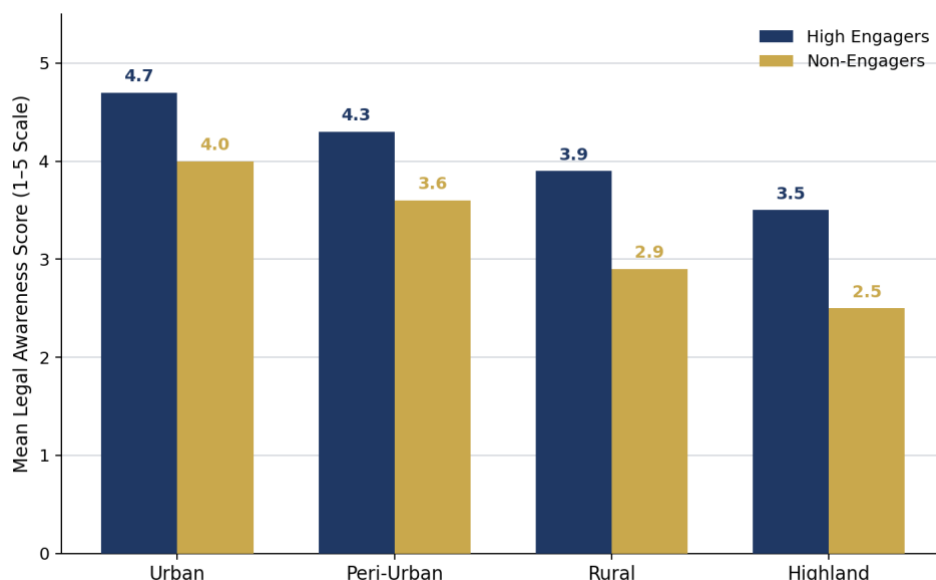


Figure 3. Mean Legal Awareness Scores (1–5 scale) by Geographic Stratum, Comparing High Online Learning Engagers versus Non-Engagers (SD Values Reported in Text and Table 4). High Engagers Show Higher Mean Scores than Non-Engagers across all Strata.

Figure 4 visualizes these same engagement gradients across the module view rate, quiz completion rate, and positive-attitude indicators.

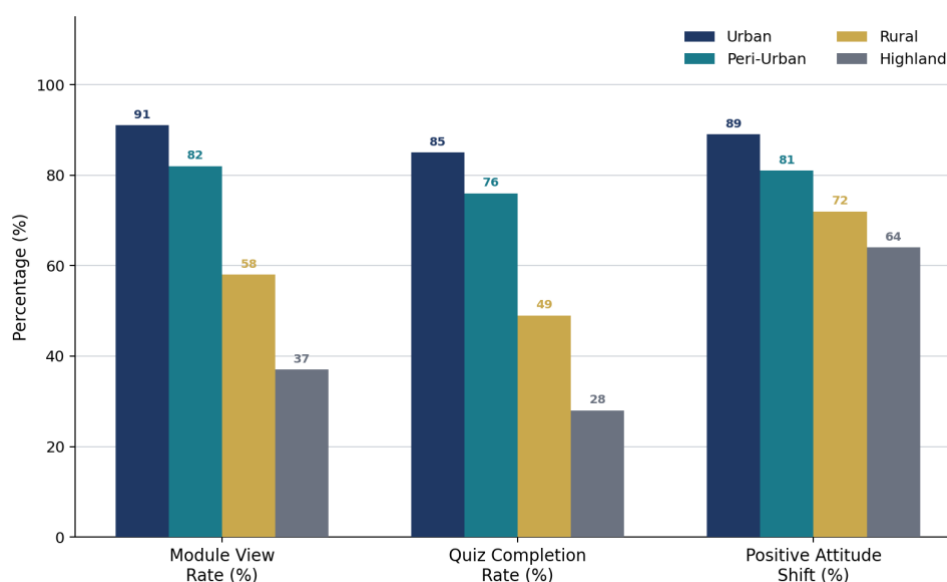


Figure 4. Online Learning Engagement Metrics: Module View Rate, Quiz Completion Rate, and Positive Attitude Shift by Geographic Stratum. Substantial Engagement Gradients Reflect Infrastructure and Digital Literacy Disparities.

Qualitative Findings: Thematic Analysis

Reflexive thematic analysis of interview and FGD transcripts, including virtual sessions via Zoom and WhatsApp, generated four primary themes illuminating the cultural, structural, and technological dimensions of early marriage and intervention effectiveness. Table 5 summarizes these themes, associated sub-themes, and representative analytical insights.

Table 5. Primary Themes, Sub-Themes, and Key Analytical Insights from Qualitative Analysis

Theme	Sub-Themes	Key Insights
Cultural Resistance to Legal Frameworks	Family honor norms; tradition over law; economic rationale	Customary practices consistently override legal provisions in highland and rural communities; early marriage framed as family obligation and economic strategy
Effectiveness of Educational Programs	School-based programs; peer advocacy networks; civic education integration	Formal programs improved legal knowledge; peer advocacy critical for translating awareness into behavioral resistance; legal discussions normalized in civic education classes
Online Learning as a Space for Private Engagement	WhatsApp learning groups; YouTube legal modules; digital peer dialogue	Digital modules experienced as privately accessible, personally relevant, and socially safe; highland participants cited WhatsApp as primary source of legal rights information
Community-Driven Solutions	Local engagement; networks; dialogue forums; leader peer village	Community leaders endorsing both physical and digital interventions significantly amplified reach and legitimacy; convergence of physical forums with WhatsApp groups created self-reinforcing engagement ecosystems

The theme of Cultural Resistance to Legal Frameworks emerged consistently across interviews and FGDs in eight of the ten communities, particularly in rural and highland settings, where participants viewed customary practices as more authoritative than formal legal provisions. As one parent in a highland community explained, “The law says wait until nineteen, but here, when a good match comes, and the family needs it, we cannot simply refuse because of a rule from the city” (Parent, highland). Resistance was strongest among older community members and parents, who framed early marriage in terms of family honor, economic security, and intergenerational obligation. However, a small minority of highland parents (4 of 20 interviewed) welcomed the legal provisions as external support for decisions they privately favored but felt unable to defend without broader community backing.

The theme of Effectiveness of Educational Programs suggested that formal schooling and structured educational interventions improved legal awareness and attitudes toward delaying marriage. Peer advocacy emerged as particularly influential, with adolescents reporting that information delivered by trusted peers felt more persuasive than messages delivered solely by adults: “When my friend who is also in the WhatsApp group explains it, I actually listen, not like when a teacher just lectures us” (Adolescent, rural).

The theme of Online Learning as a Space for Private Engagement highlighted digital modules as accessible, self-paced, and socially safe environments for engaging with sensitive issues. Adolescents described being able to access learning materials privately without fear of community judgment: “I can watch the video alone, at night, and no one asks me why I am asking about these things” (Adolescent, highland). Finally, the Community-Driven Solutions theme underscored the importance of local leadership in legitimizing intervention adoption. Participants explained that combining face-to-face community forums with ongoing digital communication reinforced engagement and increased trust in educational messages over time: “When the village head himself shared the video in the group, people paid attention in a way they did not before” (Community leader, peri-urban).

Integration of Quantitative and Qualitative Findings

The convergent synthesis matrix illustrated in Table 6 cross-checks quantitative trends, patterns in digital engagement, and qualitative themes to explore the connections between legal awareness, education, online learning, and community involvement and their impact on the attitudes and intentions about early marriage. The four integrations points shown below reveal that, in general, the themes identified through the qualitative analysis converged with the patterns revealed through the quantitative data, providing potential explanations for the patterns; the analysis also yielded supplementary information beyond what was captured by the survey variables (for instance, the economic and familial honor rationale behind parents' attitudes), rather than verifying the authors' initial assumptions. Since both strands rely on the same respondents in the same timeframe, such a triangulation increases interpretive consistency but not validation.

Table 6. Integrated Findings: Quantitative Trends, Qualitative Insights, and Intervention Implications

Quantitative Trend	Qualitative Insight	Implications for Intervention Design
Urban participants showed highest legal awareness (M = 4.3)	Urban adolescents attributed awareness to structured school-based legal education and broader digital content access	Expanding school-based programs and digital content to rural and highland communities is essential for bridging awareness disparities
Parental attitudes strongest predictor ($\beta = 2.03$, OR = 7.61)	Economic pressures and family honor narratives shaped parental attitudes; highland parents cited economic stability as primary justification	Community campaigns targeting parents through trusted local leaders and culturally resonant narratives are crucial complements to adolescent-focused programming
High engagers outperformed non-engagers by 0.8 points	Participants described digital modules as personally accessible, private, and more relatable than traditional classroom instruction	Online learning should be prioritized as complementary strategy; offline-compatible formats essential for highland areas
Peer advocacy significantly improved resistance to early marriage	Adolescents reported increased confidence learning from peers; digital dialogues via WhatsApp extended advocacy beyond physical settings	Scaling peer advocacy across digital and physical spaces, with digital facilitation training for peer educators, exponentially amplifies intervention reach

Legal Awareness as a Determinant of Behavioral Change

The findings demonstrate the structurally bounded nature of the legal awareness factor in terms of its impact on the attitudes towards early marriages held by adolescents and their parents. The large discrepancies in the level of legal awareness between regions, where the mean scores of urban adolescents were almost 1.5 points higher than those of adolescents from the highlands using a five-point scale, indicate that there are issues not just about the level of knowledge, but also structural resources invested in both educational systems and internet in remote geographical areas (Gambir, 2024; Suyanto et al., 2023). The higher legal awareness among urban adolescents appears to be a structural advantage produced due to the intersection of two systems – legal education at schools and digital information infrastructure as a whole (Arbelia & Riany, 2022). It corresponds well to the assertion made in the Legal Empowerment Theory that the process of acquiring legal knowledge is structurally based and therefore can be closed through the structural redistribution of information infrastructure, but not knowledge itself.

The statistically significant relationship between educational achievement and legal knowledge ($\chi^2 = 20.15$, $p < 0.01$), on the one hand, reflects the fundamental nature of education as an entry point for empowerment based on rights, while on the other, confirms the postulation of transformative learning theory concerning the possibility of changes in perception of social environment through the use of the formalized involvement in critical information (Ernawati et al.,

2023). Moreover, this result indicates the insufficiency of purely educational methods in terms of empowerment in conditions of inequitable distribution of education and a culturally mediated education process. The positive, additive relationship between online learning engagement and legal knowledge scores at all geographic strata, including the highland stratum, implies that digital education technologies can be used as effective tools complementing formalized education, allowing self-study of legal knowledge by marginalized adolescents (Major et al., 2021; Means et al., 2010). If replicated, this finding could carry policy significance for Indonesia's designated 3T (*tertinggal, terdepan, terluar*; underdeveloped, frontier, outermost) regions; the present study did not verify that the sampled highland and rural communities carry official 3T designation, and this connection is offered as a plausible extension for future research rather than an established claim, since digital platforms may represent one scalable channel for legal rights education where formal educational coverage remains incomplete.

The Influence of Cultural Norms and Parental Attitudes

Among the barriers to the efficacy of interventions, cultural norms appeared in the views of the participants as one of the most prominent ones; this was discussed much more often and insistently than either infrastructure or awareness barriers especially in highland and rural areas, where the traditional views concerning marriage, the family's honor, and gender roles are deeply rooted and, according to the participants, resistant to change that might be brought about by external factors; it is a qualitative ranking based on the frequency and intensity of discussion in the participants' accounts and not a statistical comparison between different types of barriers. This discovery is consistent with the systematic review conducted by Malhotra and Elnakib (2021) where it was stated that both legal and educational interventions are usually not enough to prevent child marriage unless they are supported by a transformation of social and cultural norms. The sub-themes of the importance of family honor and pragmatic view on economic matters show a culture where the prohibition of child marriage in Indonesia is perceived not as a protection measure but as an intrusion that conflicts with community values and economic interests (Lokot et al., 2022). Effective intervention in this context therefore requires engagement strategies that work from within cultural narratives rather than imposing counter-narratives from without, a principle that aligns with Social Change Communication Theory's emphasis on participatory co-construction of new norms (Sadguna & Sundari, 2024).

The determination of parental attitude as the only significant variable associated with early marriage intention ($\beta = 2.03$, $OR = 7.61$) aligns well with Bronfenbrenner's ecological systems theory, which views the family environment as the closest and most significant context shaping adolescents' behavior (El Zaatari & Maalouf, 2022). In this case, the parents in the targeted settings operate under a delicate balance of economic, social, and cultural pressures, which often justify early marriage as not only practical but also morally correct. It means that efforts targeting only attitude transformation among adolescents alone will fail to yield any meaningful behavioral outcomes without addressing factors at the parent level. Digital media channels such as parent-oriented WhatsApp groups, family-based sharing of videos, and online community platforms co-facilitated by local opinion leaders represent some of the potential avenues for reaching this important but often-neglected group (Bose et al., 2023; Rachmah et al., 2023).

Online Learning as an Enabler of Social Change

One of the key findings from this study that is theoretically interesting is the consistent positive correlation between online learning engagement and legal awareness outcomes irrespective of geographic layers of analysis, even for communities located in highland areas where connectivity is extremely poor (Zakariyah et al., 2025). Such a correlation is theoretically explained via the Community of Inquiry approach (Garrison et al., 2000) and connectivist learning theory (Conceição & Biniecki, 2024; Siemens, 2005). These approaches suggest that digital learning platforms can facilitate the creation of learning communities and allow for knowledge creation through peer interactions irrespective of geographic remoteness. Qualitatively, the theme of Online Learning as Transformative Space allows one to understand the nature of the quantified correlation: digital courses were not perceived as mere information providers but as empowering spaces for private and paced rights-related learning without fear of social backlash.

In fact, the relatively higher engager/non-engager gap found in the highlands – 1.0 scale points, against 0.7 points in urban communities – suggests the possibility that digital media may be especially useful in exactly those settings where non-traditional solutions have the least room to maneuver (Barbier, 2022; Yusriadi et al., 2022), consistent with Alamer et al.'s (2022) that WhatsApp-based learning experiences can motivate learners and alleviate their anxiety in other settings – attributes that might prove helpful for discussions of sensitive issues such as marriage rights, when public challenges to norms are socially costly. This is just one possible interpretation among many (for example, ceilings in already higher scoring urban segments could lead to a narrower gap); combined with the qualitative insights, it provides interesting but not conclusive evidence that digital media could play an equitable role in high deprivation areas, a hypothesis worth testing in a causal design setting.

This study's findings simultaneously illuminate the digital divide as a significant equity challenge within the online learning intervention (Umera & Baror, 2025; Yunitasari et al., 2025). The substantial gap in module view rates between urban (91%) and highland (37%) communities is consistent with infrastructure and literacy barriers documented by Sulisworo et al. (2021) and Rahayu et al. (2022), and underscores the risks of over-reliance on digital platforms without concurrent investment in connectivity infrastructure. The hybrid online-offline approach used in this study, combining digital content delivery with face-to-face programming and offline-compatible material formats, represents one promising model for maximizing reach and equity across heterogeneous connectivity environments (Coyle et al., 2019; Philbrick et al., 2022), though it has not been tested here against alternative delivery models. Future implementations could consider offline-first digital content strategies intended to preserve educational value where internet reliability is limited.

The Role of Peer Advocacy and Community-Driven Solutions

Peer advocacy and community-based interventions implemented simultaneously in the offline and online worlds have emerged as a significant individual-level component of the intervention that has been linked in the qualitative data to enhanced agency and resistance to early marriage among the adolescents; since no quantitative analysis of effect size has been done comparing the impact of peer advocacy to other components of the intervention, this should be interpreted as a qualitative insight into the impact of an intervention component rather than a comparative assessment of component effectiveness. The use of this type of intervention component is consistent with the principles of the social influence theory, which maintains that imitation of behavior is more effective when conducted through relatable and credible peers, as well as participatory action research, which emphasizes community ownership of the intervention implementation (Azmi et al., 2021; Khan et al., 2021). The convergence of in-person peer education sessions with ongoing digital peer dialogues via WhatsApp appeared, in participants' accounts, to create a mutually reinforcing engagement ecosystem that extended the intervention's temporal reach and enabled adolescents to process and reinforce learning across multiple social contexts and communication registers.

In the case of digital as well as face-to-face components of the intervention, engagement of the community leader was critical to legitimacy and scalability. In the peri-urban communities where the local leaders actively supported and engaged in the WhatsApp group discussion on health modules and responded to questions related to the modules in addition to linking the digital interventions with in-person forums, the levels of intervention reach and participation were invariably higher. This clearly indicates that the efficacy of the online learning module component of the intervention among the community is largely determined by the social legitimacy provided by the local leaders and implies that stakeholder buy-in of the digital intervention as an extended form of the community process is strategically important for future implementation (Simmons & Sanders, 2022).

Theoretical Contributions

This study offers several contributions to the intersecting literatures on child marriage prevention, digital learning in low-resource contexts, and community-based behavior change. First, it applies and illustrates, rather than statistically validates, the integrated use of Social Change Communication, Legal Empowerment, Transformative Learning, and Community of Inquiry frameworks in a complex social harm prevention context, suggesting these theories can function

complementarily when applied to multi-modal intervention evaluation. Second, the study extends the Community of Inquiry framework's application beyond its typical higher education domain to an illustrative community-based legal education context, an application that, to the authors' knowledge, has not previously been reported for early-marriage-prevention programming specifically (as distinct from digital or online learning research more broadly, where CoI has wider precedent). Third, the within-strata legal awareness gap analysis showing a numerically larger engager/non-engager gap in the highland stratum than in the urban stratum contributes a specific, testable observation to debates about digital technology as an equity mechanism in LMIC contexts, offering a data point that qualifies, though does not by itself overturn, assumptions that digital interventions primarily benefit already-advantaged populations.

Implications for Policy and Practice

Keeping the caveats discussed above in mind, some of the potential implications for policy and practice regarding the prevention of early marriage in Indonesia are presented below. First, the significant differences between regions in terms of legal awareness and digital connectivity suggest a need to consider region-specific approaches to intervention; investments in infrastructure development in rural and highland regions, including access to affordable internet and devices along with teaching digital literacy skills in school curriculum, may contribute to making online education an instrument of social equalization rather than amplification of advantages (Barbier, 2022; Psaki et al., 2022), however, this idea was not tested by the study design. Second, the role of parents' attitudes towards early marriage and their willingness to intervene in children's relationships indicates that future interventions should involve parents and elderly community members through appropriate programming. Third, the importance of digitally mediated peer advocacy identified in the study may be taken as grounds for piloting and evaluating the effectiveness of peer education training programs. Extending elements of this approach to Indonesia's designated 3T regions may be a worthwhile area for future piloting, given the accessibility advantages documented here in resource-limited settings, though this would require dedicated evaluation in those specific contexts before broader scale-up.

LIMITATIONS

Several issues related to the limitations of this study must be highlighted. First, although 10 communities of different geographical locations were selected for this study, the findings do not necessarily capture the socio-cultural and technological heterogeneity found in Indonesia. Thus, this study's results can only be generalized to similar remote and peri-urban settings. Second, digital engagement was quantified based on the statistics obtained from WhatsApp and YouTube platforms that could be regarded as indirect indicators of learning engagement and are unable to quantify participants' individual engagement or passive engagement. Third, self-reporting bias could be present in survey questions and interviews since anonymity of the surveys and culturally sensitive data collection were not enough to ensure participants' honest answers. Fourth, there was no control group, and participants chose to take part in the digital campaign voluntarily. Therefore, any difference found between engagement groups could be attributed to the self-selection of participants. Fifth, even though some sensitivity analyses indicated low clustering effects, the main analyses were performed without accounting for the community-level random effects. Sixth, the cross-sectional nature of the study and short period of the intervention did not allow concluding anything about the long-term behavioral changes and marriage outcomes.

CONCLUSION

In summary, this study has explored the joint influence of digital learning sites, legal awareness campaigns, education programs, and strategic communication on early marriage attitudes, legal awareness, and intentions in 10 communities in Indonesia, resulting in an empirical portrait of the relationships among these modalities. Due to its cross-sectional design, the results of this study must be understood as evidence of changes in legal awareness, attitudes, and intentions but not confirmed behavioral outcomes. Nevertheless, the results cast doubts on any single-intervention strategy and imply that the problem of early marriage prevention may be solved via a carefully designed multi-modal architecture. One of the major contributions of this study is the cross-strata correlation

between the use of online learning sites and higher legal awareness levels – numerically strongest in highland communities experiencing more intense structural pressure. While there is a potential for digital learning platforms to foster equal access to education in less developed communities, issues related to accessibility and participation must be overcome. Legal awareness campaign videos on YouTube and WhatsApp groups dedicated to educational purposes were perceived by respondents as convenient and private means of rights-based learning. These findings also highlight the importance of improving internet connectivity, device availability, and digital literacy to ensure equitable participation across communities.

Cultural norms and attitudes of parents emerge as some of the most enduring obstacles to attitudinal and behavioral changes, based on deeply ingrained stories of maintaining family honor, economic realities, and intergenerational responsibilities, which cannot easily be overcome by raising awareness of legal issues. The implementation of any successful program will require culturally sensitive, economically aware, and community-endorsed initiatives that involve active participation of parents and community leaders in norm change rather than mere delivery of information. Peer advocacy proved itself to be quite an effective tool in building adolescents' self-confidence and understanding of their rights, but more research is needed to validate this finding. On the whole, the results of the study can be used to inform policymakers, educators, and community leaders in designing interventions aimed at preventing early marriage and supporting Sustainable Development Goal 5.3.

AUTHOR CONTRIBUTIONS

ANI was responsible for conceptualization, methodology, investigation, funding acquisition, and preparation of the original draft of the manuscript. EP contributed to the methodology, formal quantitative analysis, data curation, and critical review and editing of the manuscript. Both authors read and approved the final version of the manuscript.

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