Digital Catechesis as Cyber-Theological Practice: Model Integration, Semiotic Capacity, and Hybrid Faith Formation in Post-Pandemic Indonesia

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Abstract

Purpose: This study aims to examine how digital catechesis was implemented as a cyber-theological practice in the Diocese of Ruteng, Indonesia, during the post-COVID-19 period (2020–2022). It seeks to analyze the integration of digital catechesis models, the use of semiotic strategies in digital faith communication, the pedagogical dynamics across digital platforms, and context-specific adaptations in infrastructure-diverse ecclesial settings. **Methodology:** The research employed a qualitative phenomenological design to explore the lived experiences of digital catechesis practitioners and participants. Data were collected through semi-structured interviews with 39 informants, platform-based observations of more than 150 digital catechetical posts, and document analysis of diocesan pastoral materials. Participants were selected using purposive maximum variation sampling across urban, sub-district, and rural parishes. Data were analyzed using thematic analysis with methodological triangulation to ensure rigor and credibility. **Findings:** The findings reveal that the Diocese of Ruteng implemented digital catechesis through the simultaneous integration of three complementary models: media awareness catechesis, technology-mediated catechesis, and digital media-based catechesis, forming a comprehensive catechetical ecosystem. A persistent misalignment was identified between catechetical content production, which remained dominated by conceptual theological language, and youth engagement preferences, which favored symbolic, narrative, and visual forms of communication. This gap was attributed primarily to limitations in semiotic production capacity rather than lack of pastoral awareness. Pedagogical effectiveness was found to depend more on facilitator competence than on platform affordances, with asynchronous platforms remaining underutilized despite their interactive potential. In response to infrastructural constraints, rural parishes developed innovative hybrid practices by sourcing digital content for offline, face-to-face catechesis. **Implications:** These findings have important implications for digital catechesis and cyber-theological practice. They highlight the need for integrated catechetical strategies, investment in symbolic and creative media capacities, targeted training for facilitators—particularly for asynchronous digital pedagogy—and explicit attention to access equity. **Originality/Value:** This research offers two key original contributions. First, it introduces *digitally-sourced analog catechesis* as a fourth model within digital catechesis typology, expanding existing theoretical frameworks. Second, it conceptualizes *semiotic capacity* as a critical variable in the effectiveness of digital catechetical communication.

Keywords: Cyber theology; digital catechesis; digital pedagogy; hybrid faith formation; semiotic capacity.

Abstrak

Tujuan: Penelitian ini bertujuan untuk mengkaji bagaimana katekese digital diimplementasikan sebagai praktik teologi siber (*cyber-theological practice*) di Keuskupan Ruteng, Indonesia, pada periode pasca-COVID-19 (2020–2022). Penelitian ini menganalisis integrasi model-model katekese digital, penggunaan strategi semiotik dalam komunikasi iman digital, dinamika pedagogis lintas platform digital, serta bentuk-bentuk adaptasi kontekstual dalam lingkungan gerejawi yang memiliki keragaman infrastruktur. **Metodologi:** Penelitian ini menggunakan desain kualitatif fenomenologis untuk mengeksplorasi pengalaman hidup para pelaku dan peserta katekese digital. Data dikumpulkan melalui wawancara semi-terstruktur terhadap 39 informan, observasi berbasis platform terhadap lebih dari 150 unggahan

katekese digital, serta analisis dokumen materi pastoral keuskupan. Partisipan dipilih menggunakan teknik *purposive maximum variation sampling* yang mencakup paroki perkotaan, kecamatan, dan pedesaan. Analisis data dilakukan dengan analisis tematik serta triangulasi metodologis untuk menjamin ketelitian dan kredibilitas penelitian. **Temuan:** Hasil penelitian menunjukkan bahwa Keuskupan Ruteng mengimplementasikan katekese digital melalui integrasi simultan tiga model katekese yang saling melengkapi, yaitu katekese kesadaran media (*media awareness catechesis*), katekese berbasis teknologi (*technology-mediated catechesis*), dan katekese berbasis media digital (*digital media-based catechesis*), sehingga membentuk sebuah ekosistem katekese yang komprehensif. Ditemukan adanya ketidaksesuaian yang persisten antara produksi konten katekese yang masih didominasi oleh bahasa teologis konseptual dengan preferensi keterlibatan kaum muda yang lebih responsif terhadap bentuk komunikasi simbolik, naratif, dan visual. Ketidaksesuaian ini terutama disebabkan oleh keterbatasan kapasitas produksi semiotik, bukan oleh kurangnya kesadaran pastoral. Efektivitas pedagogis terbukti lebih ditentukan oleh kompetensi fasilitator dibandingkan oleh karakteristik platform digital, dengan platform asinkron masih belum dimanfaatkan secara optimal meskipun memiliki potensi interaktif. Sebagai respons terhadap keterbatasan infrastruktur, paroki-paroki pedesaan mengembangkan praktik hibrida yang inovatif dengan memanfaatkan konten digital untuk katekese tatap muka secara luring. **Implikasi:** Temuan ini memiliki implikasi penting bagi pengembangan katekese digital dan praktik teologi siber. Hasil penelitian menegaskan perlunya strategi katekese yang terintegrasi, investasi dalam kapasitas produksi media simbolik dan kreatif, pelatihan terarah bagi para fasilitator—khususnya untuk pedagogi digital asinkron—serta perhatian yang serius terhadap isu keadilan akses. **Keaslian/Nilai:** Penelitian ini menawarkan dua kontribusi orisinal utama. Pertama, penelitian ini memperkenalkan konsep *digitally-sourced analog catechesis* sebagai model keempat dalam tipologi katekese digital, sehingga memperluas kerangka teoretis yang ada. Kedua, penelitian ini mengonseptualisasikan *kapasitas semiotik* sebagai variabel kunci dalam efektivitas komunikasi katekese digital.

Kata Kunci: Teologi siber; katekese digital; pedagogi digital; pembinaan iman hibrida; kapasitas semiotik

INTRODUCTION

The COVID-19 pandemic precipitated an unprecedented digital transformation across religious institutions globally. By mid-2020, approximately 80% of religious congregations worldwide had adopted digital ministry forms, marking the largest technological disruption in religious education since Gutenberg's printing press (Campbell, 2020; Isetti, 2022; Kuhle & Larsen, 2021; Monika, 2021; Sabate Gauxachs, Albalad Aiguabella, & Diez Bosch, 2021). This shift transcended temporary adaptation, signifying a fundamental reimagining of how faith communities maintain spiritual connectivity during crises.

In Indonesia, the world's third-largest democracy and the largest Muslim-majority country with a significant Catholic minority, this digital imperative intersects with deep infrastructure gaps. The Ruteng Diocese in East Nusa Tenggara Province exemplifies this tension. As one of the largest dioceses in Indonesia, Ruteng encompasses heterogeneous contexts: urban centers with strong 4G/LTE connectivity, sub-district towns with moderate 3G infrastructure, and remote rural villages where internet remains sporadic or non-existent.

During 2020-2022, while the Indonesian government mandated social distancing and restricted religious gatherings (Ministry of Health Regulation No. 9/2020), Bishop Siprianus Hormat issued multiple pastoral instructions requiring parishes to maintain catechetical continuity through digital means—a directive that appeared technologically feasible for urban parishes but potentially impossible for rural communities. Understanding how such contexts navigate digital transformation holds critical implications beyond Indonesia, as approximately 60% of global Catholics reside in the Global South where infrastructure disparities mirror those in Ruteng (Pew Research Center, 2013).

Although the literature on digital catechesis has grown rapidly during the pandemic, existing research still shows a number of fundamental limitations that create significant knowledge gaps. First, most previous studies have tended to focus on one model of catechesis separately from both media awareness education (Chmielewski, 2020; Mazur, 2021), technology-mediated catechesis (Chrzanowska, 2020; Sodi, 2021), and digital media-based catechesis (Kristeno & Tarihoran, 2024; Magana, 2021; Michniuk, 2023). Each of these approaches makes an important contribution to the development of digital catechesis praxis, but there has not been much research that integrates all three into one comprehensive conceptual framework. Until now, there has been no empirical research examining how these three are integrated simultaneously, especially in crisis situations when churches are required to implement a comprehensive and rapid response digitally. The second limitation is related to the semiotic dimension in digital catechesis, namely the way language is used to communicate faith in the digital space. Although a number of studies recognize that the digitization of catechesis demands the inculturation of the gospel message into the culture of digital communication (Chmielewski, 2020; Magana, 2021; Mazur, 2021), systematic studies of language strategies, especially the balance between conceptual and symbolic language, are still very limited. Some authors emphasize that symbolic and visual language is more effective for digital natives who are more responsive to religious narratives and metaphors (Kristeno & Tarihoran, 2024; Michniuk, 2023; Pranyoto, Berangka, & Noerjanto, 2024). However, empirical evidence regarding the actual distribution of language use and its impact on audience engagement is still scarce (Musa, 2019; Rahayu, 2023).

The third gap concerns the pedagogical mechanisms that underpin the success of digital catechesis. Several studies have shown that effective digital catechesis requires an interactive pedagogical approach that encourages the active participation of the people (Komsiyah, 2021; Nainggolan, 2021). However, empirical studies that systematically analyze how synchronous platforms such as Zoom and asynchronous platforms such as WhatsApp or YouTube support or limit these forms of interactive pedagogy are still very limited (Atmazaki, Ramadhan, & Indriyani, 2023; Huriyah, 2023; Masitoh, Fitriyah, & Mumtaza, 2024; Muhammad & Nagaletchimee, 2023). In addition, recent research confirms that the success of digital catechesis is greatly influenced by the capacity of facilitators, especially in terms of technical competence, digital literacy, and pedagogical skills (Fauzan, Arifin, Lubis, & Firdaus, 2022; Hanifah, Binti Adam, Faizin, Miftakhul Jannah, & Hanafi, 2024; Trick & Wadham, 2024; Tiwari, 2024). Institutional supporting factors such as training, technology support, and participatory-centered learning design are also said to play a crucial role in improving the quality of faith interactions in the digital space (Harsabawa & Ernawati, 2023; Kurniawati, Mayuni, & Lustyantie, 2024; Maemonah, Purnama, Rohinah, Aziz, & Faza Muhammadkan Bastian, 2022; Oliver, 2022). Fourth, research gaps arise from a lack of attention to context-sensitive digital catechesis implementation mechanisms. The existing literature tends to focus on urban areas with adequate digital infrastructure or presents aggregate analyses without distinguishing between regional strategies (Hanifah et al., 2024; Harsabawa & Ernawati, 2023; Mazur, 2021). As a result, the dynamics of the implementation of digital catechesis in dioceses with mixed infrastructure, such as how rural parishes adapt to limited internet and device access, are still not adequately documented (Kristeno & Tarihoran, 2024; Trick & Wadham, 2024; Maemonah et al., 2022; Masitoh et al., 2024; Musa, 2019). Some recent studies have begun to emphasize the importance of contextual implementation strategies that consider resource disparities, digital literacy, and local communication culture as key factors in the success of digital catechesis (Kristeno & Tarihoran, 2024; Pranyoto et al., 2024). This void hinders a deep understanding of how local innovation emerges in the context of limited resources. Overall, these four gaps point to the need for research that not only describes the practice of digital catechesis but also comprehensively analyzes

model integration, semiotic strategies, pedagogical dynamics, and contextual adaptation. This research seeks to answer this gap.

This study employs an integrated analytical framework synthesizing three complementary perspectives. First, it draws on the Digital Catechesis Typology proposed by Komkat KWI (2016) , which encompasses media awareness catechesis, technology-mediated catechesis, and digital media-based catechesis. Second, the study adopts semiotic theory, particularly Paul Ricoeur's (1981) distinction between conceptual and symbolic religious language, to examine how faith is communicated in digital environments. Third, it incorporates the digital pedagogy framework articulated by Siemens (Siemens, 2005), emphasizing interactive and participatory learning in digitally mediated contexts. Taken together, these perspectives converge to suggest that effective digital catechesis requires strategic alignment across multiple dimensions, including appropriate model integration, semiotic strategies that resonate with audience characteristics, and pedagogical approaches that leverage platform affordances through skilled facilitation.

The primary aim of this study is to examine how the Diocese of Ruteng implemented digital catechesis during the post-COVID-19 new normal period (2020–2022), with particular attention to the integration of catechetical models, language strategies, and pedagogical approaches across diverse infrastructural settings. Accordingly, the study investigates four interrelated questions: how various digital catechesis models were adopted and combined across urban, sub-district, and rural contexts? the extent to which catechetical language, particularly the balance between conceptual and symbolic expressions, corresponds with youth preferences and what factors shape any misalignment? how effectively do different digital platforms facilitate interactive pedagogical practices and the degree to which facilitator competence influences these outcomes? and finally, what forms of context-specific adaptation emerged as parishes navigated significant disparities in digital infrastructure? Together, these questions provide a comprehensive framework for understanding the dynamics, challenges, and innovations within the diocese's digital catechetical transformation.

RESEARCH METHOD

This study employed a qualitative phenomenological design to explore the lived experiences of digital catechesis practitioners and participants during an unprecedented crisis period, following the methodological principles articulated by Moustakas (1994). The research was conducted in the Diocese of Ruteng, East Nusa Tenggara, Indonesia, which comprises 86 parishes distributed across three regencies. For analytical clarity, parishes were classified into three infrastructural categories: urban parishes (n = 9) with reliable 4G/LTE connectivity, sub-district parishes (n = 27) with moderate 3G access, and rural parishes (n = 50) where connectivity was limited or intermittent, typically relying on 2G/3G networks.

Sampling followed a purposive maximum variation strategy (Patton, 2014) to capture diverse perspectives across ecclesial roles and infrastructural contexts. A total of 39 participants were recruited, including three diocesan commission heads, nine parish priests (three from each context), nine lay catechists (also three per context), and eighteen young Catholics aged 18–30 (six per context). Sample size adequacy was guided by theoretical saturation, which was reached by the 32nd interview, consistent with the parameters suggested by Guest, Bunce, and Johnson (2006).

Data collection drew on multiple sources to ensure depth and triangulation. Primary data consisted of structured interviews conducted between September and October 2023, lasting 45–90

minutes (mean = 62). Interviews were conducted face-to-face (67%) and via WhatsApp video calls (33%), were audio-recorded with informed consent, and transcribed verbatim within 48 hours. Complementing the interviews, platform-based observations were carried out from July to September 2023, covering more than 150 catechetical posts across parish and diocesan websites, two YouTube channels, six Facebook pages, and nine WhatsApp groups, using a structured observation protocol. Secondary data included diocesan catechesis modules from 2020–2022, pastoral instructions, and monitoring reports, providing institutional context for interpreting digital practices.

Data were analyzed using Braun and Clarke's (Braun & Clarke, 2006) six-phase thematic analysis with the support of NVivo 12. The coding process generated 127 initial codes derived deductively from the analytical framework and inductively from the data. Through iterative refinement, three major themes emerged corresponding to the study's research questions. Analytical rigor was ensured through inter-coder reliability procedures, with 15% of transcripts double-coded, yielding a Cohen's kappa of 0.82. Credibility was further strengthened through methodological triangulation across interviews, observations, and documents, as well as member checking with three key informants who reviewed and validated the preliminary findings.

RESULTS

Integrated Multi-Model Implementation

Media Awareness Catechesis

The media literacy catechesis program has been strengthened since mid-2020 by utilizing the foundation of literacy training in 2016–2017. The Diocesan Social Commission leads this initiative through three main channels. First, the Diocesan Social Commission conducts a weekly radio broadcast on NG FM 102.2, which systematically discusses the ten principles of media ethics from Komsos KWI (2018). Second, a visual campaign in the form of PowerPoint slides that was distributed through a tiered WhatsApp flow from the Pastoral Center to the deacon, then to the parish, to the KBG and the family, which allowed more than 75% of parishes to receive materials in less than 24 hours. Third, quarterly Zoom webinars targeting young people, with a consistent number of participants between 150 to 200 people per session.

According to the Head of the Commission, ESH, each ethical principle is translated into a visual slide equipped with concrete examples from cases in the local parish. For example, the principle of "filter before sharing" is presented with an illustration of a case of spreading COVID-19 information that turned out to be false and had caused panic in the parish's WhatsApp group. This local example-based approach is designed so that ethical messages are more relevant and easy for community members to internalize (ESH, personal communication, September 15, 2023).

Technology-Mediated Catechesis

Table 1. Digital Infrastructure and Platform Adoption

Technology	Description	Coverage	Parish Adoption

NG FM 102.2	Terrestrial radio + streaming	3 regencies	100% (listening audience)
YouTube	2 channels (Komsos, Komkep)	Global	39.53% parishes have own channels
Facebook	Fanpage + parish pages	8,500+ followers	50% parishes (urban 89%, sub-district 67%, rural 36%)
WhatsApp groups	Hierarchical structure	Diocese-wide	60.67% parishes (urban 100%, sub-district 85%, rural 44%)
Website	keuskupanruteng.org	2,000+ monthly visits	8.14% parishes have own sites

Source: Pastoral Center monitoring (April 2022) & current study

Table 1 illustrates the state of digital infrastructure and the adoption rate of various technology platforms used for catechesis in the Diocese of Ruteng. Each technology is described in terms of its function, territorial scope, and the extent to which parishes use it.

The Pastoral Center (through the cooperation of Komsos, Komkat, and Komkep) actively produces various types of digital content to support catechesis. The content includes: a series of pastoral lectures, the Bishop's monthly message, liturgical live broadcasts, COVID-19 documentaries, and inspirational spiritual songs such as "We Can". In addition to content production, the diocese also built a layered digital communication structure through WhatsApp. According to Father SN, this communication flow is designed so that information flows from the diocesan level to the vicariate, then to the parish, to the KBG (ecclesiastical base community). However, it is not just one direction: innovation and creative content from the grassroots (KBG or parish) can also rise to the diocesan level, resulting in a dynamic two-way communication process (SN, personal communication, September 27, 2023).

Digital Media-Based Catechesis

The implementation of digital media-based catechesis in the Ruteng Diocese develops through various forms of complementary activities. Catechists begin the process of digital catechesis by searching and curating material from various sources such as Google, YouTube, and trusted Catholic websites. The materials that are considered appropriate are then shared through platforms such as WhatsApp and Facebook, enabling the faithful to access catechetical content quickly and conveniently. Social media, especially WhatsApp, has become an important means of pastoral communication. Although there are no groups specifically created for catechesis, the conversations that take place within such groups often involve the sharing of faith experiences and simple reflection, thus serving as a lively informal catechesis space.

In addition, the Zoom platform is used for more structured catechesis activities. The Youth Commission (Komkep) regularly holds monthly meetings for representatives of Catholic Young People (OMK), which are generally attended by 30–50 participants. In urban parishes, Zoom is also used for family First Communion preparations, with a fairly high participation rate, between 85–

90% for families with digital facilities. Meanwhile, the diocesan website acts as a digital repository center that stores documents, pastoral information, audio recordings of radio streaming, and video galleries, making it easier for the faithful and catechists to access official materials in a regular and standardized manner.

In the context of rural parishes with limited internet access, more hybrid pastoral innovations have emerged. Catechists in the region usually download catechesis materials from the diocesan website when they are in a city with a stable internet connection. The material was then printed and brought back to the village to be distributed to the heads of the Ecclesiastical Base Community (KBG). Through the printed materials, KBG leaders facilitate the deepening of faith in small groups face-to-face. As DV, a rural lay catechist, put it,

> We download materials from the diocesan website when we are in town, then print them out and bring them to the village. We shared the material with KBG leaders to deepen faith in small groups. Not completely digital, but starting from digital (DV, personal communication, September 25, 2023).

This approach shows that despite the limitations of technology being a challenge, local creativity allows the catechesis process to continue effectively, by combining the power of digital platforms and in-person community meetings

Language Strategies and Engagement Patterns

Table 2. Distribution of Language Types Across Digital Platforms (n > 150 posts)

Platform	Conceptual Language	Symbolic Language	Mixed
Diocesan website	75%	15%	10%
YouTube (Komsos)	70%	20%	10%
YouTube (Komkep)	45%	40%	15%
Facebook posts	60%	30%	10%
WhatsApp shares	55%	35%	10%

Table 2 presents an analysis of more than 150 catechetical uploads across digital platforms in the Diocese of Ruteng. The findings indicate that most parishes remain heavily reliant on conceptual language, characterized by theological and doctrinal explanations presented in extended textual formats, with dominant proportions observed on the diocesan website (75%), the Komsos YouTube channel (70%), Facebook (60%), and WhatsApp (55%). In contrast, the use of symbolic language—such as narratives, testimonies, music, short videos, and imaginative visuals—remains limited, despite empirical observations indicating that this type of content generates three to four times higher levels of audience interaction. This preference is reinforced by interviews with young people: "*If there is a testimony video or a touching story, I will watch it to the end and share it with my friends immediately. But if the text is long that explains doctrine, I usually skip or read it quickly*" (SR, SV, AH, AN, EK, VB, AS, personal communication, September 17, 2023). A similar response came in the form of appreciation for musical and visual content: "*Music and video are more impactful. The song 'Kita Bisa' immediately went viral in our group. But the doctrine slide rarely has anyone commented*" (AS, personal communication, September 17, 2023). While the commission's leaders recognize that symbolic content is more effective for young audiences, they uncover

structural barriers that stand in the way of consistent creative content production. A commission head stated, "*We know OMK prefers symbolic content, but creating a video or visual content requires skills, time, and tools that we don't always have. Writing a theological text is much easier*" (BH, personal communication, September 15, 2023). Thus, the mismatch between the language style used by the church and the preferences of the digital generation is not due to a lack of pastoral awareness, but above all to the limitations of production capacity, confirming the importance of developing semiotic capacity and creative media capabilities in future digital catechesis.

Platform-Dependent Pedagogical Effectiveness

To examine how different digital platforms shape the pedagogical quality of catechetical engagement, this study compares platform affordances with their actual pedagogical utilization across the Diocese of Ruteng. Building on digital pedagogy theory, which emphasizes interaction, participation, and dialogical learning, the analysis moves beyond platform availability to assess how pedagogical practices are enacted in real contexts. Table 3 presents a comparative overview of key digital platforms used for catechesis, highlighting their interactive potential, levels of actual utilization, participation rates, and structural barriers. This comparison provides an empirical basis for understanding how pedagogical effectiveness in digital catechesis is conditioned not only by technological features but also by facilitation practices and contextual constraints.

Table 3. Pedagogical Interactivity by Platform

Platform	Affordance Potential	Actual Utilization	Participation Rate	Key Barriers
Zoom	High (real-time Q&A, polls, breakout rooms)	Moderate	30% target population	Infrastructure, cost, access
WhatsApp	Moderate-High (group chat, multimedia)	Low (mostly broadcast)	60% parishes but passive	Lack of facilitation training
Facebook	Moderate (comments section)	Very Low (minimal response mgmt)	50% parishes but one-way	No community management
YouTube	Moderate (comments section)	Very Low (rarely monitored)	40% parishes, passive viewing	No dedicated personnel
Website	Low (inherent one-way design)	Low	8% parishes, info repository	Architectural limitation

Radio	Low (medium limitation)	Low	Wide reach, passive listening	Inherent one-way medium

Table 3 illustrates that the pedagogical effectiveness of digital catechesis is strongly conditioned by the characteristics and use of each platform, highlighting what can be described as *platform-dependent pedagogy*. The findings indicate that while different platforms offer varying degrees of interactive affordances, pedagogical effectiveness is unevenly realized in practice.

Among the platforms examined, Zoom emerges as the only medium capable of facilitating high levels of interactivity through real-time video communication, live chat, polling features, and breakout rooms. Priests and catechists consistently reported that Zoom-based catechesis most closely approximates face-to-face learning environments. As one parish priest noted, *"In Zoom, I can see participants' faces, read their reactions, and receive immediate responses through chat and polls. It feels closest to face-to-face catechesis. The challenge is that only about 30% of young people have consistent access to participate"* (IS, personal communication, September 25, 2023). These findings suggest that although Zoom is pedagogically effective, its accessibility remains limited due to constraints related to data costs, device availability, and network quality.

In contrast, asynchronous platforms such as WhatsApp, Facebook, and YouTube possess substantial potential for interactive engagement but are underutilized in practice. WhatsApp, despite being the most widely adopted platform, is predominantly used in a one-way communication mode, limiting opportunities for dialogical interaction. As one young Catholic explained, *"Our parish WhatsApp group has the potential for deep conversations, but priests and catechists mostly post materials and we simply receive them. It is mostly one-way communication"* (SR, SV, AH, AN, EK, VB, AS, personal communication, September 17, 2023). A similar pattern is evident on Facebook and YouTube, where comment features are rarely managed as spaces for discussion. As a diocesan commission member admitted, *"We upload YouTube videos but rarely respond to comments. We lack dedicated personnel to monitor and facilitate online discussions"* (MC, personal communication, September 15, 2023).

Overall, the analysis confirms that the primary constraint on effective digital pedagogy lies not in technological affordances but in facilitator capacity. Many catechists serve as volunteers with full-time occupations, limiting their availability for sustained digital mentoring and interaction. As one lay catechist observed, *"Many catechists are volunteers with full-time jobs. We need capacity building in digital pedagogy, not just digital tools"* (AA, lay catechist). Consequently, the success of digital catechesis is shaped less by the choice of platform and more by the ability of human resources to facilitate dialogue, moderate interactions, and manage digital learning communities.

DISCUSSION

This study reveals that successful digital catechesis implementation in infrastructure-diverse contexts emerges not from uniform technological adoption but from strategic model integration, context-responsive adaptation, and careful navigation of capacity-technology trade-offs. Three core patterns characterize the Diocese of Ruteng's digital transformation: first, the simultaneous deployment of three complementary catechetical models media awareness, technology-mediated, and media-based catechesis created a comprehensive ecosystem that addressed different dimensions of digital faith formation. Second, a persistent misalignment exists between content production strategies and youth engagement preferences, manifesting as predominant conceptual

language use (55-75%) despite symbolic language generating substantially higher interaction rates. Third, pedagogical effectiveness proved fundamentally constrained by facilitator capacity rather than platform affordances, with synchronous tools enabling genuine interactivity only when skilled facilitation was present, while asynchronous platforms remained underutilized despite their dialogic potential. Critically, rural parishes developed innovative hybrid approaches "digitally-sourced analog catechesis" downloading content for offline face-to-face sessions, demonstrating that digital transformation in resource-constrained contexts requires reconceptualizing the digital-analog boundary rather than pursuing full digitalization.

The Diocese of Ruteng's simultaneous implementation of three catechetical models addresses a significant gap in existing literature, which has predominantly examined these approaches in isolation (Chmielewski, 2020; Chrzanowska, 2020; Dadi, 2021; Magana, 2021). Our findings demonstrate that effective digital catechesis requires integrative rather than singular strategies, particularly during crisis periods demanding rapid, comprehensive responses. This integrated approach functioned synergistically: media awareness catechesis established ethical foundations for digital engagement, technology-mediated catechesis ensured content distribution across infrastructure contexts, and media-based catechesis enabled participatory learning in conducive environments.

This model pluralism extends theoretical frameworks proposed by Indonesia's Bishops' Conference Commission on Catechesis (Komkat KWI, 2016) by demonstrating how these models operate not as alternatives but as complementary dimensions of a unified digital ministry strategy. The hierarchical WhatsApp communication structure exemplifies this integration, functioning simultaneously as an awareness-building tool (through ethical content dissemination), a technology-mediated delivery mechanism (broadcasting pastoral materials), and a media-based participatory space (enabling group conversations). This finding resonates with Isetti's (Isetti, 2022) observation that pandemic-era digital ministry required "technological bricolage" rather than singular platform solutions, though our study provides more granular empirical evidence of how such integration manifests across diverse infrastructural contexts.

However, our data also reveal critical implementation disparities across contexts. While urban parishes achieved near-universal platform adoption (100% WhatsApp, 89% Facebook), rural parishes lagged significantly (44% WhatsApp, 36% Facebook), creating what we term "tiered digital accessibility." This pattern challenges assumptions in much digital ministry literature that treats "digital adoption" as binary (Campbell, 2020; Kuhle & Larsen, 2021). Our findings suggest that in heterogeneous dioceses, digital transformation produces stratified rather than uniform outcomes, necessitating explicit attention to equity in pastoral planning.

The emergence of "digitally-sourced analog catechesis" in rural parishes represents a significant theoretical contribution. This hybrid model where catechists download digital content in urban centers, print materials, and facilitate face-to-face small group sessions was not anticipated in existing catechetical typologies. It challenges the implicit digitalism in contemporary religious education discourse that equates digital transformation with screen-mediated interaction (Kristeno & Tarihoran, 2024; Michniuk, 2023). Instead, our data suggest that in infrastructure-constrained contexts, the most valuable contribution of digital technologies may be enhancing analog practices rather than replacing them. This finding aligns with broader development communication literature documenting "hybrid media ecologies" in the Global South (Mudhai,

Tettey, & Banda, 2009), where digital and traditional media coexist and mutually reinforce rather than substitute each other.

The persistent dominance of conceptual language across platforms (55-75%) despite clear evidence that symbolic language generates 3-4 times higher engagement rates represents a critical finding with both theoretical and practical implications. This misalignment challenges conventional explanations for ineffective religious communication, which often attribute such failures to awareness deficits or resistance to change among religious educators (Chmielewski, 2020; Mazur, 2021). Our data reveal a more nuanced reality: diocesan leaders and catechists explicitly recognized youth preferences for symbolic, narrative, and visual content, yet remained unable to produce it consistently.

We conceptualize this phenomenon as a "semiotic capacity gap" the disparity between awareness of effective communicative strategies and the technical, creative, and resource capacity to implement them. Commission heads acknowledged that "making videos or visual content requires skills, time, and tools we don't always have. Writing theological texts is much easier." This capacity constraint has received insufficient attention in digital catechesis literature, which tends to emphasize pedagogical awareness and theological adaptation (Magana, 2021; Pranyoto et al., 2024) while underestimating the production competencies required for effective digital content creation.

Our findings extend Ricoeur's (1981) semiotic theory by demonstrating that the conceptual-symbolic tension in religious communication manifests not only as a theological or philosophical choice but as a capacity-constrained production challenge. In resource-limited contexts, conceptual language predominates not because it is theologically preferred but because it is technically accessible requiring only word processing skills rather than video editing, graphic design, or multimedia production competencies. This has significant implications for understanding the digital divide in religious education: the gap is not merely infrastructural (access to devices and connectivity) but also semiotic (capacity to produce culturally resonant digital content).

The finding that Komkep's YouTube channel achieved a more balanced language distribution (45% conceptual, 40% symbolic) compared to other diocesan platforms supports this capacity interpretation. Komkep, as the youth commission, possessed younger staff members with stronger multimedia skills and familiarity with digital culture. This suggests that bridging the semiotic capacity gap requires not only training existing catechists but also strategic recruitment of digitally-native content creators a human resource implication often overlooked in pastoral planning.

This semiotic analysis contributes to ongoing debates about inculturation in digital catechesis (Kristeno & Tarihoran, 2024; Michniuk, 2023). Our findings suggest that effective digital inculturation requires not just theological translation (adapting faith content for digital contexts) but also semiotic production capacity (creating content in forms that resonate with digital communication cultures). The consistent youth preference for testimonial videos, narrative storytelling, and music over doctrinal explanations aligns with broader research on digital-native communication preferences (Musa, 2019; Rahayu, 2023), but our contribution lies in documenting the institutional barriers preventing religious institutions from meeting these preferences despite explicit awareness.

Our finding that pedagogical effectiveness depends more on facilitator capacity than platform affordances challenges techno-optimistic assumptions pervading much digital education literature (Siemens, 2005). While Zoom theoretically enabled highly interactive catechesis through real-time

video, polling, breakout rooms, and chat functions, only 30% of target populations could access it due to infrastructure and cost barriers. Conversely, WhatsApp reaching 60.67% of parishes functioned primarily as a broadcast medium despite its inherent capacity for rich group interaction. This paradox demonstrates that platform affordances constitute necessary but insufficient conditions for effective digital pedagogy.

This pattern resonates with recent studies emphasizing facilitator competence as the critical variable in digital religious education (Fauzan et al., 2022; Hanifah et al., 2024; Tiwari, 2024). However, our research extends these findings by specifying the mechanism: facilitator capacity constraints manifest differently across synchronous and asynchronous platforms. In synchronous Zoom sessions, trained facilitators successfully leveraged interactive affordances, creating experiences "closest to face-to-face catechesis." In asynchronous platforms (WhatsApp, Facebook, YouTube), the same facilitators struggled to maintain dialogic engagement, defaulting to broadcast models despite theoretical awareness of participatory ideals.

We interpret this differential pattern through the lens of pedagogical immediacy. Synchronous platforms provide immediate feedback cues (facial expressions, verbal responses, chat reactions) that trigger trained facilitators' existing face-to-face pedagogical instincts. Asynchronous platforms require fundamentally different competencies: sustained community management, proactive prompting for engagement, delayed response facilitation, and asynchronous discussion moderation skills not typically developed in traditional catechetical formation. As one catechist noted, "Many catechists are volunteers with full-time jobs... We need capacity building in digital pedagogy, not just digital tools."

This finding has significant implications for understanding the volunteer labor model common in Catholic parishes. Unlike professional educators with dedicated time for pedagogical innovation, volunteer catechists face severe time constraints limiting their capacity for sustained asynchronous facilitation. The comment management gap on Facebook and YouTube where posts received minimal responses despite available comment sections exemplifies this constraint. One commission member acknowledged, "We upload YouTube videos but rarely respond to comments. We lack dedicated personnel to monitor and facilitate online discussions."

Our data thus challenge the assumption that democratizing content creation (through accessible platforms like WhatsApp and Facebook) automatically democratizes effective pedagogy. Instead, we observe a pedagogical bottleneck: while technology access has expanded, the facilitation competencies and time resources required to activate platforms' interactive potential have not. This aligns with broader educational technology research demonstrating that technology integration requires not only technical training but also pedagogical redesign and institutional support (Harsabawa & Ernawati, 2023; Oliver, 2022).

The finding that only Zoom enabled genuine interactivity and only for 30% of youth reveals a troubling equity implication: the most pedagogically effective digital catechesis remains accessible only to economically privileged youth with devices, connectivity, and data plans. This creates a two-tiered learning experience where wealthier youth receive interactive formation while rural and economically disadvantaged youth receive primarily broadcast catechesis. This digital pedagogy gap deserves explicit attention in pastoral equity discussions, as it may reproduce socioeconomic stratification within faith formation processes.

The emergence of "digitally-sourced analog catechesis" in rural parishes represents perhaps the study's most significant practical contribution. This innovation, downloading materials in urban centers, printing them, and facilitating face-to-face small group discussions, challenges binary digital/analog frameworks pervading educational discourse. As one rural catechist explained, "*We download materials from the diocesan website when in town, then print and bring them to the village... It's not fully digital, but it starts from digital*."

This adaptive strategy demonstrates what we term "infrastructural creativity," innovations that emerge when pastoral agents confront technological constraints not as insurmountable barriers but as design parameters requiring creative solutions. Rural catechists effectively decoupled content sourcing (which benefits from digital distribution) from pedagogical delivery (which in their context works better face-to-face), creating a hybrid model more effective than either purely digital or purely analog approaches.

This finding extends recent literature emphasizing contextual implementation strategies in digital catechesis (Kristeno & Tarihoran, 2024; Limbong & Wadham, 2024; Pranyoto et al., 2024). However, while these studies note the importance of context-sensitivity, our research provides concrete empirical evidence of how such adaptation manifests and why it succeeds. The rural model worked because it: (1) leveraged urban infrastructure for content access while avoiding rural connectivity barriers; (2) preserved face-to-face interaction valued in communal rural cultures; (3) utilized existing small Christian community structures (KBG) rather than requiring new infrastructure; and (4) remained economically sustainable without requiring ongoing internet costs.

This adaptive innovation also speaks to debates about technology appropriateness in development contexts (Mudhai, Tettey, & Banda, 2009). Rather than viewing rural parishes as "lagging" in digital adoption, our framework recognizes their hybrid approach as sophisticated contextual adaptation. The persistence of face-to-face small groups despite digital availability suggests that for many rural Catholics, physical community gathering holds spiritual significance beyond mere information transfer, a dimension easily overlooked in techno-centric analyses.

However, this hybrid model also reveals limitations. While ensuring catechetical continuity, it depends on individual catechists' urban access and personal resources (printing costs, transportation). This individualized solution remains vulnerable and non-scalable without institutional support. Moreover, the model sacrifices the temporal immediacy possible in digital contexts, rural communities receive materials with greater delay than urban counterparts, potentially reducing relevance for time-sensitive pastoral messages.

This study has a number of important methodological strengths. The multimethod design that combines interviews, platform observations, and document analysis allows for powerful data triangulation. Maximum variation-based sample selection also expands the scope of findings and minimizes urban biases that are often inherent in digital research. In addition, the structured observation protocol of more than 150 digital uploads provides depth of symbolic representation analysis, while longitudinal coverage during 2020–2023 allows tracing of the dynamics of digital catechesis adaptation throughout the crisis phase to post-pandemic stabilization. However, this research also has some limitations. Focusing on a single diocese limits the generalization of findings, while the limited representation of groups of elderly and older adults can reduce the complexity of intergenerational perspectives. The engagement metrics used could not isolate the causal influence of symbolic language, and the interview data could potentially contain social bias.

In addition, the categorization of digital infrastructure is less granular, and this study has not measured the effectiveness of catechesis competently, so the contribution to faith development outcomes still needs to be studied further.

In terms of implications, this study makes a significant theoretical contribution by introducing two new concepts, namely "digital-based analog catechesis" as the fourth model in the typology of digital catechesis, and "semiotic capacity" as an important variable in the effectiveness of media-based catechesis. These findings challenge both overly optimistic and skeptical technological deterministic narratives and offer a more comprehensive contingency perspective on how digital catechesis works in the context of diverse human, symbolic, and institutional capacities. Practically, the results of the study lead to the need for integration strategies between catechesis models; investment in symbolic production capacity so that the message of faith is more digitally communicative; increased facilitator capacity, especially for asynchronous platforms; serious attention to the issue of access justice; as well as continued institutional support for hybrid models, especially in rural areas.

These findings open up a variety of follow-up research opportunities. Cross-diocesan and cross-country research can produce a richer comparative picture, while long-term longitudinal studies are needed to understand the transformation of digital practices over a more stable timeframe. Outcome-effectiveness-based research and research focusing on the voices of young people will deepen understanding of the impact of digital catechesis. In addition, the development of instruments to measure semiotic capacity, in-depth ethnography of hybrid catechesis practices, as well as the study of the political economy of digital catechesis infrastructure, are important directions to expand the knowledge landscape in this field.

Ultimately, the COVID-19 pandemic has forced religious institutions to undergo the largest digital transformation experiment in history. When the crisis phase subsides, critical reflection becomes essential to build a more resilient, fair, and effective faith-building system. The study shows the potential, challenges, and creative innovations that emerge from the context of limited capacity and infrastructure, while affirming that successful digital transformation is not born from universal solutions, but rather from the integration of context-responsive models, targeted capacity building, and pastoral commitment to ensure that digitalization reinforces, not weakens, the Church's mission, especially for the poor and marginalized.

CONCLUSION

This study demonstrates that effective digital catechesis in infrastructure-diverse contexts emerges not from uniform technological adoption but from strategic integration of multiple catechetical models, context-responsive adaptation, and systematic capacity building. The Diocese of Ruteng's experience reveals three critical insights: first, the simultaneous deployment of media awareness, technology-mediated, and media-based catechesis created complementary rather than competing pathways for faith formation during the COVID-19 crisis. Second, the persistent dominance of conceptual language despite youth preferences for symbolic forms reflects not pedagogical conservatism but semiotic capacity constraints a crucial distinction that reframes intervention strategies from awareness-raising to skills development. Third, pedagogical effectiveness depends fundamentally on facilitator competencies rather than platform affordances, with asynchronous tools remaining underutilized despite their dialogic

potential due to insufficient community management skills and time resources among volunteer catechists.

The emergence of "digitally-sourced analog catechesis" in rural parishes constitutes a significant theoretical contribution, challenging binary digital/analog frameworks and demonstrating that successful digital transformation in resource-constrained contexts requires reconceptualizing the digital-analog boundary rather than pursuing complete digitalization. This hybrid innovation reveals how pastoral creativity can transform infrastructural constraints into design parameters, though its sustainability requires institutional support beyond individual catechists' resourcefulness. Theoretically, this research extends digital catechesis typology by introducing a fourth model and establishes semiotic capacity as a critical variable in content effectiveness. Practically, it calls for integrated model strategies, investment in symbolic production competencies, targeted facilitator training for asynchronous pedagogy, explicit attention to access equity, and institutional backing for hybrid approaches. Methodologically, the study demonstrates the value of multi-method designs capturing diverse infrastructural contexts.

Future research should pursue cross-diocesan comparisons to test generalizability, longitudinal studies tracking post-pandemic stabilization, outcome-effectiveness investigations measuring actual faith formation impacts, youth-centered participatory research foregrounding digital-native perspectives, and political economy analyses examining power dynamics in digital infrastructure distribution. The pandemic's forced digital transformation experiment offers unprecedented opportunities to build more resilient, equitable, and contextually-responsive faith formation systems when approached through evidence-based reflection rather than technological determinism.

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