

A Study of Sense of Virtual Community: Empirical Realities and Structural Aspirations

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Abstract: This study investigates the development of a sense of virtual community (SOVC) within a WeChat-based professional learning community for foreign language instructors in China. Grounded in McMillan & Chavis's (1986) four-dimensional framework—membership, influence, needs fulfillment, and shared emotional connection—the research employs a modified Sense of Community Index (SCI) to assess 192 instructors' perceptions. Findings reveal a paradoxical duality: while the community demonstrates strong instrumental functionality and symbolic identity, critical relational dimensions remain fragmented. Membership shows robust shared purpose, yet influence is hindered by low member familiarity and ambivalent commitment. Emotional connection relies heavily on past collective experiences and future optimism but lacks consistent present-day engagement. The study attributes these gaps to cultural factors and structural over-reliance on administrative efficiency. To reconcile these tensions, the authors propose a cyber-physical integration framework leveraging WeChat's native features, including tiered identity systems, rotating moderation, and anonymized emotional support channels. The results highlight the need to balance transactional utility with communal praxis in virtual professional learning environments, offering actionable insights for designing human-centered digital communities in post-pandemic education.

Keywords: Sense of virtual community; Professional learning communities; WeChat groups; Foreign language education; McMillan & Chavis framework

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1. Introduction

Virtual communities have emerged as the cornerstone social infrastructure of the 21st century, redefining human connection beyond physical boundaries. These digitally mediated collectives range from professional learning networks to interest-based forums. Their transformative power lies in three paradigm-shifting attributes: spatiotemporal fluidity enabling synchronous collaboration across continents, affinity-based affiliation replacing geographically constrained ties, and democratized knowledge ecosystems where expertise flows laterally rather than hierarchically ^[1-3]. In education specifically, virtual communities have evolved from supplemental tools into

primary sites of pedagogical innovation, with UNESCO reporting that 92% of teacher development initiatives now incorporate digital community elements ^[4].

Within foreign language education, virtual Professional Learning Communities have catalyzed four pedagogical revolutions. First, they resolve the authenticity deficit inherent in scripted textbooks through platforms, where learners engage in real-time conversations with native speakers across 150 countries. Second, they enable resource democratization, exemplified by Duolingo's crowdsourced forums hosting 4.7 million peer-validated language exercises. Third, they facilitate cross-cultural scaffolding, as seen in Fengtai Foreign Languages School's study tour to Spain, which fosters cross-cultural narratives through immersive classroom exchanges, collaborative football activities, and bilingual interactions between Chinese and Spanish students. Most critically, they reshape teacher agency through communities like #LangChat—a Twitter-based PLC where 15,000 language educators collaboratively troubleshoot classroom challenges. While the OECD's Teaching and Learning International Survey (TALIS) 2023 indicates that 89% of foreign language teachers acknowledge the theoretical value of Professional Learning Communities (PLCs), the critical question remains: Do members truly develop a sense of virtual community in practice? ^[5].

This study employs McMillan & Chavis's (1986) four-dimensional framework of sense of community—membership, influence, integration, and fulfillment of needs, and shared emotional connection—to conduct an empirical investigation of a WeChat-based community originally established for competition guidance ^[6]. Then the results of the data analysis aim to answer the question about whether the members in this WeChat group—this virtual community—have been equipped with a sense of virtual community, and the reasons contributing to the results.

2. Literature review

2.1. Community and virtual community

The concept of community was first defined by the German sociologist Ferdinand Julius Tönnies, who argued that, in contrast to the notion of society, a community is an enduring and genuine common life ^[7]. Subsequently, globalization, informatization, and digitization have changed the community's dependence on place, and interpersonal relationships have evolved to networks of social relations that can traverse time and space. The exchange of meanings, sharing of experiences, and cultural symbiosis in the community no longer depend on geography and "presence", and the concept of community in its original sense continues to disintegrate, and the concept of disembedding community begins to be reiterated ^[8]. From the research results on community in the last five years, group and community-based on social media platforms have received more and more attention. Shen et al., in order to achieve the effectiveness of WeChat community management, based on the perspective of community members, selected six factors affecting the management of WeChat community, such as community goals, community orientation, community trust, community belonging, community reciprocity, community rules, etc., and established a six-dimensional model of influencing factors, to explore the relationship between the factors and the effectiveness of WeChat community management ^[9].

Compared to geographic communities, virtual communities are communities based on relations (social networking) ^[10]. Balasubramanian and Mahajan proposed five characteristics of virtual communities: 1) the clustering of people (the aggregation of people); 2) rational members; 3) interaction in cyberspace without physical collocation; 4) a process of social exchange; and 5) a process of membership of social exchange; 5) an objective,

property/identity, or interest shared by members ^[11]. These results lay a solid foundation for our comprehensive understanding of the characteristics of the community.

2.2. The evolution and challenges of sense of community (SOC)

McMillan and Chavis's four-dimensional SOC framework (Membership, Influence, Needs Fulfillment, Emotional Connection) established the theoretical bedrock for community psychology, revealing how shared identity, reciprocal influence, resource interdependence, and collective rituals generate social cohesion. Obst et al. conducted a confirmatory factor analysis of the Sense of Community Index (SCI), which measures these four dimensions, and provided empirical validation for retaining measures that encapsulate Membership, Influence, Needs Fulfillment, and Emotional Connection, across multiple community types, including neighborhood and interest groups ^[12].

The sense of virtual community (SOVC) is a multifaceted construct that has garnered significant scholarly attention, particularly in understanding how community-like experiences are fostered and maintained in online environments. Blanchard et al. initiated this exploration by investigating whether a sense of community akin to that in physical settings also manifests in virtual spaces, exemplified through their study of MSN, an established virtual community. Their findings suggest that members can indeed experience a sense of belonging and community, raising questions about the mechanisms that sustain such feelings in digital contexts. Empirical investigations into the measurement of SOVC have also been conducted. Abfalter et al. examined the applicability of traditional SOC measures in virtual contexts, adopting the SOC index 2 (SCI2) to better capture the dynamics of online communities ^[13]. Their findings support the notion that adapted measurement tools are necessary to accurately assess SOVC, considering its distinct features compared to physical communities. This also becomes the foundation for our research design.

Building on this foundation, Blanchard et al. further delineated the behavioral processes underpinning SOVC, identifying key activities such as exchanging support, creating identities, making identifications, and producing trust ^[14]. These processes mirror characteristics observed in face-to-face communities, notably emotional attachment and helping behaviors, which are essential for a successful community experience. The development of these processes highlights the importance of social interactions and trust-building in cultivating a strong sense of community online.

The sense of virtual community in higher education has become increasingly significant, especially in the context of the COVID-19 pandemic, which necessitated a shift toward online and virtual learning environments. Bozkurt et al. highlighted the significant influence of social presence (a sense of connection and interaction among participants) on the effectiveness of online learning in the post-COVID-19 educational landscape ^[15]. Further, emerging technologies like artificial intelligence (AI) are being explored for their potential to enhance virtual community experiences. Xie et al. investigate how interaction with generative AI can promote learning autonomy, which may indirectly influence students' engagement and sense of community within virtual settings ^[16]. Similarly, the role of peer and tutor interactions in online collaborative learning is examined by Intaratat et al., who highlight the importance of self-efficacy and interaction quality in fostering a cohesive virtual community ^[17]. Overall, the literature underscores that fostering a sense of virtual community in higher education involves multiple interconnected factors, yet more empirical findings need to be shown to enrich the fruits of the sense of virtual community, especially those for professional learning.

2.3. Cloud teaching and research as a virtual community: Evolution and Institutionalization

The conceptual foundation of cloud teaching-research (CTR) as a virtual community predates the pandemic. Research on cloud teaching and research communities in Chinese higher education was first proposed by Wen Qiufang^[18]. Wen's research team subsequently conducted empirical studies and in-depth explorations of emotional connection, cognitive connection, and social connection in cloud-based teaching-research processes^[19–21].

In the meantime, people need to notice that CTRs coexist with—rather than replace—informal social media communities. WeChat/QQ groups retain vitality due to social stickiness and contextual adaptability. This duality underscores a critical insight: Professional learning communities thrive in multi-platform ecosystems. While CTRs provide institutional scaffolding for accredited development, social platforms enable just-in-time peer support, exemplifying how cloud technologies now support layered community architecture—from structured national initiatives to self-organized micro-communities.

3. The research design and results

3.1. Design of the research questionnaire

Based on the booming development of various types of foreign language cloud teaching and research, this study chooses a WeChat group formed for the provincial intercultural competence competition in the researcher's province as the object of the study. The group was established in September 2022, initially for the purpose of providing information support for the provincial competition of intercultural competence, and the members of the group are mainly instructors of undergraduate colleges and universities participating in the intercultural competence competition in the province. The members of the group were invited to participate in a questionnaire survey in January 2025, and analyzed based on the results of the questionnaire survey.

The questionnaire is based on the Sense of Community Index proposed by Chavis et al., which divides the sense of virtual community into four components, i.e., Membership, Influence, Needs fulfillment, and Emotional Connection. At the same time, the original 24 items were filtered and modified based on the requirements of IFLCTR, such as activity information transfer and information interaction. The main criteria for adjustment are (1) the expression of the item itself is ambiguous, like what the same thing refers to in “value the same thing”; (2) there is a difference in subjective criteria for modifiers, such as “successful” and (makes me feel) “good”; or there may be a difference in the understanding of concepts, such as “part of my identity”; (3) Combining and adjusting expressions with similar meanings, e.g., “I can recognize most of the members of this community.” and “Most community members know me.” are intended to express whether the members are familiar with each other or not; (4) expressions whose degree is not easy to judge and grasp, such as “trust people”, “important to me”, “influence other communities”, “care about each other.” Of course, no matter how the researchers adjust the test items, it is difficult to achieve a common perception of each item when it comes to “sense”, which is a subjective and abstract term in itself, and this is the key reason for reducing the test items by half. The items under the four structural and dynamically interacting elements were reduced by half. Three items concerning each component were retained to allow the participants to complete the questionnaire in a short period of time with a clear purpose. The options in the questionnaire were in the form of a Likert scale, which were strongly agree, agree, uncertain (hesitant), disagree, and strongly disagree.

3.2. Questionnaire results and analysis

There are 223 members in the group, and 192 valid questionnaires were received. The questionnaire items were

presented in English without corresponding Chinese translations (by default, the English level of each teacher in the group is sufficient to complete the questionnaire). The questionnaires were sent out by the group leader, and the overall response was good, with more than half of the members replying “completed” after completing the questionnaires in the group. This study recognizes this response as an effective interaction that demonstrates friendliness. The results of the four sections are analyzed below, followed by a summary of the overall results.

3.2.1. Dimension 1: Membership

Item 1: People in this community have similar needs, priorities, and goals.

Item 2: I get important needs of mine met because I am part of this community.

Item 3: When I have a problem, I can talk about it with members of this community.

The survey data indicate an exceptionally strong sense of membership and belonging within this community (**Figure 1**). Members demonstrate a profound shared identity. This consensus on common objectives (such as focusing on competition schedules, results, or exams) forms the fundamental bedrock for cohesion and mutual understanding. Furthermore, this shared purpose translates into significant personal value derived from membership. The 2nd pie chart shows that the vast majority of respondents affirm that the community effectively fulfills their key requirements, signifying its vital functional role in members’ lives. While 12.12% expressed uncertainty here, the dominant positive trend underscores the community’s success in meeting member needs. Finally, the data reveal a highly functional and supportive relational network. The 3rd chart confirms this, with a robust 78.79% expressing a positive attitude (Agree or Strongly Agree). This high level of perceived support availability highlights strong interpersonal trust and openness, fostering a safe environment where members feel comfortable seeking help or discussing challenges.

In essence, the membership dimension is quite well-established. Members strongly identify with the collective purpose, consistently perceive significant personal benefit from participation, and actively trust in the support network the community provides. This powerful combination of shared identity, perceived value, and relational support defines a cohesive and deeply connected group where a strong sense of belonging prevails.

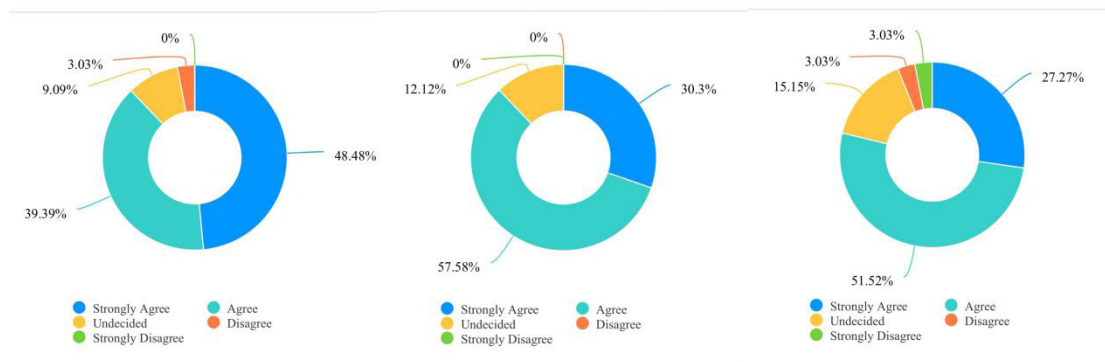


Figure 1. The results of the first dimension

3.2.2. Dimension 2: Influence

Item 4: People in this community basically know each other.

Item 5: This community has symbols and expressions of membership, such as clothes, signs, art, architecture, logos, landmarks, and flags that people can recognize.

Item 6: I put enough amount of time and effort into being part of this community.

The Influence dimension reveals significant variability in member perceptions, indicating strengths in symbolic identity but challenges in social cohesion and perceived contribution (**Figure 2**). While the community demonstrates recognizable symbolic elements, member integration and commitment show notable divisions. The data reveal a divided and nuanced perception of influence, characterized by strong symbolic identity but weak social cohesion and ambiguous personal commitment. While the community excels in establishing recognizable symbols and expressions, nearly half the members report limited interpersonal familiarity, highlighting a critical gap in foundational social integration. Further compounding this fragmentation, personal commitment levels show significant ambiguity—over half agree they invest sufficient effort (54.54% cumulative agreement), yet a striking 30.3% are uncertain about their contribution, alongside 18.2% active disagreement. This triad suggests influence hinges more on external markers than relational depth or member engagement, indicating a community whose symbolic presence outpaces its internal cohesion and inclusive contribution culture.

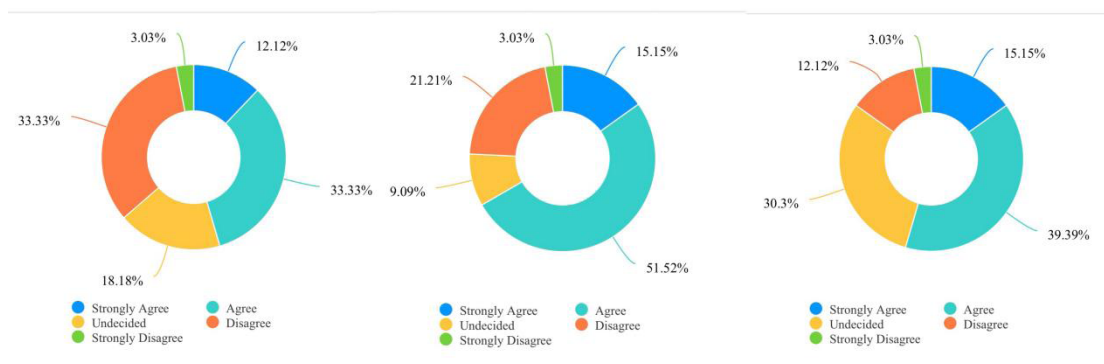


Figure 2. The results of the second dimension

3.2.3. Dimension 3: Integration and fulfillment of needs

Item 7: This community has good leaders/people in charge.

Item 8: Fitting into this community is important to me.

Item 9: If there is a problem in this community, members can get it solved.

The Integration and Fulfillment dimension reveals a striking duality: near-unanimous confidence in leadership contrasts sharply with fractured belonging and collective efficacy (**Figure 3**). The results reveal a starkly bifurcated landscape: overwhelming confidence in leadership contrasts sharply with ambiguous integration and collective efficacy. The first chart demonstrates exceptional consensus, with 84.85% positive agreement and zero disagreement, signaling near-universal trust in governance. For the middle one, while agreement totals 51.51%, the critical 24.24% uncertainty reflects ambivalence about personal belonging. Most critically, Item 9 shows profound hesitation in collective agency—a staggering 30.03% remain uncertain about problem-solving capabilities, alongside non-trivial disagreement, indicating eroded faith in communal action despite strong leadership. This triad paints a community where top-down competence anchors trust, but bottom-up integration and shared efficacy languish in ambiguity, suggesting leaders must bridge the gap between administrative reliability and empowering member-driven solutions.

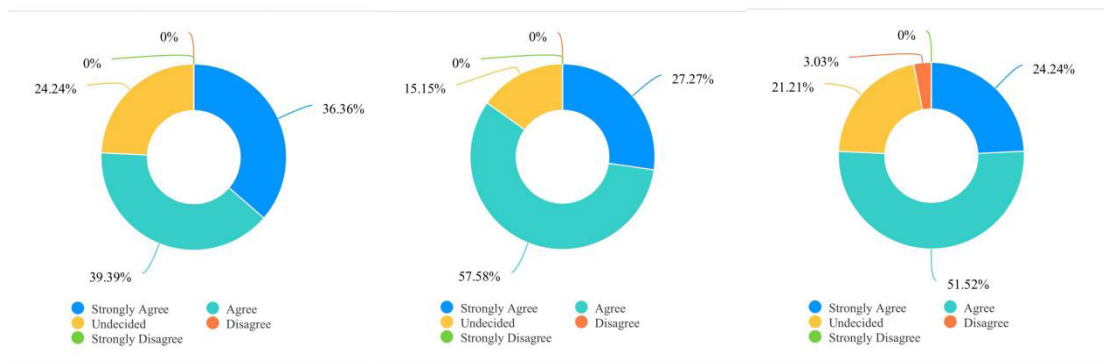


Figure 3. The results of the third dimension

3.2.4. Dimension 4: Shared emotional connection

Item 10: I am with other community members a lot and enjoy being with them.

Item 11: Members of this community have shared important events together, such as contests, lectures, or celebrations.

Item 12: I feel hopeful about the future of this community.

The Shared Emotional Connection dimension reveals a complex duality: strong collective history and future optimism coexist with significant ambivalence about present social bonds (**Figure 4**). While most members affirm shared important events (Item 11: 87.88% positive agreement, combining 51.52% Agree + 36.36% Strongly Agree) and express overwhelming hope for the community's future (Item 12: 93.94% cumulative agreement), daily interpersonal engagement shows profound fragmentation—Item 10 elicits only 57.57% positive sentiment (15.15% Strongly Agree + 42.42% Agree) against a critical 33.33% uncertainty (“Undecided”) and 9.09% disagreement. This triad suggests community bonds rely heavily on symbolic legacy (past events) and abstract aspiration (future hope) rather than consistently fulfilling in-the-moment social experiences, creating an emotional paradox where members invest in what was and what could be while hesitating about what is.

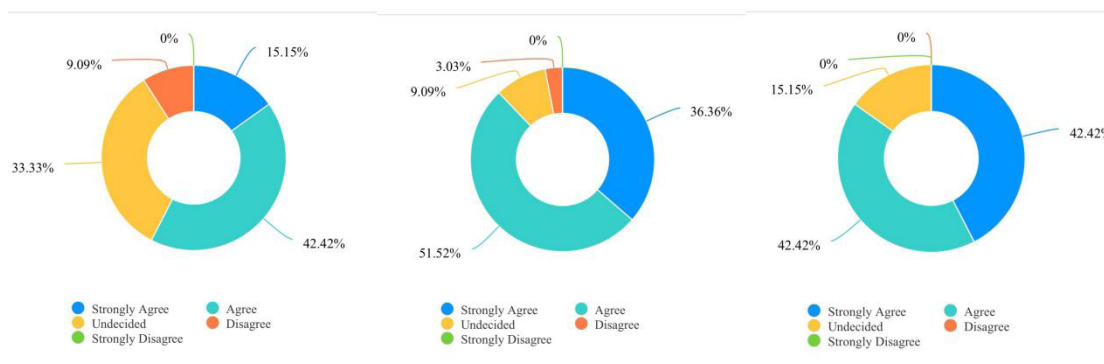


Figure 4. The results of the fourth dimension

The data collectively reveal a community with strong symbolic and structural foundations but fragmented relational integration. While members exhibit robust shared purpose, recognizable identity, and exceptional trust in leadership, these strengths are counterbalanced by critical relational gaps: limited mutual familiarity, pervasive uncertainty in personal investment, and weak present-day emotional bonds despite shared history/future optimism.

Crucially, leadership credibility fails to translate into collective efficacy, exposing a community sustained more by abstract belonging than consistent relational fulfillment.

The significant proportion of “Undecided” responses across multiple items warrants attention within the Chinese cultural context, where considerations of face (*mianzi*) significantly influence social interactions. Choosing “Undecided” may often reflect a desire for face-saving—a polite equivocation masking potential disagreement rather than genuine neutrality. Therefore, the analysis prioritizes the prevalence of this “Undecided” option, interpreting it as indicating uncertainty or, critically, an implicit lack of endorsement for the positive statement.

Among all items, the three exhibiting the highest levels of this “Undecided” sentiment are:

Item 10: I am with other community members a lot and enjoy being with them. (33.33% Undecided)

Item 6: I put enough amount of time and effort into being part of this community. (30.3% Undecided)

Item 7: This community has good leaders/people in charge.

(24.24% Undecided - despite high overall positive agreement)

These findings reveal a concerning trend: a substantial segment of members expresses ambivalence about their familiarity with peers, their own level of commitment, and, crucially, the leadership’s effectiveness. Given that social platform communities represent a dominant form of virtual community today—often distinguished by strong social attributes and user stickiness—these high uncertainty rates present significant challenges.

The core problems become clear: low member familiarity hinders interaction frequency, while uncertainty about leadership effectiveness suggests barriers to efficient information exchange and professional knowledge sharing. If these underlying issues persist—despite the platform’s inherent social advantages—its core value proposition becomes harder to realize and maintain, posing a significant threat to long-term sustainability and growth.

4. Discussion

To address these disconnects, the authors propose a multi-tiered remediation framework prioritizing cyber-physical integration. Foremost, the virtual community dilemmas revealed in this study necessitate resolution through reconfiguring WeChat’s native functionalities. To address instrumental affiliation in the Membership dimension, the authors propose an implementable tiered identity system: utilizing WeChat group announcements to display three-tier role labels (Observer/Contributor/Mentor), coupled with automated participation tracking via the “WeCommunity” mini-program. Contributors (sharing ≥ 2 resources monthly) gain privilege to initiate “Group Tasks” notifying all members, while Mentors (≥ 20 endorsements + admin certification) obtain hosting rights for Friday “Thematic Sessions”. Concurrently, embedding a “Teacher Wall” Tencent Docs (with research fields/shareable resources columns) systematically constructs cross-institutional trust networks, dismantling barriers to authentic communication.

Furthermore, power centralization in the Influence dimension requires leveraging WeChat’s distributed interaction architecture. The authors establish a rotating moderator system: recruiting volunteers through WeChat’s Sign-up Tool on the 1st monthly, granting them mute management privileges during Wednesday 19:00–20:00 “Focus Sessions”. Crucially, developing a “Suggestion Bottle” chatbot allows private suggestion submissions, with daily 17:00 proposal summaries triggering a like-based voting mechanism (30 likes = execution). This decentralized design dismantles the bureaucratic perception that “communication is administrators’ duty.”

Regarding the Fulfillment dimension, the authors construct a three-stage knowledge distillation funnel: 1) real-time discussions captured via “Group Highlights”; 2) automated weekend infographic reports (Enterprise WeChat plugin); 3) monthly resource packages unlocked through point redemption (5 points/share, 1 point/3 comments).

Most critically, Emotional Support requires reconstruction. Addressing the “zero emotional lexicon” phenomenon, the authors integrate Tencent Survey to create an anonymous confession system (pinned in group menu) with #Urgent Help/#Experience Sharing/#Achievement Celebration tags, moderated by Friday “Emotional Support Volunteers” (Mentor rotation). Conflict mediation employs a WeChat-native closed loop: anonymous submission → volunteer-matched expert pairing → private mediation room → anonymized case repository. Weekly push notifications of sentiment heatmaps (e.g., [Security] 82%) further visualize intangible connections. Ultimately, these solutions form a theory-technology symbiosis.

Only through this recalibration—centering member agency, redistributing influence, and embedding vulnerability structures—can such communities transcend their current state as “information bulletin boards” to become authentic catalysts for pedagogical transformation in foreign language education.

5. Conclusion

This study first focuses on the virtual community, laying a solid theoretical foundation for the study by exploring in depth the conceptual evolution of community and virtual community, as well as the relevant theoretical frameworks of ideology and cloud education research. The empirical investigation of an intercultural foreign language cloud teaching community reveals a profound instrumentalization paradox: while digital platforms enable unprecedented resource sharing and coordination efficiency, they simultaneously erode the relational foundations essential for authentic community consciousness. This study confirms that structural functionality—particularly in information dissemination and administrative centralization—dominates members’ conceptualization of virtual spaces, overshadowing core communal dimensions like emotional support and collaborative agency. These findings expose critical fractures across McMillan & Chavis’s four dimensions: membership manifests as transactional affiliation rather than internalized belonging; influence remains constrained by factors such as willingness to participate and familiar relationships; fulfillment exhibits perceptual asymmetry between technological convenience and real participation; and emotional connection registers as a systemic void, with zero affective lexicon in conflict-resolution scenarios and low commitment scores.

To reconcile these tensions, the authors propose a dual-architecture framework leveraging WeChat’s native functionalities. The first is about the construction of tiered identity systems (Observer/Contributor/Mentor) with automated participation tracking, transforming passive members into active agents through granular privilege escalation. Then is the distributed governance via rotating moderators and AI-facilitated suggestion mechanisms, democratizing decision-making while reducing administrator dependency. And finally is the emotional scaffolding through anonymized confession channels and digital embodiment tactics, directly addressing the affective vacuum noted in post-pandemic virtual communities. Theoretically, this framework bridges the instrumental-communicative rationality dialectic: platform-native features become mediators between operational efficiency and communal praxis. It further advances the communities of practice model by demonstrating how digital phronesis—practical wisdom in technology deployment—can transform efficiency-driven spaces into critical thinking incubators.

Ultimately, sustainable cloud teaching-research communities thrive not through structural sophistication alone, but through architectures that humanize digital interaction. This human-centered recalibration positions cloud communities not merely as transactional networks, but as living ecosystems where efficiency serves empathy, and technology amplifies human connection.

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Disclosure statement

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