The learning community for involved learning: Towards cybergogy-based learning

Komunitas belajar untuk pembelajaran terlibat: Menuju pembelajaran berbasis cybergogy

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Abstract
Online learning has significantly transformed education, especially by providing greater flexibility for both students and teachers in learning processes. However, online classes tend to rely more on teacher-centered presentations, allowing them to isolate students from the learning process. The diverse characteristics of students are a challenge for teachers in building interaction and communication and facilitating effective collaboration. A literature review shows that interaction is important for student learning outcomes. Therefore, understanding and categorizing student characteristics is important in building a learning community so that it can improve teacher and student interaction, as outlined in cybergogy-based online learning models. Cybergogy is a new concept of cyber-based learning with three main domains: cognitive, emotional, and social, known as engaged learning. This approach emphasizes the importance of creating a holistic and engaging online learning environment that caters to the diverse needs of learners. The research findings indicate that online learning designed based on cybergogy principles effectively fosters student engagement and collaboration, thereby successfully mitigating key issues that often hinder the effectiveness of online education. By recognizing and addressing the cognitive, emotional, and social aspects of learning, cybergogy aims to foster a sense of community, encourage active participation, and promote deeper understanding.

Abstrak
Pembelajaran daring telah secara signifikan mengubah dunia pendidikan, khususnya dengan memberikan fleksibilitas lebih besar bagi siswa dan guru dalam proses pembelajaran. Namun, kelas *online* cenderung mengandalkan presentasi berpusat pada guru, sehingga memberikan peluang mengisolasi siswa dari proses pembelajaran. Keberagaman karakteristik menjadi tantangan guru untuk membangun interaksi, komunikasi, serta memfasilitasi kolaborasi efektif. Tinjauan literatur menunjukkan interaksi memiliki substansi penting bagi hasil belajar siswa. Oleh karena itu, pemahaman dan pengategorian karakteristik siswa penting untuk membangun komunitas belajar yang meningkatkan interaksi guru dan siswa dalam model pembelajaran *online* berbasis *cybergogy*. *Cybergogy* merupakan konsep baru pembelajaran berbasis *cyber* dengan tiga domain utama: kognitif, emosional, dan sosial, dikenal dengan istilah *engagement learning*. Pendekatan *cybergogy* menekankan penciptaan lingkungan pembelajaran daring yang holistik dan menarik dengan memperhatikan aspek kognitif, emosional, dan sosial siswa. Pendekatan ini mendorong kebersamaan, partisipasi aktif, dan pemahaman mendalam. Studi ini menunjukkan bahwa *cybergogy* meningkatkan partisipasi dan interaksi kolaboratif siswa serta menjadi solusi atas tantangan pembelajaran daring, sehingga berkontribusi pada perancangan pengalaman belajar online yang efektif dan sesuai kebutuhan siswa.

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A. Introduction

Online learning has emerged as a widely implemented model, especially following the COVID-19 pandemic, which catalyzed significant changes across all levels of education worldwide, including in Indonesia. A primary characteristic of this learning model is its flexibility across various elements and aspects, benefiting both teachers and students. However, this flexibility also presents challenges, notably a decline in student motivation due to feelings of isolation, particularly in large classes. While online learning offers the advantage of accommodating unlimited class sizes, research indicates that excessively high student-to-teacher ratios can negatively impact student motivation (Canning et al., 2019; Ryan & Deci, 2020; Snowball, 2014; Vandenberg, 2012). These challenges are further compounded when instructional delivery is predominantly unidirectional, resulting in a teacher-centered approach (Mohd-Yusof et al., 2018). Consequently, interaction and collaboration are limited, emphasizing the need for a well-structured, technology-enhanced online learning framework to support meaningful engagement and active learning.

The rapid expansion of online learning, particularly in Indonesia, necessitates a paradigm shift in educational approaches from traditional pedagogy and andragogy toward cybergogy. Cybergogic learning, which centers on technology-driven instruction, encompasses three primary domains: cognitive, emotional, and social (Wang & Kang, 2006), forming the basis of what is known as engaged learning. The social domain within cybergogic learning emphasizes the importance of interaction and communication among students as members of a learning community. Although the concept of community has long been a focal point in sociological research—spanning over two centuries—its definition remains complex, particularly concerning the foundational elements that constitute it. At its core, the notion of community reflects a shared sentimental attachment to traditions and norms, which collectively reinforce moral codes, intensify moral responsibilities, and establish a basis for heterodoxy, as all members are integral to the broader social structure (Bell & Newby, 2021). This emphasis on communal learning and social interaction within cybergogy underlines the need for educational models that not only facilitate knowledge acquisition but also foster a cohesive learning environment where moral and social growth are paramount.

While pedagogy and andragogy provide important foundations in educational practice, both have significant limitations in accommodating the unique dynamics of modern online learning environments. Pedagogy, centered on the instructor and one-way knowledge transfer, is less relevant in the digital space that allows broad access to information and horizontal interaction among learners (Anderson, 2020). For example, the traditional lecture model with uniform assignments struggles to accommodate the diverse learning styles and individual paces of understanding within online platforms. Meanwhile, andragogy, which emphasizes self-directed learning and adult experience (Chacko, 2018), may not fully account for the crucial role of social interaction and collective knowledge construction facilitated by online technology (Hakkarainen, 2009). In online discussion forums, for instance, students not only learn independently from materials but also build understanding through the exchange of ideas, debates, and collaboration with peers, an aspect less emphasized in a purely andragogical framework. Thus, the transition to cybergogy becomes important because this approach explicitly leverages the affordances of online technology to foster learner-driven, collaborative, and community-based learning, going beyond the limitations of traditional learning models that are less responsive to the unique characteristics of the digital learning space.

The success of building a learning community is marked by indicators such as participation, trust, shared responsibility, common interests, and an openness to diversity, all of which contribute to a collective identity (Floyd, 2021). These indicators are essential to replicate in online learning through virtual media, fostering a cohesive learning community among students. For instance, at the Network Education of Shanghai Jiaotong University, a blended learning approach involving presentations to 100 in-person students and 300-500 online students resulted in severely restricted

opportunities for interaction, such as question-asking, answering, and discussions (Sturtevant, 2016). While similar cases are less common in Indonesia, where class sizes typically range from 30 to 50 students, limited interaction persists in online learning environments. Needs analysis in this study indicates that communication and collaborative interactions in online learning processes remain low, reaching only 23%. This highlights the need for effective cybergogic strategies that enhance interaction and communication, encouraging active engagement within the learning community and supporting the principles of engaged learning. By emphasizing community-driven engagement, cybergogic learning can bridge the gaps in student participation and build a robust foundation for social learning.

The cybergogy model offers an engaging learning experience by integrating cognitive, emotional, and social dimensions tailored to the diverse characteristics of students (Wang & Kang, 2006). Fundamentally, this model empowers learners to set their own goals, explore relevant resources, collaborate with peers, and construct knowledge in a meaningful way. Designed specifically for online learning environments, cybergogy is ideal for classes of 20 to 50 students, promoting more constructive and interactive learning activities. Observations indicate that this model aligns well with the conditions and needs of Indonesian students; however, its application remains limited due to its relative novelty and the lingering influence of traditional learning paradigms. To fully harness the benefits of cybergogy, a shift in educational practice is essential, encouraging a more adaptive and technology-integrated approach in alignment with contemporary online learning needs.

The development of learning communities has been widely investigated across diverse educational systems (Burden, 2025; Gilchrist, 2019; Longworth, 2019; Mitchell & Sackney, 2019; Roberts, 2021). Numerous studies propose strategies for fostering online learning communities, including frameworks like the Community of Inquiry (CoI) model (Lambrev & Cruz, 2021), Pedagogical Content Knowledge (PCK) (Rapanta et al., 2020), and innovative tools such as "rain classroom" (Huang et al., 2021). However, these strategies primarily emphasize collaborative learning activities within groups, often overlooking the foundational process of group formation. Effective group formation requires careful consideration of students' learning behaviors, including their engagement with online resources, participation in online classes, inquiry and discussion habits, as well as their preferences for taking online assessments and sharing educational materials. By incorporating these aspects, educators can construct more cohesive and dynamic study groups, thereby enhancing both individual and collective learning experiences. This approach is essential to creating robust learning communities that actively support each student's learning journey and foster sustained engagement in online environments.

An essential factor in building a learning community in this study is the homogeneous grouping of students. This approach involves tracking and analyzing students' learning behaviors based on their individual needs, with attention to their preferences for independent online learning. In many cases, students in online environments do not exhibit interdependence due to the limited structured collaborative activities, such as joint task completion. Instead, they tend to engage more in content sharing and exchanging information among peers (Yang et al., 2022). In recent years, the development of effective learning communities has attracted substantial research interest, highlighting the benefits and challenges of creating structured, supportive peer interactions in digital learning contexts (da Silveira Dib et al., 2021; Jan & Vlachopoulos, 2019; Kezar et al., 2018; Khalili, 2020; Laforge & McLachlan, 2018; Pimmer et al., 2019; Wise & Cui, 2018). By fostering group formations based on similar learning behaviors, this model aims to enhance engagement and cooperation among students in online learning environments.

The development of online learning communities is intended to facilitate interactions among students, between students and teachers, and between students and the broader community beyond the school environment (Koschmann, 2013). This emphasis on interaction makes the social domain a critical component of the cybergogy learning model. This study will investigate a specific aspect of learning communities and its impact on students' self-regulation. Recent theoretical frameworks have shifted from traditional studies on metacognition, learning strategies, and social

cognition (Bandura, 1993; Baumeister et al., 2018) toward supporting strategic and independent learning. This shift is essential for cultivating students' skills for lifelong, self-directed learning, aligning with Indonesia's ongoing educational reforms that promote the concept of Merdeka Belajar (independent learning).

This research aims to: (1) explore the effectiveness of implementing cybergogy-based learning on the level of student engagement, (2) analyze the influence of learning group composition (homogeneous versus heterogeneous), and (3) evaluate the contribution of opinion leaders in the dynamics of online learning communities.

B. Method

This research is part of a study on the development of a cybergogy learning model for high school students, with a specific focus on one of the domains of cybergogy learning, namely the social domain. The research data were collected using a questionnaire distributed to teachers and students in three public high schools in Yogyakarta City during the odd semester of 2022. School A (72 students) is in the superior cluster, School B (70 students) is in the middle cluster, and School C (72 students) is in the low cluster, with two class X sections in each school. After the quantitative data were obtained, a qualitative analysis and interpretation stage followed to gain deeper insights into the patterns of social interaction in learning.

The data collection instrument in this research was a questionnaire consisting of 51 items, divided into three main sections. The first section contained 7 demographic questions to gather respondents' background information. The second section comprised 36 items measuring the level of student engagement and collaboration in cybergogy-based online learning. These items used a 5-point Likert Scale, with response options ranging from 1 (strongly disagree) to 5 (strongly agree). The third section explored the role of opinion leaders in online learning communities through 8 statements also using a 5-point Likert scale. Prior to its use in the main data collection, the questionnaire was pilot-tested on a small group of respondents with similar characteristics to the research population. The results of the pilot test showed a Cronbach's alpha coefficient of 0.88 for the engagement and collaboration scale, and 0.82 for the opinion leader role scale, indicating a high level of internal reliability for both measured constructs.

The decision to form homogeneous learning groups in this study was based on the consideration of minimizing variability in initial knowledge and skill levels within each group. This aimed to allow researchers to observe more closely the impact of the cybergogy-based learning intervention on student engagement and collaboration among students with relatively similar ability levels. Nevertheless, we acknowledge the potential drawbacks of this approach. Homogeneous groups may limit students' exposure to diverse perspectives and learning approaches, which can be an advantage in heterogeneous groups. Heterogeneous groups have the potential to foster a richer exchange of ideas, mutual assistance among students with different ability levels, and the development of broader social skills. Future research could consider directly comparing the effectiveness of homogeneous and heterogeneous groups in the context of cybergogy-based learning to provide a more comprehensive understanding of group dynamics in online learning environments.

In the next stage, learning communities were formed according to students' learning behaviors, creating homogeneous study groups. Each group was led by an opinion leader, who plays a crucial role in influencing the attitudes and behaviors of group members through status, educational background, and social prestige. Opinion leaders were selected based on four key criteria: expertise, novelty, influence, and activity. This process aims to create effective groups that promote social interactions supporting independent and collaborative learning in line with the principles of the cybergogy learning model. Here is the diagram illustrating the research methodology for developing a cybergogy learning model for high school students. It outlines the steps in the process, including data collection, analysis, formation of learning communities, creation of homogeneous study groups, and the appointment of opinion leaders.
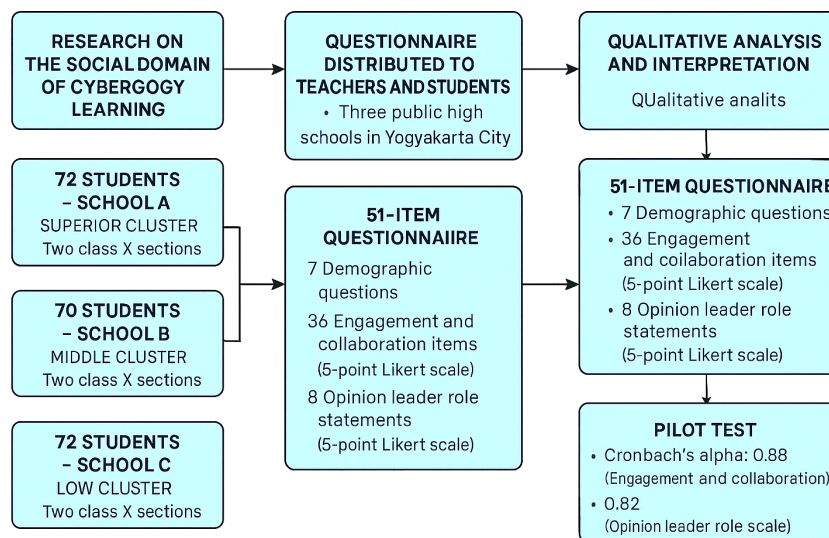
Figure 1. Research Flow Chart

C. Results and Discussion

1. Findings

a. Identification of Students Characteristics

The rapid expansion of online education has been particularly evident since the onset of the Covid-19 pandemic. As of April 17, 2020, approximately 91.3% of students, equating to roughly 1.5 billion learners globally, were unable to engage in in-person schooling (UNESCO, 2020), with 890 million students across 114 countries affected (Araújo et al., 2020). In response to this disruption, the Indonesian government implemented a policy promoting distance learning, which led to a 16% surge in broadband traffic, especially on online learning platforms, as reported by one of the country's major telecommunications providers. Data from 2018 revealed that internet penetration per household in various Indonesian provinces ranked DI Yogyakarta second (79.10%) after DKI Jakarta (89.04%) (Putri et al., 2023). While these developments sparked considerable debates within Indonesia's educational sector, the situation has gradually improved, with face-to-face learning now being reintegrated. Nonetheless, the continued advancements in technology, information, and communication offer promising potential for the future direction of cyber-based learning.

A significant issue within the discourse on online learning is the identification of student learning characteristics, which are essential for fostering an effective learning environment and achieving educational objectives. A review of the literature reveals that much of the research in Indonesia has concentrated on challenges related to online learning (Asridayati & Sari, 2021; Burhanuddin et al., 2021; Haryadi & Selviani, 2021; Rosyidiana, 2021; Sukiman, 2022; Wahyuningsih, 2021; Widodo et al., 2020), solutions to these challenges (Abdullah et al., 2021; Anugrahana, 2020; Hendrik & Pramesti, 2021; Kusumaningrum et al., 2020; Monitasari et al., 2021; Nur Lailiyah, 2021; Umam, 2020) strategies for online learning (Iswahyudi et al., 2023; Iswandari, 2020; Masruroh & Agustina, 2021; Nuravipah & Supriatna, 2021; Ramadhani, 2021; Suardinata, 2021; Wibowo et al., 2022), and the use of online learning platforms (Arsyad & Tobing, 2021; Basri et al., 2021; Lidi & Daud, 2021; Paat et al., 2023; Thahir et al., 2021). However, few studies have focused on identifying the specific learning characteristics of students engaged in online education. Much of the existing literature is based on personal teaching experiences and

anecdotal observations, leaving the question of how to systematically identify and analyze student characteristics in online learning largely unexplored.

In this study, the identification of student characteristics in online learning was based on the TOOLS (Test of Online Learning Success) technique, developed through three studies conducted over four years at two universities in Texas (Kerr et al., 2022). This assessment tool was selected due to its simple and stable measurement structure, as well as its demonstrated construct and criterion validity, along with internal consistency and retest reliability. The TOOLS questionnaire was administered via a Google Form, consisting of 45 items, which included 7 demographic questions, 36 items related to the use and understanding of technology, and 8 items measuring self-efficacy. The scale for technology use and understanding (SOTU) comprises three subscales: (1) current understanding of technology, (2) frequency of technology use, and (3) attitudes towards technology. A five-point Likert scale was employed to measure responses, with options ranging from (1) strongly disagree to (5) strongly agree. The scale generates a score that reflects the overall success of online learning, encompassing five subscales: computer skills, independent learning, need for online learning, engaged learning, and academic literacy. The identification process was applied to students, as outlined in the following table.

Table 1. Data on the Identification of Research Subjects

School	Male	Female	Amount
SMA A	31	41	72
SMA B	28	42	70
SMA C	36	36	72
Total			216

Table 2. TOOLS Value Data

School	Computer Skills	Independent Learning	Online Learning	Involved Learning	Academic Skills
SMA A	91	85	72	65	90
SMA B	88	82	69	60	85
SMA C	85	80	60	60	86

b. Formation of Online Learning Community

Networked learning communities are recognized as one of the most effective strategies within 21st-century learning models (Dawson et al., 2020; de Laat & Dohn, 2019). A core principle in designing online learning is to actively engage students in a meaningful way (Boud & Prosser, 2002). Thus, the central focus of online learning should be on student participation and activity. Consequently, the design and environment of online learning must be thoughtfully constructed to facilitate this engagement. While the learning environment plays a crucial role in fostering deep learning, it cannot solely dictate the learning experience or determine the outcomes of learning (Goodyear et al., 2004). In contrast, learning design aims to implement the designer's vision but does not seek to control students' perceptions or directly influence the consequences of the design (Jan & Vlachopoulos, 2019).

Community is defined as a group of individuals who are identifiable through their interpersonal relationships, shared activities, collective ways of thinking, as well as their beliefs and values (Biza et al., 2014). To establish a professional learning community, three key elements must be prioritized: ensuring student learning, fostering a culture of collaboration, and maintaining a focus on results (Dufour, 2004). The professional learning community model emphasizes that students should not merely be taught, but actively engage in the learning process. This model seeks to address critical questions such as: What do we aim for students to achieve during their studies? How can we assess when students have mastered the material? And what is our approach toward students who experience learning challenges? Moreover, a professional learning community values collaboration as essential for achieving collective learning goals, structured through a cooperative

culture. Finally, this model evaluates its effectiveness by focusing on results, thereby fostering collective efforts to enhance student learning outcomes.

The effectiveness of community-based learning has been widely supported by decades of research. The concept of learning communities first emerged in the 1920s, with Alexander Meiklejohn's initiation of the "Experimental College" program (Smith, 2001). The term gained renewed prominence in the 1960s and became increasingly common in the 1980s, based on the belief that learning communities could enhance the quality of education (Zhao & Kuh, 2004). This concept was further reinforced in the 1990s through studies indicating a strong association between participation in learning communities and improved student learning outcomes (Pike, 1999; Tinto, 1998). Technological advancements in society have since propelled the evolution of learning communities towards online platforms. As noted by Sharma (2002), without the active support and engagement of the learning community, online learning would not be possible.

Online learning has seen significant adoption, particularly following the outbreak of Covid-19, including across various educational levels in Indonesia. Despite the debates surrounding its advantages and disadvantages, the rapid advancement of technology in education is undeniable and must be strategically integrated into the learning process. Furthermore, the demands of 21st-century education call for proficiency in the 6C skills: Character, Citizenship, Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation. In response to these evolving needs, the traditional learning concepts must be adapted, transitioning from pedagogy and andragogy to cybergogy. Cybergogy represents a synthesis of theoretical frameworks that address three core domains: cognitive, emotive, and social (Wang & Kang, 2006).

The development of online learning communities plays a crucial role in this model, particularly through the cognitive, emotive, and social domains. The cognitive domain focuses on knowledge construction, which occurs through three stages: information acquisition, information transformation, and knowledge construction. The information acquisition stage is more personal, followed by the transformation of information that involves interaction with others in the community. Ultimately, this process leads to the construction of shared knowledge. In addition, the emotive domain significantly influences the learning process. Historically, Western academic traditions tended to separate cognitive and emotive aspects of learning, but recent literature indicates that emotional engagement is a vital component of the learning experience, especially for adults (Dirkx, 2001). Research into online learning further highlights the importance of emotional factors, particularly the emotional connections that students develop, in fostering effective learning (Kort et al., 2003).

In cybergogy, the emotive domain encompasses several key aspects, including personal awareness (such as confidence, competence, and self-efficacy), interpersonal and group relationships, awareness of the learning environment, and the emotions that arise throughout the learning process. These factors play a critical role in supporting the effectiveness of online learning communities, particularly through interpersonal and group dynamics. A sense of belonging to a community or group significantly enhances students' motivation, engagement, and overall satisfaction with the learning experience (Oren et al., 2002). The creation of social networks and the establishment of learning communities are essential for fostering enjoyable and successful learning outcomes in technology-mediated environments (Preece, 2012). Online communities are formed through public, extended discussions where sufficient emotional investment leads to the development of personal relationships and networks (Rheingold, 2000). The growing body of literature on online learning communities has consistently highlighted the positive impact of community involvement on student engagement, satisfaction, and learning outcomes.

The social domain in cybergogy refers to social actions that involve interactions between individuals and others. This domain is expansive and has a significant impact on students, making it a crucial component of the cybergogy model. Social factors in cybergogy can be categorized into four key areas: (1) personal identity, which includes factors such as age, gender, language, culture, and literacy skills; (2) socio-cultural context, encompassing goals, motivations, aspirations, and values; (3) groups, which focus on building group identity, trust, interaction, and the collaborative

construction of knowledge; and (4) communication, which addresses aspects such as the types of groups, discussion content, required software, and group moderation.

Although the term "online community" is defined in various ways, there is consensus that social connections are fundamental to online learning. Numerous studies have reinforced the idea that individuals, as members of a community, can enhance both their social and cognitive skills through social interactions. A sense of community, therefore, plays a critical role in online learning for two key reasons: (a) collaborative efforts help students resolve shared misunderstandings, and (b) social groups contribute to sustaining students' motivation and engagement throughout the learning process (Currin, 2004).

Research on face-to-face learning environments has demonstrated that fostering a positive social climate is essential for helping students feel included, which in turn enhances motivation, engagement, and satisfaction (Wegerif, 2019). While early studies on computer-mediated communication suggested that online networks did not contribute to the development of social climates (Oren et al., 2002), more recent research indicates that well-designed and effectively monitored online environments can indeed foster social interactions. Social interactions within virtual study groups can be integrated with learning processes and evolve to meet the functional needs of group work. Various contextual factors, such as learning design, the characteristics of the technological tools employed, and the role of moderators, can facilitate students' integration into the learning community (Wegerif, 2019).

c. Identify Learning Community Opinion Leaders

An opinion leader is an individual who plays a critical role in facilitating communication and ensuring that group members can exchange information effectively (Carson et al., 2007; Cascio & Shurygailo, 2003). To enhance group performance within interconnected communities, it is essential to consider key elements such as the opinion leader's superior status, education, and social prestige (Li et al., 2013). The use of opinion leaders is not limited to education but is also widely applied in fields such as business, sociology, and anthropology, making it a valuable strategy for effective diffusion of information.

Online learning communities offer significant opportunities for lifelong learning (Santi et al., 2023), as they not only foster learning-oriented communication but also promote broader social relationships. Numerous studies have shown that leadership within online learning environments positively influences interaction and engagement through the atmosphere created by opinion leaders. As such, the selection of effective opinion leaders is crucial to the sustainability and success of online learning communities.

In this study, the selection of opinion leaders is based on the ENIA model, which includes four indicators: Expertise, Novelty, Influence, and Activity (Li et al., 2013). These indicators are assessed by analyzing three key aspects: textual content, user behavior, and temporal information. Textual content refers to written material published across various social networking platforms, which can be analyzed for message content, writing style, and tone (Chan, 2001). User behavior encompasses social and technical parameters that shape an individual's role within different contexts (Preece, 2001). Lastly, temporal information is considered crucial due to the rapid growth of digital information; time serves as an essential dimension for exploring the relevance and impact of the information (Alonso et al., 2007).

The expertise indicator is evaluated based on two sub-indicators: (1) the intensity and quantity of documents posted by users, as a higher volume of uploaded documents typically reflects greater interest in a particular topic, and (2) the use of representative terms within a specific field, which indicates the level of expertise possessed by the user. The novelty indicator is assessed through two sub-indicators: (1) similarity, which can be measured by comparing owned documents to others using document similarity tools such as Turnitin, with a maximum acceptable similarity of 25%, and (2) temporal sequence, which is determined by examining the timing and history of document postings.

The influence indicator is assessed through two sub-indicators: (1) coverage, which measures document popularity by dividing the number of readers by the total number of community members, and (2) reply influence, which considers the number of reviews and comments on uploaded documents. The greater the number of reviews and comments, the more engaged and interested the community members are in the content. The activity indicator is evaluated based on the level of user activity, including the frequency of document uploads, responses, and the engagement with specific topics that receive replies from users.
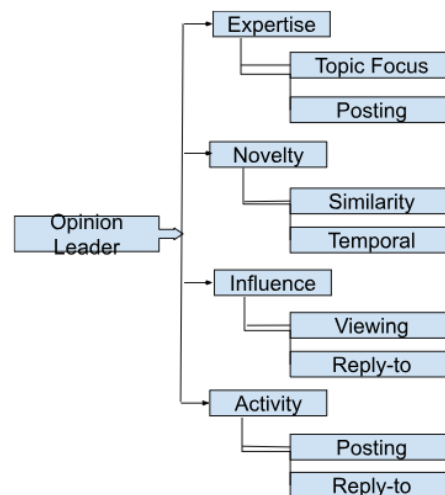

Figure 2. Opinion Leader Identification Framework

2. Discussion

The data analysis revealed the following findings: (1) The level of computer skills among students varied across the three schools. At School A, which had a total sample of 72 students (31 boys and 41 girls), the average score was 91, indicating that the students' computer skills were in the "very good" category. At School B, with a sample of 70 students (28 boys and 42 girls), the average score was 88, also placing the students in the "very good" category. In contrast, at School C, which had a sample of 72 students (36 boys and 36 girls), the average score was 85, categorizing the students' computer skills as "good." These results suggest significant differences in the level of computer skills among students at the three schools.

(2) The assessment of students' independent learning showed similar results across the three schools. At School A, the average score was 85, placing students in the "good" category. At School B, students scored an average of 82, also falling within the "good" category. Meanwhile, at School C, the average score was 80, which still placed students in the "good" category. These findings indicate that while students across all three schools demonstrated good levels of independent learning, their scores varied slightly. (3) The students' need for online learning differed significantly across the three schools. At School A, the average score for the need for online learning was 72, placing it in the "good" category. At School B, the average score was 69, which was categorized as "pretty good." Finally, at School C, the need for online learning averaged 60, also falling into the "pretty good" category. These results suggest that while all students expressed a need for online learning, the intensity of this need varied among the schools.

(4) The students' assessment of engaged learning across the three schools showed relatively consistent results. At School A, the average score for engaged learning was 65, placing it in the "pretty good" category. Both School B and School C had average scores of 60, also falling within the "pretty good" category. (5) The assessment of students' academic skills (literacy) varied

significantly across the schools. At School A, students scored an average of 90, placing them in the "very good" category. At School B, the average score was 85, categorizing it as "good." Meanwhile, at School C, students achieved an average score of 86, which also placed them in the "very good" category. To address the challenges identified in this research, educational institutions need to implement more structured interaction strategies within the online learning framework. These strategies can include the regular use of small group discussions, where students can exchange ideas and collaborate on a more intimate scale. Additionally, peer tutoring programs can be implemented to facilitate ongoing social and academic support among students. These approaches not only increase student engagement but also help build a more cohesive and supportive online learning community. Furthermore, future research can explore the effectiveness of various online platforms and tools in facilitating this structured interaction, as well as identify best practices that can be adopted by educators.

The cybergogy learning model encompasses three key domains: the cognitive domain, the emotive domain, and the social domain. Given the broad scope of this model and the limited space available, this paper focuses on the implications of these three domains in the context of forming an online learning community. The findings presented above serve as a foundation for researchers to develop learning communities tailored to student characteristics. Activity design should be aligned with students' needs and learning styles to foster connections among them, facilitating the creation of networks where they can collaborate comfortably. Activities can be structured in various formats, such as interactive, cooperative, collaborative, and competitive. Collaborative learning, in particular, has been shown to enhance student satisfaction with the learning process, and technological advancements further improve its effectiveness (Wang & Kang, 2006).

A greater emphasis on enhancing social presence, coupled with increased collaboration, can significantly ease the process of building online communities among students. When applied effectively, collaborative learning can promote learning outcomes more efficiently than individual learning. In this study, collaborative learning is implemented through several strategies: (1) structured group assignments that require project-based outcomes, utilizing communication tools such as e-mail, chat, conferencing, and messaging, all tailored to the appropriate level of engagement within the learning environment; (2) paired study assignments, incorporating various communication platforms like chat and e-mail; and (3) the use of knowledge management tools that extend learning through discussions or social software (Mayer & Clark, 2007).

However, during the course of this research, certain constraints emerged that could potentially limit the effectiveness of collaborative learning. For instance, large teams often result in students being assigned to groups without adequate guidance, while individual assessments are made despite the collaborative nature of the work. Additionally, although collaboration in online learning offers significant benefits, some students may perform better working independently or in competitive settings. Therefore, while instructors should encourage collaborative learning, it is also important to allow students the flexibility to choose work and learning methods that align with their individual learning styles.

D. Conclusion

Learning models play a crucial role in transforming information to optimize learning outcomes, especially in 21st-century education. The cyber-based learning model is an effective choice for implementing technology-driven education, fostering enhanced interaction and collaboration between teachers and students. Information transformation should not solely rely on teacher presentations; rather, it must also involve students actively exploring, collecting, formulating, sharing, discussing, and drawing conclusions. This process must be carefully planned. As such, identifying student characteristics is essential for effective teaching. In this study, the identification of student characteristics was carried out using the TOOLS (Test of Online Learning Success) technique, which is known for its simplicity, stability, construct validity, and internal reliability. By understanding these characteristics, teachers can form an online learning

community, guided by an opinion leader selected based on the ENIA model (Expertise, Novelty, Influence, and Activity). This approach facilitates more active and effective interaction and collaboration between teachers and students in the cybergogy-based learning model.

This research provides initial evidence of the potential benefits of the cybergogy approach in enhancing social interaction in online learning. However, these findings also highlight the need for further research to fully understand and optimize the implementation of cybergogy. Specifically, future research should **explore the effectiveness of cybergogy in diverse educational contexts, including its impact on students with varying levels of digital literacy**. In addition, further research can investigate the role of contextual factors such as class size, subject matter, and institutional culture in influencing the successful application of cybergogy. Consequently, future research efforts can provide more comprehensive guidance for educators and educational institutions seeking to utilize cybergogy to create more inclusive and effective online learning experiences.

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