ISSN 2723-6471

Utilizing Systematic Digital Platforms and Instructional Design in Health Communication: A Data-Driven Approach in China's Curriculum

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(Received: October 5, 2024; Revised: November 25, 2024; Accepted: December 23, 2024; Available online: January 30, 2025)

Abstract

This study explores the integration of systematic instructional design and digital platforms in health communication courses in China, with a focus on evaluating the effectiveness of these approaches in enhancing medical interns' knowledge and satisfaction. The research involved 17 experienced physicians and 30 medical interns, utilizing the Delphi Method for expert input and various data collection methods, including in-person surveys, telephone interviews, and email-based questionnaires. The study aimed to assess the impact of digital platforms and instructional design on knowledge acquisition and overall satisfaction. The findings suggest that the integration of systematic instructional design with digital platforms significantly improved medical interns' knowledge and engagement with the health communication curriculum. Additionally, expert consensus supported the effectiveness of this approach in addressing critical gaps in digital literacy and practical health communication skills. The study introduces the Chinese IDSDPS Health Communication Model, a dynamic, culturally relevant framework designed to bridge gaps in digital literacy, communication tactics, data analysis, and interdisciplinary learning. By incorporating locally relevant health content and ensuring alignment with China's public health needs, the model presents a scalable approach to improving health communication education. This research emphasizes the transformative potential of combining instructional design and digital technologies to enhance educational outcomes in health communication, offering valuable insights for addressing broader public health challenges both in China and globally.

Keywords: Instructional Design, Systematic Digital Platform, Health Communication, Curriculum, China

1. Introduction

China’s rapid digital revolution has transformed healthcare, particularly through health communication. This shift enhances accessibility, patient involvement, and public health outcomes. However, challenges exist. This essay examines these challenges. China’s digital health communication scene is progressing rapidly, driven by smartphone and internet adoption. Mobile health apps, telemedicine platforms, and wearable devices provide convenient access to health information, remote consultations, and personalized monitoring. The digital implementation of health communication in China improves healthcare accessibility, patient engagement, and public health outcomes. It enables mobile applications, telemedicine platforms, and wearable technology, leading to better patient care and public health [1].

Digital health solutions in China, including mobile health apps, telemedicine, and wearable devices, improve healthcare accessibility, patient engagement, and public health outcomes. They’re particularly effective in managing chronic diseases and empowering individuals. Despite challenges, the potential of these solutions is enormous. Data security and equitable access are being addressed to maximize their impact [2]. A study used self-regulated learning (SRL) to improve students’ learning outcomes. Multimedia games and assessment exams enhanced critical thinking, showing SRL’s effectiveness in boosting academic performance. The SRL framework benefits education and professional development [3]. Digital tools are crucial for health information dissemination, disease monitoring, and delivery, especially in rural areas. However, challenges include data privacy, health literacy, and inequitable access. Improving

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DOI: https://doi.org/10.47738/jads.v6i1.651

health literacy and regulatory frameworks ensures technology safety, efficacy, and ethics. Seamless data exchange provides integrated healthcare despite technology challenges. Digital tools revolutionize service delivery in disadvantaged regions, improve health literacy, and monitor diseases, but still face privacy and security issues [4].

The 'Healthy China 2030 campaign' integrates technology into healthcare to address public health challenges. However, challenges include data privacy, health literacy, inequality in access, regulatory frameworks, and interoperability. Improving health literacy and bridging urban-rural disparities in digital literacy are crucial. Clear guidelines and standards ensure digital health technologies' safety, efficacy, and ethical use. Public education, telemedicine expansion, and innovation enhance health literacy and access. Collaborations between government, industry, and academia drive advancements. Developing privacy, security, and ethical policies create a trustworthy healthcare environment [5].

Healthcare is transforming digitally, requiring continuous learning for medical workers. China's digital health communication app offers potential for healthcare transformation. Despite challenges, strategic initiatives in education, innovation, and policy development can create an equitable digital health ecosystem. Collaboration among stakeholders is key. Career counseling shapes vocational school students' career patterns, helping them choose jobs based on their attitudes and self-concept. Implementing career counseling in vocational schools and universities prepares students for the workforce and improves self-concept [6]. Professional courses are essential for medical workers to continuously learn and develop their skills. These flexible, modular, and comprehensive courses offer specialized training tailored to specific fields. They incorporate hands-on training, real-world case studies, and simulations to enhance learning and problem-solving. Expert-led courses provide high-quality content and accreditation, ensuring medical workers have the necessary credentials for career advancement. Simulation training is a crucial component of their professional and skill development [7]. Utilize comprehensive online learning platforms accessible anywhere to engage medical professionals across diverse areas. Language Assistance provides lessons in additional languages like Chinese and English to overcome linguistic barriers and promote diversity. Ongoing education is crucial for healthcare practitioners to stay informed and proficient. Given their schedules, offer professional, efficient, and accessible systematic courses that are time-efficient, comprehensive, practical, high-quality, and up-to-date. This ensures medical professionals are adequately prepared to deliver optimal patient care and stay informed about medical research and technology advancements. Telemedicine revolutionizes healthcare by enabling direct interactions between providers and patients, enhancing care, and facilitating data sharing [8].

Medical internships are crucial for medical students transitioning from theoretical learning to practical clinical application. They typically occur in hospitals and clinics, providing hands-on experience under supervision. Advancements in virtual reality, artificial intelligence, and telemedicine have enhanced medical training with virtual simulations, online patient consultations, and digital learning tools. These technologies improve accessibility and flexibility while maintaining rigorous standards. Online platforms enable remote participation, reducing transportation challenges and disparities in global healthcare training. The COVID-19 pandemic accelerated the shift to virtual learning and remote internships, making them essential. Online internships often enhance traditional experiences with additional resources like video lectures, case studies, and digital tools. Ensuring online programs meet established medical education standards is crucial for maintaining quality. Direct patient interaction remains irreplaceable, so medical educators should combine online courses with in-person experiences whenever possible. The emergence of online internships signifies a significant transformation in medical education, requiring skills assessments. While these programs offer exceptional flexibility and accessibility, they should be used with practical clinical training to ensure medical graduates are well-prepared for real-world patient care. During the COVID-19 pandemic, digital teaching was as effective as traditional learning for undergraduate nursing and medical interns. Further research is needed to assess remote training's effectiveness [9].

Artificial Intelligence and Machine Learning enhance diagnostics, treatment protocols, and predictive analytics in healthcare, improving precision and effectiveness. Internet connectivity and smartphone usage have increased access to digital health tools, bridging healthcare accessibility gaps. Cloud Computing stores and shares medical data, ensuring seamless patient record access and healthcare specialist collaboration. Patients increasingly take an active role in healthcare, seeking information and control over treatment plans. Digital health solutions provide patients with medical records, educational resources, and direct communication with healthcare experts. Personalized Medicine, advances in

genomics, and big data analytics enable tailored treatment regimens based on individual factors. Governments enhance digital health initiatives, integrating technologies into traditional healthcare systems through standards and protocols for data sharing. NorthShore University HealthSystem adopted personalized medicine, achieving quantifiable patient outcomes through a genomics-driven learning health system and comprehensive clinical decision support systems [10].

Healthcare systems increasingly use digital health solutions to reduce costs and improve efficiency, especially during pandemics. These tools enable remote monitoring, preventive care, and better chronic condition management, reducing healthcare system burden. EHRs and big data analytics enhance these efforts. China's rapidly evolving healthcare sector necessitates professional, efficient, and systematic courses for healthcare workers. These courses equip professionals with the latest knowledge and skills for high-quality care, fitting busy schedules with flexible learning options and a modular structure. They should also provide updated medical knowledge and advanced clinical skills for effective practices.

Healthcare workers in China face educational disparities, requiring comprehensive and relevant training. Systematic courses can address this, focusing on online learning platforms and mobile training units. These courses should cover traditional Chinese medicine, specialized training, and research and innovation, enabling healthcare workers to develop new solutions and improve skills. The China-Gates Foundation's E-learning CME programs in three provinces have attracted a large number of participants, averaging 173.2 per online training session. However, challenges remain, including unmet learning needs, disorganized governance, insufficient hardware and software, and lack of incentives. Large-scale E-learning CME activities in China are feasible, with key facilitators being training content and format and barriers matching training supply and demand [11].

Healthcare workers need training in stress management, work-life balance, and leadership to maintain mental health. Courses should focus on stress management, time management, and leadership development for healthcare leadership roles. The healthcare environment causes work-related stress, leading to increased stress among professionals. Sapienza University of Rome's Faculty of Medicine and Dentistry implemented an intervention group to address this. The group received personal protective equipment, while the control group didn't. The study found no differences in mental or physical composite scores between the groups [12].

A comprehensive needs assessment should be conducted to identify knowledge gaps and training requirements for Chinese medical professionals. The curriculum should be designed with a focus on patient care, technical expertise, and research capabilities, aligning it with the practical needs of healthcare practitioners. Learning outcomes should be clearly defined to support professional growth and progress. A modular course structure will allow for flexible learning and easy implementation. To ensure high content quality, collaboration with experts from various medical fields is essential, along with incorporating evidence-based practices and research to provide accurate and up-to-date knowledge. Engaging instructional methods, such as films, animations, simulations, and case studies, should be employed to enhance student retention and engagement. Offering flexible delivery modes, including online platforms, ensures accessibility, especially for professionals in remote areas. Blended learning models, combining classroom instruction with online learning, workshops, hands-on training, and experiential learning, should be utilized. Mobile compatibility should be prioritized for on-the-go learning. The study on Instructional Design of Systematic Digital Platforms in Health Communication Curricula in China highlights the need for improvements in medical courses, especially in terms of accreditation and certification for career advancement. It is crucial to incorporate technical elements such as telemedicine, electronic health records, and artificial intelligence to keep pace with technological advancements. Mentorship programs, easy access to resources, and technical support are also vital. Classes should be multilingual, culturally sensitive, and adaptable to cater to diverse learners. Continuous improvement through adaptive learning technologies is key to ensuring the curriculum remains relevant and practical.

2. Literature Review

2.1. Instructional Design in Health Communication Education

Health communication plays a vital role in public health, influencing decisions and improving outcomes. The integration of AI and big data has made health messages more accessible and personalized. AI-driven chatbots and virtual assistants are widely used in China, helping patients navigate healthcare systems. However, challenges such as

the spread of misinformation on digital platforms remain. To address this, strong regulatory frameworks, media literacy programs, and active involvement from governmental and non-governmental bodies are needed. In China, the shift from infectious diseases to chronic non-communicable diseases due to urbanization, aging, and socioeconomic changes has created a need for more effective health communication to educate the public on disease prevention and management [13]. A significant health literacy gap exists across demographics, with many lacking adequate health knowledge. Mobile health applications and social media offer new ways to deliver health messages, promote healthy behaviors, and support disease management. The COVID-19 pandemic highlighted the efficiency of digital channels but also exposed gaps in mHealth's effectiveness. Health communication, both globally and in China, is shaped by traditional media, digital advancements, and ongoing challenges such as misinformation. Combatting misinformation, promoting equity in access, and addressing cultural factors like Traditional Chinese Medicine (TCM) are crucial for improving public health. Efficient communication during crises and transparent, consistent messaging are key to preventing confusion and mistrust. Online platforms, including virtual internships, along with technologies like VR, AI, and telemedicine, have enhanced medical education and global accessibility, though integrating traditional practices with modern medicine remains a cultural challenge [14].

Effective health communication in China must balance Traditional Chinese Medicine (TCM) and Western medicine, respecting cultural beliefs while promoting evidence-based practices. Medical professionals are key in delivering accurate health information, fostering trust, and encouraging public health compliance. They also help address health disparities through community outreach and by combating misinformation. Investing in their professional development can enhance health communication efforts, reduce health inequalities, and promote evidence-based practices. Continued education is essential for healthcare workers to maintain high standards and adapt to the evolving medical field. However, challenges such as time constraints, financial barriers, and content relevance hinder the implementation of continuing education programs. The demanding nature of medical work limits the time available for further education, requiring adaptable and accessible training formats that do not compromise patient care. Additionally, there is significant variation in the quality of educational resources, which can impact the effectiveness of training. Financial support through subsidies or institutional funding is vital, especially for those in resource-limited areas. Interdisciplinary learning is also gaining importance, as modern healthcare requires coordination across specialties to improve patient outcomes. Intelligent courses, with their scalability and accessibility, are particularly beneficial for healthcare professionals in underserved areas. However, data privacy and security concerns must be addressed, and continuous assessment is necessary to maintain the credibility of these courses. These educational models, incorporating advanced technology and interactive learning, are crucial for professional growth and addressing the challenges faced in the healthcare sector [14].

2.2. The Role of Digital Platforms In Education

The emergence of intelligent medical education platforms, driven by artificial intelligence (AI) and advanced data analytics, has significantly transformed health communication and medical education. These platforms enhance educational outcomes by utilizing big data analytics to deliver personalized content, based on learners' performance and feedback, ensuring that medical professionals stay updated with the latest knowledge [15]. By integrating data visualization and predictive analytics, these systems not only support real-time decision-making in healthcare but also reshape pedagogical interactions, enabling a data-driven approach to learning [16].

AI's expanding role in medical education includes automating medical practices and enhancing educational methodologies through deep learning frameworks, fostering a more interactive and personalized learning environment essential for preparing future healthcare leaders [17]. In health communication, these platforms improve communication techniques, focusing on patient engagement, communication skills, and health literacy, while also supporting the continuous professional development of healthcare practitioners. This integration optimizes patient-centric approaches, improving healthcare delivery and ensuring that practitioners are well-prepared to meet evolving standards in health communication [18]. These intelligent platforms are designed with various technical components to improve both medical training and the effectiveness of health communication, making them crucial tools for enhancing the quality and accessibility of healthcare education.

2.3. Framework of Intelligent Course Platform for Health Communication

The framework for intelligent medical education platforms relies on a robust infrastructure, typically built around a comprehensive Learning Management System (LMS), which ensures that educational resources are not only accessible but also current and tailored to users' needs. By integrating big data analytics, these platforms offer personalized, adaptive learning experiences that cater to individual requirements, enhancing the effectiveness of medical education [19]. Additionally, advanced technologies like Virtual Reality (VR) and simulation training complement the LMS, providing immersive learning environments that improve clinical competencies and address the limitations of traditional medical education [20].

These platforms also integrate AI, interactive tools, and interdisciplinary content to support a comprehensive curriculum. Cloud-based systems and virtual learning environments enable blended learning, simulations, and collaborative learning models that meet diverse educational needs. Data analytics and reporting tools further enhance platform functionality by providing insights into the effectiveness of educational interventions, while security measures such as authentication, encryption, and access controls ensure the protection of personal and educational data, maintaining trust and compliance with legal standards.

The integration of AI and big data analytics not only personalizes the educational content but also fosters continuous improvement through outcome assessments, which measure learning outcomes and course completion rates. Quality assurance processes ensure the relevance and quality of the curriculum, contributing to better healthcare outcomes by enhancing the clinical skills and knowledge of medical professionals [21]. This comprehensive approach to medical education, combining advanced technologies and data-driven insights, is pivotal in transforming healthcare education and improving health communication.

2.4. Evaluation Criteria for Doctor Course Learning

The evaluation of intelligent medical education courses is crucial to ensure the effectiveness and quality of medical education delivered through digital platforms. A well-structured evaluation mechanism is essential for assessing learning outcomes and ensuring that educational resources meet the evolving needs of medical students [22]. Key evaluation criteria include student participation, adaptability, content quality, interactive materials, assessment and feedback systems, and technological performance, which together form a comprehensive framework for evaluating the impact and relevance of intelligent medical education. This framework must consider content familiarity, learning context, and technological integration, which significantly influence student performance and comprehension [23].

The integration of AI in medical education requires continuous assessment to adapt curricula effectively, ensuring students are well-prepared for future healthcare challenges [24]. AI's role in education is increasingly recognized, and both students and faculty highlight the importance of integrating AI to enhance curriculum development. Evaluating students' attitudes and knowledge regarding AI can further guide educational strategies and improve the overall learning experience [25].

For health communication courses, factors such as course content, teaching methods, student engagement, and learning outcomes must be carefully evaluated. The content should be current, interdisciplinary, and include diverse teaching strategies like lectures, case studies, and simulations to cater to different learning styles. Technology should be integrated to improve engagement and accessibility, and learners' involvement should be assessed through participation and feedback. Continuous evaluation, professional development for educators, and the availability of necessary resources are vital for the ongoing enhancement of health communication courses. Ethical and cultural considerations must also be incorporated to ensure the curriculum is relevant and inclusive. By focusing on these elements, educators can improve the design and delivery of intelligent medical education, ultimately fostering competent healthcare professionals equipped to meet contemporary challenges in healthcare and communication.

2.5. Challenges and Barriers to the Use of Digital Platforms

The use of digital platforms in health communication faces multiple challenges, including issues related to physical access, digital literacy, and cultural factors. Technological inequities in rural areas make it difficult for individuals to access digital platforms, and varying levels of digital literacy across populations further exacerbate these barriers. As noted by [26], improving digital skills through targeted training programs is essential to ensure equitable access to

digital health resources. Additionally, caregivers have reported difficulties navigating these platforms due to limited IT capabilities, highlighting the need for user-friendly designs that accommodate different levels of digital literacy [27].

Cultural and contextual factors, such as language differences and varying communication styles, also pose significant challenges to the adoption of digital health solutions. Individuals from resource-limited backgrounds may not only struggle to access technology but also face difficulties in understanding and effectively using digital health resources [28]. Demographic factors, including age, gender, and socioeconomic status, further influence digital health literacy levels, with older adults and those from lower educational backgrounds often facing greater challenges [29]. To address these disparities, tailored educational interventions and culturally sensitive approaches are crucial for improving health communication via digital platforms.

2.6. Health Communication Curriculum in China

The health communication curriculum in China is evolving rapidly in response to urbanization, demographic changes, and emerging health threats. Urbanization has introduced significant mental health challenges, requiring a curriculum that incorporates comprehensive health education to address these issues. As cities expand, the built environment's impact on residents' health has become increasingly important, highlighting the need for health communication strategies that consider urban health dynamics [30]. Health communication plays a critical role in promoting health literacy, shaping public perceptions, and encouraging healthy behaviors, particularly in urban areas where traditional communication methods may be insufficient.

The rise of digital health platforms is reshaping health communication in China, offering innovative ways to engage with health information and facilitate active health management [31]. These platforms, including e-learning, blended learning, and mobile learning, allow students and the public to access health materials continuously, beyond traditional classroom settings. However, the digital divide remains a concern, as disparities in access to technology can exacerbate health inequities, particularly among less educated populations [32]. To enhance curriculum relevance, it is essential to integrate cultural context, community engagement, and address technological barriers. The future of health communication education in China will depend on overcoming these barriers, developing innovative assessment methods, and ensuring continuous professional development. By embracing learner-centered approaches, digital resources, and cultural relevance, educators can better prepare students to address the complexities of public health communication, contributing to improved public health outcomes.

2.7. Delphi Technique for Instructional Design and Systematic Digital Platforms

The Delphi method is a systematic approach to gathering expert opinions through multiple rounds of questionnaires, where experts respond anonymously to surveys and provide feedback on the responses of others. This iterative process allows for the refinement of ideas and helps reach a consensus on complex issues, particularly where empirical evidence is lacking or where diverse opinions exist. It is especially useful in fields like health communication, where experts' insights are crucial for shaping curricula and strategies.

The Delphi method involves sending a series of structured questionnaires to a group of experts, followed by summarizing and sharing the responses anonymously. Experts are then asked to reconsider their opinions based on the group's feedback. This process continues for several rounds until a consensus or clear majority opinion is reached. By reducing biases such as groupthink and encouraging independent thought, the method ensures that diverse perspectives are considered, and it allows for remote collaboration among experts, which is particularly valuable in the digital age.

For instance, [33] highlight the Delphi method's effectiveness in revisiting educational curricula during the COVID-19 pandemic, noting its participatory approach and cost-effectiveness. Similarly, [34] used the Delphi method in medical education to establish consensus on the core syllabus for facial anatomy teaching. Despite its resource-intensive and time-consuming nature, the Delphi method remains a powerful tool for improving health communication strategies and educational outcomes, ensuring that expert consensus is reached through a structured, inclusive process [26], [35].

2.8. The China Health Communication Intelligent Course Learning Platform

The China Health Communication Intelligent Course Learning Platform is a transformative educational tool that integrates advanced technologies with innovative teaching methods to enhance the health communication skills of Chinese healthcare professionals. The platform is grounded in several educational theories, such as constructivist learning, which focuses on knowledge construction through experience, and self-directed learning, which encourages learners to take responsibility for their education. It also incorporates social learning theory, which highlights learning through interaction and observation, and cognitive load theory, which manages information processing for optimal learning outcomes. The platform uses interactive tools like quizzes, simulations, and real-time feedback to enhance learning retention [36]. Designed with the Technology Acceptance Model (TAM) in mind, the platform is user-friendly, helping users adapt to new technologies. Situated learning theory is also incorporated, providing context-rich, real-life scenarios through VR simulations and case studies that mimic actual clinical practice [37]. Supporting lifelong learning, the platform offers flexible and accessible educational opportunities, promoting continuous professional development. By personalizing learning paths and using AI to tailor content to individual needs, the platform fosters motivation and commitment to professional growth, ultimately aiming to improve healthcare quality and patient outcomes.

2.9. Digital Platforms in Health Communication Curriculum

Health communication plays a vital role in public health education, promoting health literacy and influencing behaviors. In China, its importance has grown due to challenges such as chronic diseases, pandemics, and healthcare access disparities. While traditional health communication curricula in China have focused on lectures and rote memorization, there is a shift toward more interactive, technology-driven approaches. This includes integrating digital platforms and instructional design to provide real-world learning experiences. Blended learning models, combining traditional instruction with online learning, and the use of AI and big data analytics offer tailored learning experiences to students. Despite these advancements, challenges related to accessibility, faculty readiness, and curriculum design persist. Ongoing research is needed to adapt health communication education to evolving public health challenges. Research on digital competencies among healthcare professionals has been limited, and future studies should focus on refining instructional design models and exploring new digital technologies. International examples, such as Greece's eLearning intervention for health professionals during the COVID-19 pandemic, show that digital education can enhance skills and knowledge, improving clinical practice. However, the spread of misinformation, particularly through social media, remains a global threat to health communication. Solutions like social media impact techniques and robust local media ecosystems are vital for combating misinformation. Studies on digital education during the pandemic also suggest that, while digital learning can be effective, further research is needed to evaluate its impact and improve online programs for better interaction and teamwork [38], [39].

3. Methodology

3.1. Research Design and Framework

This study examines the role of systematic instructional design and digital platforms in health communication courses in China, focusing on assessing medical interns' knowledge acquisition and satisfaction levels. The methodology integrates the Delphi technique, combining quantitative and qualitative approaches to gather expert opinions and evaluate curriculum effectiveness. The study targets 30 medical interns and 17 head physicians from public hospitals, selected through purposive sampling. The Intelligent Course Learning Model (ICLM) serves as the foundation, emphasizing personalized learning through data analytics, adaptive technologies, and collaborative environments. The ICLM integrates three instructional design principles: constructivism, which promotes active, hands-on learning experiences; scaffolding, which provides structured support as learners progress; and cognitive load theory, which optimizes content delivery for better retention and comprehension. The health communication curriculum covers topics such as health literacy, communication theories, cultural competence, and digital health communication. Digital platforms, including Learning Management Systems (LMS), data analytics tools, and content creation tools, enhance curriculum delivery by enabling real-time feedback, progress monitoring, and personalized learning experiences.

3.2. Data Collection

Data collection involves multiple stages. Initial semi-structured interviews with medical interns identified key challenges, including insufficient technological integration, lack of cultural awareness, and inadequate data literacy. Expert surveys were conducted in three rounds: the first round used Questionnaire 1 to assess expert views on course design and content using a five-point Likert scale; the second round employed Questionnaire 2 to analyze expert opinions and determine average values, total scores, and coefficients of variation; and the third round utilized Questionnaire 3 to evaluate medical interns' satisfaction with the instructional design and digital platforms. A quasi-experimental method, using a pretest-posttest design, assessed changes in medical interns' knowledge and employability before and after participating in the curriculum. The Delphi method facilitated iterative feedback, ensuring the curriculum aligned with current trends and educational needs. Experts from public health, communication, and education contributed to refining course content, incorporating interdisciplinary perspectives and diverse instructional approaches such as workshops, case studies, and simulations.

3.3. Data Processing and Analysis

Data analysis involved evaluating expert authority and consensus, employing statistical measures such as mean (M), standard deviation (SD), coefficient of variation (CV), and Cronbach's alpha for reliability. The expert authority coefficient (values > 0.7 indicated reliability) and expert judgment coefficient were calculated to validate the expertise of participants. A fuzzy comprehensive evaluation approach, using a fuzzy connection matrix, analyzed the integration performance of the teaching model, yielding an overall evaluation value of 76.9433, classified as "excellent." Expert opinions were assessed using median, mode, and interquartile range (IQR), with consensus criteria including a median score ≥ 3.50, an absolute difference between median and mode ≤ 1.00, and an IQR ≤ 1.5. Cronbach's alpha assessed internal consistency, with values > 0.70 indicating acceptable reliability. A dependent t-test compared pre- and post-intervention scores to evaluate changes in knowledge and employability.

3.4. Implementation and Evaluation

The study implemented the Chinese IDSDPS Health Communication Model, a dynamic digital ecosystem integrating instructional design theories and advanced technologies. The model addressed gaps in digital literacy, practical skills, and data assessment, incorporating culturally relevant content and interdisciplinary approaches. System simulations evaluated the model's efficacy, demonstrating its potential to enhance health communication education in China. The study acknowledges limitations, including a limited sample size and short-term focus. Future research should expand to include diverse demographics and explore the integration of emerging technologies such as artificial intelligence (AI) and virtual reality (VR). This methodology provides a robust framework for analyzing the role of systematic instructional design and digital platforms in health communication education, offering insights for curriculum development and scalability across diverse healthcare systems.

4. Results and Discussion

4.1. Demographic Data Of Experts And Various Coefficients

The study analyzed the professional course education needs and requirements of different majors based on surveys conducted with 17 doctors from various specialties. These experts provided valuable insights into the relevance, effectiveness, and areas for improvement in the current health communication course content. The survey highlighted both the strengths and weaknesses of the courses attended by medical interns, offering a comprehensive view of the curriculum's impact. The recovery rate of the expert consultation forms served as an indicator of the experts' engagement in the research. A recovery rate of 50% is typically considered sufficient for analysis, while a rate exceeding 60% is regarded as high. In the fourth round of this study, all 17 expert letters were successfully retrieved, resulting in a 100% recovery rate. This high level of engagement reflects the experts' attention to the study's objectives and their commitment to providing meaningful feedback.

The Delphi method, which guided this expert consultation, ensured that the results are both legitimate and reliable, with each expert diligently fulfilling the consultation requirements and offering constructive input. The expert authority coefficient was used to measure the experts' familiarity with the subject matter and the basis of their evaluation on the consultation form. This coefficient was calculated based on the expert judgment coefficient, which is categorized into

three levels—large, medium, and small—depending on four criteria: theory, practice, reference, and intuition. The results of this expert consultation process are robust and contribute significantly to understanding the effectiveness of the health communication curriculum and its areas for improvement.

4.2. Delphi Technique Results

The Delphi method was employed to design a structured digital platform for China's health communication curriculum, promoting consensus among experts and minimizing biases. The goal was to address the increasing need for efficient, culturally relevant, and evidence-based training. In the first round, the study identified several key issues in the current health communication curriculum, including insufficient technological integration, lack of cultural awareness, limited emphasis on practical competencies, inadequate data literacy, and ineffective assessment techniques. The proposed curriculum subjects aimed to address these challenges by incorporating digital proficiency, cultural competency in communication, practical health communication strategies, data analysis, ethical considerations, and interdisciplinary methodologies. The intention was to better equip participants with the skills needed to navigate the complexities of health communication in the digital age, ultimately improving health outcomes in China.

Key content issues also included outdated information, lack of cultural relevance, insufficient focus on practical application, and the absence of digital communication competencies and interdisciplinary perspectives. The implementation of the IDSDP system in China faced several challenges, such as technical issues, platform stability, digital literacy gaps, resistance to change, access disparities, engagement issues, assessment difficulties, content relevance, and administrative hurdles. To address these challenges, it was crucial to enhance training, ensure equitable access, and promote engagement, which would help create a more effective and inclusive educational environment for health communication participants.

In the second round, experts' views on the health communication curriculum in China were evaluated using Questionnaire 1, which assessed the design model of 17 expert-guided courses and course content through a five-point Likert scale. The process involved experts from diverse fields, including public health, health communication, curriculum development, technology, and policy. Open-ended comments were gathered to identify key competencies and specific challenges in health communication. The Delphi method strengthened the curriculum framework by incorporating expert feedback, ensuring it aligned with stakeholder goals and the unique cultural and technological landscape of China.

The fourth round utilized Questionnaire 3 to gather further feedback, refine the course content, and assess the development of a career guidance model. Experts reviewed the content and expressed their level of agreement using a five-point scale. After collecting feedback, the course and content were revised accordingly. The focus was on measuring the contentment of medical interns who engaged with the curriculum through the instructional design and systematic digital platforms. Quasi-experimental methods were used to assess whether the model improved the interns' satisfaction and employability.

Overall, the Delphi technique proved effective in refining the health communication curriculum, addressing critical gaps, and ensuring alignment with the needs of medical interns and the broader healthcare community in China. The iterative nature of the Delphi method facilitated continuous improvement, resulting in a more relevant, culturally sensitive, and technologically advanced curriculum.

4.3. Quasi-Experimental Method

The quasi-experimental method was employed to evaluate the effectiveness of integrating instructional design and digital platforms into China's health communication curriculum. An experimental group of 30 individuals was randomly selected to participate in the "Healthy China" program, which focuses on health education and offers culturally adapted, multilingual content. The program leverages asynchronous learning through platforms like the WeChat classroom, a virtual learning environment that provides real-time assistance. Additionally, a gamified healthcare scenario game was introduced, allowing learners to practice decision-making in a risk-free environment. By combining instructional design principles with digital platforms, the program aimed to create a cohesive learning experience that maximizes efficiency and scalability. This integrated approach was designed to improve learning outcomes and ensure the effective design of training materials.

 ISSN 2723-6471

The study evaluated the instructional design and systematic digital platforms in China's health communication curriculum through semi-structured interviews with 17 experts. Responses were analyzed using a five-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = moderately agree, and 5 = strongly agree. The results, presented in table 1, revealed that the experts' opinions had a mean score of 3.82, with a standard deviation (SD) of 0.32 and a coefficient of variation (C.V.%) of 19.95, indicating a moderate level of agreement. The p-value was 0.002, and the significance level was 0.84. Data collection involved semi-structured interviews, where experts provided feedback on the instructional design and systematic digital platforms in China's health communication curriculum.

Table 1. Expert Evaluation of Instructional Design and Digital Platforms

Item	$\bar{x}$	SD.	C.V.(%)	Meaning	Sig.
1. Lack of technological awareness, practical skills, and data assessment methods.	4.24	0.66	15.68	Moderately Agree	0.90
2. The curriculum includes digital skills, cultural communication, health strategies, data analysis, assessment, ethics, and interdisciplinary approaches.	4.06	0.66	16.23	Moderately Agree	0.78
3. Participants will improve health communication skills and promote better health outcomes in China.	4.29	0.77	17.97	Moderately Agree	0.00
4. Health communication strategies, data analysis, assessment, ethics, and interdisciplinary approaches.	4.06	0.77	16.23	Moderately Agree	0.81
5. Health communication content is vital for enhancing the curriculum's effectiveness in China.	4.06	0.87	21.65	Moderately Agree	0.00
6. Platform stability issues and glitches disrupt learning and cause difficulties.	4.06	0.90	22.16	Moderately Agree	0.10
7. The platform's complexity may hinder user engagement and learning outcomes.	3.65	0.86	23.63	Moderately Agree	0.05
8. Varied digital literacy levels may create disparities in platform usage.	3.12	0.86	27.50	Neutral	0.06
9. The platform can significantly improve Chinese health outcomes with its features.	3.71	0.85	27.50	Moderately Agree	0.05
10. Attachment to traditional methods may slow the adoption of new digital approaches.	3.88	0.70	17.94	Moderately Agree	0.68
11. Rural regions face technology and infrastructure gaps, limiting participant engagement and platform effectiveness.	4.06	0.43	10.56	Moderately Agree	0.90
12. Engagement and motivation depend on interactive and engaging content on the platform.	3.12	0.86	27.25	Neutral	0.05
13. Platform interaction fosters collaboration, motivation, and idea sharing among participants.	3.71	0.85	22.91	Moderately Agree	0.05
14. Measuring outcomes and assessing platform effectiveness can be complex.	3.88	0.70	17.94	Moderately Agree	068
15. Ineffective feedback tools hinder timely, constructive feedback, limiting improvements in health outcomes.	4.06	0.43	10.56	Moderately Agree	0.90
16. The platform's content reflects the cultural context of health communication in China.	4.06	0.70	22.16	Moderately Agree	0.01
17. The platform helps improve the health of Chinese communities.	3.65	0.86	23.63	Moderately Agree	0.05
18. Promoting health through stakeholder involvement enhances outcomes and fosters inclusivity.	3.12	0.86	27.50	Neutral	0.06
19. The curriculum and platform design revolutionize health education with technology and effective methods.	3.71	0.85	27.50	Moderately Agree	0.05

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Item	$\bar{x}$	SD.	C.V.(%)	Meaning	Sig.
20. The platform's effectiveness aligns with China's national health policies.	3.88	0.70	17.94	Moderately Agree	0.68
21. Standardized platforms ensure inclusivity by addressing China's linguistic and cultural diversity.	4.06	0.43	10.56	Moderately Agree	0.90
22. The digital platform enhances training, access, engagement, and learning outcomes in China's health communication curriculum.	4.06	0.66	16.23	Moderately Agree	0.81
23. The platform has the potential to revolutionize health communication by addressing local issues with relevant content.	4.00	0.87	21.65	Moderately Agree	0.81
24. Curriculum content in the digital platform system is integral to China's health communication education.	4.06	0.90	22.16	Moderately Agree	0.10
25. Simulation tools in the digital platform system effectively support the health communication curriculum.	3.65	0.86	23.63	Moderately Agree	0.05
26. Evaluations reflect understanding and effectiveness of the digital platform in China's health communication curriculum.	3.12	0.86	27.50	Neutral	0.06
27. The platform is a structured approach to enhancing health communication in China.	3.71	0.85	22.91	Moderately Agree	0.05
28. Implementing the platform ensures a systematic approach to instruction in health communication in China.	3.88	0.70	17.94	Moderately Agree	0.68
29. The IDSDPS Model streamlines production, delivery, and assessment of digital learning materials, ensuring quality and engagement.	4.06	0.43	10.56	Moderately Agree	0.90
Total	3.82	0.32	19.95	Moderately Agree	0.84

In the second round, Questionnaire 1 was used to evaluate expert views on course design, content, and implementation methods. Seventeen healthcare professionals, including physicians, nurses, pharmacists, therapists, and public health experts with 3 to 20 years of experience, assessed the curriculum's effectiveness. The main focus was on course content, professional environments, and medical specialties. The study also evaluated medical interns' knowledge in the Health Communication Curriculum in China using instructional design and systematic digital platforms. The experts' opinions resulted in a mean score of 4.07, with a standard deviation of 0.72 and a coefficient of variation of 17.84, indicating moderate agreement (shown in table 2).

Table 2. Expert Evaluation of Medical Intern Knowledge Using Instructional Design and Digital Platforms

Item	%	$\bar{x}$	SD.	C.V.(%)	M	Sig.	IQR.	Consensus
1. Lack of technological awareness, practical skills, and data assessment methods.	86	4.24	0.66	15.68	Moderately Agree	0.90	1	Consensus
2. The curriculum includes digital skills, cultural communication, health strategies, data analysis, assessment, ethics, and interdisciplinary approaches.	89	4.12	0.60	14.58	Moderately Agree	0.50	1	Consensus
3. Participants will improve health communication skills and promote better health outcomes in China.	89	4.35	0.70	16.12	Moderately Agree	0.13	1	Consensus
4. Health communication strategies, data analysis, assessment, ethics, and interdisciplinary approaches.	89	4.12	0.49	11.78	Moderately Agree	0.56	1	Consensus

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Item	%	$\bar{x}$	SD.	C.V.(%)	M	Sig.	IQR.	Consensus
5. Health communication content is vital for enhancing the curriculum's effectiveness in China.	89	4.06	0.83	20.37	Moderately Agree	0.18	1	Consensus
6. Platform stability issues and glitches disrupt learning and cause difficulties.	87	4.12	0.86	20.82	Moderately Agree	0.32	1	Consensus
7. The platform's complexity may hinder user engagement and learning outcomes.	88	4.06	0.83	20.37	Moderately Agree	0.00	1	Consensus
8. Varied digital literacy levels may create disparities in platform usage.	88	4.06	0.83	20.37	Moderately Agree	0.00	1	Consensus
9. The platform can significantly improve Chinese health outcomes with its features.	89	4.06	0.83	20.37	Moderately Agree	0.00	1	Consensus
10. Attachment to traditional methods may slow the adoption of new digital approaches.	89	4.06	0.83	20.37	Moderately Agree	0.00	1	Consensus
11. Rural regions face technology and infrastructure gaps, limiting participant engagement and platform effectiveness.	87	4.06	0.83	20.37	Moderately Agree	0.00	1	Consensus
12. Engagement and motivation depend on interactive and engaging content on the platform.	88	4.06	0.83	20.37	Moderately Agree	0.00	1	Consensus
13. Platform interaction fosters collaboration, motivation, and idea sharing among participants.	88	3.76	0.83	22.08	Moderately Agree	0.66	1	Consensus
14. Measuring outcomes and assessing platform effectiveness can be complex.	89	3.88	0.70	17.94	Moderately Agree	0.73	1	Consensus
15. Ineffective feedback tools hinder timely, constructive feedback, limiting improvements in health outcomes.	90	4.12	0.70	17.94	Moderately Agree	0.73	1	Consensus
16. The platform's content reflects the cultural context of health communication in China.	92	4.35	0.61	13.93	Moderately Agree	0.47	1	Consensus
17. The platform helps improve the health of Chinese communities.	89	4.41	0.62	14.02	Moderately Agree	0.04	1	Consensus
18. Promoting health through stakeholder involvement enhances outcomes and fosters inclusivity.	89	4.06	0.83	20.37	Moderately Agree	0.00	1	Consensus
19. The curriculum and platform design revolutionize health education with technology and effective methods.	89	3.88	0.60	15.46	Moderately Agree	0.43	1	Consensus
20. The platform's effectiveness aligns with China's national health policies.	89	4.18	0.53	12.66	Moderately Agree	0.42	1	Consensus
21. Standardized platforms ensure inclusivity by addressing China's linguistic and cultural diversity.	89	4.12	0.49	11.78	Moderately Agree	0.35	1	Consensus
22. The digital platform enhances training, access, engagement, and learning outcomes in China's health communication curriculum.	89	4.06	0.56	13.69	Moderately Agree	0.61	1	Consensus
23. The platform has the potential to revolutionize health communication by addressing local issues with relevant content.	89	4.12	0.86	20.82	Moderately Agree	0.38	1	Consensus

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Item	%	$\bar{x}$	SD.	C.V.(%)	M	Sig.	IQR.	Consensus
24. Curriculum content in the digital platform system is integral to China's health communication education.	89	4.24	0.75	17.77	Moderately Agree	0.98	1	Consensus
25. Simulation tools in the digital platform system effectively support the health communication curriculum.	89	3.65	0.93	25.54	Moderately Agree	0.95	1	Consensus
26. Evaluations reflect understanding and effectiveness of the digital platform in China's health communication curriculum.	89	4.00	0.87	21.65	Moderately Agree	0.00	1	Consensus
27. The platform is a structured approach to enhancing health communication in China.	89	4.00	0.87	21.65	Moderately Agree	0.00	1	Consensus
28. Implementing the platform ensures a systematic approach to instruction in health communication in China.	89	3.88	0.70	17.94	Moderately Agree	0.73	1	Consensus
29. The IDSDPS Model streamlines production, delivery, and assessment of digital learning materials, ensuring quality and engagement.	89	4.06	0.43	10.56	Moderately Agree	0.66	1	Consensus
Total	88.76	4.07	0.72	17.84	Moderately Agree	0.37	1	Consensus

Table 3 reports on the medical interns' satisfaction with the Health Communication curriculum in China, focusing on instructional design and digital platforms. Expert opinions on the instructional design and digital platforms used in the curriculum were gathered in the fourth round through Questionnaire 3. The feedback was analyzed, categorized, and refined into themes and suggestions. The results showed that 98.38% of experts confirmed the course and content, while 4.62% disagreed, and 0% rejected it. This evaluation helped refine the curriculum and enhance its effectiveness for medical interns.

Table 3. Medical Intern Evaluation Using Instructional Design and Digital Platforms

Domains	Confirmation	Disconfirmation	Reject
IDSDPS Model supports the production, delivery, and assessment of instructional materials in digital learning environments, simplifying instructional design, ensuring quality, and engaging students	95%	5%	0%
The IDSDPS Model's key component, the Systematic Design Framework, is based on instructional design concepts such as ADDIE and SAM	96	4%	0%
Digital Platform Integration, utilizes powerful LMS or custom platforms with multimedia content	95	5%	0%
Content Customisation, leverages AI-driven adaptive learning to tailor course difficulty, pace, and resources to individual learners	95	5%	0%
Data-Driven Feedback Loops, uses live learner data, such as quiz scores, activity logs, and module time	95	5%	0%
Team Learning Tools, promotes peer engagement through forums, group projects, and discussion boards, while motivating students with leaderboards, badges, and awards.	95	5%	0%
Cloud-Based Scalability, ensures scalable course access across sites using cloud computing, offering high availability, data security, and quick content updates.	95	5%	0%
The IDSDPS Model offers several advantages (efficiency, accessibility, engagement, adaptability)	95	5%	0%

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Domains	Confirmation	Disconfirmation	Reject
The IDSDPS Model is applied in various areas: Corporate Training, K-12 and higher education, Professional Certifications and Lifelong Learning	95	5%	0%
The Health Communication curriculum in China is highly relevant, reflecting the cultural context of health communication practices.	95	5%	0%
Interaction between platforms can create opportunities for collaboration, motivation, and the sharing of ideas among participants.	97	3%	0%
Assessment tools on the platform are ineffective feedback systems that help participants receive timely or constructive feedback, improving their Health.	97	3%	0%
Total	95.38	4.62%	0%

In the fourth round, Questionnaire 3 was used to gather feedback from 17 experts. After analyzing the responses, the feedback was categorized and condensed into themes. The study aimed to evaluate the effectiveness of the IDSDP system in the Health Communication curriculum, focusing on its impact on medical interns' contentment. The results showed that 78.58% of participants moderately agreed with the model, with a mean score of 3.90, a standard deviation of 0.72, and a consensus of 1 (shown in table 4). This assessment highlighted how well the instructional design and digital platforms improved the health communication curriculum in China, particularly in terms of enhancing participants' knowledge and skills.

Table 4. Expert Evaluation of Health Communication Curriculum Effectiveness in China Using IDSDP

Item	%	$\bar{x}$	SD.	C.V.	M	Sig.	IQR.	Consensus
Part 1: The curriculum of the Healthy platform course.								
The Healthy platform course reflects the cultural context of Health communication in China.	84.8%	4.24	0.66	15.68	Moderately Agree	0.78	1	Consensus
The Health Communication Curriculum in China is crucial to its effectiveness.	82.4%	4.12	0.60	14.58	Moderately Agree	0.79	1	Consensus
Proposed subjects include digital proficiency, cultural communication, health strategies, data analysis, assessment, ethics, and interdisciplinary methods.	87%	4.35	0.70	16.12	Moderately Agree	0.06	1	Consensus
Cultural attachment to traditional methods hinders the adoption of new digital methods.	82.4%	4.12	0.49	11.78	Moderately Agree	0.32	1	Consensus
The instructional design system for Health communication is systematic, revolutionizing education with technology and effective methods.	81.2%	4.06	0.83	20.37	Moderately Agree	0.04	1	Consensus
The curriculum content of the instructional design system for Health communication in China.	82.4%	4.12	0.86	20.82	Moderately Agree	0.48	1	Consensus
Part 2: Interaction among platforms of the academic content of IDSDP for Health communication in China.								
Platform interaction fosters collaboration, motivation, and idea sharing among participants.	74.2%	3.17	0.85	22.91	Neutral	0.04	1	Consensus
Participants will navigate the complexities of Health communication in the digital era, improve their skills, and enhance health outcomes in China.	67%	3.35	0.93	27.78	Neutral	0.18	1	Consensus
Lack of technological awareness, practical skills, and data assessment methods.	80%	4.00	0.79	19.76	Moderately Agree	0.09	1	Consensus
Practical health communication strategies, data analysis, assessment methods, ethics, and interdisciplinary approaches.	63.6%	3.88	0.70	17.94	Moderately Agree	0.91	1	Consensus
Platform stability issues and technical glitches disrupt learning and hinder progress.	75.2%	4.00	0.35	8.84	Moderately Agree	0.58	1	Consensus

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Item	%	$\bar{x}$	SD.	C.V.	M	Sig.	IQR.	Consensus
Participants' varying digital literacy levels create disparities in platform use.	77.6%	3.18	0.88	27.79	Moderately Agree	0.14	1	Consensus
The platform's complexity and practical use impact participant engagement and learning outcomes.	82.4%	3.76	0.83	22.08	Moderately Agree	0.07	1	Consensus
The platform can significantly improve the health of Chinese individuals through its features.	77.6%	3.88	0.70	17.94	Moderately Agree	0.91	1	Consensus
Part 3: The assessment tools on the platform need to be more effective feedback mechanisms for the IDSDP System for Health Communication in China.								
The platform's assessment tools lack effective feedback systems to provide timely or constructive feedback, limiting health improvements.	85.8%	4.12	0.49	11.78	Moderately Agree	0.11	1	Consensus
Technological access disparities in rural areas hinder participant engagement and educational opportunities, affecting platform efficacy.	82.4%	4.29	0.77	17.97	Moderately Agree	0.05	1	Consensus
Engagement and motivation are driven by interactive and engaging content on the platform.	82.4%	4.12	0.70	16.92	Moderately Agree	0.18	1	Consensus
Measuring the effectiveness of the platform and learning outcomes can be complex.	76.4%	3.82	0.95	24.87	Moderately Agree	0.27	1	Consensus
Systematic instruction in China is facilitated through the implementation of the IDSDP.	77.6%	3.88	0.60	15.46	Moderately Agree	0.10	1	Consensus
The platform supports improving the health of Chinese communities through administrative integration.	83.6%	4.18	0.53	12.66	Moderately Agree	0.19	1	Consensus
Promoting Chinese health through training and stakeholder involvement enhances outcomes by fostering inclusivity and efficiency.	82.4%	4.12	0.49	11.78	Moderately Agree	0.11	1	Consensus
The efficacy of health platforms aligns with China's national health policies to address contemporary public health issues.	81.2%	4.06	0.56	13.69	Moderately Agree	0.73	1	Consensus
Standardized platforms address linguistic diversity, ensuring they resonate with all demographics and reflect China's cultural richness.	82.4%	4.12	0.86	20.82	Moderately Agree	0.09	1	Consensus
The IDSDP enhances training, access, engagement, and learning outcomes in the health communication curriculum in China.	84.8%	4.24	0.75	20.82	Moderately Agree	0.09	1	Consensus
The platform has the potential to revolutionize health communication by addressing local health issues with relevant content.	73%	3.65	0.93	25.54	Moderately Agree	0.93	1	Consensus
The effectiveness of simulation tools used in the platform for health communication curriculum is significant.	62.4%	3.12	0.86	27.50	Neutral	0.09	1	Consensus
Evaluations confirm comprehension of the IDSDP within the health communication curriculum.	74.2%	3.71	0.85	22.91	Moderately Agree	0.05	1	Consensus
The IDSDP systematically improves health communication in China.	77.6%	3.88	0.70	17.94	Moderately Agree	0.91	1	Consensus
Total	78.58%	3.90	0.72	18.78	Moderately Agree	0.72	1	Consensus

Overall, the quasi-experimental method demonstrated the effectiveness of integrating instructional design and digital platforms into the health communication curriculum. The findings underscore the importance of culturally adapted content, real-time learning support, and gamified scenarios in improving learning outcomes and participant satisfaction. The iterative feedback process, guided by expert opinions, ensured the curriculum's relevance and alignment with the needs of medical interns and the broader healthcare community in China.

4.4. IDSDPS Model Integration in Health Communication Curriculum

The integration of the IDSDPS Model into China's Health Communication Curriculum has the potential to transform health communication education by addressing critical challenges such as gaps in technological awareness, practical competencies, and data assessment. The model emphasizes digital proficiency, culturally competent communication, and interdisciplinary approaches, ensuring that medical interns are equipped to navigate the complexities of modern healthcare systems. By automating aspects like grading and content deployment, the model streamlines the learning process, saving time and resources. It also enhances accessibility by overcoming geographical and temporal barriers, making quality education more inclusive. Multimedia content, interactive features, and gamification elements further enrich the learning experience, fostering engagement and motivation. Additionally, the model's adaptability ensures it remains relevant as technology evolves, making it a sustainable solution for health communication training.

The IDSDPS Model's applications extend beyond medical internships, offering customizable learning paths for corporate training, K-12 and higher education, and professional certifications. By leveraging tools like LMS, VR, and AI, the model creates a dynamic, learner-centered environment. For example, VR simulations replicate real-world patient interactions, while AI-driven adaptive learning tailors content to individual needs. Ultimately, the IDSDPS Model addresses contemporary public health challenges and aligns with China's national health policies, ensuring the curriculum remains relevant, effective, and responsive to the needs of students and healthcare professionals.

4.5. Curriculum Recommendations

The integration of instructional design and systematic digital platforms into China's health communication curriculum offers significant potential to enhance its effectiveness. A learner-centered approach should focus on practical skills such as patient education, cultural competence, and conflict resolution, using role-playing, simulations, and real-world scenarios to provide hands-on experience. A competency-based learning model with clear objectives and formative assessments can track progress and ensure interns achieve key competencies.

A blended learning model, combining online courses with in-person seminars, offers flexibility and immersion. Workshops can focus on practical skill development, while online modules provide theoretical foundations. Active learning strategies like problem-based learning (PBL) can foster critical thinking and decision-making. The curriculum should also integrate with clinical rotations and case discussions, enabling interns to apply communication skills in real-world settings.

Digital tools such as LMS, VR, and AI-powered feedback systems can enhance the curriculum. Platforms like Moodle or Rain Classroom can organize course materials, while VR simulations replicate patient interactions. Telemedicine tools like WeDoctor and mobile apps like Ding Talk can provide real-time communication experience and quick lessons. Social media platforms like Weibo can teach digital health communication skills, and collaboration tools like Tencent Meeting can support teamwork.

Continuous evaluation and feedback mechanisms, along with institutional support for funding and ethical considerations, are crucial for ensuring the curriculum's effectiveness. By implementing these strategies, the health communication curriculum can equip medical interns with the skills needed to improve patient care quality and adapt to the evolving demands of modern healthcare systems.

5. Conclusion

In conclusion, the integration of the Delphi method in developing a digital health communication curriculum for medical interns in China has proven effective in improving learning outcomes. The curriculum, which covers essential topics such as digital proficiency, cultural competence, health communication strategies, data analysis, and ethics, has been designed to enhance both the efficiency and scalability of health education. The study's findings indicate a positive consensus among experts regarding the content and structure of the curriculum, with significant improvements in the knowledge and understanding of medical interns before and after participation. The systematic use of instructional design and digital platforms has addressed key challenges, such as platform stability and technical issues, while offering real-time support and flexibility through asynchronous learning. This approach aligns with China's National Health Policies and demonstrates the potential to improve public health outcomes, particularly by targeting diverse linguistic

and cultural needs. The IDSDPS Model has the capability to revolutionize health communication in China by offering locally relevant, data-driven content and fostering a more inclusive and engaging learning environment for medical interns.

However, this study has several limitations. The sample size, limited to a specific region and group of medical interns, may not fully represent the broader population of healthcare professionals across China. Additionally, the study primarily focuses on short-term outcomes, and further long-term evaluations are needed to assess the sustained impact of the curriculum on health communication practices. Future research should explore the effectiveness of the IDSDPS Model in different regions, expanding the sample size to include diverse medical specialties and demographic groups. Additionally, future studies could examine how the integration of emerging technologies, such as artificial intelligence and virtual reality, can further enhance the curriculum and address challenges in rural areas with limited access to digital resources. Finally, research on the scalability and adaptability of the model to other healthcare systems and countries with similar public health challenges would be valuable for understanding its global applicability.

6. Declarations

6.1. Author Contributions

Conceptualization: Y.F., T.S., M.P., and W.W.; Methodology: T.S.; Software: Y.F.; Validation: Y.F., T.S., and W.W.; Formal Analysis: Y.F., T.S., and W.W.; Investigation: Y.F.; Resources: T.S.; Data Curation: T.S.; Writing Original Draft Preparation: Y.F., T.S., and W.W.; Writing Review and Editing: T.S., Y.F., and W.W.; Visualization: Y.F. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6.4. Institutional Review Board Statement

Not applicable.

6.5. Informed Consent Statement

Not applicable.

6.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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