Curriculum Design and Implementation of a Digital Intercalated Program for Business Undergraduates in Medical Colleges

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Abstract: This study introduces the design, delivery, and preliminary evaluation of a digitally mediated intercalated program tailored for business undergraduates in medical colleges. As the demand grows for professionals who can bridge healthcare and business disciplines, traditional curricula often fall short in equipping students with the interdisciplinary and digital competencies required in today's health sector. The program presented here addresses this gap by integrating health systems knowledge, business strategy, and digital innovation into a three-year hybrid-flexible curriculum. It emphasizes project-based learning, analysis, and data analytics while fostering entrepreneurial thinking. Evaluation data from the pilot cohort suggest strong student engagement, improved interdisciplinary understanding, and alignment with national priorities in digital health and educational reform. This research contributes to the limited literature on interdisciplinary curriculum design and offers a scalable framework for other specialized institutions.

Keywords: Digital Intercalated Program; Interdisciplinary Curriculum; Business Education in Medical Colleges; Curriculum Innovation

1. Introduction

The healthcare sector increasingly demands professionals equipped with both business acumen and domain-specific knowledge in health systems. Roles such as hospital administrators, healthcare consultants, and health finance analysts require interdisciplinary competencies that are rarely addressed by conventional business programs. In response, there is growing interest in developing intercalated curricula—programs that offer business students in medical colleges a structured opportunity to engage with healthcare-focused content [1].

Recent advancements in artificial intelligence (AI) and digital health technologies further underscore the need for such innovation in education. AI tools are now widely used across healthcare operations, from administrative workflows to clinical diagnostics. Some applications have demonstrated superior accuracy to human professionals, such as in the early detection of cancers or predictive patient analytics [2]. Yet, few business curricula have adapted to prepare students for the digitized realities of healthcare management.

Despite technological advancements, existing business programs in medical colleges often remain rooted in traditional, classroom-based models. These curricula tend to lack input from either healthcare or business domain experts, resulting in fragmented and outdated learning experiences [3,4]. The digital transformation of higher education presents both opportunities and challenges for medical colleges to design flexible, relevant, and interdisciplinary learning environments [5].

This paper responds to these challenges by presenting a comprehensive model for a digital intercalated business program tailored to medical college contexts. The program is designed to deliver healthcare-relevant business education through digital platforms, enabling students to acquire interdisciplinary competencies without disrupting their primary academic pathways.

The study has two primary objectives: (1) to describe the conceptualization, structure, and implementation of the program, and (2) to evaluate its initial outcomes based on qualitative and quantitative feedback from students, faculty, and institutional stakeholders. In doing so, it aims to contribute to the emerging literature on digitally delivered interdisciplinary education and to provide a practical framework for institutions seeking to innovate at the intersection of healthcare, business, and digital pedagogy.

2. Literature Review

2.1 Entrepreneurship and Innovation Education in Specialized Contexts

Entrepreneurship and innovation are often treated as overlapping but distinct areas of educational focus. Ng and Au (2022) argue that while entrepreneurship centers on venture creation and market viability, innovation education emphasizes the development of new technologies and the delivery of stakeholder value. Misunderstanding these differences can lead to fragmented or ineffective interdisciplinary curricula—a risk particularly salient for medical colleges integrating business programs. In such contexts, clarity in pedagogical design is critical to ensure coherence and relevance.

In metropolitan innovation hubs, curriculum reforms increasingly integrate entrepreneurial thinking with innovation capacity through interdisciplinary models. These reforms align with broader governmental initiatives like InnoHK, which promote innovation ecosystems and translational research in higher education [6]. These policy-aligned initiatives highlight the growing need for business curricula to incorporate digital and experiential learning components, particularly in healthcare-focused institutions.

2.2 Entrepreneurship Education in Health-Related Fields

The emergence of student entrepreneurship in medical technology highlights a paradigm shift in higher education. Manbachi et al. (2018) describe how institutions such as Johns Hopkins, MIT, and Stanford have developed ecosystems that allow students to commercialize biomedical innovations while remaining embedded in academic programs[7]. These models support both academic and entrepreneurial development without requiring students to abandon their studies.

Such initiatives are made possible by the proliferation of on-campus innovation hubs, design studios, and structured support for prototyping and venture development. These environments allow students to engage with complex, real-world healthcare problems while receiving mentorship and regulatory guidance. For business education in medical colleges, these findings reinforce the importance of designing curricula that accommodate dual roles—students as learners and as prospective innovators.

2.3 Entrepreneurship Education in Non-Traditional Student Populations

Henry and Treanor[8] explore how entrepreneurship education can enhance both immediate professional readiness and long-term employability in non-traditional fields, such as veterinary medicine. Their study suggests that embedding entrepreneurial thinking within discipline-specific curricula can help students translate technical expertise into business applications.

This insight applies directly to business students in medical colleges, many of whom aspire to work in health administration, pharmaceutical management, or healthcare consulting. Curricula that incorporate entrepreneurship in a digitally flexible format can better prepare these students for interdisciplinary, innovation-driven roles in the healthcare sector.

2.4 Digital and Interdisciplinary Curriculum Innovation

Although digital learning has become mainstream, limited research exists at the nexus of digital pedagogy, entrepreneurship, and healthcare business education. Emerging models such as Stanford2025 illustrate the potential of combining digital infrastructure with experiential, cross-disciplinary learning [9]. When supported by appropriate platforms and pedagogical frameworks, digital programs can enhance access, facilitate collaboration, and support application-based learning across diverse academic contexts.

2.5 Gaps in the Literature

Despite increasing attention to interdisciplinary education, few studies have examined intercalated programs targeting business students in medical colleges. Even fewer explore how digital platforms can be systematically leveraged in such programs. This study addresses both gaps by presenting a case of digitally delivered interdisciplinary curriculum design and its implementation in a specialized institutional setting.

3. Program Design

3.1 Program Objectives

The program is grounded in frameworks for interdisciplinary and professional education [10]. Its overarching goal is to prepare business

undergraduates in medical colleges for careers that intersect healthcare, policy, and innovation. The specific objectives are to:

Equip students with a dual understanding of health system structures and business strategies.

Foster analytical and critical thinking skills applicable to health policy, public health, and healthcare entrepreneurship.

Develop digital literacy and collaborative skills through project-based learning and online interaction.

Enable students to explore career paths in health policy, health technology, consulting, pharmaceutical management, and public-sector innovation.

3.2 Curriculum Structure

The program is structured into three tiers of learning across three intercalated academic year. This program integrates core business knowledge with health system applications and digital transformation, aiming to equip students with interdisciplinary and practical competencies in healthcare management. The program spans for three years, including the foundation of business and health, applied management and health systems and analytics based on health data. The followings are the course structure for the intercalated program for business students in medical college.

3.2.1 Foundations and skill development in business and health (Year 1)

The objective for the first academic year of the program is to

Understand medical education theory: to grasp the fundamental theories and principles that underpin medical education. And to explore the role of medical education in shaping healthcare professionals.

Master research methods and project management: to learn how to design, implement, and manage research projects effectively and to develop skills in critical analysis and evaluation of research methodologies.

Acquire statistics and data analysis skills: to understand basic statistical concepts and their application in healthcare research. Learn to use data analysis tools and techniques to interpret research data.

Develop Teaching Skills and Reflective Practice: to Practice teaching methods and receive feedback to improve instructional skills. Engage in reflective practice to enhance self-awareness and professional development.

Foster Academic and Personal Skills: Enhance academic writing, critical thinking, and problem-solving abilities. Develop personal skills such as time management, communication, and teamwork.

The compulsory modules for the year 1 of the program is as follows:

Principles of Economics and Healthcare Systems: Combines micro/macro-economic theories with real-world health system applications.

Introduction to Health and Social Care: Explores structures, stakeholders, and delivery models in global and national healthcare systems.

Accounting and Finance for Healthcare Managers: Fundamentals of financial management with cases from hospitals, NGOs, and insurance firms.

Foundations of Management in Health Settings: Organizational behavior, leadership, and operations in healthcare environments.

Business Statistics and Data Insights for Health: Introduction to quantitative methods and healthcare datasets.

Principles of Marketing and Patient Engagement: Patient-centered communication and marketing strategies in health-related businesses.

Innovation and Entrepreneurship in Healthcare: Introduction to startups, venture capital, and innovation ecosystems in medical tech and health services.

3.2.2 Application and analysis in health systems (Year 2)

The objective for the second academic year of the program is to:

Compare healthcare systems across countries and assess their performance.

Analyze ethical and legal issues that arise in health management and policy.

Manage healthcare-related projects using formal project management tools and frameworks.

Evaluate healthcare interventions through economic and financial analysis methods.

Understand supply chain dynamics and digital logistics in healthcare delivery.

Apply research methods to investigate problems at the intersection of business and health.

Examine demographic trends and workforce challenges shaping health policy and strategy.

The compulsory modules for the year 2 of the program is as follows:

Comparative Health Systems and Policy: Comparison of international healthcare systems and reforms.

Health Ethics and Legal Governance: Covers

bioethics, data protection, and governance in health innovation.
Project Management for Health Services: Planning, implementation, and evaluation of health service delivery projects.
Health Economics and Policy Evaluation: Economic evaluation (e.g., cost-benefit, QALYs) in healthcare decision-making.
Healthcare Finance and Risk Management: Budgeting, capital allocation, and financial risk in hospitals and insurance.
Health Supply Chain and Digital Logistics: Procurement, distribution, and digital platforms in medicine and equipment supply.
Human Resource Planning in Health Organizations: Workforce management in hospitals and public health agencies.
Research Methods for Business and Health: Qualitative and quantitative techniques for interdisciplinary research.
Demographic Analysis and Health Trends: Population aging, disease burden, and forecasting in policy contexts.
3.2.3 Strategy, analytics, and capstone (Year 3)
The objective for the third academic year of the program is to:
Use data analytics and AI tools to support healthcare decision-making and innovation.
Evaluate sustainability and ESG (Environmental, Social, and Governance) considerations in the health sector.
Examine the role of health in broader economic development and national policy agendas.
Design strategic operations frameworks for health organizations undergoing digital transformation.
Analyze and interpret health policy and systems using evidence-based frameworks.
Integrate knowledge from all three years to deliver a capstone project focused on a real-world business-health challenge.
Demonstrate readiness for advanced studies or professional roles in healthcare management, consulting, policy, or entrepreneurship.
The compulsory modules for the year 3 of the program is as follows:
Health Data Analytics & AI Applications: Using AI tools and predictive analytics for health system optimization.
Health Sustainability and ESG Governance: Environmental, Social, and Governance issues in the healthcare industry.
Health and Economic Development: Role of health in national economic growth and inclusive development.
Operations Strategy in Health Enterprises: Strategic planning, quality control, and digital transformation in healthcare delivery.
Health Policy and Systems Management: Frameworks for policy design, evaluation, and organizational change.
Capstone Project in Business and Health: An applied, interdisciplinary project involving data collection, stakeholder interviews, and strategic analysis.
Entrepreneurship and Startups in Digital Health (Optional elective): Venture building in medical software, biotech, and wearable tech.

3.3 Delivery Model and Digital Features

The digital intercalated program is designed to optimize learning flexibility, engagement, and accessibility for business undergraduates studying within the institutional context of a medical college. The program employs a hybrid-flexible delivery model, combining asynchronous content with scheduled synchronous activities. This approach accommodates varying student learning preferences, time zones, and clinical scheduling constraints, while maintaining academic rigor and collaborative depth.
To support flexible, scalable, and collaborative learning, the program employs a hybrid-synchronous model anchored by a learning management system (e.g., Moodle or Canvas). Key features are included in Table 1:

3.4 Assessment Strategy

To support the interdisciplinary, application-driven nature of the program, the assessment strategy combines both individual and group-based evaluations, formative and summative tasks, and traditional and digital media. Assessments are designed to measure students' acquisition of both domain-specific knowledge and transferable skills such as critical thinking, teamwork, and digital communication.
The assessment strategy of the digital intercalated program is grounded in principles that promote sustained engagement, practical application, and interdisciplinary learning. Continuous assessment is employed to ensure students maintain consistent interaction with course materials and develop a habit of iterative learning. Peer collaboration is emphasized through group-based projects and discussion forums, fostering teamwork and mutual

knowledge exchange. The program also prioritizes digital fluency by integrating assessments that require the use of online collaboration tools, data analysis platforms, and digital presentation formats. Furthermore, authentic assessment is central to the program's design, with assignments simulating real-world challenges in healthcare business environments. These principles collectively support the development of both domain-specific expertise and transferable skills essential for professional success in the evolving health sector, which are shown in Table 2.

Table 1. Delivery Model and Digital Features

Component	Format	Purpose
Asynchronous Modules	Pre-recorded video lectures, readings, self-paced quizzes	To provide foundational knowledge with scheduling flexibility.
Synchronous Sessions	Weekly Zoom-based seminars or case workshops	To deepen understanding through real-time discussion and group interaction.
Digital Office Hours	1–2 hours/week per instructor (Zoom or Teams)	To support student queries, mentoring, and feedback.
Collaborative Labs	Team-based tasks using Miro, Jamboard, and Google Workspace	To facilitate project development, brainstorming, and peer review.
Capstone Showcase	Live virtual pitch event and digital portfolio submission	To evaluate applied skills and presentation competency in an authentic setting.

Table 2. Assessment Strategy

Assessment Component	Weight	Details
Weekly Online Quizzes	15%	After each lecture topic, students complete short multiple-choice or scenario-based quizzes to reinforce conceptual understanding. Quizzes are auto-graded via the LMS and include feedback explanations.
Case Study Analysis	20%	Each student selects a real-world healthcare business case (e.g., a failed digital health startup or a successful pharmaceutical pricing model) and submits a written analysis (1,500–2,000 words) applying frameworks learned in Modules 1–3.
Group Project: Health Venture Pitch	35%	Teams of 4–6 students develop a digital health business concept in response to a challenge brief (e.g., improving chronic disease management in rural areas). Deliverables include a 10-slide pitch deck, a 5-minute video pitch, and a 2,000-word business report. Peer review is factored into final grading.
Reflective Digital Portfolio	20%	Each student curates an individual e-portfolio (using Notion or Padlet), containing reflections, learning logs, key assignments, and a final reflective essay (1,000 words) connecting theory with personal development.
Participation and Engagement	10%	Assessed based on engagement in weekly discussion forums, peer feedback submissions, live Q&A sessions, and contribution to online teamwork (tracked through digital collaboration tools).

3.5 Faculty and Support Structure

3.5.1 Interdisciplinary teaching team

The program is led by an interdisciplinary faculty drawn from business, public health, and digital innovation. Each module is overseen by a module convenor with academic and industry expertise. Guest lecturers include healthcare entrepreneurs, digital health innovators, and hospital administrators.

3.5.2 Industry mentors and advisors

Health industry experts (e.g., digital health startup founders, hospital CFOs, policy consultants) participate as mentors. Serve as judges during the capstone pitch competition and provide ongoing feedback during the group project phase.

3.5.3 Digital learning support

To ensure smooth digital delivery: Instructional Designers: Collaborate with faculty to structure content for online environments (e.g., integrating H5P tools, interactive quizzes). Technical Support Team: Offers live troubleshooting during synchronous sessions and maintains LMS

functionalities. Digital Orientation Sessions: Held at the beginning of the program to train students in using key platforms like Zoom, Miro, Canvas, and collaborative tools (e.g., Google Workspace, Padlet).

3.5.4 Academic advisors

Each student is assigned a faculty advisor for personalized academic and career guidance, particularly in aligning their business skills with future roles in the healthcare or public sector.

3.6 Learning Outcomes

Upon successful completion of the program, students will have acquired a comprehensive understanding of national and international healthcare systems from both economic and managerial perspectives. They will be capable of analyzing the structural components, financing mechanisms, and policy implications of various health systems. Through comparative analysis and case-based learning, students will develop the ability to evaluate system performance based on indicators such as cost-efficiency, access, quality of care, and health outcomes.

In parallel, students will learn to apply business strategies and tools—such as financial analysis, operations management, and marketing principles—to address real-world problems in healthcare delivery. Through interdisciplinary coursework and experiential projects, they will gain experience in designing business models for healthcare services and innovations. This will prepare them to contribute meaningfully to sectors including hospital administration, pharmaceutical operations, digital health startups, and healthcare consulting.

Digital fluency and data analytics are also core outcomes of the program. Students will become proficient in using statistical software, visualization platforms, and AI-driven tools to analyze healthcare data and support decision-making. These competencies will be reinforced through assignments that involve health data modeling, risk assessment, and the development of technology-enabled solutions aimed at improving patient care and operational efficiency.

Finally, students will be equipped with the skills to operate effectively in collaborative and virtual environments. They will demonstrate strong communication, teamwork, and project management abilities through the use of digital tools like Miro, Notion, and Google Workspace. In their capstone projects, they will integrate interdisciplinary knowledge to tackle complex challenges in healthcare innovation. Overall, graduates of the program will be well prepared to pursue advanced study or careers in health policy, public-sector innovation, or entrepreneurial ventures in the digital health domain.

4. Preliminary Evaluation and Outcomes

To evaluate the initial implementation of the digital intercalated program, feedback was gathered from students, faculty, and institutional stakeholders during the pilot phase (2023–2024 academic year). The evaluation focused on three core areas: (1) student experience and learning outcomes, (2) instructional and technological effectiveness, and (3) institutional feasibility and scalability.

4.1 Student Experience and Learning Outcomes

A total of 38 students completed the first cycle of the program. Survey data and reflective portfolios indicate high levels of satisfaction, particularly with the flexibility of the digital format and the relevance of interdisciplinary content. Over 85% of students reported that the program enhanced their understanding of healthcare systems and improved their ability to apply business concepts in real-world health contexts. Reflective essays revealed increased confidence in using digital tools, conducting data-driven analysis, and developing entrepreneurial ideas in healthcare.

Focus group discussions revealed that students particularly valued the capstone project, which provided a structured but open-ended opportunity to integrate knowledge across domains. Common themes included appreciation for real-world relevance, peer collaboration, and mentorship from industry professionals.

4.2 Instructional and Technological Effectiveness

Faculty feedback highlighted the advantages of hybrid-flexible delivery, noting that asynchronous modules allowed for deeper student preparation before live sessions. Synchronous workshops enabled meaningful dialogue, especially in small-group breakout discussions. Challenges included the need for more training in digital pedagogy and the uneven digital literacy levels among students at program entry.

Technical issues were minimal, though early onboarding sessions proved critical. Students who received the digital orientation performed significantly better in early assessments and demonstrated higher engagement in collaborative activities. The learning management system effectively supported content delivery, while tools like Miro and Padlet enhanced visual collaboration.

4.3 Institutional Feasibility and Scalability

From an institutional perspective, the program was viewed as an innovative and strategic fit within the college's long-term goals to expand interdisciplinary offerings and leverage digital transformation. Administrators cited the program's modular design, cross-departmental collaboration, and cost-efficiency as scalable features. However, the need for sustained investment in digital infrastructure and faculty training was emphasized.

The program's alignment with national policy priorities in digital health and entrepreneurial education was also noted, enhancing its potential for replication across similar institutions.

5. Discussion and Implications

The successful design and early implementation of the digital intercalated program provide important insights into interdisciplinary curriculum development within specialized institutional contexts. Several key themes emerge that have broader relevance for medical colleges and universities seeking to integrate business education into health-related domains.

5.1 Bridging Disciplinary Silos

This program demonstrates the feasibility of bridging the gap between business and healthcare education, particularly through a digital, modular format. By structuring content around thematic integration—such as entrepreneurship in health, digital innovation, and public sector strategy—students develop competencies that are not traditionally cultivated in siloed business or health programs. The result is a more agile graduate, capable of navigating complex challenges in healthcare systems with both managerial insight and technological fluency.

5.2 Digital Transformation as an Enabler

Digital delivery is not only a logistical solution for intercalated programs but also a catalyst for pedagogical innovation. The hybrid-synchronous model adopted in this program enabled both flexibility and interactivity, key components in engaging diverse student populations. Moreover, exposure to collaborative platforms and digital assessment tools reflects the realities of the modern health business environment, where virtual collaboration and data-driven decisions are standard practice.

5.3 Curriculum Design for Future-Readiness

The program aligns with global trends in healthcare management education that emphasize skills such as data analytics, entrepreneurial thinking, policy literacy, and sustainability. These themes were embedded not as stand-alone modules but as cross-cutting competencies across the curriculum. The capstone project, in particular, functioned as a culminating experience in which students were expected to integrate these dimensions and apply them to real-world challenges.

5.4 Institutional Innovation and Policy Alignment

At the institutional level, the intercalated program supports strategic objectives around digital transformation, interdisciplinary teaching, and employability enhancement. Its alignment with national digital health priorities and educational modernization policies further supports its long-term viability and relevance. The model may serve as a prototype for other specialized institutions aiming to diversify their program offerings and expand digitally mediated learning.

5.5 Limitations and Future Research

While preliminary outcomes are promising, this study is limited to a single pilot cohort. Future research should explore longitudinal outcomes, such as graduate employability, innovation outputs (e.g., startup formation), and student retention in health-related fields. Comparative studies between traditional and digitally delivered intercalated programs may also yield insights into cost-effectiveness and pedagogical impact.

6. Conclusion

This study presents the conceptualization, development, and pilot implementation of a digitally delivered intercalated business program within a medical college. By integrating

healthcare content with business disciplines and leveraging digital platforms, the program addresses critical gaps in curriculum innovation for non-traditional business learners.

Through its interdisciplinary design, hybrid-flexible delivery, and outcome-oriented assessment, the program fosters a new generation of business professionals equipped to lead in the evolving healthcare ecosystem. Its success underscores the potential for digitally mediated, interprofessional education in shaping future-ready graduates and highlights a scalable model for other institutions facing similar educational and industry demands.

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