Global Journal of Medical Terminology Research and Informatics, Vol. 2, No, 4, 2024
ISSN-3107-5282

Developing an Effective Training System for Interventional Pulmonology Education through Digital Learning

Dr. Rajiv Malhotra[1], and Dr. Ananya Iyer[2]

[1] *Professor of Pharmacology, Delhi Institute of Medical Sciences, New Delhi, India.*

[2] *Professor of Pharmacology, Delhi Institute of Medical Sciences, New Delhi, India.*

Received: 16/September/2024; Revised: 21/October/2024; Accepted: 18/November/2024; Published: 30/December/2024

Abstract

This research aimed to provide a competency paradigm for Pulmonology Education students, serving as the initial stage in implementing outcome-based curricula. The current investigation was executed in three steps. Initially, the perspectives of 100 participants, comprising learners, alumni, teachers, and educational administrators, were examined through the Nominal Group method, surveys, and phone conversations. The collected codes were categorized into subcategories and sections using an inductive content evaluation method. In phase two, the results were transformed into competency elements, sub-domains, and competency categories within working subgroups. The generated elements' intellectual relevance was assessed using qualitative and quantitative methods. Five hundred thirty-five codes, twelve sub-categories, and seven categories were retrieved from stakeholders' perspectives and further refined into sixty-five competency elements, twelve sub-domains, and seven competency domains within group discussions. A competency structure is crucial for creating a thorough and cohesive curriculum. Implementing a competency-based program for Pulmonology Education is feasible by developing a competency structure.

Keywords: Pulmonology, Digital Learning, Healthcare, Education.

1 INTRODUCTION

Digital Learning is a prominent and swiftly advancing method of instruction in healthcare education. It provides diverse intervention methods utilizing Information and Communication Technologies (ICT), including computer-assisted instruction, mobile instruction, and online simulation-based instruction, which facilitate the acquisition of expertise and abilities efficiently and economically while enhancing personal autonomy (Guzman et al., 2022). The Mayo Clinic, a vast national healthcare organization in the United States, indicated that a significant fraction of national spending (about US $1.2 billion over 2 to 6 years) is allocated to digital training in medicine, with other developed nations adopting a comparable trajectory. Notwithstanding significant expenditures, there is an absence of adequate evidence to substantiate the efficacy of digital initiatives in medical profession education (Hennessy et al., 2022).

The application of educational theories in educational design can mitigate uncertainty by offering organized theoretical and practical frameworks that assist educators in developing curricula, pedagogies, and evaluations that are most pertinent and beneficial to student acquisition. Learning

concepts assist learners in comprehending their stages of learning, identifying methods to secure both short- and long-term retention of knowledge, and employing effective strategies to attain their educational goals (Yang & Chen, 2023).

Learning theories guide and motivate pedagogical strategies that promote successful instructional methods in conventional and digital learning, allowing educators to recognize and comprehend the intricacies of acquiring knowledge while offering insights for efficient curriculum development and suitable assessment of outcomes for learning (Darius et al., 2021). Despite the abundance of concepts about learning that can inform and assess conventional educational frameworks, these hypotheses have not been uniformly used or actualized in creating digital learning. The absence of a solid learning theory basis or pedagogical paradigm to direct or assess digital health instruction raises significant doubts about its efficiency in attaining optimal educational results. A growing body of research indicates that theory-based learning treatments have a more substantial impact than nontheory-based treatments (Shi et al., 2021).

Research is limited regarding the degree to which digital interventions in Pulmonology Education professionals' educational design include the theory of learning. The insufficient comprehension of how learners assimilate knowledge through various digital modes complicates the identification of suitable outcomes for assessing the efficacy of these treatments (Barashkin et al., 2023). This research study examined the significant yet frequently overlooked education domain in digital health professionals.

The research thoroughly examined digital treatments in Pulmonology Education professions instruction to assess the explicit application of educational theories of creating and evaluating these activities and to investigate the implementation of these hypotheses (van Gaalen et al., 2021). The research established a development framework based on the results to enhance educational theories in creating digital treatments for healthcare professionals.

2 METHODS

The current research was executed in three steps (Figure 1).

The Initial Phase: Articulating the Perspectives of Multiple Players

In the initial phase, the perspectives of various stakeholders were collected through the Nominal Group method, questionnaires, and phone conversations (Rosa et al., 2023). During this phase, the research has solicited the perspectives of multiple stakeholders regarding the inquiries, including:

1. What abilities are essential for a student in Pulmonology Education Professions education to address the requirements of the system of schools?
2. What actions are anticipated for Pulmonology Education Healthcare Learning?
3. What talents and skills do you possess in the present position to fulfill the employer's standards?

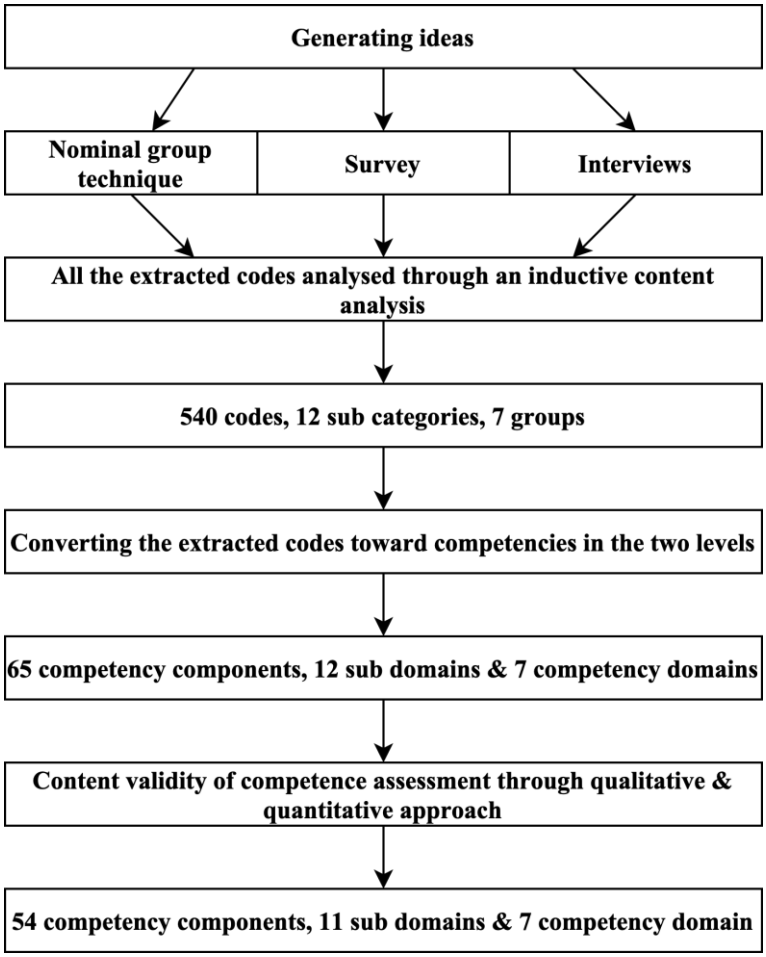

Figure 1: Flowchart of the Research

The discussions utilizing the Nominal Group approach were conducted initially. The research categorized various stakeholders into three categories: Doctoral candidates and pupils in Medical Education, teachers, and administrators in education. Of the 62 University of Health Sciences participants theoretically suitable for the study, 48 engaged in the Nominal Group method meetings. The research executed three Nominal Group method meetings involving Doctoral alumni and pupils in Health Professions Learning (n = 32), instructors from medical schooling and health occupations education faculties (n = 9), and educational leaders (n = 9) from the Educational Development Office (EDO) at University of Medicine. Every meeting occurred in the serene and tranquil atmosphere of the Educational Development Centre (EDC) meeting hall. The sessions commenced with the silent generation of thoughts. Every Nominal Group session lasted approximately four hours. The cumulative duration of the lessons was 12 hours.

The Nominal Group approach was executed in four stages, which comprised:

Step 1: Idea Generation: following the leader's articulation of objectives, attendees were invited to provide their perspectives on the skills of Doctoral students throughout the brainstorming session.

Step 2: Recording thoughts; collective replies were noted on a page accessible to all users.

Step 3: Outlining concepts; in the third stage, individuals engage in conversation that clarifies specific thoughts into coherent and precise statements.

Step 4: Evaluate ideas; the Nominal Group sessions concluded with individuals scoring to ascertain and rank the proposed concepts. Upon completion of this stage, the selected concepts were retrieved and submitted to the information analysis stage.

Interviews were applied to collect stakeholders' perspectives, namely educational administrators and students in Pulmonology Education from six institutions with medical schooling and medical professionals education divisions or students in Health Professions Learning (n = 9). Of the 15 individuals possibly eligible for the study, 10 engaged in the inquiries, resulting in a response rate of 72.38%. An electronic questionnaire featuring open-ended inquiries was distributed to the subjects, who were requested to complete it within a 4-week timeframe.

Telephone-based informal conversations with key informants were undertaken. Key informants, specifically supervisors of Learning Development Places, were selected using intentional sampling. Each one lasted approximately 90 minutes. The interviews were documented and transcribed verbatim. The transcripts were analyzed verbatim, and codes were derived from the respondents' remarks.

In this phase, all retrieved codes from the Nominal Group approach, inquiries, and interviewees were organized in the coding sheet for evaluation. The results were examined using an inductive analysis of the content method. The codes were organized into subgroups according to their semantic similarity. The pertinent subgroups that were compiled were the resultant categories. The sub-categories were designated sub-areas, while the groups were called competency domains.

Second Stage: Transforming and Elucidating Competencies

During this phase, working group discussions occurred at two tiers: the first involved doctoral learners and recent graduates. At the same time, the following stage included professors from the departments of medical schooling and medical occupations education aimed at transforming obtained codes into abilities.

At the first tier, eleven meetings were conducted to reformulate the gathered standards into a competency layout, adhering to the fundamentals of competency writing. Before the meetings, the obtained codes were delivered to the attendees, who were instructed to translate the symbols into competency elements. Several codes exhibited redundancy, several were inadequate in functionality, and the majority required amalgamation. The codes were derived from the respondents' remarks, requiring numerous modifications to transform into competency elements. The codes were converted into competency elements based on the respondents' perspectives. The suggested competency areas, sub-domains, and elements were evaluated for the accuracy of the retrieved codes and adherence to writing rules, with recommendations made to enhance abilities. The skills of a sub-domain were evaluated and amended in each meeting.

In the second stage, three meetings were held to evaluate the competencies created among the teaching staff of the Medical Educational and Health Professionals Educational division, resulting in consensus-based suggestions. The preliminary iteration of the competency structure for the Doctorate in Pulmonology Education was established during this period.

Third Stage: Evaluation of the Competence Framework's Validity

In the third stage, the enhancements of competency elements were executed by evaluating content validity using qualitative and quantitative methods. Subject validation denotes a technique designed to ensure the efficacy of the competencies, including the subject area, for equipping graduates for future careers.

During this phase, respondents evaluated the material's validity of the competency elements using a web-based questionnaire. Following the collection of replies, the experts' remarks were compiled and deliberated within group discussions.

The quantitative measures of content reliability, namely the Content Validation Ratio (CVR) and Content Validation Index (CVI), were assessed based on participants' judgments. The CVR is a statistical measure that aids in accepting or dismissing particular objects. Respondents were instructed to evaluate each ability according to a three-point scale: required, helpful but not required, and not essential to ascertain the CVR. The Lawsche table established the minimum threshold for the CVR. Every item satisfied the lowest value kept in the final version of its structure as per the Lawsche list. The "relevancy" criteria of each competence and its elements for the CVI were evaluated using a four-level Likert scale. The clarity of abilities and elements was assessed using a four-level Likert scale from the respondents' perspective.

The enhancement of the competencies and elements was executed by the outcomes of this phase. The competency model for Doctoral Healthcare Professions Teaching was conclusively established through a panel majority.

3 RESULTS

Participants

The current study engaged 100 individuals from several stakeholders, including graduates and pupils in Pulmonology Education, instructors, and educational administrators (Table 1). From the very beginning of the investigation, 540 codes, 13 subdivisions, and seven groups were retrieved. Figure 2 illustrates the perspectives of several groups of stakeholders. The collaborating group generated 68 competence elements, 13 sub-domains, and seven competence categories.

Table 1: Study Phase Analysis of Participants

Stages	Graduates	Faculty	Managers
First			
Nominal category	32	9	9
Questionaries	8		3
Interviews			3
Second			
Working category	11	7	2
Third			
Content validation		10	6
Panel	3	3	
Total	54	29	23

The questionnaire used for reliability evaluation included the following competency elements: professional expertise (21 parts), scholarship and study (15 parts), instructing (4 parts), multidisciplinary collaboration (6 parts), management and supervision (2 parts), professionalism (12 parts), and particular and competent development (7 parts). In the third phase, 31 qualitative feedbacks were obtained following the content accuracy evaluation, resulting in the revision of 17 questions. Four sub-domains were amended for enhanced simplicity, and the "scholarship" area was renamed to the "study and scholarship" area (Figure 3).

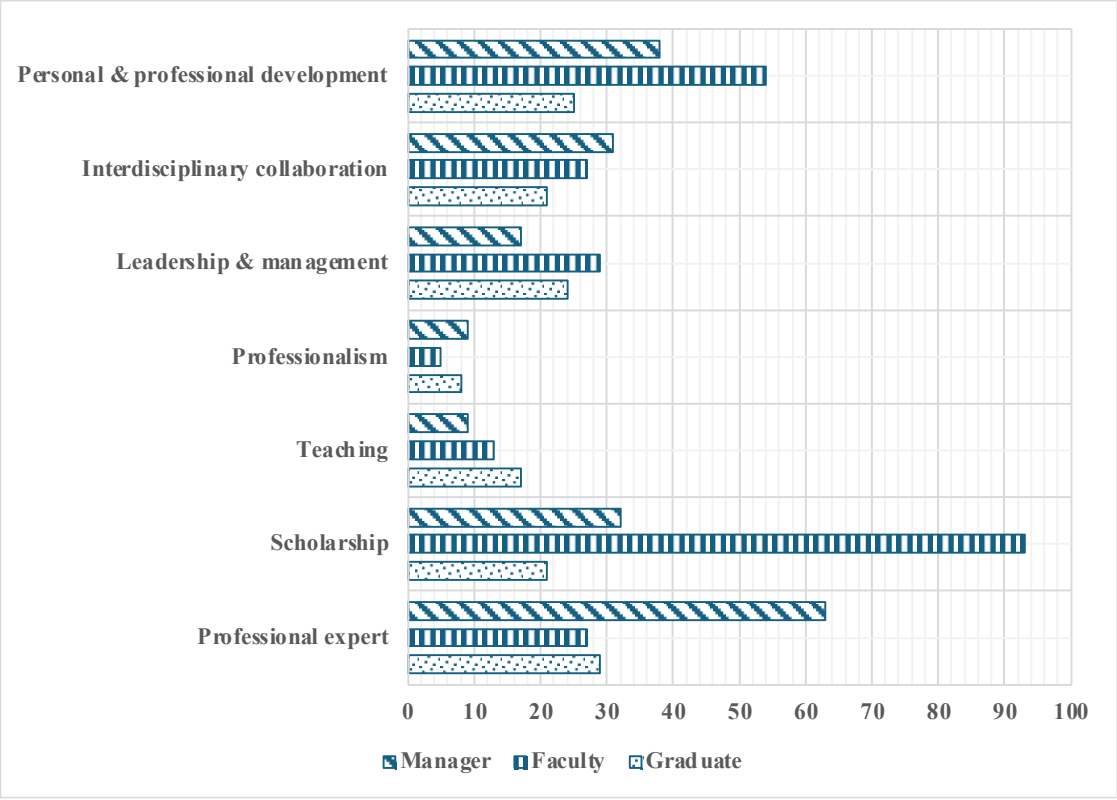

Figure 2: Stakeholders Perspective

According to the Lawsche results, the lowest permissible CVR for every product is 0.49 in terms of quantitative indexes. The study's findings indicated that the CVR score for the 11 competence elements was below 0.49, leading to their exclusion from the structure. According to the CVI indices, all competence elements achieved scores over 0.81 and were preserved in the framework. The scale-level CVI was determined to be 0.89, indicating a favorable outcome. The competence architecture was ultimately established with 52 competence parts, 12 sub-domains, and seven competence levels. The mean clarity of competence elements was 0.87, which is favorable.

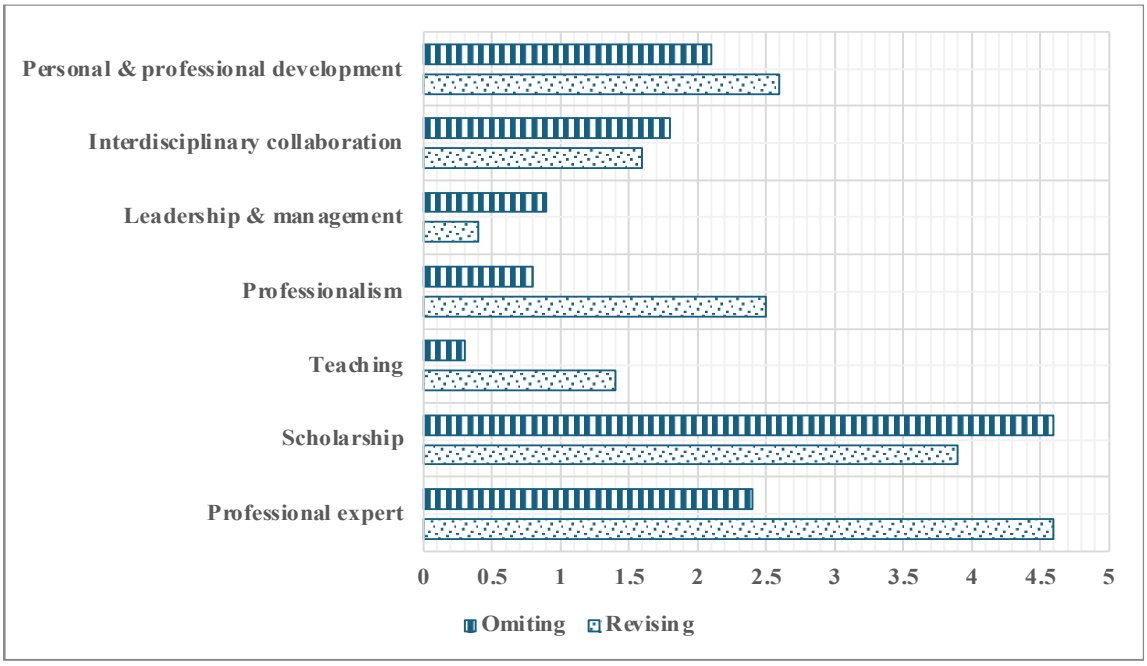

Figure 3: Subdomain Analysis

4 CONCLUSION

Developing a graduate's competency structure can significantly advance the implementation of competency-based learning and the training of proficient students. This study delineates the competency aspects of Pulmonology Education across seven fields: professional expertise, research and scholarship, pedagogy, cross-disciplinary teamwork, managerial and leadership competence, and career and personal growth.

REFERENCES

[1] Guzman, J. H. E., Zuluaga-Ortiz, R. A., Barrios-Miranda, D. A., & Delahoz-Dominguez, E. J. (2022). Information and Communication Technologies (ICT) in the processes of distribution and use of knowledge in Higher Education Institutions (HEIs). *Procedia Computer Science*, *198*, 644-649. https://doi.org/10.1016/j.procs.2021.12.300

[2] Hennessy, S., D'Angelo, S., McIntyre, N., Koomar, S., Kreimeia, A., Cao, L., ... & Zubairi, A. (2022). Technology use for teacher professional development in low-and middle-income countries: A systematic review. *Computers and Education Open*, *3*, 100080. https://doi.org/10.1016/j.caeo.2022.100080

[3] Yang, K. H., & Chen, H. H. (2023). What increases learning retention: employing the prediction-observation-explanation learning strategy in digital game-based learning. *Interactive Learning Environments*, *31*(6), 3898-3913.

[4] Darius, P. S. H., Gundabattini, E., & Solomon, D. G. (2021). A survey on the effectiveness of online teaching–learning methods for university and college students. *Journal of The Institution of Engineers (India): Series B*, *102*(6), 1325-1334. https://doi.org/10.1007/s40031-021-00581-x

[5] Shi, Y., Yu, H., Miao, J., & Wang, L. (2021). Application of the nursing model based on acceptance and commitment therapy (ACT) in improving mental health and quality of life after colorectal cancer drug chemotherapy. *Journal of Oncology*, *2021*(1), 8142155. https://doi.org/10.1155/2021/8142155

[6] Barashkin, R., Nurguatova, A., Kalashnikov, P., Taktasheva, D., & Tupysev, A. (2023). Enhancement of efficiency of the training process with the use of digital technologies. *Education for Chemical Engineers*, *45*, 104-121. https://doi.org/10.1016/j.ece.2023.08.005

[7] van Gaalen, A. E., Brouwer, J., Schönrock-Adema, J., Bouwkamp-Timmer, T., Jaarsma, A. D. C., & Georgiadis, J. R. (2021). Gamification of health professions education: a systematic review. *Advances in Health Sciences Education*, *26*(2), 683-711. https://doi.org/10.1007/s10459-020-10000-3

[8] Rosa, A. F., Martins, A. I., Cerqueira, M., Santos, M., Silva, A. G., & Rocha, N. P. (2023). Applying the Nominal Group Technique for the Conceptual Validation of ehealth Solutions. *Procedia Computer Science*, *219*, 1240-1248. https://doi.org/10.1016/j.procs.2023.01.407