Strategies to Develop Competencies of Health Science Educators: A Systematic Review

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Abstract. This systematic review aimed to identify strategies for developing health science educators' competencies based on published academic papers. The authors searched for articles published within a restricted period from January 2013 to December 31, 2021, using the ScienceDirect, Scopus, PubMed, and CINAHL databases. The final review included nine papers. The results showed that building health science educators' competencies can be classified into two main methods: 1) learning from mentors and 2) attending seminars/workshops. Learning from mentors for at least one year was more likely to change educators' teaching behaviors. Attending seminars/workshops in various patterns, including a single seminar, periodic workshops, and seminar modules, could improve health science educators' teaching knowledge. However, attending seminars/workshops cannot help develop competencies in other aspects. This systematic review showed that mentoring was more effective than attending seminars or workshops in developing the competencies of new health science educators. Therefore, providing a mentor to novice educators would be helpful.

Keywords: competency, health science educators, faculty development, competency development

Introduction

Educators are vital persons in a higher education system, as they can provide a supportive and effective learning environment for their students. The tasks of educators are organizing an educational process, ensuring a productive educational background, and effective teaching (Smolikevych, 2019). Similarly, a recent study reported the top five roles of health science educators (Van Wyk & Van Zyl, 2020). These are role models for students, information providers in the classroom, learning facilitators, information providers in a clinical setting, and student learning assessors (Van Wyk & Van Zyl, 2020). Therefore, health science educators should have high levels of professional competency level (Smolikevych, 2019).

Competence is an essential set of personality qualities, potential skills, and knowledge integration used to perform a professional activity (Abykanova et al., 2016). Educators' competencies include three components: competency in a specific field, pedagogical competency, and multicultural competency (Smolikevych, 2019). Similarly, facing the change in technology and higher education requirements of healthcare professionals, the core competencies of health science educators, including knowledge, skills, and attitudes, are essential for development (Mikkonen et al., 2018). In addition, due to the COVID-19 pandemic, most higher education institutes worldwide have changed their teaching methods from sitting in classes to online education classes. Therefore, some essential competencies of

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health science educators, such as digital skills or technological literacy, are needed (Pérez-Sanagustín et al., 2022). In addition, as social and healthcare systems are changing, health science educators should ensure that they can teach their students to apply evidence-based practices in the clinical setting. Therefore, understanding evidence-based healthcare competence is essential for health science educators (Immonen et al., 2022).

Faculty professional or academic development should be considered because of the current complexity of higher education (Geertsema, 2021). In addition, faculty development is one method for developing educators' competencies to be prompt in their roles, including teaching, assessment, research, and other education-related functions (Abdulghani et al., 2021). Faculty development aims to improve educators' skills based on their organizational position to ensure that all tasks can be continued effectively (Majidi et al., 2018). A previous study reported that workshop solutions, short-term training courses, and fellowships were suitable strategies for developing health science educators' competencies (Majidi et al., 2018). However, using multiple professional development approaches than a single method, such as individual counseling and mentoring services, online training seminars, podcasts, peer reviews, and training workshops, is more effective (Jacob et al., 2015).

A previous systematic review reported the effects of faculty development approaches on teaching efficiency (Steinert et al., 2016). The results showed that most faculty development programs were more likely to be effective because they could help faculty members feel confident and realize the importance of effective teaching (Steinert et al., 2016). However, a previous systematic review included only papers published between 2002 and 2012. In addition, a previous systematic review focused only on medicine educators, not on other health science educators such as nurses, dentists, and pharmacists. Therefore, to update the body of knowledge related to this issue, we conducted this systematic review to provide the most up-to-date findings on the effects of faculty development programs on improving the competencies of health science educators within a strict period from January 2013 to December 31, 2021.

Furthermore, this systematic review aimed to identify suitable faculty development strategies and their effectiveness in improving the competencies of faculty members in the health science professions. The specific research questions were as follows: What methods were used in faculty development by health science educators? What were the effects of each strategy used in faculty development for health science educators? We expect that the conclusions from this updated systematic review will enhance health science educators' and educational policy makers' provision of faculty development strategies for health science faculty members.

Methods

Eligibility Criteria

All studies were selected based on the inclusion and exclusion criteria. The following inclusion criteria were applied followed the PICOS concept: 1) population: participants were health science faculty members; 2) intervention: the study required faculty development programs or strategies as the intervention; 3) control: the study might have or did not have a control group or comparative group; 4) outcomes: the primary outcome was a component of competencies of health science educators, including knowledge, skills, or personality. If the outcomes of interest were not measured, the studies were excluded from the review; and 5) study: only experimental research, action research, research and development, evaluation research, and randomized controlled trials (RCT) were included in the review. Quantitative studies using a cross-sectional or longitudinal design, qualitative studies, case studies,

reviews, expert-opinion papers, non-refereed articles, abstracts, and dissertations were excluded. Only papers published in English were eligible to include in this study.

Information Sources

A literature review was performed within a restricted period from January 2013 to December 31, 2021, using the ScienceDirect, Scopus, PubMed, and CINAHL databases. In addition, reference lists of electronically retrieved manuscripts were manually searched to retrieve additional relevant citations within the search timeframe.

Search Strategy

A combination of subject headings, terms, and keywords, such as 'faculty development,' 'professional development,' 'professional development program,' and 'faculty,' 'health science educators,' 'health science teachers,' or 'health science instructors,' was used to search. The search query for ScienceDirect and Scopus included: "faculty development" OR "professional development" OR "professional development program" AND "faculty" OR "health science educators" OR "health science instructors." Search query for PubMed included: “faculty development” [tiab] OR “professional development” [tiab] OR “professional development program” [tiab] AND “faculty” [tiab] OR “health science educators” [tiab] OR “health science teachers” [tiab] OR “health science instructors”. Search query for CINAHL included: T.I. "faculty development" OR TI "professional development" OR "professional development program" AND TI "faculty" OR "health science educators" OR "health science teachers" OR "health science instructors"; A.B. "faculty development" OR AB "professional development" OR AB "professional development program" AND AB "faculty" OR AB "health science educators" OR AB "health science teachers" OR AB "health science instructors."

Selection Process

We obtained the full text when the papers appeared eligible, and two review authors independently screened them. If there was disagreement, a consensus was reached by a third reviewer.

Data Collection Process

Data from each study were extracted from a literature review created by the authors. One author extracted the data, and the another checked the data. Disagreements were resolved by consensus with a third reviewer to ensure appropriate and accurate material representation.

Data Items

Two reviewers independently extracted all data from the included studies. The extracted details included study details (design, population), intervention details (intervention content, time), and outcomes details (competency: knowledge, skills, and personality of health science educators). Quality appraisal was conducted independently using the Johns Hopkins Nursing Evidence-based Practice Rating Scale (Dang et al., 2022). The quality level is divided into five levels: I) experimental study/randomized controlled trial (RCT) or meta-analysis of RCT, II) quasi-experimental study, III) non-experimental study, qualitative study, or meta-synthesis, IV) expert opinions based on evidence-based or expert consensus panel, and V) opinion of individual expert based on non-research evidence.

Results

Study Selection

This review identified 862 papers from the databases, and five additional articles were retrieved from the reference lists of the included studies. A total of 867 articles were initially screened. After removing duplicates, 819 papers were screened, and 799 were excluded based on the title and abstract because they did not meet the inclusion criteria. Twenty-five articles were retrieved for the full-text assessment. Of these, 16 failed to meet the inclusion criteria. Nine studies were included in the final review (Figure 1).

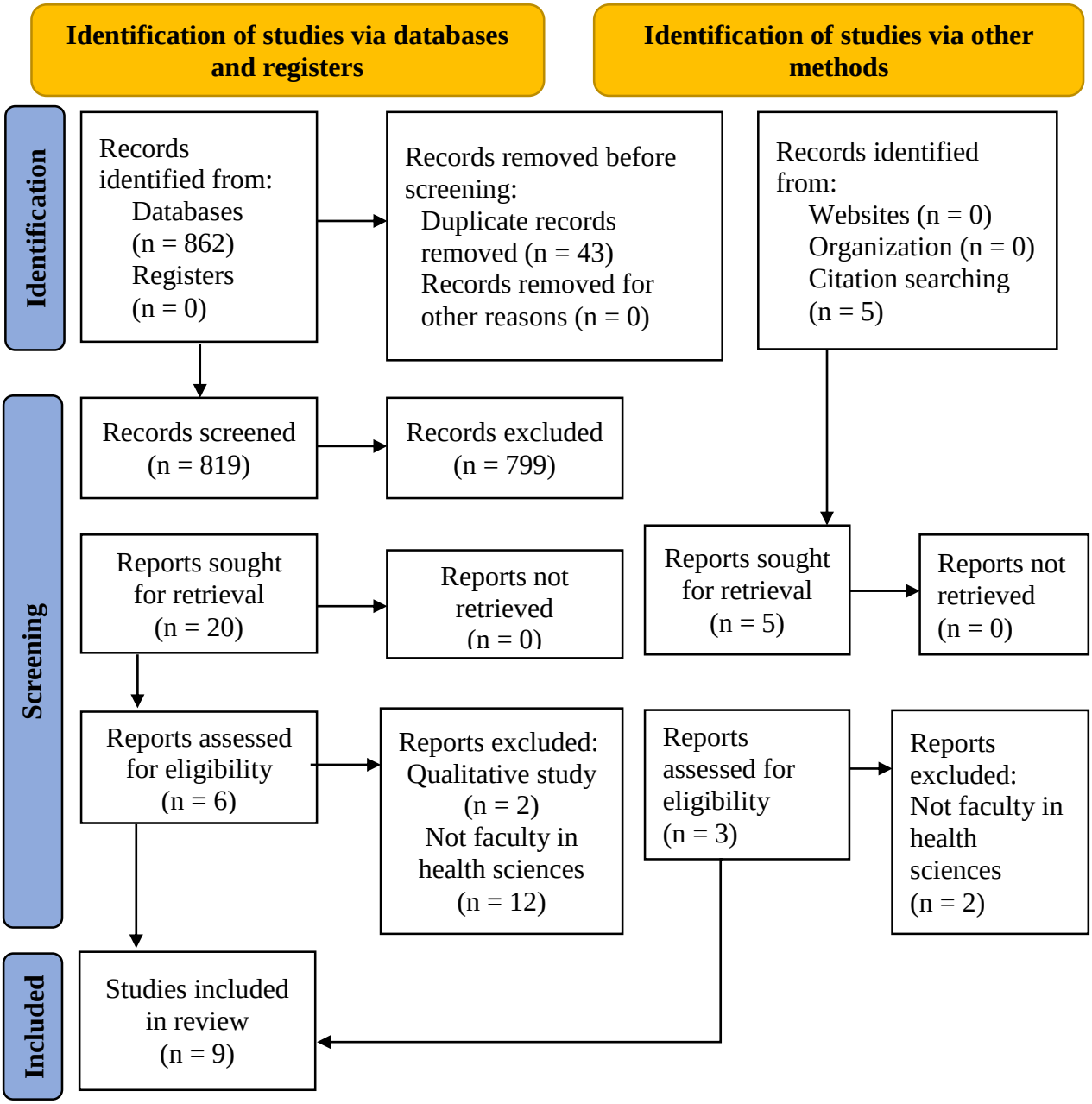

Figure 1. PRISMA 2020 flow diagram for systematic reviews

Study Characteristics

Two studies (22.30%) were survey research (Cate et al., 2014; Fleming et al., 2015). Three studies (33.40%) used quasi-experimental research with a one-group pretest-posttest design (Davis et al., 2015; Ghazvini et al., 2014; Mahajan, 2019). Additionally, four studies (44.50%) used a mixed-method design (Jones et al., 2015; Chang & Pribbenow, 2016; Cha et al., 2020; Khan et al., 2020) (Table 1).

Table 1. Summary of the effectiveness of strategies to develop competencies of health science educators

Study	Design and Sample	Intervention	Findings	Evidence level
Workshops/Seminars				
Cate et al. (2014)	Survey/31 scholars of 5 schools in the Netherlands, Canada, Sweden, and the UK.	The International Medical Educators Exchange (IMEX) was a week of faculty development activities, including group discussions, short presentations, observations and active engagement in local education, one-on-one meetings with local faculty members, and many opportunities for in-depth discussion.	55% felt that their experiences impacted their competence and international orientation, and to some extent, their career, their daily work, and their institution.	III
Davis et al. (2014)	Quasi-experimental design/53 volunteer faculty from the schools of medicine and nursing, Emory University, USA	A 2-hour training session led by experts in the science of teamwork and patient safety.	Post-session scores on inter-professional team knowledge, skills, and attitudes were significantly higher ($p = .02$).	II
Ghazvini et al. (2014)	Quasi-experimental study/76 faculty members of Mashhad University of Medical Sciences, Iran	The Mashhad University of Medical Sciences faculty development workshops consisted of 3 workshops focused on research in education using a brief lecture and small-group discussions.	Participations reported significant improvement in cognitive knowledge and attitude regarding the program.	II

Study	Design and Sample	Intervention	Findings	Evidence level
Jones et al. (2015)	A mixed-methods study design/12 faculty members from the Colleges of Pharmacy and Health Sciences University of Kentucky.	A longitudinal FD program was a 7-hour course (3 modules) that utilized experiential learning, reflection, feedback, and just-in-time training as primary teaching methodologies.	Perceptions about their interprofessional (IPE) facilitation skills improved after completing the program. 92% reported gains in knowledge, skills, and improved preparedness to lead IPE initiatives. 85% reported a desire to facilitate future IPE events. 55% served as facilitators for the University's year-long interprofessional core curriculum.	III
Mahajan (2019)	A longitudinal, prospective quasi-experimental approach/ 72 faculty members from the Department of Medical Education, India.	The three days' workshops with a comprehensive hands-on training with interactive discussions and collaborations.	The workshops increased knowledge of teaching, learning, and assessment methods ($p<.05$).	II
Khan et al. (2020)	A mixed-methods/11 faculty member at the University College of Medical Sciences, Delhi, India.	A 2-day faculty development workshop: Day one included ice breaking, introducing competencies curriculum, teaching, and assessment methods. Day two included group work.	The two-day workshop could improve knowledge and attitude toward competency-based medical education ($p<.05$).	III
Learning from a mentor				
Fleming et al. (2015)	Survey/104 junior faculty members of the Department of Pediatrics at Vanderbilt University School of Medicine, USA.	Multidisciplinary small groups led by senior faculty facilitators: small groups met once a month for 1.5 hours over 18 months. Each group included 8–10 junior faculty members per senior facilitator.	Changes in self-reported knowledge, attitudes, and skills in professional development were reported ($p< 0.05$).	III

Study	Design and Sample	Intervention	Findings	Evidence level
Chang & Pribbenow (2016)	Mixed-method/260 faculty members from biology and multiple other disciplines, USA.	The ASM-NSF (National Science Foundation) Biology Scholars Program (BSP) was a year-long residency training for teaching and learning.	Participants reported that the program achieved its proposed goals relative to scholarship, professional society impact, leadership, community, and faculty professional development.	III
Cha et al. (2020)	Mixed-method study/12 Cambodian faculty members, Cambodia.	The 2-year Cambodian Nurse Bridging Program comprised 1,305 hours or 23 weeks. Education comprised various educational methods such as lectures, self-study, laboratory and clinical practicums, and a research workshop. In addition, faculty members experienced new and diverse teaching methods by observing lectures and practicums of professors dispatched from Korea in English.	Teaching competency increased significantly over time ($p=0.001$). In addition, the three domains of teaching competency increased significantly over time: confidence in knowledge ($p<.001$), control of teaching strategies ($p=0.042$), and leadership of students ($p=0.001$).	III

Of the nine included articles, nearly half studies (44.50%) were conducted in the United States (Davis et al., 2015; Jones et al., 2015; Fleming et al., 2015; Chang & Pribbenow, 2016). The remaining studies were conducted in other countries such as India (Mahajan, 2019; Khan et al., 2020), Iran (Ghazvini et al., 2014), the U.K. (Cate et al., 2014), and Cambodia (Cha et al., 2020). A total of 607 participants (ranked from 11 to 260) were included in these studies.

Quality of Study

Based on the Johns Hopkins Nursing Evidence-based Practice Rating Scale (Dang et al., 2022), most studies were level III (Cate et al., 2014; Jones et al., 2015; Cha et al., 2020; Chang & Pribbenow, 2016; Fleming et al., 2015; Khan et al., 2020). In addition, three quasi-experimental studies were ranked at level II (Davis et al., 2015; Ghazvini et al., 2014; Mahajan, 2019).

Results of Individual Studies

Strategies for Developing Competencies of Health Science Educators

The results showed that procedures for developing health science educators' competencies could be classified into two methods: 1) learning from mentors and 2) attending seminars/workshops.

1) Learning from mentors who had experience in teaching.

This systematic review found that three studies used learning from mentors who had experience in teaching management to develop health science educators' competencies (Fleming et al., 2015; Cha et al., 2020; Chang & Pribbenow, 2016). In addition, exchange meetings were held to periodically exchange knowledge with mentors. The exchange meetings were held weekly or monthly for 1-2 years. The learning areas enhanced competence in teaching, research, administration, and other professional and academic skills, such as academic writing or technology. Mentors taught their mentees using various methods such as lecturing, practicing, and giving feedback.

The results showed that learning from a mentor for at least one year was more likely to change health science educators' teaching behaviors, such as providing more time for teaching and using various teaching methods. In addition to learning from the mentor for one year, health science educators had other competencies besides teaching skills, such as research, decision-making, career planning, communication, conflict management, and networking skills (Chang & Pribbenow, 2016). Furthermore, after 1.5 years of learning from a mentor, professional competencies, including knowledge, attitudes, and skills, could significantly improve (Fleming et al., 2015). Finally, health science educators have significantly increased overall teaching competency and technology skills by learning with a mentor for two years (Cha et al., 2020).

2) Seminars/Workshops

This systematic review found that four studies used seminars or workshops to develop educators' competencies (Cate et al., 2014; Davis et al., 2015; Ghazvini et al., 2014; Jones et al., 2015; Mahajan, 2019; Khan et al., 2020). Previous studies have used three seminars or workshop patterns: 2.1) one-time seminars, 2.2) periodic workshops, and 2.3) seminar modules.

The one-time seminar showed that durations ranged from 2 hours (Davis et al., 2015), to three days (Mahajan, 2019; Khan et al., 2020), or one week (Cate et al., 2014), with lecturing, group discussion, or teaching observations. For periodical workshops, a previous study divided workshops into three sessions, where activities consisted of lectures and small group discussions (Ghazvini et al., 2014). Finally, a previous study prepared online instructions for the seminar's three modules. The first two modules help learners understand the concept of interprofessional education and the importance of teamwork. The last module was a practicing classroom that focused on practicing teamwork skill assessment (Jones et al., 2015).

The effectiveness of a single seminar showed that it could help educators change their teaching behaviors after the training. Approximately 55% of the participants thought the training affected their performance (Cate et al., 2014). A single seminar also helped improve their knowledge, attitudes, and skills in working with an interdisciplinary team (Davis et al., 2015; Mahajan, 2019; Khan et al., 2020). Meanwhile, periodic workshops help trainees apply fundamental knowledge to their teaching (Ghazvini et al., 2014). However, it should be noted that these results were based on the participants' assessment and no comparison with those who did not attend the training. Finally, a previous study with a seminar/workshop of three modules showed that 92% of learners perceived that they had gained knowledge and skills in teaching and learning (Jones et al., 2015).

Discussion

This systematic review reflected two main approaches for developing health science educators' competencies: 1) learning from mentors who had experience in teaching and 2) attending seminars/workshops. The results showed that learning from a mentor for at least one year can help improve health science educators' teaching competency. In addition, other

competencies, such as research and management, were also approved for a one-year learning experience. The study results were in line with a previous study that found that having a mentor would allow health science educators to conduct research confidently because having a mentor was a process of developing knowledge and competency to conduct research successfully (Schwan et al., 2020). However, new educators reported that although research competency was essential for the academic world, research competency development should not be in the earlier step of competency development. Other competencies, such as teaching competency or good attributes, were more important (Van Wyk & Van Zyl, 2020). Therefore, to be a good mentor, one should prioritize what competency should be prepared for novice health science educators. In addition, good mentors should understand their mentoring positions: 1) facilitator, 2) coach, 3) monitor, and 4) exemplar, as these positions can affect mentees' learning and development. (Loosveld et al., 2020). In addition, mentorship involves interactive behaviors to support the mentees' academic and non-academic needs. One should be concerned about cultural sensitivity. As a result, the mentorship programs should be appropriately designed for each group or individual (Murry et al., 2021).

Moreover, a qualitative study reported that more experienced clinical educators might be more suitable for being health science mentors because health care systems are complex. Therefore, good planning and preparedness will be helpful (Ladyshewsky & Sanderson, 2021). Finally, to succeed with a mentoring program in health sciences, frequent points of contact between a mentor and mentee, at least monthly meetings are needed (McRae & Zimmerman, 2019).

At the same time, developing competency by attending seminars/workshops, all patterns could improve educators' knowledge about teaching, which could change teaching methods. However, attending seminars/workshops cannot develop competencies in other aspects or change teaching behaviors. These findings might be because applying the knowledge gained from the training to a natural setting depends on many factors, such as the trainers themselves, training style, and training atmosphere (Iqbal & AlSheikh, 2018). In addition, motivation to learn is also related to the organization's management structure, such as creating a motivating work atmosphere or having a more comprehensive academic network (Samani, 2017). Development programs should be continually and systematically performed to effectively improve health science educators' competencies. Therefore, a supportive system, either budget or time from the educational institution, is needed. A good development technique includes practicing reflection techniques to allow participants to analyze their areas of improvement (Algahtani et al., 2020). In addition, strategic use in faculty development programs should also align with faculty members' needs and institutional goals because these activities will enhance faculty members' teamwork and engagement (Ziedonis & Ahn, 2019).

The results showed that most studies reported the effectiveness of faculty development programs on each component of competencies. Therefore, future research is warranted to develop a model to improve the full competency of health science educators. In addition, selecting activities for faculty development should be appropriate to faculty needs. For example, early career faculty members may need mentorship that helps them grow up in their clinical and academic identities. Those in their mid-career may want new skills and leadership training programs. Finally, advanced-career faculty members may want mentorship as they focus on integrating, contributing, and changing roles and power (Teshima et al., 2019). One limitation of this systematic review was that the quality of most studies was ranked at level III. This limitation supports the need for further rigorous studies with larger sample sizes. Moreover, most of the measures used in the included investigations were self-assessment reports. Therefore, further research using other objective measures is required.

Conclusion

The knowledge gained from this systematic review can be used to improve the competency of health science educators by examining their primary goal of development. For example, if an institute wants to develop competency in teaching but has a limited budget, a one-time seminar or workshop may be helpful. However, if the institute seeks to achieve other performances and increase the network of health science educators, periodic training or training modules will be helpful. Furthermore, a systematic review showed that having a mentor was more likely to be effective than attending seminars or workshops for new educators. Therefore, providing a mentor to novice health science educators for at least one year will help develop a clearer competency for being a good health science educator.

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Declaration of Conflict of Interest

The authors declared no conflict of interest in this study.

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