

# The Impact of Certificate-Based Simulation Training on Faculty Development: A Study on Self-Efficacy in Clinical Education

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## ABSTRACT

**Objective:** To evaluate the effectiveness of a certificate course in simulation-based clinical education on faculty self-efficacy in key teaching domains.

**Methodology:** In this study, 50 faculty members (60% physicians, 30% nurses, 10% allied health professionals) participated in a structured one-week certificate course in March 2023. Self-efficacy in three domains including scenario design, facilitation, and debriefing was assessed using a 5-point Likert scale, both before and after the course. Paired t-tests was used to analyze pre- and post-training changes keeping 95% confidence interval

**Results:** Participants showed statistically significant ( $p < 0.001$ ) improvements in self-efficacy across all domains—Scenario Design, Facilitation, and Debriefing—with mean increases ranging from 1.05 to 1.10 points on a 5-point scale. Debriefing showed the highest gain, supporting the course’s effectiveness in enhancing simulation teaching confidence.

**Conclusions:** The certificate course significantly enhanced faculty self-efficacy in simulation-based teaching tasks. These findings support the inclusion of structured simulation curricula in faculty development programs to strengthen clinical teaching competencies in medical education.

**Keywords:** Debriefing, Faculty development, Scenario design, Self-efficacy, Simulation-based education.

### Authors’ Contribution:

<sup>1,2</sup>Conception; Literature research; manuscript design and drafting; <sup>2,3</sup>Critical analysis and manuscript review; <sup>1,3</sup>Data analysis; Manuscript Editing.

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**Note. All the authors were working in same institute at the time of study.**

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## Introduction

Simulation provides immersive, realistic experiences that safely replicate clinical practice for learners.<sup>1-5</sup> It is widely used to train clinicians and students, improving technical skills, teamwork, and patient safety.<sup>6</sup> As simulation grows in importance, faculty must be skilled in curriculum design, facilitation, and debriefing.

However, many healthcare educators lack formal training in simulation pedagogy. Faculty development programs are therefore essential to ensure effective use of simulation.<sup>7-9</sup>

Self-efficacy – an individual’s belief in their ability to succeed at a task – is a key factor in adopting new teaching methods.<sup>10</sup> Bandura’s theory posits that higher self-efficacy leads to greater effort and persistence.<sup>11</sup> In educational settings, increased self-efficacy is linked to better instructional performance. Previous studies show simulation training can raise teachers’ confidence. For example, Garner et al. found that a simulation workshop significantly improved nurse educators’ teaching self-efficacy ( $P < 0.001$ ).<sup>12</sup> Similarly, Chung et al. reported that participants’ confidence in simulation-based teaching improved after a multi-day

workshop.<sup>13</sup> A recent scoping review of simulation faculty programs also noted uniformly positive outcomes, with learners endorsing gains in knowledge and skills.<sup>4</sup> Despite these encouraging findings, few reports focus on structured certificate courses for faculty, particularly in diverse clinical specialties.

In this study, we evaluate a novel Certificate Course in Simulation-Based Clinical Education designed for healthcare faculty. We hypothesized that completion of the course would significantly increase self-efficacy in key simulation teaching domains. Using pre- and post-course surveys and statistical analysis, we aimed to quantify changes in self-efficacy and demonstrate the course's effectiveness as a faculty development initiative.

## Methodology

A one-group pre-test post-test study of a simulation education certificate program was conducted at Clinical Skills Laboratory, Postgraduate Medical Institute (PGMI), Hayatabad, Peshawar in March 2023. Fifty faculty members (mean age 42 years, 56% females) from a tertiary teaching hospital enrolled voluntarily. Written informed consent was obtained from all the participants. Specialty distribution was 60% physicians (internal medicine, surgery, paediatrics, anaesthesiology), 30% nursing educators, and 10% allied health professionals (e.g., respiratory therapy). The certificate course spanned one week (40 contact hours) and covered simulation scenario design, facilitation, and debriefing techniques. Instruction was multimodal (didactic, hands-on workshops and peer teaching). Course objectives followed International Nursing Association of Clinical Simulation and Learning (INACSL) standards emphasizing best practices in simulation education. A self-efficacy questionnaire was developed based on validated scales.<sup>14,15</sup> Participants rated their confidence (1=not confident, 5=very confident) in performing tasks within three domains: (1) Simulation Scenario

Design, (2) Facilitation/Moderation, and (3) Debriefing Skills. Surveys were administered at start of the course (pre) and immediately after completion (post). Demographic data were also collected.

Data were analyzed in Python. Descriptive statistics (mean±SD) were calculated for pre- and post-training scores. Paired t-tests assessed the significance of pre-post differences in each domain. We also computed 95% confidence intervals (CI) for mean score changes. A significance level of  $\alpha=0.05$  was used. Graphs were generated to visualize the mean scores and differences. All procedures adhered to relevant research ethics standards.

**Ethical approval** from the Institutional Review and Ethical Board of Postgraduate Medical Institute (PGMI), Hayatabad, Peshawar (Ref No: 120/IREB/PGMI) dated 08-02-2023.

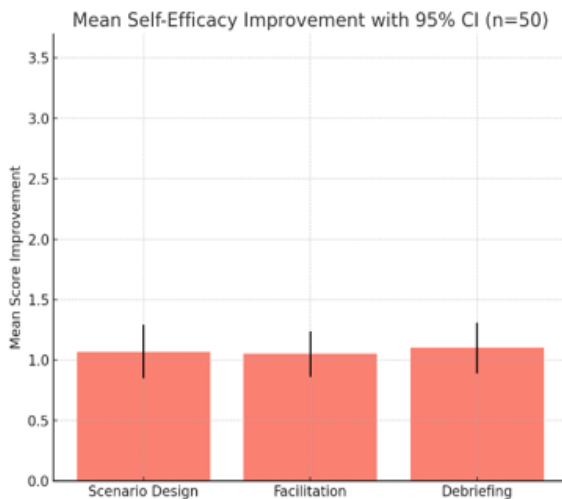
## Results

Fifty participants completed both the pre-course and post-course self-efficacy assessments. The mean self-efficacy scores increased significantly across all three domains after completion of the certificate course in simulation-based clinical education. At baseline, the mean self-efficacy scores were  $3.32 \pm 0.64$  for Scenario Design,  $3.47 \pm 0.53$  for Facilitation, and  $3.47 \pm 0.57$  for Debriefing (on a 5-point scale). Following the course, scores rose to  $4.39 \pm 0.49$ ,  $4.52 \pm 0.45$  and  $4.57 \pm 0.50$  respectively, indicating marked improvements in participants' confidence (Table I). Paired t-tests showed these increases were highly statistically significant ( $p < 0.001$  for all domains). The mean differences (post-course minus pre-course) were 1.07 (95% CI: 0.85–1.29) for Scenario Design, 1.05 (95% CI: 0.86–1.24) for Facilitation, and 1.10 (95% CI: 0.89–1.31) for Debriefing. These improvements demonstrate consistent and meaningful gains in self-efficacy related to key simulation teaching skills. Figure 1 illustrates the mean self-efficacy scores before and after the course with standard deviation error bars,

showing clear upward shifts across all domains. Figure 2 depicts the mean improvement scores with 95% confidence intervals, further emphasizing the significant gains post-training. Notably, Debriefing skills showed the greatest improvement, with the entire confidence interval well above zero, indicating a robust positive effect.



**Figure 1. Mean self-efficacy scores (±SD) before and after the course, by domain. The graph shows pre- and post-course mean scores with standard deviation error bars.**



**Figure 2. Mean improvement scores in self-efficacy (post minus pre) for each domain, with 95% confidence intervals.**

Domain	Pre-Course Mean ± SD	Post-Course Mean ± SD	Mean Difference	95% CI	P. Value
Scenario Design	3.32 ± 0.64	4.39 ± 0.49	1.07	0.85 – 1.29	0.000
Facilitation	3.47 ± 0.53	4.52 ± 0.45	1.05	0.86 – 1.24	0.000
Debriefing	3.47 ± 0.57	4.57 ± 0.50	1.10	0.89 – 1.31	0.000

**SD= Standard Deviation; CI = Confidence Interval.**

## Discussion

Numerous studies worldwide report that structured simulation educator programs significantly boost instructor confidence and skills. For example, Paige et al.<sup>13</sup> found that after a 3-hour debriefing workshop, surgical faculty's self-efficacy ratings jumped dramatically – 7 out of 8 debriefing tasks showed statistically significant gains. Supporting and engaging faculty fosters a positive learning environment and strengthens teamwork in education. Simulation-based teaching (SBT) has become integral to healthcare education, offering a dynamic and immersive learning experience for bridging theoretical knowledge with real-world clinical practice. Faculty members play a crucial role in shaping the effectiveness of simulation-based education, necessitating the implementation of comprehensive faculty development programmes.<sup>14</sup> Collaborative goal setting and faculty development are key to enhancing the quality and effectiveness of nursing education programs.<sup>15</sup> Oikawa et al.<sup>16</sup> reported that the top learning topics in a year-long fellowship were debriefing, simulation operations, and scenario design – underscoring that faculty value mastery in those areas. Likewise, Robertson and Bradley<sup>17</sup> observed that even a brief (1.5 h) simulation workshop produced higher self-reported teaching competence. In low-resource settings,

Robinson et al.<sup>18</sup> found that faculty debriefing performance (measured by the OSAD tool) improved significantly pre- to post-course and was sustained at 1-year follow-up. These international findings from high-income and low-income contexts alike consistently show that simulation faculty development yields substantial gains in confidence and instructional competence (especially in debriefing skills) across diverse health professions. Regional data from South Asia mirror the global trends. Garner et al.<sup>19</sup> evaluated an 8-hour simulation workshop for nurse educators in India and reported significant improvements in total teaching self-efficacy and all subscale scores. In Pakistan, Bajwa et al.<sup>20</sup> conducted a 6-hour simulation pedagogy course for medical faculty. Participants overwhelmingly reported higher confidence: 100% desired more simulation training, and 70% “strongly agreed” that active debriefing practice during the course boosted their confidence. In fact, Bajwa et al. found improvements in acceptance of simulation, knowledge gain, self-efficacy, and facilitation skills across the board. A related 2019 study from Bhutan<sup>21</sup> showed faculty self-efficacy rising from a mean of 31 to 34 out of 40 after structured development ( $p=0.009$ ). These South Asian studies indicate that, as in other regions, simulation workshops significantly elevate educators’ confidence and perceived competence. It is notable that in Pakistan and neighbouring countries where simulation is still emerging, even short courses achieve measurable impact, though faculty often cite needs for more time and resources for sustained implementation. The results of this study align closely with these international and regional reports. The mean self-efficacy increases observed in the study ( $\approx+1.05$  to  $+1.10$  on a 5-point scale) are comparable in magnitude to gains reported elsewhere. For instance, Paige et al. saw participants move from  $\sim 2.6$  to  $\sim 4.1$  (on 5-point items) in key debriefing competencies, and in the current reported data, scenario design, facilitation,

and debriefing all showed robust mean improvements.<sup>13</sup>

This consistency has important implications. First, it suggests that investing in faculty development (even brief, targeted courses) can overcome initial discomfort and vastly improve teaching readiness, a pattern seen both in developed countries and resource-limited settings. Higher instructor self-efficacy is linked to better learning experiences for students, so this course likely sets the stage for improved learner outcomes (as other authors emphasize). Moreover, results of this study reinforce calls (from INACSL and local educators) to expand simulation training: participants in Pakistan and Bhutan have recommended longer, more in-depth workshops to consolidate gains. Finally, the alignment across studies highlights contextual factors: while all groups improved, educators in low-resource contexts often face barriers (limited infrastructure, time, institutional support) that must be addressed for lasting change. The confidence boost of the faculty involved in this study echo a global trend, underscoring the value and relevance of simulation-based faculty development in this region and beyond. By empowering instructors with stronger self-efficacy, such programs can enhance the quality and impact of simulation-based education in medical curricula.

**Limitations:** This study has several limitations. The absence of a control group limits causal inference, as improvements in self-efficacy cannot be solely attributed to the intervention. Self-reported data may be affected by response bias, and no objective evaluation of teaching performance was included. The sample size was relatively small ( $n=50$ ), which may reduce statistical power and limit the generalizability of findings. Additionally, outcomes were assessed immediately after the course, with no long-term follow-up to evaluate retention or application in practice. Lastly, while the questionnaire was based on validated tools, it was not independently validated in this specific context.

## Conclusion

The certificate course in simulation-based clinical education was effective in significantly enhancing faculty self-efficacy across key teaching domains scenario design, facilitation, and debriefing. Among these, debriefing skills showed the greatest improvement, with confidence intervals indicating a strong positive effect. These results align with Level-2 of Kirkpatrick's evaluation model, reflecting meaningful learning gains. The statistically significant improvements observed reinforce existing evidence that simulation training enhances educator competence. These findings support the integration of structured simulation-based training into faculty development programs to strengthen clinical teaching capacity and improve educational quality.

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