E-Portfolios As A Tool For Learning And Assessment For Undergraduates In Surgery. Single Institutional Study

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Abstract

Background

Undergraduate students' induction in surgical knowledge and skills underlines the importance of evidence-based teaching and learning has happened, and records for achieving all learning competency-based outcomes, not just classroom teaching, and assessment of skills, along with feedback skills, may help build confidence among students and teachers over -E-portfolio. Digital recording of learning and documentation will bring confidence for lifelong learning.

Objectives: Our study aimed to identify and assess the E portfolio as a learning and assessment tool for undergraduate students in surgery

Methodology

In this quasi-experimental crossover study, pretest and post-test were conducted for Undergraduate students in the Surgery pre-final and Final year of Karpaga Vinayaga Institute of Medical Sciences and Research Centre. Students were grouped into four groups: two in the final year and two in the pre-final year. The students were briefed on the use of E-portfolios and Log book documentation. Their surgical knowledge and skills competence were measured by a pre-validated self-appraisal questionnaire. Statistical analysis was done with independent and paired t-tests.

Results

The results showed statistically significant values between average scores of surgical skill and knowledge competencies in all three domains in the E-portfolio-based education method (P=0.0001). The average change in scores before and after E-Portfolio was found to be between the two educational groups in the three domains,

consisting of cognitive (P=0.002), affective (P=0.0001), and psychomotor (P=0001). Final average between the groups also reflected a significant difference in total average scores of clinical competences between the two methods (P=0.0001).

Conclusion

The statistical results showed that the effect of the dynamic teaching learning method by incorporating E-Portfolio has not only helped in more inclusive learning but also improved communication establishment by way of feedback on both sides. This new method can be used as a valid learning tool for knowledge, skills, attitude, communication, and assessment. evaluation and student-

Keywords: Teaching learning, E-Portfolio, Domains, Assessment, medical students.

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I. Introduction

The period of surgical training is only for a short duration, and it helps the student document their dayto-day activities in terms of knowledge and basic surgical skills. In undergraduate Surgical training, the Eportfolio of a student points to the electronic storage of evidence-based learning, including videos and progress of learning.¹Studies in many countries have documented that he hurdles to competency based medical education for undergraduates is due to paucity of resources, teacher-oriented class rooms lack of qualified trainers and little coordination between departments which helps in integration of basic sciences aligning with clinical learning². Psychomotor training in hospitals is the most affected as it needs dedicated teachers and mentors. E-portfolios comprise the individual students' progress in terms of knowledge, skills, attitudes, ethics, communication, and assessment. It is more towards pedagogy, where students get to interact with their teachers and get feedback for the benefit of both students and teachers³. Different kinds of assessment may help the slow learns to catch up to par with other students, and electronic documentation in the form of e-portfolio helps in periodic review and assessment.⁴ E-Portfolios have been identified as a medium of learning as they are more towards pedagogy and give a reflection of both student and teacher interaction. Though the primary goal of the E-portfolio is reflection on learning, it also ensures competency-based medical education (CBME).⁵. EPortfolios for surgery undergraduates help in competency training and assess their progress in clinical skills, which encourages selfassessment and peer learning. E-Portfolio gives confidential feedback, mentorship and personalised.⁶ The portfolios can be maintained either in hard copies or in an electronic form of storage, as an e-portfolio by the medical students. McCready and Pennbrant, and Nunstedt documented that clear briefing and guidelines for portfolio construction and qualitative assessment are important to achieve desired results. Byrne et al proved that the E-portfolio process is a well-validated tool for encompassing professional aspects in communication and learning domains. This study was conducted at Department of General Surgery, Karpaga Vinayaga Institute of Medical Sciences & Research Centre, a tertiary teaching hospital.

The objective of our study was to evaluate the effectiveness of E-portfolio method as an effective teaching learning and assessment tool for undergraduate students in Surgery.

II. Materials And Methods

The pre-test-post-test quasi-experimental crossover design used in this research compared groups and measured changes between pretest and post test data among all groups for a period of one year from February 2023 to January 2024 After the small briefing 200 of the 250 students volunteered with written consent. Then, students were divided into four groups. All students who provided their first portfolio report were included in the study. The crossover method was used to compare both teaching and learning methods in each group. (Table 1)

Data Collection: In this quasi-experimental crossover study, pretest and post-test were conducted for 200 Undergraduate students in the Surgery pre-final and Final year. The sample size was calculated based on the mean for clinical competence and E-portfolio. Crossover design provides an equal chance to all the students. Power analysis between the means of the two educational methods after intervention was calculated to be 0.87, which is higher than the suggested average range (0.80) for power in statistical analysis.

Tuble 1. Groups Studied Using the Crossover Method						
Group	No of students	Educational Method	Educational Method	Duration		
		First cycle				
First group	50	E-Portfolio	Conventional	Six months		
Second group	50	Conventional	E-Portfolio	Six months		
Third group	50	E-Portfolio	Conventional	Six months		
Fourth group	50	Conventional	E-Portfolio	Six months		

 Table 1. Groups Studied Using the Crossover Method

The length of the study was one year with six months each for conventional and e-portfolio. A briefing about the study was given to all four groups with a demonstration. At and end of the session, two groups were taught conventionally by using written logbooks and the other two were educated by the trained teachers in e-portfolio with the E-portfolio method for 6 months. Then, in the six months, a cross-over took place with students who had been educated with the E-portfolio method being taught by the assigned teacher with the conventional method. The groups that had been educated with conventional methodology were put on E portfolio.

At the end of the one year, a clinical competence form was given to the students for self-assessment and feedback in the conventional group. The portfolio group was reviewed every week by the mentor and returned to the students after feedback for gap analysis. A self-evaluation checklist of clinical competence was filled out by the students at the end of each study period, and data were analysed. Evaluation was based on the pre-validated checklist given to all four groups to compare clinical competence between the conventional and portfolio groups.

III. Data Analysis

Demographics, including age, sex, semester, assessment records of previous years of study, and familiarity with the portfolio method, were collected along with a pre-validated self-assessment questionnaire on knowledge, skills and AETCOM. Its reliability had been validated with Cronbach's α of 0.94, showing high internal consistency and reliability. For competency score assessment, Likert scale with five response options with score ranges between very low (0–10%), low 301%–40%), high (41%–60%) and very high (60%–80%). Scores before and after the introduction of the E-Portfolio were compared using t. Paired t-tests were used to compare average scores before and after the E Portfolio, and the results were documented.

IV. Results

Clinical competency in diagnosis and skill assessments of students to compare their performance in different groups before and after E portfolio indicated that there were significant differences in cognitive (P=0.0001), affective (P=0.0001), and psychomotor. (P=0.0001; Scores before and after E Portfolio showed statistically significant differences in all three domains.

Mean Scores of Clinical Competence Before and After Study using Conventional and Portfolio-Education Methods in the Psychomotor Domain. The Difference in Mean Scores for Clinical Competence in the Psychomotor Domain Before and After Internship in the Portfolio Group using Paired T-Tests was Statistically Significant (P=0.0001). Also, Clinical Competence Scores in the Field of Motor Psychology in the Two Groups Before and After the Internship Using Independent T-Tests Showed a Significant Difference (P=0.0001) Mean Scores for Clinical Competence Before and After Study Using Conventional and Portfolio-Education Methods in the Affective Domain. The Difference in Mean Scores for Table 2.

Table 2. Chinear competence before after E portiono					
Clinical	Before Internship	After Internship	Mean Difference	p-value	
Competence					
Conventional	97.2±15.8	98.5±17.6	1.3±3	0.67	
portfolio	96.0±13	117.5±13.0	21.4±2.3	0.0001	
Average difference	1.5±18.4	19.5±22.6	21.0±24.7	0.001	

Table 2: Clinical competence before after E portfolio

Mean clinical competence scores before and after study using the conventional and portfolio programs showed significant differences in all three domains — cognitive (P=0.0001), affective, and psycho-motor (both P=0.0001) — and clinical competence overall (P=0.0001; Differences between the two groups before and after education showed significant differences in all three domains with average p value of p-value of 0.001

V. Discussion

In our study, the students, after the introduction of portfolio along with traditional teaching and learning methods, were compared with intragroup pre-final and final year undergraduate students in surgery. The increased knowledge, skill, and AETCOM competence scores after using the E portfolio method show that CBME (Competency-Based Medical Education). Demographic profiles in the two groups did not show much difference, as all the students were familiar with online-based educational activities, especially after COVID online classes. Habibzadeh et al have also concurred with our understanding that portfolio education enhanced students' understanding of the clinical environment more than conventional education, consistent with our study.⁷ Implementation of E-portfolio-based assessment methods was effective in terms of all domains of their learning, including communication, digital documentation of records, and feedback. Valizadeh et al, in their study on portfolio had concluded that this is an effective teaching and assessment method, and a method make sure that ensures teaching and learning has taken place, which has been the aim of Competency-Based Medical Education.⁸Driessen E, van Tartwijk J, V.Vleuten et al in their study, found the portfolio method influenced the affective domain competence⁹. In comparison with Buckley et al, they concluded that E-

Portfolio enhances the application of theoretical knowledge in clinical decision making. ¹⁰Bahreini M, Ahmadi F, Shahamat reported that E-Portfolio also improves students' interaction with the teacher and personal feedback on their learning and suggests any remedial measures if needed¹¹ Hekmatpou et al in their experience in a qualitative study using the analysis, have concluded that E-portfolio learning enhanced the psychomotor aspect, consistent with ours.¹² The impact of the E-portfolio method on all domains of clinical competence needed for undergraduate students in Surgery indicated that it is effective in improving the clinical competence of students during the surgical training.¹³Vance GHS, Burford B, Shapiro E, et al introduced the E-portfolio method in clinical education that aims to incorporate the cognitive, affective, and Psychomotor domains in clinical diagnosing skills¹⁴. E-Portfolio-based education and evaluation can be used to improve evaluation, assessment, education, and efficiency in CBME. With this method, it will be possible to monitor the students in large numbers for professional development and scientific writing.

VI. Conclusion

Self-assessment of clinical competence of undergraduate students in surgery, and feedback on portfoliobased education and assessment, along with reflection by the students, helps the students to identify their level of understanding of the topics they learn. E- portfolio method is the Pedagogy student-centred teaching and learning method, which enhances students' knowledge, skills, and soft skills like AETCOM of clinical situations and can be effectively incorporated into their curriculum.

Disclosure

The authors have no conflicts of interest in this work.

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