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Implementation of Reflective Practice through E-Portfolios in Behavioural Science Teaching for Undergraduate Medical Students: An Evaluation of Self-Directed Learning Using the Garrison Model

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ABSTRACT

E-portfolios based on reflections and reflective practice enhance self-directed learning. The key components of self-directed learning according to Garrison's model include self-management, self-monitoring, and motivation. The aim of the present study was to explore students' perceptions of utilising learning portfolios as a tool for reflective practice and to evaluate their responses based on Garrison's Model of Self-Directed Learning. The current study was conducted among the second-year pre-clinical students at the College of Medicine and Health Sciences, National University of Science and Technology, Sultanate of Oman. 165 students, enrolled for the Behavioural Science in Medicine course were part of the study. They were given an orientation to reflective practice and portfolio writing. Feedback from students was obtained on completion of the course e-portfolio. A majority of students indicated that completing the e-portfolio enhanced self-directed learning, encouraged self-reflection, improved insight, and contributed towards self-awareness. Participants' responses based on Garrison's Model of Self-Directed Learning indicate above average mean scores across all three domains- self-management, self-monitoring, and motivation. Significant inter-domain correlation was also seen The e-portfolio is an effective modality to translate reflective practice to practical learning in undergraduate medical education. There has been a significant impact on students' self-directed learning, critical thinking, and self-monitoring. Using the e-portfolio is extremely advantageous to the holistic development of students- both in their personal and professional domains. It is thus imperative that activities focussing on reflective practice be introduced into formal curricular delivery in undergraduate medical education.

Keywords: *Reflections, E-portfolio, Medical Education, Oman*

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INTRODUCTION

Personal reflections are integral in enabling individuals obtain insights and achieve goals in their learning process. Reflections and reflective practice are now considered a core student activity in higher education. Reflections, as a vital dimension in experiential learning, has immense potential to prepare students to work on academic and professional challenges (1). Reflective practice is also increasingly associated with exploration of thoughts and feelings and maximising on self-awareness (2). Research indicates that activities focussing on reflective practice facilitates personal and professional learning, enhances application of theoretical concepts to practice and stimulates creative thinking. Reflections are also considered an effective tool in work-based learning (3).

The utilisation of reflective practice in medical education is crucial to holistic student training. In graduate medical education, reflections are considered critical (4, 5). Studies indicate that the use of reflections increased learning of complex subjects and deepened professional values. It also appeared to be effective in improving student attitudes when exploring difficult material (6). With most medical schools currently transitioning toward a competence-based curriculum, reflections are being considered an essential aspect of lifelong self- directed learning (4). Activities aimed at promoting reflective practice are now becoming part of the curriculum at all levels of medical education (7). Reflections, that are focussed on increasing empathy and 'emotional education' of medical students, are also considered the bridge between patient-centered and evidence-based medicine (8). Introducing reflective practice for medical students may therefore positively impact humanism in health-care training and delivery.

Reflections and reflective thinking have become accepted tools to enhance deeper learning, particularly clinical reasoning, and professionalism (9). Reflective practice is an integral component of experiential and self-directed forms of learning (10). Research also indicates that reflective

practices are significant predictors of Self-Directed Learning (SDL) competencies (11) that are considered an important component of life-long learning and thus, a key competency in medical school curricula (12). Based on the principles of self-directed learning, reflective practice motivates students to do self-assessment, improves critical thinking skills, encourages professionalism, and even communication skills (13).

The present global trend is that most of the educational bodies are advocating for medical graduates to be lifelong, self-directed learners. This makes SDL an important aspect, which enables the learners to adopt a metacognitive process to identify, monitor, and evaluate their approach to a particular task (14). It is therefore vital to introduce the skill of reflective practice at the undergraduate level to ensure life-long learning and productivity in health-care delivery.

Practical, measurable dimensions of SDL are effectively portrayed in Garrison's Model. Garrison defined SDL as an approach where learners are motivated to assume personal responsibility and collaborative control of the cognitive (self-monitoring) and contextual (self-management) processes in constructing and confirming meaningful and worthwhile learning outcomes (15). There are therefore three dimensions to self-directed learning- (a) Self- Management (involving goal setting and interdependence), (b) Self-Monitoring (highlighting reflections and critical thinking) and (c) Motivation (focus of initiating and maintaining task motivation) (16). Self-management relates to task control issues including the enactment of learning goals and the management of learning resources and support. Self-monitoring is the process whereby the learner takes responsibility for the construction of personal meaning through integrating new ideas and concepts with previous knowledge. It utilises reflective practice to facilitate metacognition. Motivation helps initiate and maintain effort towards learning and the achievement of cognitive goals (15).

Portfolio writing is a method of self-directed learning that encourages and enhances practices of reflective writing. A portfolio is a collection of written accounts involving a process of recording,

reviewing, reflecting, and learning. It also contains a record of reflections and insights, which are valuable to learning (17). It is an approach firmly rooted in the principles of experiential learning, that is the basis of self-directedness (18). The advantages of writing portfolios include enabling students to act and learn autonomously and allows personal and professional development (19). Students are also able to assess their learning needs.

In medical education, the use of reflective portfolios is associated with a high educational impact. The use of portfolios in undergraduate medical education is thus encouraged (20). Research indicates that portfolios allow medical students to reflect and better appreciate their clinical, research and academic experiences which promotes their personal and professional development (21). Portfolio writing also contributes to the improvement of students' capacity for critical thinking, self-regulation, lateral thinking and evaluating evidence (22). In addition, the portfolio is an accepted assessment tool in medical education (17). Portfolio-based work is a feasible method to encourage reflective practice through self-directness, actively involving the domains of self-management, self-monitoring, and motivation according to Garrison's model of SDL. The current global trend in higher education is the utilisation of Electronic Portfolios (e-portfolios) (23). The advantages of e-portfolios are that they are user-friendly for both students and tutors and facilitate quick review of the current and aggregated materials. There is also the flexibility to archive materials of varied formats (20). These factors enhance their receptivity among medical students (21).

Portfolio usage in undergraduate medical education is not widespread, especially related to Behavioural Science courses. It was therefore proposed to introduce this innovative method to enhance reflective practice and self-directed learning among the pre-clinical students at the College of Medicine and Health Sciences (COMHS), National University of Science and Technology, Sultanate of Oman. This is one of the first initiatives at the COMHS to introduce portfolio writing for undergraduate medical students. The aim of the study was to explore students' perceptions of utilising

learning portfolios as a tool for reflective practice and to evaluate their responses based on Garrison's Model of Self-Directed Learning.

Methods

Study Design and Participants

The present study was conducted among the second-year pre-clinical students at the College of Medicine and Health Sciences, National University of Science and Technology, Sultanate of Oman. These students were enrolled for the course- Behavioural Science in Medicine offered by the Department of Psychiatry and Behavioural Science. This is a 4 credit-hour course offered over a duration of 16 weeks that includes modules on developmental psychology, abnormal psychology, health psychology and counselling psychology. An exploratory intervention-based research design that included the survey method was used. Approval from the institution's Ethics and Biosafety Committee was obtained (Registration Number: NU/COMHS/EBC0021/2022). All pre-clinical students enrolled for the Behavioural Science in Medicine course participated in the educational initiative as part of their course assignment.

Procedure

Previous research has indicated that training and guidance is essential for students to develop the required skills for reflective writing (24). Therefore, participants in the current study were introduced to the reflective process in an orientation session. A practice task on the reflective process was also completed by the students. Feedback was provided by the faculty members. Students were then introduced to the various concepts involved in portfolio writing. The details of the required course assignment to complete an e-portfolio was also shared with the students. Students were allotted adequate course time in the teaching schedule as self-directed learning sessions to complete the e-portfolio for various course modules. Guidance and support by faculty members was also provided, whenever required. Feedback from students was obtained on completion of the course e-portfolio. An

adapted version of the survey utilised by Elango et.al., was used (17). Permission from the author was obtained. Face validity was established for the adapted survey. Students were also encouraged to provide qualitative feedback on the reflective writing activity as part of their e-portfolio submission. The steps involved in the study are illustrated in Figure 1.

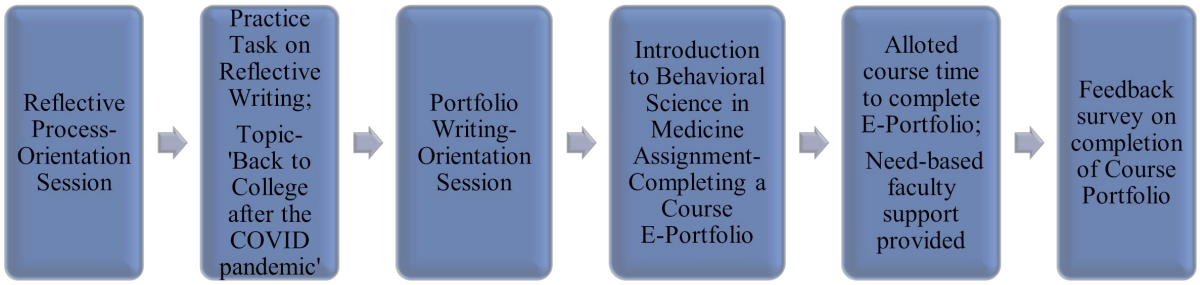

Figure 1 Represents the Steps Involved in the Study

The feedback survey questionnaire included 21 items. Participants recorded responses on a 5-point Likert scale. Each item is scored on a scale from one to five (1= 'strongly disagree', 2= 'disagree', 3 = 'neutral', 4= "agree", and 5= "strongly agree"). To highlight the self-directed learning process in portfolio writing, the survey items were also classified based on the dimensions of the Garrison model as follows:

Domain 1 (DI) on Self-Management included six survey questions- Q2, Q7, Q8, Q9, Q16, Q19.

Domain 2 (D2) on Self-Monitoring included ten survey questions- Q3, Q6, Q10, Q11, Q12, Q14, Q15, Q17, Q18, Q20.

Domain 3 (D3) on Motivation included five survey questions- Q1, Q4, Q5, Q13, Q21.

The maximum possible score for D1 was 30, for D2 was 50 and for D3 was 25. The median value was considered as the cut-off score to interpret participant's responses.

Statistical Analysis

Data obtained were analysed using IBM's Statistical Package for Social Sciences version 22. Descriptive statistics were employed to analyse participants' survey responses. Reliability analysis was carried out using Cronbach's alpha to assess internal consistency. Spearman's correlation methods were employed to interpret data. Linear regression analysis was carried out to explore the strength of association.

Results

165 students were part of the study. Results indicate good internal consistency for the survey items used. A Cronbach's alpha value of 0.93 was obtained for the 21 survey items. Results of the Shapiro-Wilk test of normality for all survey items (p=0.000) indicate that participant's responses were not normally distributed.

Participants' responses across all survey items are indicated in Table 1.

Table 1 Represents the Participant's Responses Across all Survey Items

Survey Item	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	Mean	SD
Q1. I enjoy writing the portfolio.	10.9	27.9	36.4	12.1	12.7	3.121	1.157
Q2. I can appreciate that my written communication has improved.	6.7	38.2	38.8	11.5	4.8	3.303	0.933
Q3. It has helped me in self-directed learning as I can analyze problems on my own.	10.9	46.7	24.8	10.3	7.3	3.436	1.055
Q4. Writing the portfolio is a stressful process.	18.2	29.7	30.9	12.7	8.5	2.636	1.169
Q5. Writing the portfolio has helped my personal and professional development.	6.7	32.1	41.8	12.1	7.3	3.188	0.985
Q6. The portfolio encourages self-reflection.	13.3	45.5	29.1	5.5	6.7	3.533	1.015
Q7. I normally write the portfolio on a regular basis.	4.2	20	30.9	28.5	16.4	2.673	1.099
Q8. There is adequate guidance to write the portfolio.	13.9	29.7	30.9	17.6	7.9	3.242	1.137
Q9. I use resources other than textbooks while writing my portfolio.	23	49.1	15.2	7.3	5.5	3.770	1.057
Q10. While I write the portfolio, I try to connect to my individual/personal issues.	29.1	49.7	18.8	1.8	0.6	4.048	0.779
Q11. When I write the portfolio, I try to connect to issues in my family, society, and culture.	30.3	52.1	15.8	0	1.8	4.091	0.787

Q12. Writing the portfolio has given me a lot of insight.	8.5	42.4	35.8	7.9	5.5	3.406	0.949
Q13. Portfolio should be part of every medical program.	5.5	7.9	24.2	33.9	28.5	2.279	1.124
Q14. I usually reflect on the issues I am discussing.	7.9	39.4	44.2	4.8	3.6	3.430	0.849
Q15. The portfolio is a useful additional learning tool.	4.8	19.4	47.9	16.4	11.5	2.897	1.003
Q16. I usually read the relevant chapter in the textbook before I write the portfolio.	9.7	30.9	30.9	18.8	9.7	3.121	1.125
Q17. The portfolio has changed the way I think, especially related to Behavioral Science.	7.3	30.9	40.6	12.1	9.1	3.152	1.033
Q18. Portfolio writing has changed my approach to learning.	6.1	18.8	51.5	15.2	8.5	2.988	0.962
Q19. Writing the portfolio has helped me to monitor my learning goals.	7.3	29.1	37.6	18.2	7.9	3.097	1.037
Q20. Writing the portfolio has helped me to recognize my strengths and weaknesses.	6.7	34.5	38.8	12.1	7.9	3.200	1.007
Q21. Writing the portfolio has helped me revise my work.	15.8	50.9	22.4	7.3	3.6	3.679	0.949

Overall, a majority of students indicated that completing the e-portfolio enhanced self-directed learning (57.6%). Participants also reported that the portfolio encouraged self-reflection (58.8%), improved insight (50.9%) and contributed towards self-awareness (41.2%). In addition to prescribed learning material, most students reported that they used multiple resources (72.1%), that the portfolio helped them revise their work (66.7%) and review textbook content (40.6%). Participants reported that they were able to apply theoretical concepts to personal issues (78.8%) and connect to issues in their family, society, and culture (82.4%).

Though participants appreciated that their skills for written communication had improved (44.9%) and writing the portfolio had helped their personal and professional development (47.9%), a majority of students felt that the process was stressful (57.6%) and should not be included as part of the medical program (62.4%). Results also indicate significant inter-item correlation.

Participants' responses were analysed based on Garrison's Model of Self-Directed Learning. Mean scores of participants are above average across all three domains of the Garrison's Model of Self-Directed Learning. The mean score obtained by participants on the Self-Management domain was 19.206 (SD= 4.256, Max score=30). This indicates that students reported that task control issues and management of learning resources were integral in completing their learning portfolio. The mean score obtained by participants on the Self-Monitoring domain was 34.182 (SD= 6.909, Max score=50). This indicates that students reported that cognitive and metacognitive processes, including learning strategies were also greatly involved in task completion. The mean score obtained by participants on the Motivation domain was 14.903 (SD= 3.940, Max score=25) indicating that students also agreed that motivation to initiate and maintain effort for the task was essential in completing the assigned course e-portfolio.

Spearman's correlation analysis was also conducted across the three survey themes. Adequate inter-domain correlation was seen. Correlation values were significant at the 0.01 level (2-tailed). Domain-wise correlation was also seen to the total score: Self-Management (0.823), Self-Monitoring (0.927) and Motivation (0.860). These values were also significant at the 0.01 level (2-tailed).

Linear Regression was carried out to analyse the influence of self-management, self-monitoring, and motivation to participants' reflective practice. Results indicate that Self-Management ($R^2 = 0.761$) and Motivation ($R^2 = 0.828$) were moderate predictors to students' reflective practice. The domain of Self-Monitoring ($R^2 = 0.931$) was a high predictor to the reflective process. Results are shown in Figure 2.

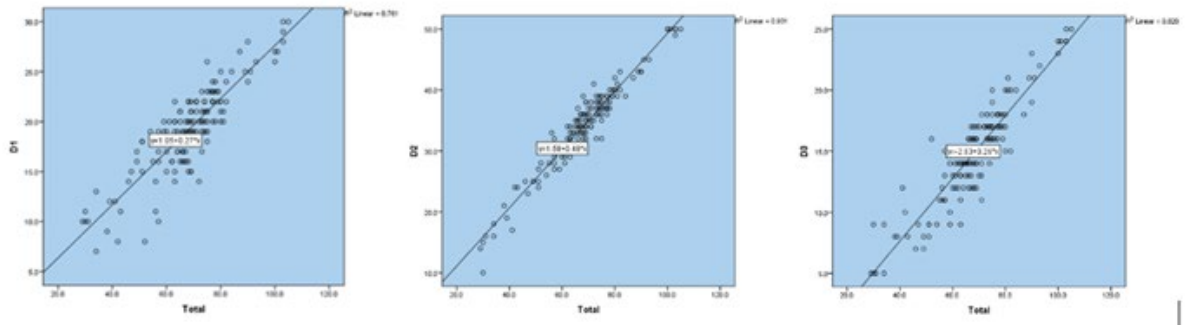

Figure 2 Portrays Results of Linear Regression Analysis

Qualitative Feedback

A few qualitative comments from participants regarding the reflective e-portfolio are included below:

"Regarding this portfolio, it was something that you can express in and write whatever you want: summary, experience, thinking. Reflection takes a lot of time, but it is something worthwhile for us."

"The assignment was really interesting and different from the usual things we do. It helped us read more and use our creativity and skills."

"Completing the portfolio also aided me in understanding the lectures better, taking more notes and doing extra reading."

"Doing this portfolio was good because it made me understand concepts better and also relate it to my life. It gave me responsibility over my learning process."

'The assignment was challenging, but I enjoyed the process. I honed my soft skills and also explored new platforms for creating mind maps. The instructors were always ready to help us."

"Working on the portfolio has taught me how to use my critical thinking while applying the concepts I learnt. The most important thing was that it was enjoyable."

"I truly did enjoy doing the portfolio, where I was able to express my feelings and to see how much knowledge I gained."

"The portfolio took up a lot of my time, but I cannot ignore the great benefits I gained by doing it."
These comments highlight both the benefits gained and challenges faced by students while completing the portfolio.

Discussion

"Reflective thinking turns experience into insight." said John C. Maxwell (25). Reflections though often considered an ambiguous phenomenon, efforts in medical education have translated it into a teachable, measurable concept (26). The activity designed for the present study has set the stage at COMHS by encouraging the 'first-steps' to translate reflective practice as a continual routine in learning for undergraduate medical students at the pre-clinical level. This may eventually contribute to providing students a direction for life-long learning as a reflective practitioner (26).

The overall results of the current study indicate that students reported enhancement of self-directed learning while completing the reflective portfolio as part of their Behavioural Science course assignment. Using reflections has therefore positively impacted deep learning in participants. Similar research has indicated that reflections, as a form of SDL, plays a significant role in the cognitive and emotional growth of students (6). Reflections are also reported to be the link for developing emotional intelligence and experiential learning (10).

Medical educators believe that reflection as a subject is required to be taught for undergraduate medical students as it not only contributes to promoting deep learning, but also increases core medical

knowledge and enhanced patient-centered care (27). Integrating an activity for reflective practice as part of the curriculum in this current study has introduced students to the prospective benefits of using reflections as a core technique in SDL and has provided adequate skill training in assimilating the requirements for the same.

In the present study, students reported positive personal changes including increased insight, self-awareness, and application of theory to practical observation. This is similar to observations in other studies that outlined improvement in competency, experiential learning, and awareness (20). Research also indicates that the use of reflective practice in an e-portfolio had similar benefits. It was reported that their written skills had improved and that they utilised varied resources beyond the prescribed course material (17). This is also seen among the students in the current study. Educators have always encouraged learners to 'go beyond the textbook'. Implementing reflective practice is thus a proactive strategy to enable students explore material beyond the prescribed curriculum while simultaneously contributing to stimulating and sustaining learner interest.

The contraposition of participants in the current study is that they perceived the activity of completing the portfolio as a stressful process and preferred that it not be included in the curriculum. Previous research indicates that this may be attributed to an addition to an already challenging workload for students, who may have initially considered the portfolio as a burden before realising its usefulness. In addition, students may tend to accumulate work, thus contributing to the stress experience (17). Another contributing factor may be 'innovation resistance' (28). As the assigned activity was a novelty for students, apprehension towards task completion may have been reported. Other reported research indicates that students perceived trialability and complexity as innovation resistance characteristics related to e-portfolios (29). Additional barriers to the acceptance of activities involving reflective practice includes prescribed structure and assessment rubric. It is vital that educators consider these factors while designing activates that include reflections (30).

The analysis of participants' feedback for the portfolio activity based on Garrison's SDL model indicates that self-monitoring was the highest contributor to reflective practice. The importance of this skill as a contributor for successful reflective learning has been highlighted in previous research (31). Participants' responses in the current study indicate that they have assumed responsibility for their learning and have effectively engaged in integrating knowledge and experience with optimal utilisation of available resources. As the submission of the e-portfolio was an essential component for course summative assessment, task control (a component of the self-management domain and motivation to complete the task) may have been initiated and maintained. Studies indicate that the effectiveness of portfolios in medical education include curricular integration and support as vital contributing factors (32).

One of the limitations of the present study was that peer review of portfolios was not included as part of the methodology. This may be incorporated for upcoming cohorts to enhance collaborative learning.

Conclusions

As reported in the current study, the use of the e-portfolio to acuminate reflective skills in undergraduate medical education is extremely advantageous to the holistic development of students-both in their personal and professional domains, thus fulfilling the study objectives. Portfolios effectively target self-directed learning, deep learning, experiential learning, critical thinking and also enables students to obtain a humanistic perspective to healthcare delivery. The implementation of reflective practice through portfolios also encourages self-management, self-monitoring and sustains motivation to learn. It is thus imperative that activities focussing on reflective practice be introduced into formal curricular delivery in undergraduate medical education.

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