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Abstract: Introduction: The aim of this study was to gain an understanding of radiology professionals’ awareness of, and approach towards e-portfolio use. A further aim was to monitor the effect of the training intervention, and individuals’ views and attitudes towards e-portfolio usage in their continuous professional development.

Materials and Methods: Questionnaires were initially distributed to 142 radiology professionals in the pre-intervention phase to investigate individuals’ knowledge and understanding of e-portfolios. An intervention phase was then carried out consisting of training such as lectures, handouts, and group discussions relative to the benefits of e-portfolio use. Post-intervention questionnaires were then distributed to those participants who had responded to the initial survey and had experienced training during the intervention phase. Quantitative data were collected through the pre and post-intervention questionnaires using attitudinal questions with Likert scales. Results were then analyzed to determine any significant correlations following the intervention.

Results: Ninety-nine respondents completed the questionnaire in the pre-intervention phase resulting in a response rate of 70%. The response rate decreased to 55% in the post-intervention phase. Statistically, significant post-intervention results indicate that radiology professionals’ perceptions towards e-portfolios improved following training and enhanced their interest to adopt it for lifelong learning.

Discussion: It is evident that individuals’ understanding of what e-portfolios are and how they can help to develop an individual both professionally and personally is lacking. Following the intervention period the positive responses from participants increased significantly indicating that in order to encourage the future use of e-portfolios amongst those who work in radiology, either clinically or academically, prior training and awareness sessions would be beneficial.

Keywords: Radiology professionals, e-portfolio, lifelong learning, continuing professional development, post-intervention, Likert scales.

1. INTRODUCTION

The radiology profession, along with the other allied health professions and the nursing profession, places emphasis on continuing professional development with the aim of individuals improving standards, service, and experience. It is important to determine radiology professional perceptions on the use and effectiveness of portfolios in their professional development as well as their perceptions on the use of the portfolio as both an assessment and learning tool [1]. Professionals must provide evidence of learning and maintenance of their current skills proving they fulfill professional body requirements. Ordinarily this was done through the use of a paper-based folder collecting the necessary documents throughout the process of professional development, however, due to the advent of recent technological advances, online or electronic portfolios (e-portfolios) have been gaining popularity. Paper-based or electronic portfolios are it is not compulsory in radiology profession. However, the literature documents that compulsory portfolio allows reflection on personal learning and professional development [2].

The purpose of Professional Development Portfolio is to express immediate evidence about professional strengths, experiences and professional development activities [3]. An e-portfolio is a digital collection of professional and educational activities that documents evidence in the form of text, audio, video and images [4]. Portfolios are recognized as being multi-purpose and can be used for showcasing skills, learning, and assessment [5]. Portfolios are often used to document professional development, and their use has been shown to encourage reflective practice and support work-based learning in different health care professions [6].
A portfolio allows an individual to provide evidence that they have attained the required educational outcomes and thus fulfill any necessary prerequisites for employment in the health care environment. Radiology education uses e-portfolios as evidence of practical competency throughout an individual’s academic and professional career. Previous research [7-9] indicates that the integration of e-portfolios as a part of the medical and health education strategy have grown with increased use demonstrated in continuing professional development (CPD) and life-long learning. E-portfolios can encourage the development of evidence-based practice skills for students [10], thus enabling faculties to provide formative feedback and evaluation in order to analyze the competencies of an individual and to highlight areas where improvement is needed.

The literature also suggests that e-portfolios can establish a platform to inspire peer assessment, to evaluate any concerns regarding students’ achievements, and to serve as a reference guide throughout a graduate’s career [11, 12]. Even after graduation the e-portfolio can be utilized when participating in CPD [13]. Developing e-portfolios can facilitate an individual’s learning experience, outlining areas of self-improvement whilst demonstrating knowledge and providing an overview of progress.

Employers can see how well candidates’ educational and professional qualifications meet the job requirements. From an educator’s perspective, portfolios can lead to enhanced teaching with broad ranges of tasks specific to students, competence and speed of learning [14]. Paper-based portfolios are evolving into electronic versions owing to the increased portability and versatility, e-portfolios can be accessed on numerous media formats without any physical limitations leading to potential academic or research collaboration [15]. Each institute and university could develop their own e-portfolio platform or utilize one of the commercially available platforms. E-portfolios encourage habit of learning and reflection, with progression to applied learning and continuous improvement in a periodic manner [16, 17].

The concept of e-portfolios has risen from the relevance of CPD requirements in radiology, and on the basis of this study, the lack of preparation students have in this aspect of professional development. The research framework of this study focused on the preceptors who engage in supervising students during clinical practice. Many professionals already use the available commercial e-portfolios for the collection of individual credentials, achievements, and certificates [16].

This project is led by the faculties of Medical Diagnostic Imaging Department, College of Health Sciences, University of Sharjah. The team expects that moving from a paper-based academic portfolio to an electronic portfolio (e-portfolio) would provide benefits to radiology education and the learning environment. This project aimed to determine the preceptors’ level of knowledge, their current practice, and assess their requirements, experience and approach towards e-portfolio in order to develop an e-portfolio for students and radiology professionals. A further aim was to monitor the effect of the training intervention, and individuals’ views and attitudes towards e-portfolio usage in their continuous development.

2. METHODOLOGY

This paper reports the results from an interventional study conducted in 2015. Quantitative data was obtained through the distribution of pre and post-intervention surveys to 142 radiology receptors with varying levels of education and experience. Participants were selected randomly based on their availability and acceptance to participate in the study. As it is not compulsory in radiology profession practice in the United Arab Emirates, the participants either not using e-portfolio or they are not integrating their current portfolio in their professional development effectively. A pilot study was carried out among three radiologists and four senior radiographers to determine the completion time and understandability. The survey built on previous studies [6, 18-20] and based on the comments and recommendations received from the pilot study, minor amendments were made to the wording and presentation of the questions.

The survey comprised of 12 questions arranged in three sections. The first section included simple demographic questions such as gender, age, and education. The second part comprised of attitudinal statements using 5-point Likert scale to evaluate individuals’ approach towards e-portfolio. The third section consisted of questions designed to analyze the nature and usage of e-portfolio in their current practice. The responses were anonymous and preserved respondents’ confidentiality. Validity and reliability of the questionnaires were assured via a pilot study, with the corresponding target participants.

The initial 99 respondents were invited to take part in the intervention. The intervention will be described using the 5Ws as followed: What: The intervention consisted of lectures, handouts, and a group discussion on e-portfolios with regards to the different types of e-portfolios, their function, how, where and when they can be used. The intervention was preceded by a training workshop for the participants who consented to participate in the study. The workshop included a discussion about e-portfolios and on how to use them. Participants were assured of the anonymity of their feedback. Who: A trainer holding a Master’s degree in Leadership in Health Profession Education from Royal College of Surgeons in Ireland, Leadership Institute, led the intervention. The trainer is a faculty member in the Medical imaging department, university of Sharjah. Where and when: The intervention conducted in the university of Sharjah, a medical campus in 2015. The University of Sharjah established in 1997 in the United Arab Emirates, it employs the concept of domain clusters, where colleges and similar centers are located in close proximity. This unique feature allows for students from similar fields to interact and exchange experiences and challenges. The medical campus exposes students to a wide variety of programs in the medical and health sciences field. It consists of the Colleges of Medicine, Dentistry, Pharmacy, and Health Sciences. The campus is a model of multi-professional medical education, research, and service, having the health of the community at its center, introducing innovation in education and translating researchers from the labs to the patient with its impact on the health of the community at large. Why: This study was designed to investigate whether the radiology preceptors were utilizing an e-portfolio in their professional practice as a tool to plan
their future career development effectively. Additionally, it is hypothesized that the radiology preceptors are unaware of the benefits of using e-portfolio as a part of their professional development.

Ethical approval was obtained from the Research Ethics Committee of the University of Sharjah. Participation in the study was entirely voluntary. Written and informed consent were obtained and participants were informed of their right to withdraw from the study at any time. The aims and objectives of the study along with the chosen methodology were explained to all participants before beginning the study. The data generated from the questionnaire was coded and entered into SPSS for Windows (version 23.0) and percentage distributions were calculated.

3. RESULT

The response rate in the pre-intervention phase was 70%, with 99 respondents. However, 21 participants were lost during the intervention phase with only 78 individuals responding in the post-intervention phase, providing an overall response rate of 55%. The period between the pre and post intervention was approximately three months, this period was given to allow the participant enough time to work and develop skills and knowledge about using portfolio, but on the other hand we think it leads to high attrition rate. Results are shown in Table 1 and Table 2 for the pre and for post-intervention phases respectively. Demographical analyses of the participants in the pre and post-intervention phases are illustrated in (Fig. 1).

Table 1. Results of the pre-intervention survey.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 My e-portfolio serves only as a digital collection of personal data.</td>
<td>7 7.1%</td>
<td>31 31.3%</td>
<td>57 57.6%</td>
<td>4 4.0%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>2 My e-portfolio is a meaningful collection of professional data compared to paper format.</td>
<td>14 14.1%</td>
<td>29 29.3%</td>
<td>55 55.6%</td>
<td>0 0.0%</td>
<td>1 1.0%</td>
</tr>
<tr>
<td>3 My e-portfolio helps to share and discuss experiences among colleagues.</td>
<td>3 3.0%</td>
<td>21 21.2%</td>
<td>71 71.7%</td>
<td>4 4.0%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>4 My e-portfolio saves learning experience and challenging/rare cases.</td>
<td>24 24.2%</td>
<td>0 0.2%</td>
<td>69 69.7%</td>
<td>4 4.0%</td>
<td>2 2.0%</td>
</tr>
<tr>
<td>5 My e-portfolio motivates and engages me in work and lifelong learning.</td>
<td>18 18.2%</td>
<td>19 19.2%</td>
<td>61 61.6%</td>
<td>1 1.0%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>6 My e-portfolio encourages reflective learning and self-evaluation.</td>
<td>17 17.2%</td>
<td>21 21.2%</td>
<td>60 60.6%</td>
<td>1 1.0%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>7 My e-portfolio helps me to plan or organize my work/education.</td>
<td>18 18.2%</td>
<td>19 19.2%</td>
<td>60 60.6%</td>
<td>1 1.0%</td>
<td>1 1.0%</td>
</tr>
<tr>
<td>8 My e-portfolio gives creative ways of presenting my work using technology.</td>
<td>18 18.2%</td>
<td>21 21.2%</td>
<td>58 58.6%</td>
<td>1 1.0%</td>
<td>1 1.0%</td>
</tr>
<tr>
<td>9 My e-portfolio has been interesting to do and user-friendly.</td>
<td>12 12.1%</td>
<td>26 26.3%</td>
<td>59 59.6%</td>
<td>1 1.0%</td>
<td>1 1.0%</td>
</tr>
<tr>
<td>10 My e-portfolio serve as social network like</td>
<td>12 12.1%</td>
<td>26 26.3%</td>
<td>60 60.6%</td>
<td>0 0.0%</td>
<td>1 1.0%</td>
</tr>
<tr>
<td>11 My e-portfolio is performance assessment or indicator</td>
<td>14 14.1%</td>
<td>20 20.2%</td>
<td>63 63.6%</td>
<td>1 1.0%</td>
<td>1 1.0%</td>
</tr>
<tr>
<td>12 I’m satisfied with my current e-portfolio</td>
<td>4 4.0%</td>
<td>15 15.2%</td>
<td>80 80.8%</td>
<td>0 0.0%</td>
<td>0 0.0%</td>
</tr>
</tbody>
</table>
The pre-intervention results highlighted the limitation of participant’s knowledge and insight regarding e-portfolios. Fifty-six percent of the participants (n = 55) in the pre-intervention phase did not appreciate the benefits associated with using e-portfolios to store educational and professional achievements in comparison to a paper-based alternative. Eighty-one percent of respondents (n = 80) were unsure if they were satisfied with their current e-portfolio or not. Thirty-seven percent of responders (n = 37) agree that the use of an e-portfolio helps to plan or organize their work and/or education. Eighteen percent (n = 18) were sure that using an e-portfolio helped with organization. In the post-intervention period 58% (n = 62) responded positively to this statement providing statistical significance, \( r = 0.89, p = 0.001 \).

Thirty-eight percent of responders (n = 38) agree or strongly agree that the use of an e-portfolio encourages reflective learning and self-evaluation. 15% (n = 16) were unsure if e-portfolios encouraged reflection and evaluation in the post intervention. A statistically significant \( r = 0.82, p = 0.001 \) eighty percent of responders (n = 70) agreed or strongly agreed with this statement post-intervention.

Post-intervention responses also show that 84% (n = 73) of respondents now consider e-portfolios to provide a
meaningful collection of professional documentation compared to paper format, in comparison to only 43% (n = 43) in the pre-intervention phase. This post-intervention increase was proven to be statistically significant, r = 0.87, p = 0.001.

Twenty-four percent of responders (n = 24) agree or strongly agree that e-portfolios help to share and discuss experiences with colleagues. Eighty-one percent of responders (n = 70), following the intervention, responded positively to the above statement and this was proven to be statistically significant, r = 0.88, p = 0.001.

With regards to utilization of e-portfolios in current practice, 76% of respondents in the post-intervention phase confirmed that they now use e-portfolios such as LinkedIn and Research Gate compared with only 3% (n = 2) in pre-intervention phase. Additionally, only 35% of responders (n = 38) initially agreed or strongly agreed that e-portfolios are interesting to use. After the intervention 61% (n = 65) of responders agreed or strongly agreed with the above statement, providing a strong positive correlation, r = 0.9, p = 0.001.

The finding above is highlighted by 35% of responders (n = 38) who agree or strongly agree that using an e-portfolio motivates and engages them in lifelong learning. Eighteen percent (n = 19) were unsure if motivation and engagement in lifelong learning were generated through using an e-portfolio. A statistically significant correlation was also present within the post-intervention responses relative to the above statement (r = 0.85, p = 0.001) as 85% (n = 70) responded positively.

4. DISCUSSION

This study focused on radiology preceptors with varying levels of education and experience. The study was carried out to identify respondents’ understanding and awareness regarding using e-portfolios for personal and professional development. Pre- and post-intervention surveys were carried out in order to assess individuals’ views and understanding. Consequently, following the intervention the results generated infer that radiographers’ perceptions and understanding of e-portfolio use have increased.

The findings from the pre-intervention phase of this study highlighted a distinct lack of awareness and understanding towards e-portfolio use amongst respondents. These findings correlate with Timmins [21] who recognizes that although e-portfolio use is growing within the educational facilities and practice, there is perspective for improvement.

The main aim of this project was to analyze the integration of e-portfolios regarding awareness, knowledge, and experience of use amongst respondents in the pre and post-intervention phases. The results demonstrate that training, such as that carried out in the intervention phase, is necessary to develop individuals’ understanding relative to the benefits of using an e-portfolio. A notion supported by Alwraikat [22] who suggests that training should provide an opportunity for graduates and faculties to integrate e-portfolios into teaching and learning.

More than 75% of participants (n = 66) in the post-intervention phase were using a commercially available portfolio for social networking without gaining a great deal of professional benefit or development, or even recognizing that they could develop a professional-centric one. However, the post-intervention responses show that e-portfolios are thought to be a worthwhile compilation of personal and professional data. This outcome increases our motivation to develop a platform for radiology professionals for sharing knowledge and research, which can include Digital Imaging and communications in Medicine (DICOM), digital teaching files, links to an image library, reflections on practice, and even case studies. Stewart [16] concluded that using e-portfolios with open networking tools and processes is a viable option as it provides opportunities for collective reflection and learning.

The post-intervention results highlighted respondents increased awareness regarding the benefits of sharing expertise in professional practice as 81% (n = 70) agreed that e-portfolios help to share and discuss experiences among colleagues. Following the intervention, it is considered that the responses by participants align with the research by Bahreini [23] which proposes that the e-portfolio is an efficient tool for expanding proficiency and helps to keep knowledge, skills and competence up to date.
The study by Bradley [24] with medical radiation science students established that the e-portfolio is an excellent device to motivate individuals and to aid professional development expectations. The results of this study emphasize the scope for development of a structured e-portfolio for the radiology preceptors and university students owing to the multitude of benefits in acquiring and disseminating knowledge. The concept of integrating e-portfolio use for their continuous professional development was well accepted by the participants following the intervention phase. It is evident from this study that individuals’ understanding of what e-portfolios are and how they can help to develop an individual both professionally and personally was lacking. Following the intervention period of training, lectures and discussions relative to e-portfolios and their use, the positive responses from participants increased significantly.

CONCLUSION

The results from this study provide motivation to develop an e-portfolio, which can integrate into to radiology curriculum to enrich scholars and faculties as an aid to academic development, and to enrich their practice of radiology preceptors. A tailored radiology e-portfolio can be used to enhance the education process with the latest available technology. Devices such as a mobile application or a web-based program linked to Picture Archiving and Communication System (PACS) with a DICOM viewer with the ability to upload and view images and video will encourage professionals to utilize e-portfolios in their future continuing professional development.

Limitation of the Study

It would have been better if participants completed a tailored radiology e-portfolio to evaluate their experience. Additionally, this would have provided an insight into advantages and drawbacks of the tailored radiology e-portfolio for improvement.

Lessons for Practice

The findings from this study that in order to encourage the use of e-portfolios amongst those who work in radiology, prior training and awareness sessions would be beneficial outlining the key areas outlined in Table 3 as the reasons for using an e-portfolio.

<table>
<thead>
<tr>
<th>Training Sessions</th>
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<tbody>
<tr>
<td>Aid to plan or organize their work and/or education</td>
<td></td>
</tr>
<tr>
<td>Encourages reflective learning and self-evaluation</td>
<td></td>
</tr>
<tr>
<td>Provides a meaningful collection of professional documentation compared to paper format</td>
<td></td>
</tr>
<tr>
<td>Helps to share and discuss experiences with colleagues</td>
<td></td>
</tr>
<tr>
<td>Motivates and engages one in lifelong learning</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. covering the areas below would be beneficial to increase e-portfolio use.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Research Ethics Committee of the University of Sharjah. Participation in the study was entirely voluntary. Written and informed consent was obtained and participants were informed of their right to withdraw from the study at any time.

HUMAN AND ANIMAL RIGHTS

There is no human or animal intervention conducted in this research.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

REFERENCES


