

E-Portfolio in Faculty of Medicine, Suez Canal University: Perceptions of Students and Mentors

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Abstract:

Background: E-portfolio is one of the most significant innovations in educational technology and medical education. It allows students to exhibit their development in a variety of knowledge and skills and eliminates most paper format drawbacks. Accordingly, the Faculty of Medicine, Suez Canal University, shifted the paper format portfolio into an e-portfolio in the preclinical years. **Aim:** To assess the students' and mentors' perceptions of using e-portfolio at the Faculty of Medicine, Suez Canal University. **Subjects and methods:** This study used a descriptive cross-sectional design during the academic year 2021-2022. Students' perceptions and mentors' perceptions questionnaires were designed and distributed online at the end of the second semester to a total comprehensive sample of year 2 students and the e-portfolio mentors (n=512 & 40 respectively). **Results:** About one-third of students and mentors agreed that the guidance on dealing with e-portfolio was excellent. 43.4% of the students asserted that the e-portfolio was a time saver and decreased their study burden. They asserted that e-portfolio increased their communication and computer skills and gave them new ways of presenting their work (60.9%, 48.5%, and 76.5%, respectively). 76.3 % of mentors stated that e-portfolio minimizes the workload and time consumption. 57.5% of students had a very successful experience with e-portfolio. 84.2% of mentors asserted their satisfaction regarding the new experience with the e-portfolio. **Conclusion:** The overall responses of the students and mentors were in favor of positive perceptions towards the e-portfolio. However, there is a need for frequent guidance and training, and continuous technical support.

Keywords: *Electronic portfolio, Assessment, Undergraduate, Reflection, Medical Education.*

Introduction:

Portfolio has been evoked as one of the most innovative learning and evaluation tools in the last two decades, owing to the numerous advantages it provides in terms of both learning and assessment⁽¹⁾. It is an excellent learning tool because it provides a realistic, performance-based evaluation and enables learners to take charge of their own learning.

It reflects a student's developmental status because it is a systematic collection of student products gathered over time⁽²⁾.

The portfolio as a method of learning and assessment is considered especially significant in self-reflective learning. It plays a crucial role in the development of professionalism through reflection and self-reflection⁽³⁾.

Recently, paper-based portfolios have been replaced by electronic portfolios (e-

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portfolios), and this replacement has become an urgent necessity to keep pace with the emerging technological development in learning and assessment methods⁽⁴⁾. This innovative replacement has been developed to overcome the limitations and challenges that face portfolios in their traditional paper-based format, including increased student numbers, excessive burden (paper workload), time-consuming limitations on data storage, and ease of fabrication⁽⁵⁻⁶⁾.

E-portfolios are one of the most significant innovations in educational technology. Simply, it is the digitized, computer- or Web-based version of the traditional paper format^(4,7), which enables students to exhibit their development in a variety of skills and knowledge, whether it's discipline knowledge or graduate competencies⁽⁸⁾.

Portfolio was introduced in the Faculty of Medicine at Suez Canal University (FOM-SCU) in 2013⁽⁴⁾. It was first introduced to the clinical undergraduate years and then introduced to the preclinical years in 2018⁽⁹⁾. FOM-SCU was the first school in Egypt to implement a portfolio in undergraduate medical education⁽⁵⁾. Nowadays, portfolios are a mandatory tool for learning and assessment in undergraduate medical education in Egypt, especially with the newly introduced 5+2 undergraduate program in medicine.

Recently, FOM-SCU found a compelling need to shift portfolios in the undergraduate curriculum from the already-used traditional paper-based format to the electronic format. There were many reasons behind the need for FOM-SCU to shift to an e-portfolio, which include the massive shift from face-to-face to online learning due to the COVID-19 pandemic and the fact that the electronic format of the portfolio can eliminate most of the drawbacks of the paper format, like excessive workload, time consumption, an increased number of students, and inflexibility of

communication between the students and their mentors⁽⁵⁾, in addition to the continuous work in FOM-SCU towards improving the learning and assessment processes, besides motivating student engagement. The E-portfolio committee handled this shift and implemented the e-portfolio in the preclinical years (Year 2). The new experience evaluation has an important role to play in the improvement of the portfolio and e-portfolio implementation. Accordingly, this study aims to assess the undergraduate medical students and the mentors' perceptions of using e-portfolio at the FOM-SCU.

Subjects and Methods:

Study design:

This is a descriptive, cross-sectional study to explore the perception of both the students and the mentors regarding the new experience of e-portfolio implementation.

Sample and population:

A comprehensive sample of second-year medical students (n=512) was recruited, while 494 of them responded. In addition to all second-year medical students' mentors for e-portfolio (n=40), 38 of them participated.

Context:

The e-portfolio committee at the FOM-SCU decided to replace the second-year medical students' traditional paper format portfolio with the new e-portfolio experience. This took place in the academic year 2021–2022.

Microsoft Teams and OneNote Class Notebook were used as a platform for the e-portfolio. FOM-SCU had an enterprise version of these applications for all its personnel, faculty, staff, and students. The portfolio template and sections were uploaded to the used platform. Each student had an account and access to their portfolio, where they uploaded and modified the e-portfolio evidence.

Two orientation and guidance videos about using the e-portfolio were created by the committee's coordinator and members; one was sent to the staff via email, and the second was uploaded on the Moodle platform for the students.

The students had been divided into 40 groups (teams); each group comprised roughly 11 to 13 students. For each group, a mentor was assigned. Each mentor had an account where he followed up on the progress of his group and gave feedback.

Data collection:

The data was collected using two questionnaires, one of which was designed to assess the perceptions of the students, while the other was designed to assess the mentors' perceptions. Both were designed to explore their perceptions of the e-portfolio orientation and guidance, practicality, usability, and importance. The questionnaires were developed and adopted from previously published studies^(6,10,11). Content validity was assessed using the Delphi method, which was started after choosing the facilitator and 10 subject area experts who were informed about the questionnaires. Then, the comments from the experts were analyzed in two phases until they reached a consensus.

The students' perceptions questionnaire consisted of 37 items, 32 of which were on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree," and 3 items with a 4-point response scale for rating the successfulness of the experience, level of guidance, and selection of the method for accessing the e-portfolio.

While the mentors' perceptions questionnaire is composed of 25 items, twenty items were on a 5-point Likert scale ranging from strongly agree to strongly disagree, and 3 items with a 4-point response scale on rating the successfulness of the experience, level of guidance, and selection of the method of accessing the e-portfolio.

In each questionnaire, two open-ended questions were provided to the students and mentors asking them about e-portfolio strengths and their suggestions for improvement.

The questionnaires were distributed online using Google Forms and took between 5 and 10 minutes to complete. They were available for three weeks at the end of the last semester of Year 2, and during this time, two emails were sent to students and mentors as a reminder.

Data Analysis:

Data analysis was performed using the statistical package for social science (SPSS version 26). Data was tested for normality. Appropriate tests were conducted, consequently, according to data normality. Data was presented either by tables or graphs. Regarding the open-ended questions, they were analyzed using the inductive approach of thematic analysis.

Ethical considerations:

Ethical approval was obtained from the Faculty of Medicine, Suez Canal University Research and Ethics Committee (REF No: 4621#). The participants were informed about the purpose of the study. Only those who agreed to be involved in the study were included. Participants' names are highly confidential. Any information the participants included in the questionnaires was treated with confidentiality.

Results:

A total of 494 second-year medical students in the academic year 2021-2022 responded to our questionnaire, with the predominance of females (52.6%). A total of 38 mentors responded to the mentors' questionnaire. Females were the predominant (89.5%) among mentors. Most of those mentors (39.5%) were assistant professors. Regarding specialty, the majority of the participants (68.4%) were academics.

The response rate of the students was 96.48%; meanwhile, the mentors' response rate was 95 %. The results are represented in three main headings: orientation and guidance about the e-portfolio, importance, usability, and practicality of the e-portfolio. The questionnaires showed high reliability, with Cronbach's alpha being 0.945 for the student questionnaire and 0.922 for the mentors' questionnaire.

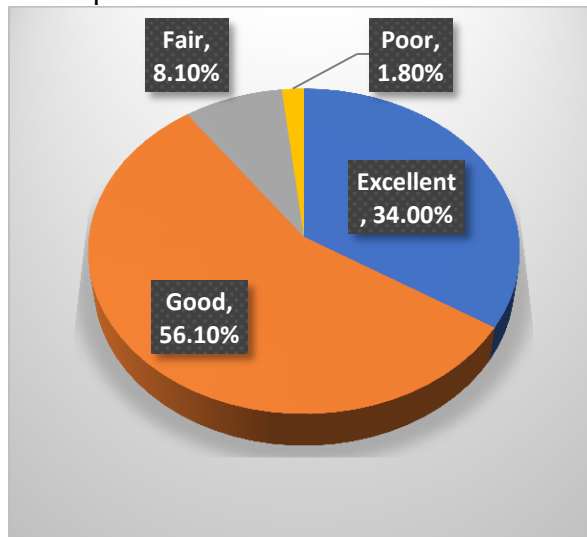


Figure 1. Students' perception of the guidance they received about the e-portfolio.

Orientation and guidance on the e-portfolio

About one third of students and mentors agreed that the guidance on dealing with e-portfolio was excellent, 34%, 29 % respectively. While nearly two-thirds (65.8%) of the mentors need more knowledge and guidance about dealing with e-portfolio, as shown in Figures 1&2.



Figure 2. Mentors' perception of the guidance they received about the e-portfolio

Usability of the e-portfolio

E-portfolio lets students learn anytime and anywhere, as reported by most of them (77.4%). Also, nearly half of them approved that the e-portfolio was easy and simple to use (46.7%).

Most mentors (81.5%) agreed that e-portfolio has been interesting to proceed with and user-friendly, and most of them (60.5%) stated that it facilitates and improves communication with the students anytime and anywhere. 44.1 % of students and the majority of mentors, 89.5%, reported that the usage of e-portfolio faced many challenges, such as technical issues and limited resources.

The highest percentage of students and mentors agreed and strongly agreed that e-

portfolios were more useful than the traditional format, at 79.6% and 76%, respectively, in terms of usability.

Importance and practicality of the e-Portfolio

Regarding the importance of e-portfolio as shown in Tables 1 & 2, most of the students (60.9%, 48.5%, and 76.5% respectively) asserted that e-portfolio increased their computer skills and gave them new ways of presenting their work using technology. Additionally, most of the mentors stated that e-portfolio minimize the workload and time consumption (76.3%).

Regarding the practicality of e-portfolio, 43.4% of the students asserted that e-portfolio was a time saver, and 43.9% of them agreed that it decreased their study burden.

The majority of the students agreed that frequent feedback was important for their progress (78.7%). Additionally, 65% of them

reported that they will continue using e-portfolio for their career development

Table 1: Students' perception of the importance of the e-portfolio.					
Statement	Strongly disagree	Disagree	Natural	Agree	Strongly agree
E-portfolio helps me to increase my computer skills.	95 (19.2)	37 (7.5)	123 (24.9)	190 (38.5)	49 (9.9)
E-portfolio enables me to learn communication skills through portfolio messages with colleagues and teachers.	13 (2.6)	53 (10.7)	127 (25.7)	204 (41.3)	97 (19.6)
E-portfolio made me collate my work for submission as part of the modules' assessment	3 (0.6)	19 (3.8)	111 (22.5)	251 (50.8)	110 (22.3)
E-portfolio improved my reflection skills on what I have learned during the module	10 (2)	24 (4.9)	115 (23.3)	237 (48)	108 (21.9)
E-portfolio helps me to improve my understanding of concepts and solve problems.	2 (0.4)	30 (6.1)	122 (24.7)	222 (44.9)	118 (23.9)
E-portfolio made me integrate and make connections between the things I have learned (whether in this module or other contexts)	3 (0.6)	25 (5.1)	129 (26.1)	237 (48)	100 (20.2)
E-portfolio helps me to be creative	3 (0.6)	37 (7.5)	124 (25.1)	213 (43.1)	117 (23.1)
E-portfolio helps me to be confident	7 (1.4)	38 (7.7)	123 (24.9)	229 (46.4)	93 (18.8)
E-portfolio helps me judge whether I have improved over time	5 (1)	17 (3.4)	127 (25.7)	235 (47.6)	106 (21.5)
E-portfolio forced me to be committed to due dates	5 (1)	10 (2)	94 (19)	240 (48.9)	145 (29.4)
E-portfolio helps me be better organized in my work	4 (0.8)	14 (2.8)	88 (17.8)	240 (48.6)	145 (29.4)
E-portfolio gives me new ways of presenting my work using technology	2 (0.4)	12 (2.4)	98 (19.8)	239 (48.4)	139 (28.1)
E-portfolio lets me upload a variety of file formats (PDF, video, audio, picture, document).	2 (0.4)	10 (2)	81 (16.4)	238 (48.2)	160 (32.4)
E-portfolio is useful for my personal development	5 (1)	24 (4.9)	124 (25.1)	224 (45.3)	116 (23.5)
E-portfolio characterized by sustainability (i.e., the ability to keep it even when you are done the course/program).	2 (0.4)	7 (1.4)	110 (22.3)	249 (50.4)	124 (25.1)

Table 2. Mentors' Perception of the importance of the e-portfolio.

Statement	Strongly disagree	Disagree	Natural	Agree	Strongly agree
The e-portfolio minimizes the mentors' workload.	1 (2.6)	4 (10.5)	4 (10.5)	13 (34.2)	16 (42.1)
The e-portfolio minimizes the mentors' time consumption.	2 (5.3)	3 (7.9)	4 (10.5)	13 (34.2)	16 (42.1)
The e-portfolio promotes student-centered learning.	0	2 (5.3)	10 (26.3)	15 (39.5)	11 (28.9)
The e-portfolio enhances reflective learning.	0	1 (2.6)	13 (34.2)	14 (36.8)	10 (26.3)
The e-portfolio improves the evaluation and monitoring of the students' performance.	0	2 (5.3)	10 (26.3)	16 (42.1)	10 (26.3)
The e-portfolio motivates and engages the students in their learning and lifelong education.	0	1 (2.6)	12 (31.6)	18 (47.4)	7 (18.4)
The e-portfolio improves mentors' computer and technological skills.	0	2 (5.3)	3 (7.9)	21 (55.3)	12 (31.6)
The e-portfolio helps students plan and organize their learning/education.	0	3 (7.9)	5 (13.2)	18 (47.4)	12 (31.6)
The e-portfolio provides the students with creative ways to present their work/tasks using technology.	0	1 (2.6)	4 (10.5)	21 (55.3)	12 (31.6)
The e-portfolio saves learning experience and challenging/rare cases.	0	4 (10.5)	8 (21.1)	18 (47.4)	8 (21.1)

Usefulness and satisfaction with the e-portfolio overall experience

More than half of the students (57.5%) had a very successful experience with e-portfolio, and nearly one-third (34.8%) of them had a

quite successful experience, as shown in Figure 3. In addition, 84.2% of mentors asserted their satisfaction regarding the new experience with the e-portfolio, as shown in Figure 4.

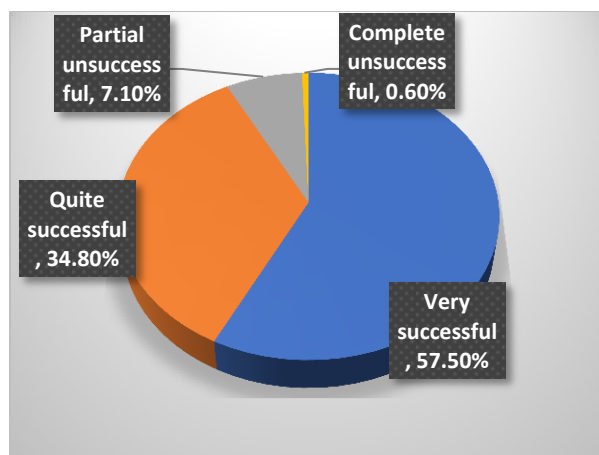


Figure 3. Overall satisfaction of the students with the e-portfolio

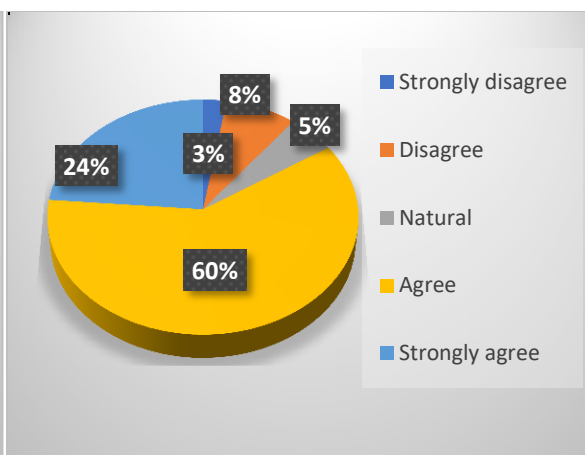


Figure 4. Overall satisfaction of the mentors with the e-portfolio

Thematic analysis of the open-ended questions:

The thematic analysis of open-ended questions added to the questionnaires revealed two themes: the strengths of e-portfolios and suggestions for e-portfolio improvement. Quotes were selected that represent the views expressed by a majority of participants.

Theme 1: Strengths of e-portfolio

The analyses of the students' and mentors' answers to the open-ended question about e-portfolio strengths are summarized under four subthemes: time management, usability and accessibility, communication, organization, and sustainability.

Most students reported that the e-portfolio saved time, managed time, and was a fast tool. Some of them mentioned that it can be used anytime, is available anywhere, and can be accessed anytime. Others stated that it allowed easy communication with mentors and improved their various skills. Some students agreed that the e-portfolio was organized and helped them organize their tasks.

The majority of mentors reported that timesaving and less time-consuming were the points of strength of the e-portfolio. Also,

most of them stated that e-portfolios were easily accessible, easy to evaluate, saved effort, and cost-effective. Others mentioned that it improved their skills, including communication and computer skills, between the students and them.

Theme 2: Students' and mentors' suggestions for e-portfolio improvement

The analyses of the students' and mentors' answers to suggestions for e-portfolio improvement are summarized under four subthemes: technical support, guidance, organization, and generalization.

The suggestions of most of the students were about solving technical problems and improving systems. Providing more information about the e-portfolio and improving its guidance were reported by a few of them.

Others reported that applying the e-portfolio to all students is one of the most important improvement suggestions.

Most mentors suggested solving technical problems, as well as reporting about their need to increase the number and frequency of training workshops and guidance, in addition to their need for hands-on workshops.

Most of the mentors suggested applying e-portfolio to all the students' academic years in the faculty, and some of them stated that increasing the number of mentors would improve the e-portfolio, while a small number of them suggested improving the e-portfolio format and organization.

Discussion:

E-portfolio is a digital adaptation of the traditional paper portfolio ⁽¹²⁾. In this study, we explored the perceptions of both students and mentors of e-portfolio as a step for improving the e-portfolio implementation among the undergraduate medical students in FOM-SCU.

The application of e-portfolio as a new experience in the (FOM-SCU) came post-COVID-19 pandemic, which generally induced online learning all over the world and in Egypt in particular. It was a big moment of online learning, and medical education was revamped in response to the Coronavirus ⁽¹³⁾. Also, Wasfy et al. (2020) study asserted that a rapid shift to remote learning happened worldwide with the COVID-19 strike ⁽¹⁴⁾. This transition had a role in the preparation of the students for online learning; for this reason, most of the students who participated in this study reported that e-portfolio usage is easy and simple. This wasn't in agreement with previous studies ^(8,11), which showed that e-portfolio usage was problematic, which may be due to the lack of experience regarding online learning at the time of introducing e-portfolio to them. Additionally, these studies used different e-portfolio platforms rather than Microsoft Teams.

E-portfolio adoption in educational programs acknowledged the need for user orientation, guidance, and training to be introduced ⁽¹⁵⁾. In this study, most of the students agreed that the guidance level they received ranged from good to excellent.

It was the first time that second-year medical students were exposed to the e-portfolio and used it through the Microsoft Teams platform after their usage of the portfolio in its traditional paper format in the first year of the faculty. So, about two-thirds of them reported that they should have good computer skills to proceed with the e-portfolio to be able to upload & present their work in different formats. Also, students reported that using a portfolio in its electronic format enhances their computer and communication skills. Other studies supported that students should have good computer skills as a strong requirement for using e-portfolio ^(11,16).

The majority of the students stated that the e-portfolio was user-friendly and could be accessed anytime and anywhere, owing to the digital and electronic format. These results are in agreement with Malmir et al.'s (2016) study, whose students stated that e-portfolios made them free to learn the educational material at any time they desired ⁽¹⁷⁾.

Mentors reported that e-portfolio facilitates the follow-up of the students' progress as it is suitable and easier to access anytime and anywhere, saving the time and effort of the mentors. Also, it can be processed electronically without the need to arrange face-to-face meetings between mentors and students. In addition to facilitating the assessment process, it has storage and collective criteria. This is supported by a previous study in FOM-SCU, where the staff reported that the paper format portfolio was exhausting due to excessive workload and time consumption ⁽⁵⁾.

"E-portfolio made me a better learner", was the status that most of the students in this study agreed about, as e-portfolio provided those students with computer skills, enhanced their communication skills, made

them more organized, and integrated new technologies in their learning, which motivated them in addition to the enhancement of their reflective skills and professional development. Accordingly, most of them stated that they became more confident due to e-portfolio usage, which was supported by the study of Rodriguez et al. (2022), whose students asserted that the e-portfolio played a role in encouraging them to be better, more autonomous, and more responsible learners ⁽¹⁸⁾. Additionally, two-thirds of the students and the majority of mentors agreed that e-portfolio cultivates students' creativity by providing the students with multiple tools to help them be more creative. Also, other study results concluded that the early introduction of e-portfolio improved the students' learning ⁽⁶⁾.

Most students faced technical issues that limited their usage and their progress with e-portfolio, which may be explained by its requirements for a good internet connection, which is lacking, especially at the student dorms, as many of the FOM-SCU students are expatriates living in the students' dorms. Technical issues and limitations are also reported in other studies ^(4,6,11).

In the current study, most of the students and mentors accept and support the shifting of the portfolio from the traditional paper format to the electronic format. Generally, it is the era that induces electronic shifting and virtual replacement in education ⁽¹⁴⁾. Also, an e-portfolio has more advantages than a traditional one, such as easy, anytime, anywhere access. It also fosters mentor-student communication and enables the students to review and restore their work so that it is easy to pick up anytime.

Mentors suggested adding hands-on training and support, in addition to the online guidance videos, as supported by the Avila et al. (2016) study. Their results concluded that

the implementation of WordPress (e-portfolio) should be accompanied by introductory courses in the use of the software and its apps to facilitate usability ⁽¹⁹⁾. Additionally, they suggested addressing the technical issues related to the e-portfolio and its platform (Microsoft Teams) by providing the faculty with reliable internet. Additionally, mentors suggested applying the e-portfolio to all the students in the faculty, as this will improve the ability to use it and increase the e-portfolio orientation level among the students and mentors. Finally, they need to increase the number of e-portfolio mentors to improve the students' performance and evaluation.

Conclusion:

The conclusion of this study stated the positive perceptions of the students and mentors towards the new e-portfolio experience, with some areas that need to be enhanced in the future, such as guidance, training, and continuous technical support, which need to be more frequent. This new experience elaborates that the e-portfolio is considered an easy and simple tool that improves various skills for both students and mentors.

This study recommends applying the new e-portfolio experience to all academic years in FOM-SCU. Also, conducting orientation sessions and organizing frequent hands-on training workshops for the mentors and students about the innovative and technological methods in medical education, especially e-portfolio. Finally, further studies are recommended to explore the benefits of shifting to an e-portfolio using qualitative data analysis.

This study is the first to assess the perception of FOM-SCU students and mentors regarding a new experience of e-portfolio implementation. Additionally, it is considered

to be one of the few studies that explicitly assessed the perception of mentors towards e-portfolio. But it has some limitations as the e-portfolio was applied only to the FOM-SCU 2nd year students, and the study assessed their perception, which might limit the generalizability of the findings.

Acknowledgements:

We thank the Vice-Dean for Education and Student Affairs and the portfolio committee at the Faculty of Medicine, Suez Canal University, who significantly facilitated the accomplishment of this study.

Competing Interests:

Authors have declared that no competing interests exist.

Authors' Contributions:

Mai Mahmoud had made substantial contributions to the acquisition, analysis, and interpretation of data. She has drafted the work and made substantive revisions to it. Nourhan F. Wasfy and Sally Fouad made substantial contributions to the acquisition, analysis, and interpretation of data. Nahla Hassan managed the analyses of the study. All authors read and approved the final manuscript.

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