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Students learning about research through the process of publishing academic papers in Qatar

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ABSTRACT

This study investigates undergraduate students' experiences working with a mentor to understand research through the process of publishing scholarly manuscripts. The study is based on a 10-week educational program. Two undergraduate students were integrated into an educational mentoring process to identify and evaluate the research of various scientific manuscripts, such as literature reviews, research questions, hypotheses, and methods. The undergraduate students were exposed to the processes behind the review, research and production of manuscripts. They also worked with their mentors to review a manuscript, an activity that engaged them in the process of editorial work through the manuscript management system. The students then drew concept maps of the publishing process, pre- and post-session. These maps presented evidence of students' knowledge of the complex interactions of the players and issues in the publishing process. The students evaluated the mentoring process and demonstrated their satisfaction with the strength of the program. As a qualitative study and as a result of the study program, a blueprint of an undergraduate course in scholarly publishing was developed, and is presented in the paper.

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BACKGROUND

Mentoring students on research activities through scholarly publication has historically been considered a worthwhile endeavor, particularly with respect to the process of scholarly publication. Among academics, published scholarship has become the standard by which academic output is measured. Although scholarly outputs in the form of publications have not traditionally been expected of graduate students,¹ in recent years, students in higher education—particularly graduate students—are frequently required to publish their theses or dissertations to earn their academic degrees.¹

Publishing is viewed as the process by which students become scholars and scientists; it qualifies them to enter the academic world.^{2,3,4} Many graduate students feel that this can be accomplished through the providence of the appropriate academic mentoring.^{5,6} However, in many parts of the world, “few opportunities are available for students to learn about the scientific publishing process. Even fewer opportunities are available for students to learn first-hand how to publish or to participate in a scientific publication”.⁷ In these contexts, undergraduate research is rarely disseminated and is only made available to evaluators; publishing is not embedded in their overall educational and research experiences.⁸ However, initiatives such as the Boyer Commission,⁹ cited by Fechheimer, Webber, and Kleiber,¹⁰ have re-conceptualized the idea of scholarship and suggested linking research to the dissemination process. More recently, other projects—including the Undergraduate Research Experience Program (UREP) in Qatar—have promoted the active establishment of publishing within the context of undergraduate curricular activities.

It has been suggested that research and scholarly skills can be learned at colleges and universities under the guidance of specialized mentors. In these environments, students can learn to develop a literature review, understand the structure of a scientific paper, and become familiar with the publication process.^{11,12} Thus, the current study explores the mentee and mentor experiences of faculty members and two undergraduate students in a public university in Qatar.

Mentoring takes place when one who has expert knowledge provides that knowledge and those skills to individuals with less experience.¹³ A mentor adopts the roles of a guide, coach, counselor, peer advisor, and/or sponsor.¹⁴ Successful mentoring in higher education results in greater appreciation for and satisfaction with the overall higher education experience, which leads, in turn, to higher levels of student retention and graduation.¹⁵ Mentoring relationships provide students with knowledge, skills, a greater interest in science and “further study,” and letters of recommendation to graduate schools.^{16,17,18,19,20,21,22} In addition, mentoring improves academic achievement;^{23,24,25} raises competence, self-confidence and optimism; provides opportunities for learning; and increases the participants’ sense of cooperation, helpfulness, and responsibility.^{26,27} Mentoring also has its challenges, including increased frustration, scheduling challenges, and increased time, and effort.^{28,29,27} The significant impact of mentoring can be observed when the mentees have little knowledge of the subject at hand. The authors of this study believed that the mentees would learn a great deal from their mentors.

Undergraduate research through mentoring has been funded by national grants and supported by public and private agencies in the US and is being integrated into the overall undergraduate student experience.³⁰ These initiatives offer rare opportunities for mentor-mentee apprenticeships, with the majority of these opportunities offered in engineering and the sciences. There are few comparable programs in the social sciences, and little instruction is available on research throughout the undergraduate research experience.^{6,31} It is believed that providing university students with early exposure to the publishing and research processes carries over into graduate students’ work, enhancing their ability to communicate, share ideas, read other people’s ideas, and understand what others are doing through intellectual interactions and collaborations in scientific endeavors in their fields.^{32,33,34} It is also thought to lead undergraduates to become independent researchers²⁷ and critical thinkers and motivates them to pursue scholarly activity,³⁵ which helps them successfully complete their tertiary and further education, and improves their employment outlook, including increased preparedness for science-related careers or postgraduate studies³⁶ and increased admission to graduate school, higher levels of persistence and graduation rates, and a greater likelihood of getting jobs, promotions and salary increases in the professional world.^{37,38} Additionally, mentoring has helped students to forge careers in academia, improved their levels of personal satisfaction,^{39,40} and deepened their understanding of research and the scientific process.^{41,42} Other reported gains of undergraduate research experiences includes students “becoming scientists”⁴³ as this provides them diverse learning environments,⁴⁴ enhanced hands-on opportunities, and enthusiasm for the subject matter.⁴⁵

Furthermore, mentoring students on scholarly activities has enabled them to conduct literature searches; locate and schematize main ideas from manuscripts; dissect research questions, hypotheses, and methods; note and record quotations; organize their writing; and categorize, evaluate, design, analyze, and discuss the implications of research.⁵ Another reported benefit of mentoring relevant to this study is that it can empower female students by providing them with “knowledge, resources, and support to ensure academic success, a satisfying university experience, and assistance with future life”.⁴⁶

While drawing on the positive aspects of mentoring research skills, several researchers have challenged such practices, arguing that the learning outcomes of undergraduate education are incompatible with those of research.^{47,48} Given these challenges, initiatives in the development of scholars and scholarship among students at Western colleges has been numerous.⁴⁹ In many North American-style accredited universities, stress has been placed on scholarly productivity for faculty promotion and retention.^{50,51} Thus, involving students in publishing scientific research to teach them to understand the process of publishing, how a scientific paper is structured, the roles of editors and reviewers, and the processes required to publish scientific manuscripts draws students much closer to the academic world.⁵

A body of literature has addressed the impediments to publishing experienced by students.⁵² A greater impetus toward and interest in involving students in research through programs and infrastructures such as conferences and the development of student journals, has been established in the Quarterly Journal of the Council on Undergraduate Research. A number of universities have in kind provided opportunities for students to publish their work in student-based academic journals.⁸ While no study has emerged from the Middle East discussing the ways that teaching on publishing can impact students’ understanding of scholarship and, in particular, the teaching of scholarship, scholarship on the teaching of scholarly publishing is scarce. Brown and Utting⁵³ have described how some universities have offered their computer science majors courses on the hidden components of publishing, such as standards, text handling, page descriptions, and the other technical components of publishing. Other researchers, such as Raffa,⁷ have developed semester-long courses on the development of scholarly papers. However, few studies have addressed or illuminated the work of editors in the review of scientific scholarly manuscripts as a teaching activity and in the process of learning about research. Thus, this paper will be the first such study in the Middle East to shed light on the need for initiatives to mentor students in higher education in the process of scientific publishing and research in Qatar and the Middle East in general.

CONTEXT OF RESEARCH

This study was carried out at an institution of higher education in one of the wealthiest countries in the world, Qatar.⁵⁴ The leadership of Qatar has argued that the oil and gas basis of that country’s wealth is finite⁵⁵ and that the countries of the Gulf Cooperation Council countries must invest in a knowledge-based economy⁵⁶ for sustainable growth. Educational reform is, therefore, recognized as central to the new economy⁵⁷ to make Qatar a strong, credible participant in global economic, political, cultural, and social debates. Therefore, research is viewed as a vehicle for modernizing Qatar’s infrastructure and supporting the cultural development of the Qatari people.

A significant research initiative has positioned Qatar to build a research base for the sustainable development of a knowledge-based society. The state of Qatar has invested 2.8 percent of its gross domestic product in research, placing Qatar’s investment in research among the top 10 countries in the world.⁵⁸ Tremendous expenditure has been made in the development of a bio-medical research infrastructure, supporting research and establishing partnerships with the Hamad Medical Corporation (HMC) (a publicly funded medical service), the National Ministry of Health, Sidra Medical and Research Center (a private/public initiative for medical services, and research & development), the Qatar Science and Technology Park (QSTP), and Weill Medical College of Cornell University.^{58,59} Another important development has been initiated by Qatar’s leadership through the large endowment⁵⁵ of the Qatar National Research Fund (QNRF), which has adopted familiar Western science-style policies for competitive grant funding based on external (United States and European reviewers) peer review and support and funding for partnerships with international universities, especially those in the United States and Europe.⁶⁰

UNDERGRADUATE RESEARCH EXPERIENCE IN QATAR

The Undergraduate Research Experience Program (UREP) was established by the Qatar National Research Fund (QNRF) to serve undergraduate students in all universities in Qatar. The UREP's primary program and activities are highlighted on their web page (http://www.qnrf.org/funding_programs/urep/). They promote "learning by doing" and "hands-on" mentorship activities as effective methods of undergraduate education. In its programs, students work with academic faculty on research following the mentor (faculty) mentee (student) model found in tier-one universities in the United States.^{61,31} In addition to providing a research-based education, the UREP offers students experience with team-based research collaborations with faculty, postdoctoral fellows, graduate students, and other undergraduates or research staff in Qatar. The institutionalized initiatives of the UREP within higher education institutions in Qatar are unprecedented in the Middle East in terms of their promotion of student engagement. To establish student participation in a research group, faculty members and students in institutions of higher education in Qatar work together on a proposal detailing their research plan and the role of the undergraduate researcher and summarizing the anticipated benefit of the project toward creating a research culture in Qatar. The mentor-mentee relationship comprises one faculty mentor per a maximum of three students, but a research project may also include more than one faculty member and more than three students. This program encourages and maximizes faculty-student interactions and involves students in faculty members' scholarly and professional activities. It is thought that these interactions between faculty mentors and undergraduate mentees enhance the students' understanding of the research and scientific processes while fostering the mentoring relationship.^{62,42}

MENTORING PROGRAM

The research experience of the mentees took place through 10 sessions that focused on the principles and knowledge of scholarly writing and publishing. The researchers organized the mentoring program prior to initiating the mentoring relationships. During the program, one of the researchers asked the mentees unstructured questions, and the mentor intervened, explained or explored an idea or perspective. The themes for each session included the following:

1. Organizational approach of the sessions (exercise: concept maps);
2. What constitutes a scholarly manuscript;
3. The quality of a scientific research paper;
4. Publishing models;
5. What constitutes a journal and its scope
6. Preliminary assessment of an article with a journal editor and the criteria scientific manuscripts should fulfill;
7. The production process post-acceptance and the role of publishers;
8. Management of manuscripts from submission to production via a manuscript management system;
9. The review process of a manuscript;
10. Resubmission of revised manuscripts and the re-review of revisions;
11. Mentee identification of research questions, literature reviews, different types of research methodologies, selection of reviewers, and the initiation of a manuscript review.

STUDY AIMS

The paper investigated the experiences of two undergraduate students being mentored on scholarly practice. The main activity revolved around the review of a scholarly paper. The aim of this study was to demonstrate to students the research process through the publication of scholarly manuscripts. The mentees were introduced to the world of publishing through dissecting scholarly papers, identifying and evaluating research literature, research questions, hypotheses, and methods. The mentees were also exposed to the mechanics of publishing from the stage at which a manuscript is received by a journal editor through to its final production. The process was explored with an online editorial management system (Editorial Manager[®]) courtesy of Aries Systems Corporation. The study described in this paper engaged the mentees in the work performed by journal editors and helped demonstrate the components of the production of a scientific research paper.

METHODOLOGY

Sample

Students in the College of Education at Qatar University were informed of the study by faculty members in class and were invited to participate. Two students came forward and expressed their interest in being a part of the study. The College of Education enrolls only women into its programs and therefore both participants were female. One student was 20 years of age and a sophomore; the other was 22 years of age and a senior. The mentees were considered good representatives of typical female students in Qatar University: conservative, traditional, and living at home with parents.

Research methods

A case study approach was chosen to explore the interactions between the mentors and the mentees. This method was deemed suitable as it could involve the gathering of a combination of qualitative and quantitative data that allowed for a thorough understanding of a case.

As McLeod⁶³ suggests, “the case study offers getting closer to the ‘whole’ case in a way that a single-method study could never do.” According to Peck and Dolch,⁶⁴ the case-study approach allows individuals to contextualize person-centered issues, revealing whatever is real, relevant, and significant to their experiences. This study approach also allows for “naturalistic generalization”,⁶⁵ making assertions based on the observations and personal engagement of the mentor and the mentee.

At the heart of the case study approach is the ability to collect a range of data allowing for in-depth observations concerning beliefs, structure, and change, i.e., process. It was necessary to make naturalistic observations that would illuminate the students’ understanding. The mentor also observed intra-subject understanding, which generated a detailed case description and case-based themes.⁶⁶

The two student mentees’ experiences in the process would reveal what they had learned⁶⁷ and demonstrate the impact of this newly conceptualized approach to teaching about research through scholarly publishing.

Three types of data gathering methods were used to collect information from the mentees.⁶⁸ Interviews were conducted over ten sessions, concept maps were drawn by mentees pre- and post-program and a questionnaire was administered for mentees to evaluate the program.

Interviews

At each session, the mentors conducted phenomenological interviews.⁶⁹ The mentor presented a question, registered the answer, and provided feedback, guidance, and explanation as needed.

The case-study interviews examined the participants’ thoughts, beliefs, and scientific knowledge. This approach permitted participatory knowledge claims, narratives, and open-ended interviews. It also helped the researchers examine issues related to the students’ knowledge perception. The researchers attempted to collect information through a narrative approach where mentees were interviewed at some length and described experiences of what they knew and what they learned.⁷⁰

In the process of interviewing, the mentor made note of the sessions’ contextual realities and also noted the possible differences between mentees views, perceptions, and general knowledge in the area.

Concept maps

Concept maps were developed more than three decades ago to assess the organization of learning, which taps into the cognitive structures and understanding of specific educational concepts.⁷¹ The concept map is a visual representation of one’s own knowledge. It can take the form of a drawing or diagram that represents a connection between one’s knowledge of the content and one’s prior knowledge. The appearance of concept maps are like pictographs linked by arrows and words depicting relationships and connecting issues or concepts.⁷² They have been useful in viewing developments or changes in conceptual structures,^{73,74} to assess content and knowledge,^{75,76} and as an instructional tool.^{77,78} In addition, concept maps have been used to assess students’ cognitive structures and their representations of complex schema.⁷⁹

Concept maps were used to uncover the difference in students’ knowledge of academic publishing pre- and post-program. The mentees were instructed on how to create a concept map using the Inspiration Software and were then asked to map out the process of publishing scientific research papers.

Questionnaires

Ehrich et al.'s²⁹ review of the literature on mentoring and mentees in education synthesized the specific strengths and challenges of the mentor-mentee relationship. The strengths included collegiality, understanding, encouragement, openness, satisfaction, and constructive feedback. The challenges included mentees' observations that their mentors had little time or were out of touch with reality, participants' incomplete understanding of program goals, and mentees' experience of mentoring as an extra burden that was difficult to manage.

The items addressing the above specific strengths and challenges were adapted into a Likert questionnaire and presented to mentees for their reflection. The items on the questionnaire are presented in Table 1; a Likert scale from 1 = "very low" to 5 = "very high" was provided for their responses. The questionnaire was distributed at the end of the 10 sessions by administrative staff members to avoid bias in the mentees' responses.⁸⁰ Before they were administered to the mentees, the items were randomly ordered to avoid clustering among the challenge items and the strength items. Table 1 presents the items, as derived from Ehrich et al.²⁹.

Table 1. Elements of the mentee-mentor process.

There was a sense of collegiality, and collaboration with faculty members
The mentor showed understanding to our needs
The mentor showed encouragement, and friendship
The mentor discussed issues openly
The mentor shared important ideas with us
I am personally satisfied with the mentoring experience
The mentor provides constructive feedback
I am personally satisfied with the mentoring process
I felt the mentor had a little time for us
There were no time to meet
Mentor was out of touch with our reality
We had little understanding of the program goals
We felt that there was always that extra burden
It was always hard to meet
The program was an extra responsibility

The mentees were referred to as Nisyam and Madiam; these are pseudonyms used to conceal their identities.

RESULTS

Interviews

One mentor worked with the two mentees on a one-to-one basis. In the first two sessions, the mentor presented the operational aspects of the program to the mentees.

First and second sessions

The mentor asked the mentees questions about what constituted a scientific paper. The mentees' responses were recorded, and the key elements are presented below:

Madiam: A scientific paper is usually submitted with a presentation. A paper has a hypothesis, tables, and results. Studies usually also have important social implications.

Madiam: A scientific paper must address a hypothesis; the authors provide the evidence to refute or accept the hypothesis.

Nisyam: A scientific paper informs others about one's ideas. A research paper solves a problem and provides a recommendation to improve or evaluate a situation.

Mentor: So a paper must have a problem statement and must address research questions or a hypothesis?

Nisyam: Yes, a research paper must define the problem, plan to solve the problem, and present evidence of what happens.

The mentor referred to Klingner, Scanlon, Pressley,⁸¹ noting that a scientific manuscript should clearly articulate a research question derived from a theoretical framework, leading to a well-elaborated and detailed study design, an explanation of the sampling techniques, and analyses of the data with the

associated discussions. At the end of the two sessions, the mentees were provided with documentation from research articles or examples that supplemented the mentor's demonstrations.

Third and fourth sessions

In the third and fourth sessions, the mentor steered the discussion toward addressing the question of who judges the appropriateness of scientific research papers. The intention was to draw mentees toward the concept of peer review.⁸² The following discussion ensued:

Mentor: Who determines whether there is a problem or hypothesis and evidence that can refute or verify that hypothesis?

Madiam: It goes between a group of people who discuss the paper to see whether the substance and form, i.e., presentation, reflects a research paper.

Nisyam: The editor receives the paper and asks for help from the reviewers. The reviewers generally review the paper and send it back to the editor. The editors, of course, must have knowledge of the research topic.

Mentor: Are there different levels of editors? Is there a difference between editor-in-chief and an editor?

Madiam: The editor makes the recommendation to publish. The editor is the leader and decision maker regarding whether he or she transmits the editors' comments to the authors and asks for revisions to be made before publishing.

The mentees believed that once a journal article was sent for review, the editor was the one to judge whether it would be accepted or not. According to Hyman,⁸³ the editor has a multitude of tasks to manage and generally consults reviewers and critically examines his own review, addressing the changes to decide whether to accept or reject a scientific research paper for publication.

The mentor explained that peer review is a complex process, involving the editor, reviewers, authors, and that the space in which reviews and re-reviews take place is loosely organized. Generally, inquiry is negotiated, which is the basis of the way research is socially situated: self-dialogue may create bias in the way the reviewers judge the submitted work. The reviewers and the editor must have a strong understanding of the journal's scope and "culture."

Fifth session

In the fifth session, the mentor and mentees discussed electronic publishing models and what open access meant. Neither mentee had any knowledge of what open access was or how "prepaid" models⁸⁴ worked. Madiam believed that open access referred to articles that had been uploaded to the Internet, leading to a greater level of plagiarism and opportunities for others to abuse the work over the World Wide Web. The mentor addressed the mentees' concerns about how the "prepaid" model is different from the "post-paid" model and the possibility that addressing plagiarism in the open access model could be easier than with restricted models.

The mentor added that pre-paid publishing models, in which authors bears the cost, are a popular mode of publishing because they offer open access to the public and are more likely to be read than closed access, pay-per-view journals. Many institutions are currently supporting such models by providing grant money through university funds and grants that help faculty with publication fees. Furthermore, many institutions of higher education now support the establishment of journals through grants and awards. According to Suber,⁸⁴ institutions worldwide have dedicated funds to bear the publication fees of pay-to-publish, which has supported significant initiatives in open-access databases and journals.

Sixth session

In the sixth session, the mentees and mentor discussed the impact of academic journals. The two mentees were not aware of the measure of a journal's impact, nor were they aware of journal citation metrics. It was explained that citation metrics make the most of the online publishing environment through their electronic intensity.⁸⁵ Exclusively electronic publications have taken shape; since the 1990s, they have received a greater audience than print materials. Electronic materials are more likely to be downloaded and cited, giving them a higher impact than journals published in hard copy.⁸⁶ The mentor revealed the massive scope of the online repositories of journals to the mentees, citing Suber⁸⁴:

"A total of 893 [repositories in ScientificCommons.org], the Registry of Open Access Repositories, 968, and OpenDOAR, 1,017. On the journal side, the Directory of Open Access Journals reached the milestone of 3,000 titles, and SHERPA's RoMEO database documented more than 300 publisher policies on self-archiving, more than doubling the number of entries since last year." (<http://dx.doi.org/10.3998/33.36451.0011.110>)

Both Madiam and Nisyam inquired as to why many Arab journals have not moved into the open-access model or even onto the Internet. Nisyam in particular asked why Arab journals have traditionally come from university departments and colleges and have little coverage on the international scene. She said that she had rarely accessed research papers through the library database or found articles through the various search engines or major English indexing utilities. The mentor explained that many Arab journals have not undertaken the indexing operation which requires certain qualifiers, such as an abstract, references, keywords, authors' names and titles, as well as Digital Object Identifier (DOI) numbers. All these qualifications would have to be in the English language. Coupled with the restrictions of the indexing organizations, such as the Institute of Scientific Information (ISI), Arab and Middle Eastern scholars have trouble gaining access to the established English language journals.⁸⁷

It was therefore apparent to the mentees that a limited amount of Middle Eastern and Arab researchers are exposed to the world. Both mentees realized that Arab journals needed to utilize information technology to address the global changes in the world of publishing. While many university libraries have cultivated electronic sources,⁸⁸ many Arab journals have not kept up with the current changes taking shape, especially regarding open access initiatives. Madiam believed that a new model of peer review and publishing would emerge in the Arab world to make publishing much faster with what she called "surface mail peer review."

The mentor explained that some initiatives exist in the Arab world that are taking different forms, such as the recent indexing of Arab journals carried out by Edusearch, an educational information portal covering a large number of scientific and educational journals issued in Arabic. Likewise, AskZad, an Egypt-based organization, has "a series of databases for Arabic language materials: Pan-Arab News Index (PANI), Pan-Arab Newspapers (PAN) (AskZad Full-Page newspapers), Pan-Arab E-books (PAEB), Pan-Arab Journals Index (PAJI), Pan-Arab Academic Journals (PAAJ), Pan-Arab Dissertations (PAD), Pan-Arab Peer Review Articles (PAPRA), and Pan-Arab Conference Proceedings (PACP)" (http://www.qu.u.qa/library/e_resources/items.php?type=cat&id=5) repository. Another example is Shamaa, a network/database of educational studies in the Arab world developed by the Lebanese Association of Educational Studies. In addition, Elsevier Publishing is now seeking Arab journals within its large journal portfolio, translating their abstracts into English, providing a DOI number, and indexing the journals (<http://www.info.sciverse.com/sciencedirect/content/journals>). With these new initiatives, publishing houses have made use of electronic publishing. More recently, the establishment of Qscience in Qatar, an organization within the Qatar Foundation, demonstrates a vision of being the largest open-access repository in the Middle East based on open access academic journals. Along with individual university archive programs, these initiatives are shifting formerly print-based materials to the electronic medium. Neither of the mentees was aware of the mechanics of indexing and its function in search engines. The mentees were shown how to access some of the databases. They were asked to search for specific literature related to a manuscript that they were reviewing.

Seventh Session

In the seventh session, the mentor encouraged the mentees to reflect on the role of peer review, asking them what it takes to be a peer reviewer. Madiam said that peer review generally means that

"A peer reviewer is able to understand the problem, is familiar enough with the topic to identify the research literature, and is able to actually review the literature to understand what is in the manuscript."

Nisyam added:

"The peer reviewer is also able to comprehend the theories, recognize the proposed theories and premises, and address whether the established information about the problem is in line with the research questions."

Both Madiam and Nisyam provided the hierarchy of the work, tasks and decisions and generally understood the reviewer's role in relation to the editor. Both the mentor and the mentees explored the

reviewer's tasks and the handling of reviews. Neither mentee believed that a manuscript could go through more than one review to bring it to a "publishable level." Nor were they aware of the role of the copy editor and the fact that editors generally go through a number of additional reviews to clean up the paper's language and organizational structure. Both mentees missed an important activity of the peer reviewers' task, namely, their responsibility to address the empirical, methodological aspects of the research and the appropriateness of the methodology and research design. Both mentees were familiar only with the conceptual ideas they studied in their research methods course, a general requirement at the university that stressed the development of surveys and experiments without the necessary application of these methods or the development of a comprehensive research project (see Jiang & Roberts⁸⁹).

Eighth Session

In the eighth session, the mentees inquired about the post-acceptance status of the scientific manuscript, addressing the process through which the manuscript is published. The mentees had little knowledge about the final publishing process. They inquired about electronic publishing and whether manuscripts published in this model can be protected from plagiarism. Both mentees were provided with Litman's text⁹⁰ to help them understand the "business" of copyright.

The mentor then probed the mentees about their understanding of the tasks that evolved between the acceptance and publication of a manuscript. The mentor asked, "So, what happens after the acceptance?" The mentees said that the manuscript is published. They expressed little knowledge of the editorial processes of copyediting, typesetting, indexing, providing a DOI, and cross-referencing a manuscript.⁹¹ All these components were explained to the students. The mentor then spoke about copyright and the idea of manuscript ownership. The mentor explained the difference between ownership of the product, i.e., the manuscript, and ownership of the ideas conveyed in scientific research. Both Madiam and Nisyam believed that a manuscript and its ideas were exclusively owned by the author. The mentor showed the mentees a journal's copyright release form to underscore the existence of an agreement between the publisher and the author and to show how manuscripts become appropriated.

Ninth Session

At that point, the mentees simulated the roles of the editor and reviewer. One of the mentees adopted the role of the editor, and the other took the role of the reviewer. Both mentees were trained to use the manuscript management system. The mentor, also the editor-in-chief of the Near and Middle Eastern Journal of Research in Education, uploaded a dummy manuscript and assigned Nisyam as its editor. She vetted the manuscript submitted through the manuscript system for review to Madiam. Once Madiam reviewed the manuscript, she was able to submit the manuscript back to the editor, i.e., Nisyam. As an editor, Nisyam was then able to write a reflection based on the reviews and submit it.

Tenth Session

In the final session, both mentees explained how they had reviewed the paper by addressing whether the paper contained systematic and useful information. The mentees were asked to go through the literature cited in the manuscript; read about the theories; provide appropriate evidence of the findings, and draw the correct conclusions when analyzing and interpreting the information. Both mentees also addressed the language issues and significance of the manuscript. The manuscript was submitted back to the mentor (playing the role of the author), who asked the mentee, i.e., the editor, to produce the appropriate review. As reviewers, the mentees rejected the dummy manuscript.

CONCEPT MAP FINDINGS

The initial concept maps were produced by the mentees prior to mentoring. These concept maps are presented in [Figure 1](#). The results of the first concept maps expressed a novice's perspective on academic publishing. Nisyam's six concepts were linked without identifying the relationships between them. In addition, these concepts did not present an in-depth understanding in that they lacked multi-hierarchies. McClure, Sonak and Suen⁷⁶ described a scoring scheme by which concept maps could be awarded points corresponding to the number of hierarchies and propositions, i.e., two concepts linked by an arrow from one hierarchical level to another and by the number of cross-links. Madiam provided three very basic concepts and attempted to depict the relationships between the

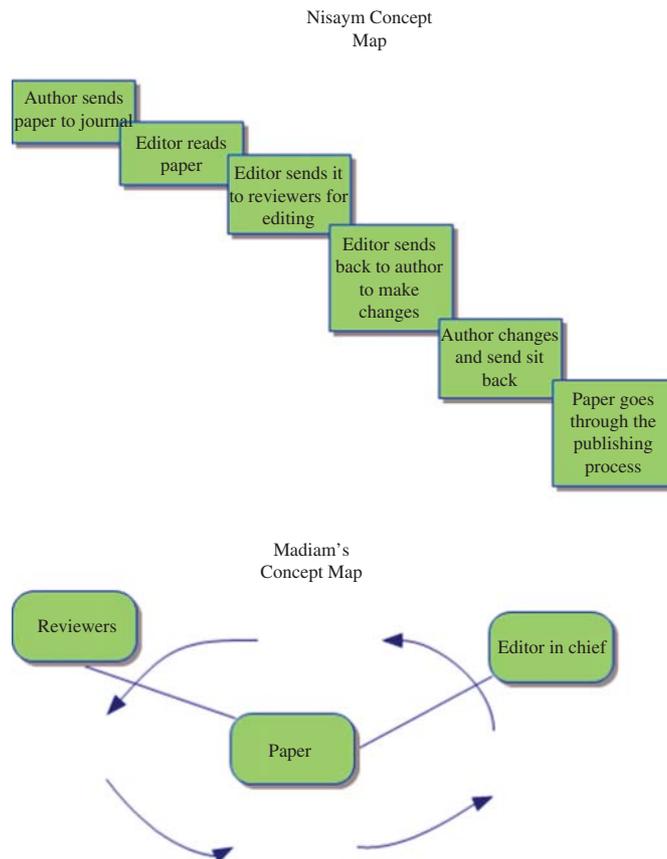


Figure 1. Concept maps drawn by mentees prior to the intervention.

concepts by drawing a cyclical relation between only two of the three concept maps, which included one cross link (see Figure 1). Nisaym presented a decomposition linking super-ordinate concepts to subordinate concepts in a “descending approach,” noting the linear development of publishing, submission, vetting, review, and resubmission. Madiam viewed publishing as a continuous and circular exercise between the author, editor, and reviewer. The two concept maps showed little integration in their map structures and covered a limited number of concepts, relations, and cross links.

After the 10 mentoring sessions, the mentees were asked to develop a second concept map. Post-session, both mentees developed somewhat more elaborate concept maps (see Figure 2). Nisaym drew a complex concept map of the publishing process by including a multilayer picture with cross-linkages between layers of concepts. She presented a fuller picture of the process of publishing than she did pre-session. Madiam’s first concept map presented a loop, through which an editor, reviewer, and manuscript cycle. Madiam’s new concept map produced a linear, ascending structure of concepts and linked the concepts. She reproduced these concepts, rather than looping back to the previous concept. Madiam listed more than 10 ideas, which she linked with action links that explored the ideas of and relationships between author, editor, and reviewer. Nisaym, on the other hand, presented decision loops and spoke of a similar structure with multi-cross-links. Both Nisaym and Madiam exhibited an understanding of the general workflow with decision “ifs,” i.e., if the journal accepts or rejects, if the author responds or if revisions are then sent back to the editor. However, neither mentee explored the research methodology or even what a research paper constitutes. Generally, the use of the concept map was understood as functional flow diagram that demonstrated the meaningful relationships between the concepts and components of the publishing process.

STUDENTS’ RATING OF THE MENTORSHIP PROCESS

After the 10 sessions, the mentees evaluated the program’s mentoring through a questionnaire that addressed what the mentees perceived as the strengths and weaknesses of the process. The questions included on the evaluation are listed in Table 1. A mean score of the advantages and a mean score of

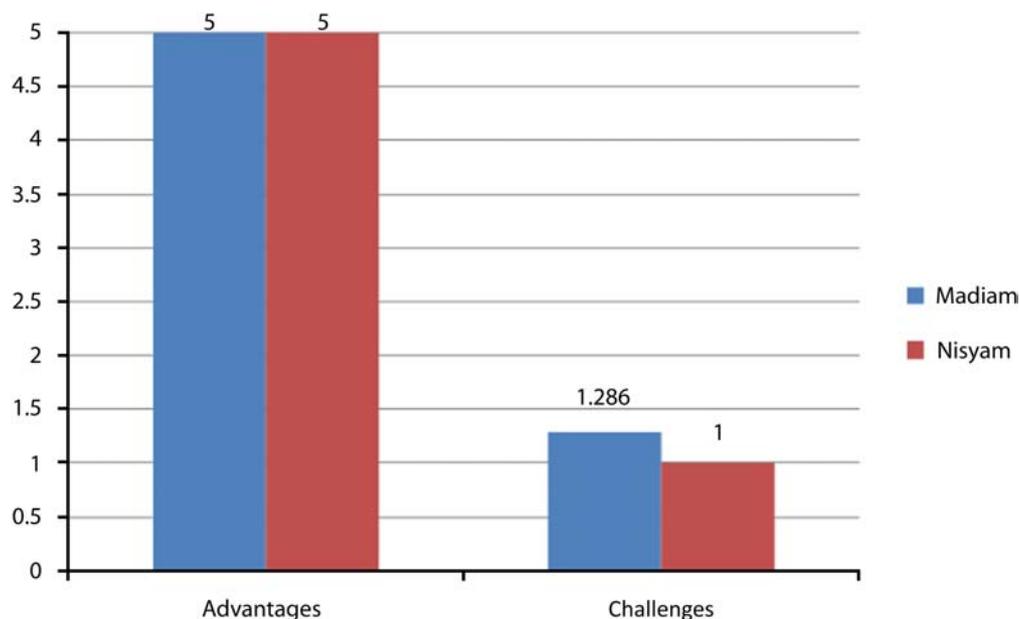


Figure 3. The mean rating on advantages and challenges faced by mentees.

other students.⁹³ They took part in the editorial review process by reviewing research manuscripts, understanding the process of peer review, editing, and simulating a review process. They were learning by doing, which is more likely to lead to a deeper approach to learning.⁹⁴ As the research strongly suggests, the mentees' engaged in learning about research within a mentoring process and through the publication of scholarly manuscripts in their disciplines. This helped them develop lifelong research skills and techniques.⁹⁵ More generally, the mentees who worked on this project learned many skills related to planning research methodologies and the evaluation of research. The mentees attended every meeting to discuss the processes of research, publishing, and publishing models. They were introduced to new skills and were able to develop an understanding of scholarly publishing through their firsthand experiences of the work performed by journal editors and publishers.

The findings suggest that the mentees greatly valued the opportunity to participate in this research project. Such findings are not unique in the mentoring literature.⁹⁶ The mentees rated the program's advantages highly; its disadvantages received low ratings (see Ehrich, et al.²⁹). These ratings gave the mentor a sense of satisfaction and accomplishment regarding the program. One of the two mentees mentioned that she thought more about the nature of research in scientific papers than she did in her research coursework at the university. Thus, the study of scientific research through publishing serves as a report of what the scientist does in the field. That particular mentee expressed amazement at the amount of work a researcher goes through to put a scholarly manuscript together, especially when one has already dedicated so much time to planning and fieldwork. She realized that scholarly outcomes are generally conceptual exercises undertaken to demonstrate one's research.

CAVEAT

The impetus for this project was the idea of an undergraduate research experience in which mentees learned about and experienced the world of publishing. The underlying etiology of this paper and the author's belief is that student participation in the process of mentoring is linked to a positive student understanding of the research and scientific processes.^{62,42,41} One objective of this study was to shed some light on the mentor component through student apprenticeships with an academic and editor-in-chief and to examine the benefits and challenges of the undergraduate research experience. From the author's standpoint, this mentoring approach was a success. In fact, at the end of the program, the students were seeking their mentor more than the mentor sought them. One of the mentees expressed that she had learned so much about research with less effort than she had put into her academic projects in her research methods course.

Given this positive sense of fulfillment, the author believed that a course on scholarly publishing could address the process of scholarly publishing as part of the scholarly experience. Such experiences writing and analyzing papers have been shown to be successful in other research¹² and are now encouraged at universities through integrating modules into the coursework toward the Bachelor's degree.⁸ Through the mentoring interviews and concept map development, the researchers developed a blueprint for a university honors course. The course is conceptualized as a full 3-credit-hour course for an honors program. Table 2 illustrates a weekly program of conceptualized course activities. This course blueprint will be proposed to the honors program committee at the national university in Qatar for further development.

Table 2. Course Syllabus.

Week	Activity
1	General introduction to the course: expectations, requirements, grading, etc. Discussion of reasons for publishing; types of scientific research manuscripts; scope of a journal
2	Overview of steps involved in publishing; selection of journal by an author; role of an editor; role of reviewer What constitutes a scientific scholarly paper, parts of a scholarly paper scholarly paper strength, research question, and research method?
3	What is publishing? What do scientific research papers report? Why do people publish? What are the ethics of publishing? Who are the academics in the world of publishing? What constitutes a journal? What is an editorial board? Does a journal have bylaws?
4	How do authors locate a publishing outlet? What is a scope of a journal? How does an author locate a journal?
5	How does an author(s) submit a manuscript? What is Manuscript Management System? What is the structure of the manuscript management system? How does an author use the manuscript management system? How does an editor, and reviewer use the manuscript management system?
6	What is the role of the editor-in-chief? Is the editor-in-chief a reviewer? How does an editor in chief review a manuscript? How does an editor in chief identify a reviewer?
7	What is the role of an editor? How does an editor review a manuscript? What are some criteria of evaluation? What are empirical papers? What is the most important part of the paper which a reviewer addresses?
8	How does a reviewer suggest the changes? What is the role of the editor in chief or editor once the reviews are at hand? What is the administrative component of the manuscript? Who takes the administrative part of the running the journal?
9	Stages of review. What is required of the author after review? What is a second review? Marking the manuscript, and re-review process.
10	Students take the role of review; Reviewing the manuscript. Actively taking the role of the editor and reviewer.
11	What is the relationship between publisher, and editor-in-chief? What is the relation between reviewers, and publishers? What is the role of the copyeditor? What is the relation between the copyeditor, and editor in chief? What is the relation between publishers and editor?
12	What is the production stage of publishing? What is cross referencing? Assigning a DOI number to a document. Indexing an article or the journal. How are keywords used, abstract, author affiliation
13	Copyrights agreements; who maintains ownership of ideas? Who owns the manuscript?
14	Review and assessment

An alternative consideration is to reinvent the concept of the course into modules that students could pick up throughout their educations. At each level, faculty could usher students to the next, resulting in a published manuscript by the final year of study. Such modules do exist and could be adapted to a predominantly higher education audience.⁸

LIMITATIONS

This mentoring research may provide wider student engagement in research in all areas of scholarship. One key lesson learned is that mentoring programs may provide ideal learning environments for students to internalize their research skills. The scale required by a program intending to reach all students in higher education would be unfeasible due to funding and the availability of specialized academic manpower to take the endeavor on in universities in the Middle East. This raises the question of how feasible such a program is in the Middle East, where the realist philosophy of "mass education" still persists in most areas of higher education. The author surveyed the missions of 20 Middle Eastern (with the exception of Israel) higher education institutions' web pages. In most Middle Eastern countries, education remains a teaching endeavor, where limited research programs are available for faculty, much less for students. Certainly, such a mentoring program would be critical to advancing a strong research culture in Qatar and elsewhere in the Middle East.

While little is known about the mentoring approach as a teaching method, professors provide skills and activities and encourage students through to graduation. This study is limited as it does not address the program's impact on student academic outcomes. In a recent study, Fehheimer, Webber and Kleiber¹⁰ suggested that the GPAs of students who have gone through a research-mentoring program increased significantly. Because this study explored the pedagogical aspect of such training, further quantitative approaches to addressing specific student outcomes will generally require a larger, representative sample of male and female students from Qatar's institutions of higher education.

CONCLUSION

In some cases, there are great divides between what academics and students do in higher education. University students are generally alienated from the work performed by faculty, especially in terms of research. It is widely believed that student engagement is vital to students' academic growth.⁹⁷ Students can gain personally from engagement, as they are able to actually make sense of their knowledge. Rather than feeling as though they can only learn from lectures, they learn to think independently and find new ways of learning in situations they would have never experienced at a university where teaching is traditionally lecture-oriented. Thus, the authors believe that when students take part in an effective and interesting undergraduate research experience, it can inspire them to become involved with academic research, academic work, and the world of academia.

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